Miami-Dade County Public Schools

Office of Academics and Transformation

K – 12 Comprehensive

Science Plan

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Chapter 1
The Vision and Mission of the Science Department

Vision

Our vision is to be at the forefront of STEM education creating a community of scientifically literate lifelong learners who are globally competitive.

We have a commitment to improve science teaching and learning for all.

Mission

Our mission is to ensure the highest level of science teaching and learning by empowering science teachers through professional development, support from highly qualified science specialists, and research-based resources that will provide all students with a high quality science education that will result in scientifically literate students achieving at globally competitive proficiency levels, who are college and/or career ready.

Goals

- Train teachers to deliver a high-quality science instruction aligned to the Florida Next Generation Sunshine State Standards with an emphasis on embedding the Common Core State Standards.
- Provide all our schools with a science curriculum that offers the latest research based instructional strategies.
- Encourage scientifically rich classroom environments.
- Promote the rigor, relevance, and integration of other disciplines in the science classrooms.
- Involve universities, informal science institutions, businesses, the community, and parents in supporting science competence throughout the District.

Underlying Principles

- We support instructional programs and teaching strategies that serve all students and accommodate diverse needs and learning styles to eliminate the achievement gap.
- Excellence in scientific teaching and learning grows from a commitment shared by administrators, teachers, students, parents, and the community at large.
- Learning is a lifelong process. Successful learners are lifelong learners.

Chapter 2
Overview of the K – 12 Comprehensive Science Plan

The initial blueprint for a comprehensive plan occurred in 1999 with a Board mandate to prepare students for the world via the Comprehensive Mathematics and Science Plan. The integration of several District-wide initiatives involving the Literacy Plan, Secondary School Reform, Enhanced Summer School, Inclusion of Students with Disabilities, Increased Parental Choice Options, and the Seamless PreK-12 instruction allowed this blueprint to be comprehensive in that it utilized common resources, systemic actions, and the synergy of various District Initiatives.

Miami-Dade County Public Schools (M-DCPS) faces daunting challenges involved in laying the blueprint to develop a knowledge base for science, technology, engineering, and mathematics (STEM) literacy for this community's diverse student population. STEM literacy plays a vital role not only in the local economy, but in our nation's standing in the global economy.

This nation's economic pre-eminence and competitive advantage in science, technology, engineering, and mathematics is quickly eroding. Many worldwide countries (India, China, Ireland, Finland.) currently have large populations with advanced knowledge, low-cost labor, modern communication, and other technological advances available to them, and they have become direct competitors to the American workforce. Based on a congressionally requested committee, the May 2005 report by the National Academies, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, four recommendations that would create high quality jobs and focus new science and technology efforts on meeting the nation's needs, especially in the area of clean, affordable energy were outlined:

1. "Increase America's talent pool by vastly improving K-12 mathematics and science education;
2. Sustain and strengthen the nation's commitment to long-term basic research;
3. Develop, recruit, and retain students, scientists, and engineers from both the U.S. and abroad; and
4. Ensure that the United States is the premier place in the world for innovation."

This national outcry for increased science, technology, engineering, and mathematics (STEM) education called for a revision in the way states and school districts envisioned science education. Although the State of Florida was one of the first states to create and implement a state-wide system of science standards (Sunshine State Standards, 1996), in May 2007 the Florida Department of Education (FLDOE) Office of Mathematics and Science convened a committee to revise the standards based on current research in science and science education. This effort culminated in 2008 with development of the Next Generation Sunshine State Standards (NGSSS, 2008).

Today, the K-12 Comprehensive Science Plan embodies the District's motto of "giving our students the world" and continues to embrace an interdisciplinary approach to teaching concepts and skills necessary to prepare our students to access a global workforce that is increasingly interconnected and multicultural. The plan is based on a District-wide curriculum that is framed from a standards-based instructional model that provides students with a deeper understanding of content rather than a broad base of knowledge. This approach focuses on the "less is more" concept (NSES, 1995). The M-DCPS district science curriculum is delineated in

the District Pacing Guides, which address grade level and course specific standards described in the FLDOE course descriptions.

In the K-12 Comprehensive Science Plan, teachers and administrators are provided professional development on the curriculum and the effective monitoring of student learning through data-driven instruction. The use of data and collaborative inquiry to review student work and student/teacher interaction is part of a continuous improvement process (Johnson, 2006). Assessment is also an essential part of classroom practices to improve student learning (Black & William, 1998).

Various documents based on the District Pacing Guides, such as the Essential Laboratory documents, provide additional educational support needed to enhance classroom instruction and addresses the evolving needs of the District's students.

The M-DCPS K-12 Comprehensive Science Plan has also incorporated the six core principles of the Secondary School Reform Framework and adapted it to meet the needs of preK-12 students: 1) Personalized learning environments are accomplished using differentiated instruction; 2) academic engagement of all students is incorporated through stimulating and rigorous, hands-on laboratory activities with real-world connections; 3) empowered educators are built through professional learning communities, extensive professional development, and the effective utilization of the Continuous Improvement Model (CIM); 4) accountable leaders are designated as department chairpersons, coaches, and elementary lead teachers who provide equitable and democratic classroom environments that reach all students, especially historically underrepresented groups (i.e., minorities, English Language Learners (ELL), and students with disabilities); 5) community and its youth are engaged through on-going curricular initiatives and summer outreach programs (e.g., SECME, and community/university partner programs); and 6) integrated system of high standards, curriculum, instruction, assessment, and support are found in the K-12 District Pacing Guides that establish clear, rigorous, and relevant standards that integrate cross-curricular practices and global principles.

Research and current education reform continue to be the backbone of the K-12 Comprehensive Science Plan. The United States' (U.S.) high quality of life and our nation's security are the inherited legacy and hope for the American children. Our nation's challenge is to continue producing an American workforce that is capable of scientific and technological innovations, that will lead to new discoveries and new technologies, and that will help improve our economy and maintain its global competitiveness. Therefore, a global education must allow students to view events from a variety of perspectives and utilize higher-order thinking skills to find solutions to global issues (Ramussen, 1998; *The American Forum for Global Education*, 2001; Uranek, 2002).

Chapter 3
The Science Curriculum

The Science Curriculum is described by the District Pacing Guides. They address the Bodies of Knowledge (BOK) in science: the Nature of Science, Earth and Space Science, Life Science, and Physical Science. Each BOK meets the specified annually assessed and content-sampled benchmarks found in the Florida Next Generation Sunshine State Standards. The benchmarks have been grouped in nine-week clusters ~~in order~~ so that teachers may plan science instruction that meets the standards. The Curriculum Pacing Guides have been designed to accommodate elementary grades (K-5) and middle school grades (6-8), which includes middle school science honors courses. Additionally, Curriculum Pacing Guides for Physical Science, Biology, Chemistry, and Physical Science have been completed for senior high school science courses. The pacing guides are available to teachers, school-site administrators, and regional center personnel at the Employee Portal portal in the Learning Village. In addition, the guides are located on the Office of Academics and Transformation Science website. The hard copies have not been included in this document due to their size. Therefore, a sample of each Curriculum Pacing Guides document (K-12) has been included for review.

INTRODUCTION TO DISTRICT PACING GUIDES

The Office of Academics and Transformation, is committed to improving academic standards and student performance throughout the District. Based on the varied levels of performance found in schools, it is evident that support can no longer be isolated to only the schools with the lowest performance. The key to increased student achievement in all schools lies with the District's ability to maximize all resources towards a common goal. With that in mind, realignment of resources and collaboration among District, Regional Centers, and Differentiated Accountability (DA) staff in analyzing data and creating common action plans is critical to achieve this goal.

To positively impact student achievement across all schools, the consistent implementation of the core curriculum within the context of the Florida Continuous Improvement Model (FCIM) is essential. To this end, District and Regional Center administrators collaborated on the development of the template for the Pacing Guides and Instructional Focus Calendars ensuring the implementation of these materials District-wide. All of these materials support the District-wide administration of the interim assessments and the Florida Comprehensive Assessment Test 2.0 (FCAT 2.0) and Biology EOC. The consistent implementation of the core curriculum will maximize the impact of professional development provided and support personnel to schools.

Development of District Pacing Guides

Staff, within the core content areas of Language Arts/Reading, Language Arts through ESOL, Mathematics, and Science, has aligned State Standards and essential curricular content to instructional materials and resources. Each discipline has developed content-specific pacing guides which set expectations for student performance at K-12 levels. The District Pacing Guides support the following goals:

- assist teachers with transition to new standards;
- address issues of pacing to ensure that all State Standards are being addressed and that curriculum, in full, is being covered;
- improve usage of curriculum programs with fidelity and improve quality and continuity of instruction;
- provide consistency and uniformity at both school-site level and District-wide for increased rigor and equity of instruction for all students;
- address issues which arise due to student mobility within the District;
- ensure that the necessary content included in the FCAT 2.0 and Biology End-of-Course assessment is addressed;
- allow teachers to be in close instructional proximity of one another through the orderly, systematic use of Pacing Guides by grade levels, though styles and use of materials may vary; and to
- foster and encourage collaborative planning and increased rigor of instruction leading to improved student achievement.

Language Arts/Reading, Language Arts Through ESOL, Mathematics, and Science used a common template to develop District Pacing Guides which are course specific by grade level. The guides can be accessed, downloaded, and printed through the Learning Village website: https://village.dadeschools.net/PageLib/default.aspx.

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District Pacing Guide

Grade Level *or* Course Title: (General Format for Language Arts/Reading, Language Arts Through ESOL, Mathematics, and Science)
Course Code:

BODY OF KNOWLEDGE: Specifies the Curriculum Content Area
TOPIC: Indicates specific content area to be addressed

Pacing		**Date**
Traditional	**# of**	**Date**
Block	**Days**	**Range**

Next Generation Sunshine State Standard(S)	**Essential Content**	**Objectives**	**Instructional Tools**
Lists current State Standards to be covered during the specific date range	Lists the instructional focus to be met through the objectives during the specific date range	Lists behavioral objectives for the specific date range which demonstrate level of mastery of the essential content and benchmarks	Lists a variety of resources and strategies that support and enhance effective instruction The tools are suggested resources and are not required.

Areas included in the guide are the appropriate pacing or time frame in which instruction is to occur, the Body of Knowledge covered, main topic or theme, the instructional focus, Next Generation Sunshine State Standards (NGSSS), Common Core State Standards (CCSS), Essential Content, Objectives, and Instructional Tools. Additional support for ELL and SPED students are also aligned to the guides. Some variation occurs based on curriculum content and timelines of the implementation of NGSSS.

These guides are developed and updated through a collaborative effort by teachers, department chair persons, District and Differentiated Accountability curriculum support specialists, District supervisors, and executive directors. Additionally, during the planning phase, the required elements and format of the District Pacing Guides were discussed at length with Regional Center Administrative Directors to ensure that school needs would be met through this document and that all parties involved would be in agreement as to the function and use of the District Pacing Guide.

Research Supporting the Usage of the Pacing Guides

In pacing the year's curriculum, teachers have little control over the many variables that affect teaching and learning; however, they do have control over how they allocate time to teach the standards and grade-level objectives that every student must master. Instructional pacing is directly linked to time allocation and must begin the first day of the new school year (McLeod, Fisher, Hoover, 2003).

In a joint project between San Diego State University and the San Diego Unified School District, researchers from Stanford University worked with teachers in creating a four-step process for creating a school-wide environment that fosters the *precision* needed in teaching and learning in order to move all students along a continuum of learning experiences that allows them to achieve grade-level standards. Essential to this school-wide process is the development and use of common pacing guides. "Pacing guides generally identify when the teacher will teach specific content standards, which instructional materials are appropriate, and what types of instructional strategies teachers can deploy" (Fisher, Grant, Frey, Johnson, 2008, p. 64.)

The use of common pacing guides not only provides teachers with these and other components but they also foster collaborative planning and promote instructional conversations. "Talking with colleagues that teach the same content and see the same data results is foundational to instituting improvements and helps teachers determine which instructional strategies are working, which materials are effective, and which students still need help to master the standards" (Fisher, et. al. 2008.)

In a study conducted in an urban elementary school where 100% of students qualify for free lunch, a task force made up of researchers, teachers, parents, and administrators, agreed on the following: learning is social and conversations are critical for learning. "Learning takes place when humans interact with one another: kids with kids, kids with teachers, teachers with teachers-everything related to learning is social" (Fisher & Frey 2007.) One of the core beliefs of this study is that, "it's not just talk about anything, its talk that is focused and based on an agreed upon purpose." Fisher & Frey (2007) stated that "we are flush with information about teaching students to read and write well. The challenge, it seems, is putting all of this information into practice at the whole-school level" (Fisher & Frey 2007.) Additionally, guiding teachers' instructional decisions was an essential component for achieving success. By

creating a framework for pacing instruction, expectations were changed and established. The task force had essentially decided that every student should, and could, meet grade-level expectations. "If every teacher at a specific grade level were focused on specific content standards, then students could be assessed and interventions could be developed" (Fisher & Frey 2007.)

District-wide pacing guides provide targeted action plans for teachers when planning lessons. Research on new teachers points to the need for curricular guidance. Kauffman, Johnson, Kardos, Liu, & Peske (2002) found that new teachers can benefit from resources such as pacing guides designed to help them determine what to teach and how to teach it. In Districts where teacher and student mobility is high, the use of pacing guides steer and point all teachers, novice and veteran, to where they need to be at any stage in the academic year.

In Science, Pacing Guides are available for grades K-5, Grades 6-8, Earth/Space, Biology, Chemistry, Physical Science, and Physics. Pacing Guides are also available for the middle school advanced courses and the high school honors courses.

All grade levels of the Science Pacing guides have fully transitioned to the Next Generation Sunshine State Standards (NGSSS) and have fully implemented the Common Core State Standards (CCSS).

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District Pacing Guide

GRADE 1 — Course Code: 5020000C1

BIG IDEA 14: **Organization and Development of Living Organisms**

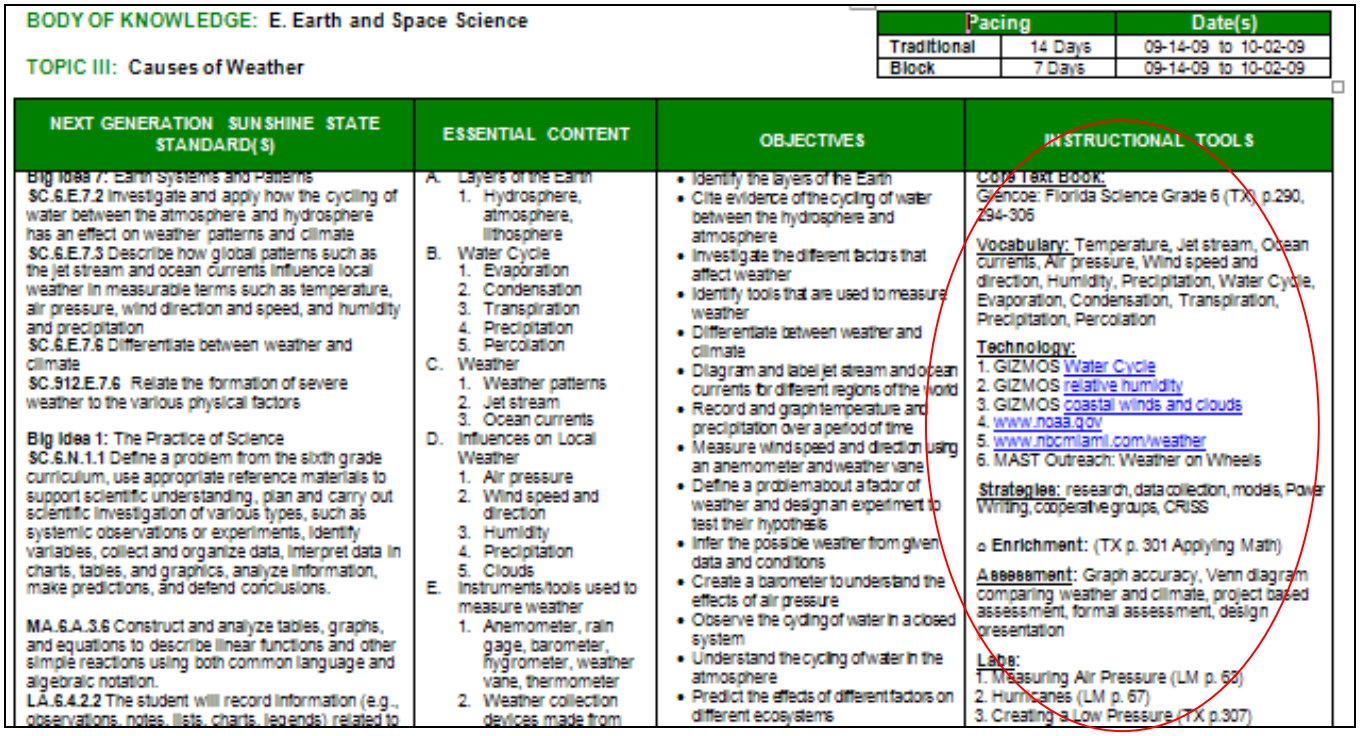
A. All plants and animals, including humans, are alike in some ways and different in others.
B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow.
C. Humans can better understand the natural world through careful observation.

Pacing	Date(s)
17 Days	08-24-09 to 09-16-09

TOPIC 1: **Living and Nonliving Things**

NEXT GENERATION SUNSHINE STATE STANDARD(S)	ESSENTIAL CONTENT	OBJECTIVES	INSTRUCTIONAL TOOLS
SC.1.L.14.3 Differentiate between living and nonliving things SC.1.N.1.4 Ask "how do you know?" in appropriate situations.	A. Living Things 1. Grow and Change 2. Plants/Animals 3. Basic Needs Food Water Space Shelter 4. Can Reproduce B. Nonliving Things 1. Do not grow and change 2. Do not move or respond on their own 3. Do not need food or water	• Apply knowledge about life processes to distinguish between living and nonliving things in the environment • Identify the basic needs of all living things • Infer that if living things do not receive water, food, shelter and space, they will die • Create a concept web to organize ideas about living and nonliving things	Core Text Book: SF p. 1-23 Quick Study: p. 2,3,8,9 Workbook: p.4-7 Vocabulary: living, nonliving, shelter Technology: River Deep Brain Pop www.sfsuccessnet.com Strategies: See pg. 2 • ELL: Every Student Learns, pages 2 and 5

The Instructional Tools column contains suggested materials, strategies, web sites, and technology. Using resources from the instructional tools column is at the teacher's discretion.



BODY OF KNOWLEDGE: E. Earth and Space Science

TOPIC III: Causes of Weather

Pacing		Date(s)
Traditional	14 Days	09-14-09 to 10-02-09
Block	7 Days	09-14-09 to 10-02-09

NEXT GENERATION SUNSHINE STATE STANDARD(S)	ESSENTIAL CONTENT	OBJECTIVES	INSTRUCTIONAL TOOLS
Big Idea 7: Earth Systems and Patterns **SC.6.E.7.2** Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate **SC.6.E.7.3** Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation **SC.6.E.7.6** Differentiate between weather and climate **SC.912.E.7.6** Relate the formation of severe weather to the various physical factors **Big Idea 1:** The Practice of Science **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systemic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. **MA.6.A.3.6** Construct and analyze tables, graphs, and equations to describe linear functions and other simple reactions using both common language and algebraic notation. **LA.6.4.2.2** The student will record information (e.g., observations, notes, lists, charts, legends) related to	A. Layers of the Earth 1. Hydrosphere, atmosphere, lithosphere B. Water Cycle 1. Evaporation 2. Condensation 3. Transpiration 4. Precipitation 5. Percolation C. Weather 1. Weather patterns 2. Jet stream 3. Ocean currents D. Influences on Local Weather 1. Air pressure 2. Wind speed and direction 3. Humidity 4. Precipitation 5. Clouds E. Instruments/tools used to measure weather 1. Anemometer, rain gage, barometer, hygrometer, weather vane, thermometer 2. Weather collection devices made from	• Identify the layers of the Earth • Cite evidence of the cycling of water between the hydrosphere and atmosphere • Investigate the different factors that affect weather • Identify tools that are used to measure weather • Differentiate between weather and climate • Diagram and label jet stream and ocean currents for different regions of the world • Record and graph temperature and precipitation over a period of time • Measure wind speed and direction using an anemometer and weather vane • Define a problem about a factor of weather and design an experiment to test their hypothesis • Infer the possible weather from given data and conditions • Create a barometer to understand the effects of air pressure • Observe the cycling of water in a closed system • Understand the cycling of water in the atmosphere • Predict the effects of different factors on different ecosystems	Core Text Book: Glencoe: Florida Science Grade 6 (TX) p.290, 294-306 Vocabulary: Temperature, Jet stream, Ocean currents, Air pressure, Wind speed and direction, Humidity, Precipitation, Water Cycle, Evaporation, Condensation, Transpiration, Precipitation, Percolation Technology: 1. GIZMOS Water Cycle 2. GIZMOS relative humidity 3. GIZMOS coastal winds and clouds 4. www.noaa.gov 5. www.nbcmiami.com/weather 6. MAST Outreach: Weather on Wheels Strategies: research, data collection, models, Power Writing, cooperative groups, CRISS o Enrichment: (TX p. 301 Applying Math) Assessment: Graph accuracy, Venn diagram comparing weather and climate, project based assessment, formal assessment, design presentation Labs: 1. Measuring Air Pressure (LM p. 62) 2. Hurricanes (LM p. 67) 3. Creating a Low Pressure (TX p.307)

As a result of the "Fair Game" policy, in which benchmarks from Graded 3 and 4 will be tested in the Grade 5 FCAT 2.0, the Grade 5 Pacing Guides includes a column with the Prior Grade Level Benchmarks Assessed on FCAT 2.0.

Next Generation Sunshine State Standard(s)	**ESSENTIAL CONTENT**	**OBJECTIVES**	**INSTRUCTIONAL TOOLS**	**Prior Grade level Benchmarks assessed on fcat 2.0**
SC.5.N.1.1 Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types. AA	A. Science Process Skills 1. Observe 2. Predict 3. Measure 4. Classify 5. Infer 6. Predict 7. Make and use models 8. Make operational definitions 9. Communicate	• Use science process skills. • Identify examples of or distinguish among observations, predictions, and/or inferences in science.	**Core Text Book:** TE pp. xxii-xxxii **Vocabulary:** , **Technology:** (see p. 2) **Strategies:** (see p. 2) Use the Five E's, Inquiry, Think/Pair/Share, Centers/Stations, Cooperative Learning Groups, o **ELL:** o **Enrichment:** o **SPED:**	**SC.3.N.1.1** Raise questions about the natural world, investigate them individually and in teams. **SC.4.N.1.1**

The Science Pacing Guides promote the use of inquiry-based activities, cooperative learning, differentiated instruction, and integration of skills such as the use of graphic organizers. They include a Year-at-a-Glance document for preparation and effective instructional strategies for concept development and pedagogical understanding. These documents list a variety of instructional tools such as the alignment with the adopted textbook, the Essential Labs, investigations, explorations, and hands-on activities from various sources. There is a technology section which lists technology correlations such as Discovery Education, *ExploreLearning Gizmo*, PBS Learning Media, NBC Learn, the use of hand-held technology such as Pasco, Texas Instruments, Vernier, and other technology are included. For senior high school, there is a more detail table which lists additional instructional tools.

TOPIC XXIV	INSTRUCTIONAL TOOLS
	Vocabulary: Acid, Base, Amino acid, Carbohydrate, Lipid, Nucleic Acid, Chemical reaction, Reactant, Product **Technology:** 4. Data Analysis: Acid Rain 5. Art in Motion: A Salt Solution 6. Bozeman Podcast: Enzymes 7. HippoCampus Biology: Enzymes and Metabolism: Overview 8. HippoCampus Biology: Enzymes as Catalysts 9. HippoCampus Biology: Enzymes and Metabolism: Overview **Strategies:** • CRISS - Incorporate strategies which are most appropriate for your students and learning environment, such as: Concept Mapping, Venn Diagrams, KWL, Think Pair Share, Jigsawing, Word Walls, Two-column Notes, Sticky Notes, Think-Tac-Toe, Cooperative Learning, and Exit Cards. • Differentiated Instruction - Implement strategies which are most appropriate for your students and learning environment, such as: Inquiry Based Learning, Performance Based Assessments, Foldable Booklets, Student Portfolios, Concept Bingo • Lab Strategies - Use the scientific method to analyze the variables in labs and report results in a proper lab write-up format. Assign lab roles to student; Project Director, Materials Manager, Technical Manager, Safety Director. Follow the district's guideline for Power Writing in Science. **Assessment:** 3. Cornell Style Notes (AVID) 4. Class participation **Labs:** 5. Quick Lab: Model an Ionic Compound (LM) p.291 6. Additional Labs: #2 Enzymes in Detergent (LM) p. 219 **CPALMS:** Enzyme Reactions (SC.912.L.18.11)

TOPIC XXIV	GIZMO CORRELATION
BENCHMARK	**GIZMO TITLE**
SC.912.P.8.6	Covalent Bonds
SC.912.L.18.2	Dehydration Synthesis

Instructional Focus Calendar

The Instructional Focus Calendar (IFC) is a document which is found at the end of every *District Pacing Guide* and provides schools the opportunity to personalize instruction based on school needs. This document includes the date-range, benchmarks, activities, assessment(s), and strategies, and is aligned to the Florida Continuous Improvement Model (FCIM). Regional Center staff, in collaboration with the Office of Academics and Transformation designed the calendar template, and intended it to be used by school-site leadership teams to customize data-driven instruction.

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Instructional Focus Calendar

Date	Pacing Guide Benchmark(s)	Data Driven Benchmark(s)	Activities	Assessment(s)	Strategies
Coincides with the date –range found on the upper-right hand corner of the Pacing Guide	Lists all the benchmarks found on the Pacing Guide. The expectation is that these will be the main focus of instruction	Lists benchmarks from the previous column that require additional or more targeted instruction based on available data (see assessment column)	Lists instructional activities which best serve to address the benchmarks	Includes assessments which yield information regarding students' achievement levels, strengths, and/or weaknesses. These may include SAT-10, FCAT, FAIR, On-Going Progress Monitoring, Interims, and in-program assessments.	Lists strategies to be used during this period of time in order to ensure that all benchmarks listed are addressed with rigor.

For example, communities of instructional practice, such as Elementary Grade Level teams or Secondary Course-alike teams (Algebra I, Geometry, Comprehensive Science, Physical Science, Biology, etc.), use this calendar to collectively plan and customize learning to meet the needs of their particular students.

The course-alike/grade level communities of instructional practice meet regularly to develop the instructional focus calendar, design lessons that focus on five (5) key elements of instructions: preparation, meaning, content, practice, and performance. Additionally these teams analyze student data and work product so as to research, discuss, design, and implement instructional strategies to improve student achievement.

In preparing the IFC, course-alike/grade level communities of instructional practice teams come together to begin the work of planning their focus for the content to be studied. Teachers must keep in mind that the IFC is a calendar designed to target benchmarks in need of maintenance, enrichment, or remediation. Teachers utilize current FCAT data to include baseline assessments, interim assessments, and teacher-designed assessments in order to focus on selected benchmarks.

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Instructional Focus Calendar

Date(s)	Pacing Guide Benchmark(s)	Data Driven Benchmark(s)	Activities	Assessment(s)	Strategies
08-20-13 to 08-24-13	**SC.5.N.1.1** Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. AA **SC.5.N.1.2** Explain the difference between an experiment and other types of scientific investigation. (Assessed as SC.N.1.1) **SC.5.N.1.4** Identify a control group and explain its importance in an experiment. (Assessed as SC.N.1.1)				

The hard copies of the District Pacing Guides have not been included in this document due to their size and online interactive nature. Therefore, a sample of each Curriculum Pacing Guide Year-at-a-Glance for the assessed grade levels (grades 5, 8 and Biology) has been included for review. A complete list of year at a glances are included in the appendix at the end of this document.

The District Pacing Guides for all grade levels can be accessed, downloaded, and printed through the portal at Learning Village at https://village.dadeschools.net/PageLib/default.aspx

Sample Year-at-a-Glance: Elementary – Grade 5

Grade 5	**COURSE CODE: 5020060**
Big Idea 1: The Practice of Science A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.	Big Idea 2: The Characteristics of Scientific Knowledge A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion. B: Scientific knowledge is durable and robust, but open to change. C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery. The science skills taught in Big Ideas 1 and 2 will help prepare students in developing their science fair projects for the District Elementary Science Fair held in January. It is suggested that schools conduct their Science Fair during the first week of December.

Big Ideas 1 and 2 should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.5.N.1.1 Define a Problem, Do Research, Investigate, Defend Conclusions
- SC.5.N.1.2 Compare use of Experiments and other Types of Investigations
- SC.5.N.1.3 Recognize and Explain the Need for Repeated Experimental Trials
- SC.5.N.1.4 Identify a Control Group and Explain its Importance
- SC.5.N.1.5 Recognize that Steps of the Scientific Method can Vary
- SC.5.N.1.6 Understand the difference between personal interpretation and verified observations
- SC.5.N.2.1 Empirical Observations and Linked to Evidence
- SC.5.N.2.2 Recognize that Evidence Produced should be Replicated

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
Big Idea 1: The Practice of Science **Big Idea 2: The Characteristics of Scientific Knowledge** I. Practicing Science **AA** (08/19-08/23) II. Thinking Like a Scientist **AA**(08/26-8/30) **Big Idea 8: Properties of Matter** III. SC.5.P.8.1 - Properties of Solids, Liquids and Gases. AA (09/03-09/06) IV. SC.5.P.8.3 Mixtures of Solids can be Separated. **AA** SC.5.P.8.2 - Materials that Dissolve in Water. AA SC.5.P.8.4 – Atoms (09/09-09/20) V. **Science Fair Project Introduction** Suggested Timeline begins 09/23 with projects due 11/25 for Dec. school site fair. **Big Idea 9: Changes in Matter** VI. SC.5.P.9.1 - Physical and Chemical Changes. AA (09/30-10/11) **Big Idea 13: Forces and Changes in Motion** VII. SC.5.P.13.1- Forces **AA** SC.5.P.13.2- Changes in Motion **AA** SC.5.P.13.3- Forces that Move objects AA SC.5.P.13.4- Balanced and Unbalanced Forces AA (10/14-10/24)	**Big Idea 10: Forms of Energy** VIII. SC.5.P.10.1 - Forms of Energy **AA** SC.5.P.10.2 - Energy can cause motion or create change. **AA** (10/28-11/07) **Big Idea 11: Energy Transfer** IX. SC.5.P.10.4- Electrical energy can be transformed. **AA** SC.5.P.8.4- Protons, Neutrons, Electrons SC.5.P.10.3 – Electrically charged objects AA SC.5.P.11.1 – Flow of Electricity AA SC.5.P.11.2 – Conductors and Insulators AA (11/12-11/27) **Big Idea 5: Earth in Space and Time** X. SC.5.E.5.1- Our Galaxy **AA** SC.5.E.5.3- Solar system **AA** SC.5.E.5.2- Planet Characteristics AA SC.4.E.5.4- Movement in Space (Also assesses SC.4.E.5.1; SC.4.E.5.2) **AA** (12/02-12/20**)** **Big Idea 6: Earth Structures** XI. SC.4.E.6.2-Minerals and Rocks (Also assesses SC.4.E.6.1) **AA** SC.4.E.6.3- Earth's Resources (Also assesses SC.4.E.6.6) **AA** SC.4.E.6.4- Weathering/Erosion **AA**(01/06-01/16)	**Big Idea 7: Earth Systems and Patterns** XII. SC.5.E.7.1 - Water Cycle **AA** (01/21-01/31) SC.5.E.7.2 - Water Cycle Processes AA XIII. SC.5.E.7.3 - Weather **AA** SC.5.E.7.4 - Forms of Precipitation AA SC.5.E.7.5 - Weather Conditions AA SC.5.E.7.6 - Climate Zones AA (02/3-02/14) **Big Idea 14: Organization & Dev. of Living Organisms** **Big Idea 16: Heredity and Reproduction** XIV. SC.3.L.14.1- Plant Structures and Functions (Also assesses SC.3.L.14.2; SC.4.L.16.1) **AA** SC.5.L.14.2- Comparing Plant and Animal Organ functions (Also assesses SC.3.L.15.1; SC.3.L.15.2 **AA** SC.4.L.16.4- Life Cycles **AA** (02/18-02/28) **Big Idea 17: Interdependence** XV. SC.5.L.17.1-Animal Adaptations **AA** SC.5.L.15.1- Environmental Changes AA (03/03-03/14) XVI. SC.4.L.17.3 Food Chain **AA** (Also assesses SC.4.L.17.2, SC.3.L.17.2) (03/17-03/20)	**Big Idea 14: Organization & Dev. of Living Organisms** XVII. SC.5.L.14.1- Human Body Organs **AA** (03/31-04/04) XVIII. FCAT Crunch Time Review (04/07-4/21) XIX. Health Literacy: Concept Human Growth and Development HE.5.C.1.6 Explain how human body parts and organs work together in healthy body systems, including the endocrine and reproductive systems. HE.5.C.1.1; HE.5.C.1.2 HE.5.C.1.5; HE.5.C.2.4 (04/28-05/16) XX. SC.5.E.7.7- Natural Disaster Plans (05/19-06/05)

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Sample Year-at-a-Glance: Middle School – Grade 8

M/J COMPREHENSIVE SCIENCE 3			COURSE CODE: 200210001
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Matter (SC.8.P.8.2, SC.8.P.8.3, SC.8.N.1.1; SC.8.N.1.2: SC.8.N.1.4, SC.8.N.1.5, SC.8.N.1.6) A. What is Matter? B. Review Forces C. Weight vs. Mass D. Density E. Scientific Measurement F. Designing an Experiment G. Baseline Testing II. Physical Properties of Matter (SC.8.P.8.4; SC.8.P.9.2; SC.8.P.9.3, SC.8.N.1.1; SC.8.N.1.2, SC.8.N.1.6) A. Physical Properties B. Chemical Properties C. Physical and Chemical Changes III. Matter – Phase Change (SC.8.P.8.4; SC.8.P.8.1; SC.8.N.1.1; SC.8.N.1.2) A. States of Matter B. Changes of State C. Law of Conservation of Mass D. How Scientists Work IV. Atoms (SC.8.P.8.7; SC.8.P.8.1; SC.8.N.1.4; ;SC.8.N.3.2; LACC.68.WHST.1.2; LACC.68.WHST.3.9) A. Scientific Models and Systems B. Scientific Theories C. Describing Matter D. Atoms V. Atoms and the Periodic Table (SC.8.P.8.6 SC.8.P.8.7; SC.8.N.1.1; SC.8.N.1.4; SC.8.N.1.6; SC.8.N.3.2) 1. Periodic Table 2. Atomic Models 3. Interim Assessment	VI. Chemical Properties and Changes of Matter (SC.8.P.8.5; SC.8.P.8.6; SC.8.P.8.8; SC.8.P.9.1; SC.8.P9.2; SC.8.P.9.3; SC.8.N.2.2; LACC.68.RST.1.3) A. Compounds B. Chemical Changes VII. Mixtures and Solutions (SC.8.P.8.4; SC.8.P.8.9; SC.8.N.1.1; SC.8.N.1.6; LACC.68.RST.4.10; LACC.68.WHST.1.2) A. Pure Substances and Mixtures B. Solutions C. What Factors Affect Solubility? VIII. Photosynthesis and Cellular Respiration (SC.8.L.18.1; SC.L.18.2; SC.L.18.4; SC.8.N.1.1; SC.8. P.8.5) A. Cell Structure Overview B. Photosynthesis (reactants) C. Photosynthesis (products) D. Law of Conservation of Mass and Energy E. Review Electromagnetic Spectrum F. Cell Respiration G. Process and Pathways IX. Cycles of Matter (SC.8.L.18.3; SC.8.L.18.4; SC.8.N.1.1; SC.8.P.8.5; LACC.68.RST.3.7) A. Cycles in Nature B. Recycling Carbon, Oxygen and Nitrogen C. Conservation of Matter and Energy X. Stars and Galaxies (SC.8.E.5.2; SC.8.E.5.1; SC.8.E.5.5; SC.8.E.5.3; SC.8.E.5.4; SC.8.E.5.11; SC.8.E.5.10; LACC.68.RST.2.4) A. Objects in Space B. Distances in Space C. Properties of Stars D. Astronomical Bodies E. Law of Universal Gravitation and the Formation of Stars F. Interim Test	XI. The Sun (SC.8.E.5.4; SC.8.E.5.5; SC.8.E.5.6; LACC.68.RST.3.7; MACC.8.F.2.5) A. Scientific Knowledge B. The Sun's Characteristics C. Energy from the Sun XII. Solar System (SC.8.E.5.8; SC.8.E.5.7; SC.8.E.5.3; SC.8.N.1.3; SC.8.N.3.2) A. Introduction to the Solar System B. Earth's Moon C. Planets D. Other Objects (Asteroids, Comets, Meteor, Meteorite) E. Models of the Solar System XIII. Sun, Earth, and Moon (SC.8.E.5.9; SC.8.E.5.10; SC.8.E.5.11; SC.8.N.1.6); LACC.68.RST.3.7; LACC.68.RST.4.10 A. The Impact of Gravity on Earth B. Earth in Space C. Seasons D. Phases and Eclipses E. Tides F. Benchmark Assessment	XIV. Review Annually Assessed Benchmarks (Fair Game SC.7.E.6.2 ; SC.6.E.6.1; SC.6.E.6.2; SC.7.E.6.6; SC.7.E.6.4; SC.7.E.6.3; SC.7.E.6.5; SC.7.E.6.1; SC.7.E.6.7; SC.6.E.7.4; SC.6.E.7.2; SC.6.E.7.3; SC.6.E.7.6; SC.6.E.7.9; SC.6.E.7.5; SC.6.E.7.1; SC.7.P.10.3; SC.7.P.10.2; SC.7.P.11.2; SC.6.P.11.1 SC.7.P.11.3; SC.7.P.11.4; SC.7.P.11.1; SC.6.P.13.1; SC.6.P.13.2; SC.8.P.8.2; SC.6.L.14.1; SC.6.L.14.2; SC.6.L.14.3; SC.6.L.14.4; SC.6.L.14.5; SC.6.L.14.6; SC.6.L.15.1; SC.7.L.15.2; SC.7.L.15.1; SC.7.L.15.3; SC.7.L.16.1; SC.7.L.16.2; SC.7.L.16.3, SC.7.L.17.2) XV. Human Regulation and Reproduction (HE.8.C.1.7; HE.8.C.1.8; HE.8.C.2.7; HE.8.C.2.8; HE.8.C.2.9; HE.B.3.1; HE.B.3.6; HE.B.3.7; HE.8.B.4.1; HE.8.P.1.1; HE.8.P.1.2; HE.8P.1.3) A. Endocrine System B. Reproductive System C. Human Life Stages D. Planning for Marriage and Parenthood E. Abstinence F. Sexually Transmitted Disease G. HIV/AIDS XVI. Substance Abuse - Personal Health Relationships (HE.8.P.1.1; HE.8.B.3.4; HE.8.B.3.7; HE.8.B.2.1; HE.8.C.2.2; HE.8.C.2.7; HE.8.C.1.1; HE.8.C.1.5) A. Family and Peers B. Substance Abuse Prevention C. Peer Pressure D. Communication E. Personal Health

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Sample Year-at-a-Glance: Senior High – Biology

BIOLOGY I — **COURSE CODE: 200031001**

1st Nine Weeks

I. Introduction to Biology/Nature of Life**
- A. What is Biology
- B. Science in the real world

ECOLOGY (How do interactions among organisms impact the changing environment?)

II. Ecosystems (17.5)
- A. Review of community Interactions**
- B. Distribution of life in aquatic systems (17.2)
- C. Succession and changes (17.4)
- D. Predict impact from catastrophic events: Climate change, Human activity, Invasive species (17.8)

III. Populations in an ecosystem (17.5)
- A. Population dynamics and graphs
- B. Carrying capacity
- C. Limiting Factors

IV. Energy Flow (17.9)
- A. Food Chains and Food Webs
- B. Trophic levels and energy reduction
- C. Biogeochemical Cycles: water and carbon (E.7.1, 18.12)

V. Human Impact on Environment (17.20)
- A. Costs and benefits of renewable and non-renewable resources (17.11)
- B. Sustainability and environmental policy (17.11)

EVOLUTION (How do scientists think life began and continues to change on Earth?)

VI. Origins of Life (15.8)
- A. Law vs. theories in science
- B. Contribution of scientists (Pasteur, Oparin, Miller and Urey, Margulis, Fox)
- C. Endosymbiotic theory (conceptual)
- D. Role of amino acids and proteins (18.1)

VII. Theory of Evolution (15.1)
- A. Evidence for the theory of evolution
- B. Trends in human evolution: brain size, jaws, tools (15.10, 14.26)
- C. Brain structures (14.26)

VIII. Mechanisms of Evolution (15.13)
- A. Darwin's Natural Selection
- B. Introduction to other Mechanisms (15.14, 15.15)

2nd Nine Weeks

CLASSIFICATION (Why do scientists classify living things the way they do?)

IX. Taxonomy (15.6)
- A. Hierarchical classification based on evolutionary relationships (15.4)
- B. Domains and Kingdoms (15.6)
- C. Reasons for changes in how organisms are classified. (15.5)

X. What defines a plant (14.7)
- A. Overview of Plants: Organs, tissues, evolution (14.7)
- B. Physiological Processes of Plants (Growth, Reproduction, Transpiration, Photosynthesis, Cellular respiration) (14.7)
- C. Properties of Water (18.12)

XI. Cell energy: Photosynthesis (18.9)
- A. General equation of Photosynthesis (18.7)
- B. Where it occurs(14.7)
- C. Non plant examples of photosynthetic organisms (15.6)
- D. Role of carbohydrates as a source of energy (18.1)

XII. Cell energy: Cellular Respiration (18.9)
- A. General Equation for Cellular Respiration(18.8, 18.9)
- B. ADP/ATP cycle(18.10)
- C. Aerobic vs. Anaerobic respiration (18.8)
- D. Krebs cycle and Electron Transport Chain (Aerobic Respiration)**

HUMAN BODY (How are human body systems different?)

XIII. Circulatory System (14.36)
- A. Factors affecting blood pressure, blood volume, blood flow and viscosity

XIV. Immune System (14.52)
- A. Specific and non-specific responses
- B. Significance of factors: genetic, environmental, and pathogenic
- C. Use of antibiotics and vaccines
- D. Antibiotic resistance

REPRODUCTION (How do organisms grow and reproduce?)

XV. Human Reproductive system (16.13)
- A. Basic Anatomy and Physiology: male and female
- B. Human Development – Fertilization to Birth (all stages)
- C. External Membranes

3rd Nine Weeks

XVI. Review of Cells (14.1, 14.3)
- A. Cell theory and discovery (14.1)
- B. Compare/contrast cell types(14.3)(prokaryote, eukaryotic, plant, animal)
- C. Organelles and membrane: roles and functions
- D. Role of lipids in cell membrane (18.1)
- E. Role of membrane: Highly selective barrier (14.2)

XVII. Comparing Cell Processes: Mitosis (16.17)
- A. Cell Cycle (16.14)
- B. Process of Mitosis (16.14)
- C. Mistakes in Mitosis (16.8)
- D. Asexual vs. sexual effect on genetic variation

XVIII. Comparing Cell Processes: Meiosis (16.17)
- A. Process: creating gametes and independent assortment (16.16)
- B. Crossing over and non-disjunction(16.16)
- C. Genetic variation resulting from meiosis (16.15)
- D. Comparison of Mitosis and Meiosis (16.17)

GENETICS (How do inherited traits lead to variations?)

XIX. Review Heredity - Mendelian (16.1)
- A. Law of segregation and independent assortment (16.1)
- B. Other patterns of inheritance: co-dominance, incomplete dominance, polygenic, sex-linked, multiple alleles (16.2)
- C. Punnett Squares: Mono-,Dihybrid (16.1)
- D. Predict and analyze pedigrees
- E. Genetic Drift/Gene flow (15.14)

XX. Biotechnology (16.10)
- A. Predicting impact on society, individual, and environment (16.10)
- B. Medical and ethical issues (16.10)

MOLECULAR GENETICS (How does your genetic code determine an organism's physical appearance?)

XXI. DNA and Replication (16.3)
- A. Experiments and History**
- B. Universal code for all organisms (16.9)
- C. Review of structure of DNA and chromosomes and location in cell**
- D. Role of Nucleic acids (18.1)
- E. DNA Replication in prophase (16.3, 16.17)
- F. Types of mutations and effects (16.4)

XXII. RNA and Protein Synthesis (16.3)
- A. RNA synthesis: Transcription (16.5)
- B. Protein synthesis: Translation (16.5)
- C. Types of mutations: harmful, beneficial, variation, neutral (16.4)

4th Nine Weeks

BIOCHEMISTRY (What are the basic building blocks)

XXIII. Review of macromolecules (18.1)
- A. Types (carbohydrates, proteins, lipids, and nucleic acids)
- B. Structure and function

XXIV. Role of Proteins in the Body: Enzymes (18.11)
- A. As a catalyst to reduce activation energy
- B. Factors affecting enzyme function: pH temperature, concentration

XXV. *BIOLOGY EOC AA BENCHMARKS CRUNCH TIME (3 weeks)*

FACTORS THAT AFFECT HUMAN HEALTH

XXVI. Pathogens: Prokaryotes, Viruses, Protists, and Fungi**

XXVII. Review of Animal Kingdom

XXVIII. Genetic Diseases and Human Genetics**

****Denotes content necessary for in depth understanding of the content matter but will not be assessed on the EOC exam.**

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Chapter 4
Instruction

Lesson Design

Differentiated Instruction in the Science Classroom

Miami-Dade County Public School (MDCPS) teachers will be able to enhance the District's science curriculum by providing students with differentiated instruction opportunities in the science classroom. Students will be able to enhance their conceptual understanding of the Next Generation Sunshine State Standards via varying entry points of instruction, learning tasks, and outcomes that are tailored to the individual needs of students (Hall, Strangman, & Meyer, 2003) throughout the District.

In addition, the teachers will also be able to differentiate science content and pedagogical instruction and product (Tomlinson, 1999) in order to meet the needs of students. This type of instruction will allow students to explore the elementary science benchmarks through inquiry-based explorations, expanded research skills, and scientific reflection.

Five E Instructional Model

The science curriculum will be taught utilizing the 5E instructional model of learning cycle (Trowbridge, Bybee, & Powell, 2000), which is a constructivist model that has five essential phases of instruction:

1. Engagement
2. Exploration
3. Explanation (& Elaborate)
4. Evaluate
5. Extend

This approach takes students through the learning cycle by tapping into prior knowledge and experiences, new explorations and investigations.

Engage

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

Explore

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

Explain
Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

Elaborate/Extend
Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts

5E Instructional Model

5 E's Instructional Model*

<table>
<tr><td>Engage</td><td colspan="3">Teacher Guided <u>E</u>ngagement</td></tr>
<tr><td></td><td colspan="3">• Engage students with scientific questions and/or defining problems about an event or phenomenon.
• Encourage students to make connections with what they already know.
• Set the ground work for the day's activities.</td></tr>
<tr><td rowspan="2">Explore and Explain</td><td colspan="3">Type of Inquiry</td></tr>
<tr><td>Directed Inquiry
A Directed Inquiry activity.
• Teacher guides students to <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems.
• Teacher guides students to analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained.</td><td>Guided Inquiry
A Guided Inquiry activity.
• Students <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems in cooperative group(s).
• Students analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained in cooperative group(s).</td><td>Full Inquiry
Experiments and Science Fair Projects at the end of each unit provide opportunities for Full Inquiry.
• Students <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems independently.
• Students analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained independently.</td></tr>
<tr><td>Evaluate</td><td colspan="3"><u>E</u>valuate (should be ongoing throughout the 5 E's cycle)</td></tr>
<tr><td></td><td colspan="3">Whole Group Instruction
• Students answer questions, pose questions, and evaluate his/her own understanding of the concepts explored.
• The teacher will assess student learning through one or more of the following methods: Observations, whole group open forums, Science Journaling, Research, Inquiry-based lab report and written assessment.</td></tr>
<tr><td>Extend and Elaborate</td><td colspan="3"><u>E</u>xtend and Elaborate</td></tr>
<tr><td></td><td colspan="3">Structured Independent Extension
• Students <u>e</u>xtend their new conceptual understanding and apply concepts and skills to new situations.-</td></tr>
</table>

***Mandatory Elementary Science Instructional Time Schedule**

Weekly schedule:
Grades: K-1: 60 minutes (A minimum of 20 minutes blocks are recommended for science instruction)
Grades: 2-5: 150 minutes (A minimum of 1 sixty minute block per week for laboratory activities is recommended)

Instructional Block with Essential Features of Classroom Inquiry and Their Variation

5E Model	Student Role	Inquiry Variations			
		More ←-Amount of Learner Self Direction -→ Less			
		Less ←-Amount of Direction from Teacher or Material -→More			
Engagement	Learner engages in scientifically oriented *questions*	Learner poses a question	Learner selects among questions, poses new questions	Learner sharpens or clarifies questions provided by teacher, materials, or other source	Learner engages in question provided by teacher, materials, or other source
Exploration	Learner gives priority to *evidence* in responding to questions	Learner determines what constitutes evidence and collects it	Learner directed to collect certain data	Learner given data and asked to analyze	Learner given data and told how to analyze
Explanation	Learner formulates *explanations* from evidence	Learner formulates explanation after summarizing evidence	Learner guided in process of formulating explanations from evidence	Learner given possible ways to use evidence to formulate explanations	Learner provided with evidence
Extension/Expansion/ Elaboration	Learner *connects* explanations to scientific knowledge	Learner independently examines other resources and forms the links to explanations	Learner directed toward areas and sources of scientific knowledge	Learner given possible connections	
	Learner *communicates* and justifies explanations	Learner forms reasonable and logical arguments to communicate explanations	Learner coached in development of communications	Learner provided broad guidelines to sharpen communication	Learner givens steps and procedures for communications
Evaluation	Appropriate formal and informal evaluations are identified throughout lesson.				

**Adapted from National Academy of Science (2000). *Inquiry and the National Science Education Standards,* Washington. D.C. National Academy Press.

* Bybee, R.W. 1997. *Achieving Scientific Literacy*. Portsmouth, N.H.: Heinemann

5E Lesson Plan Templates

Science 5E Lesson Plan Template (1)

Teacher:	Grade Level:	Dates:
Benchmark(s) from the SSS for this lesson	Copied and pasted from learning schedule; benchmark numbers and letters from learning schedule but can put text in student-friendly language. Remember to include Nature of Science benchmarks.	
Essential Question	Taken from learning schedule for this lesson	
Objective for Students	States what students should know or be able to do at end of each day's part of the lesson. This may be included under each E below as appropriate.	
NOTE	ALL 5 E's WILL NOT BE DONE IN ONE DAY.	
Engage Date:	What will you have students do so they become interested in the lesson? AND What wonderings and questions do students have about the essential question? Assess: How will you check students' background knowledge and misconceptions for the unit of study?	
Explore Date:	What hands-on investigation will students do to explore the concept(s)? AND What will they record in their science notebooks? What data will they collect? AND How will you monitor their work during the investigation? Assess: How will you determine who demonstrates the skills needed during the investigation? How will you know who is beginning to understand the concept(s)?	
Explain Date:	How will you help students ▪ infer based on their observations? ▪ develop conclusions to answer the testable question? ▪ connect the data to the concept(s) they are learning? How will you introduce and use vocabulary in the context of the benchmarks? AND How will you address students' misconceptions identified in Engage and Explore? AND What will students be reading and writing to deepen their understanding? What reading strategy will they use? What else will students do to master the benchmark(s)? Assess: How will you determine who understood the concept(s) and who did not? This is necessary to determine who receives enrichment or remediation during the Extend.	
Extend Date:	How will you differentiate instruction based on previous informal assessments of the Explore and Explain: ▪ For enrichment allow students to work on Performance Task or activities that extend the concepts. ▪ For remediation design a new way to teach the benchmark that addresses student misunderstandings and misconceptions identified through the informal assessment in the Explain Assess: How will students demonstrate that they have now met the benchmark? How will students demonstrate that they have a deeper understanding of the concepts and skills?	
Evaluate	The summative evaluation determines how well each student has understood the concepts taught in the lesson. It might be a short quiz based on the lesson or a writing response to the essential question or another appropriate prompt. This is where a performance task may be used.	
Supplies and Technology Needed	List science supplies, technology equipment, etc.	
Vocabulary	Copy and paste from learning schedule as appropriate for this lesson. Identify the vocabulary strategy to be used. Define content vocabulary after the Explore using appropriate strategies; remember "ABC – CBV" (Activity Before Concept – Concept Before Vocabulary).	
Homework:	Should be embedded appropriately throughout the 5 E's lesson	
Resources	List the resources that need to be available. (A/V, websites, books, etc.)	
Special Instructions	Cite safety issues and/or lab materials management tips.	
Additional Differentiated Instruction	ESOL: Include appropriate strategies Inclusion: Include appropriate strategies	
Higher Order Questions	In each E above, what higher order questions will be asked to challenge thinking and deepen understanding?	
Reflections on this lesson	What do I need to clarify with my students during the next class session? How will I modify this lesson the next time I teach it?	

Science 5E Lesson Plan Template (2)

Curriculum Resources: _____
State Standards (all standards that apply including science, literacy and mathematics)
_____
Learning Goals (to be written on board or overhead and in student note books) _____
_____
Key Vocabulary: _____
Preparation_____
Safety Considerations _____
What to Do: (see explanation on page 2)

Lesson Phase	Notes and Discussion (Details of what the teacher and students will do.)	Materials Needed	Essential Questions (Probes/Questions to ask students at every phase in the lesson)	Evaluate (Student outcomes to "Look For", products, or performances at every phase of the lesson)
Engage mentally engage students with an event or question.				
Explore hands-on experiences to explore the concept further.				
Explain provide the scientific explanation and terms for what they are studying…via lecture, demonstration, reading, or multimedia (video, computer-based).				
Elaborate/Extend opportunity to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. ..discussing their ideas with others, students can construct a deeper understanding of the concepts.				

Science 5E Lesson Plan Template (3)

5E Lesson Plan Model			
Description	Title / Type Unit / Pacing		
Standards and Practices			
Science and Engineering	NGSSS		
	Science and Engineering		
Literacy in H/SS, S, & TS	Reading		
	Writing		
Mathematics (Practices)			
Learning Goals – "KUD" Model			
Students will	**Know…**		
	Understand…		
	Do…		

Sequence		Tier 2 / 3 / ELL
Engage		
Explore		
Explain		
Elaborate		
Evaluate		

Best Practices in an **Effective Science Classrooms**

An effective science program must provide appropriate instruction, high expectations, and the same standards for all students. The content must be challenging and stimulating for everyone and based on the assumption that all students can achieve these standards if given adequate opportunities to learn. The science program must be responsive to the demands of a technological society and the needs of an increasingly diverse population. Innovative, active learning experiences for the students are desired over the more traditional, passive learning. The program should foster conceptual convergence of the sciences, mathematics, engineering, and technology with other disciplines. Current research delineates specific instructional strategies that should be present for exemplary science programs.

Essential Science Components Appropriate for All Grade Levels

Preparing Students for Learning and Prior-Knowledge Assessment

Teachers should inquire about students' understandings of concepts before sharing their own understanding about the topic. The technique of "frontloading" to elicit prior knowledge related to real-life experiences and applications can create a direct connection to the content for students.
Strategies: Using graphic organizer, e.g., Concept Mapping, KWL, showing a video clip, conducting a demonstration, using literature.

Developing Active Learners

Students can become active learners by providing opportunities for them to construct their own understanding. These situations should require students to organize, classify, interpret, and draw conclusions about real-life mathematical and scientific problems. Students must communicate their ability to problem-solve through oral, written, and physical demonstrations.
Strategies: Posing open-ended questions, real-life scenarios to solve, or situations requiring higher order thinking skills.

Teaching to Diversity

Teachers, as the facilitators of the learning should provide a variety of activities that address learning, language, and cultural differences. Activities within the classroom should reflect a variety of cultures, learning styles, interest based projects, and multiple intelligences. This will help students become aware that there are different ways of learning.
Strategies: Using graphic organizers such as concept mapping or KWL; incorporating verbal/linguistic, logical/mathematical, body/kinesthetic, visual/spatial, and musical/rhythmic activities; providing opportunities to work individually as well as in small and large groups.

Orchestrating Collaborative Discourse

There should be encouragement of student discourse within the classroom through students engaging in dialogue, both with the teacher and especially with one another. Teachers should encourage and accept student autonomy and initiative by allowing student responses to drive lessons, shift instructional strategies, and alter the lesson plans. The manner in which students apply process skills to support their ideas is central to their understanding of science.
Strategies: Posing questions and tasks that elicit, engage, and challenge thinking; asking students to clarify and justify issues; encouraging elaboration during discussions.

Vary the Instructional Format
A variety of instructional formats should be used in classrooms to make sense of the content and to construct meanings from new situations. Science classrooms should provide the opportunity for inquiry-based instruction. Instead of traditional lecture-type instruction, opportunities should be provided for small-group work, individual exploration, peer instruction, and whole class discussion.
Strategies: Using scientific laboratory equipment, hands-on activities, and technology-based activities.

Use of the Learning Cycle Instructional Model
Teachers need to develop techniques that move their students from concrete to abstract concepts through frequent use of the learning-cycle model. First, the teacher provides an opportunity for students to generate questions and hypotheses through an open-ended discovery activity. This is followed by the concept- introduction lesson(s) provided by the teacher. Finally, students must be provided with opportunities to demonstrate their understanding of the learned concept by transferring it successfully to other situations through solving a scenario, or by doing a demonstration or project.
Strategies: Posing scenarios to be solved.

Integrated Teaching
Multi- and interdisciplinary activities should be included within the classroom that provides connections for students. Students must recognize the various roles that science plays in real life. The connection and application of science will motivate, give meaning to, and reinforce student learning. These activities should involve students in critical thinking, process skills, and product development.
Strategies: Posing authentic problems to solve; bridging.

Critical Thinking and Higher-Order Questioning
Use effective, open-ended questioning techniques that encourage student inquiry. Encourage students to pose their own questions, evaluate the information presented, and make informed decisions about the information. Examples would include, “How would you solve a similar situation?” or “What criteria would you use to . . . ?”
Strategies: Elaborating, analyzing, hypothesizing, and evaluating.

Continuous Assessment of the Learning
Assessment should reflect how and what is being taught. It should be embedded at various points in the lesson to guide the instructional planning and pacing. There is a clear alignment between curriculum, instruction, and how students are assessed.
Strategies: Using performance tasks, essays, portfolios, video presentations, and demonstrations.

Promotion of Collegiality
Teacher collaboration is essential for effective teaching practices. Teachers should collaborate to establish long-range plans, prioritize curriculum, share best practices, mentor, and model lessons for each other.
Strategies: Participating in team, departmental and grade-level planning; study groups; peer coaching; and mentoring.

Teacher Role in Inquiry

Plan an Inquiry-Based Science Program for Students

- Inquiry into authentic questions generated from student experiences is the central strategy for teaching science.
- Teachers focus inquiry on real phenomena, in classrooms, outdoors, or in laboratory settings, where students are given investigations or guided toward investigations that are demanding but within their capabilities.
- Activities provide a basis for observations, data collection, reflection, and analysis of events and phenomena and encourage the critical analysis of secondary sources, including media, books, and journals.

Guide and Facilitate Learning

- Teachers guide, challenge, and encourage student learning and inquiry.
- Successful teachers are skilled observers of students, as well as knowledgeable about science and how it is learned.
- Teachers continually create opportunities that challenge students and promote inquiry by asking questions.
- Although open exploration is useful for students when they encounter new materials and phenomena, teachers need to intervene to focus and challenge the students, or the exploration might not lead to understanding.
- A teacher who engages in inquiry with students models the skills needed.
- An important stage of student science learning is the oral and written discourse that focuses the attention of students on how their knowledge connects to larger ideas and the world beyond the classroom.
- Teachers promote many different forms of communication (e.g., spoken, written, pictorial, graphic, mathematical, and electronic).
- Teachers give students opportunities to make presentations of their work and to engage with their classmates in explaining, clarifying, and justifying what they have learned.

Engage in Ongoing Assessment of own Teaching and Student Learning

- Teachers observe and listen to students as they work individually and in groups
- They examine portfolios of student work, performance tasks, as well as more traditional paper-and-pencil tests.

BEST PRACTICES FOR TEACHING SCIENCE WORKSHEET

School: **Teacher/Class:**
Date: **Per.:**

FOR REFLECTION PURPOSES ONLY

❑ Capturing and maintaining student's attention ❑ Instilling motivation and purpose in students ❑ Using cooperative learning strategies ❑ Using the scientific method of problem solving (Inquiry Approach)-(Constructivist Approach) ❑ Students identifying problem to be solved Students hypothesizing or predicting solution and results ❑ Students experimenting and testing trial solutions ❑ Students organizing data ❑ Students analyzing and interpreting information ❑ Students discussing results ❑ Students writing and communicating conclusions ❑ Students maintaining a daily journal ❑ Using manipulatives and hands-on investigations ❑ Communicating with and involving parents ❑ Providing for real-life applications ❑ Problem Experimental Design by students	**Comments:**

❑ High teacher expectations ❑ Delivering standards-based curriculum using appropriate pedagogy/instructional materials. ❑ The teacher shows a constructivist instructional approach to inquiry methods the students use. ❑ The students test solutions to problems with each group member highly involved. ❑ During the investigative activities, the teacher constantly moves around the room guiding the cooperative learning groups in formulating their solutions and in the appropriate use of manipulatives and technology that she has provided thereby keeping everyone engaged in productive work. ❑ Helps all students explore career opportunities that use the science that they are learning. ❑ Uses assessments that focus on problem solving and understanding rather than on memory. ❑ Communicates with other teachers to improve themselves and make connections between disciplines.	

Green Initiatives

Earth Day Packets
The science department develops annually elementary, middle and senior high school packets that contain science lessons and activities to use with your students during the weeks of April preceding the state-wide assessments.

A list of links, that provides additional resources are provided as extension activities for home-school connection, and can be found in the Appendix section of each packet. Miami-Dade County Public Schools wants to ensure that students, parents, and staff remember to appreciate nature and learn ways to help keep the planet clean and protect the environment. The packets may be accessed and downloaded from the District Science website: http://science.dadeschools.net/default.html under seasonal packets.

Collaborative Nutrition Initiative (CNI)
The Collaborative Nutrition Initiative (CNI) is an interdisciplinary STEM-based, standard-based program. CNI fosters rigor, relevance, life-long academic growth and physical fitness through the use of school gardening, cooking and other hands-on activities. It teaches life, physical, and earth science, in a seed-to-garden-to-table-to-compost-to-soil repetitive cycle. The thematic approach provides rigor, creating the interest and motivation needed to master more difficult content and skills. It also provides relevance, uniting science with all the other school disciplines in purposeful, meaningful activity. CNI is a partnership between M-DCPS and The Education Fund. Financial support is provided by a grant funded by the Health Foundation of South Florida.

In 2007-2008, five elementary schools with diverse student populations were chosen participate in the project. By 2012-2013, CNI expanded to 38 schools. Each school has a CNI team which consists of two second grade teachers and an administrator (either AP or principal). Each team spearheads a science/nutrition initiative using an interdisciplinary curriculum and vegetable and herb gardens. Each school team focuses and evaluates their efforts through the implementation of Action Research study. Teams collaborate on research and best practices in monthly weekend CNI training sessions. Parents are included in the program through participation in the garden and numerous events and workshops. Schools also engage other community members (i.e., guest chefs, nutritionists, master gardeners, farmers, health professionals) to help with the program at their schools. CNI partnerships include active participation by universities, businesses, public service organizations, entrepreneurs, farms and more. Additional partnerships are being negotiated; a medical school has recently been recruited. Additional emphasis will be placed on spreading CNI best practices to additional grades and schools.

Dream in Green
The Dream in Green^{sm} Foundation is a non-profit organization whose mission is to develop and implement projects that promote energy conservation and efficiency, environmental sustainability, and the use of renewable energy. Dream in Green earned the approval of the Miami-Dade County Public School Board in 2006 to implement the Green Schools Challenge for the 2006-2007 school year. Two M-DCPS high schools, MAST Academy and Palmetto Senior

High, participated in the Green Schools Challenge's pilot year. During its first year, the program focused primarily on promoting no or low cost steps for reducing energy consumption. The participating students designed and implemented various energy conservation strategies to reduce their respective school's overall carbon footprint. Costs were calculated and infrastructure improvements were designed to further accelerate the energy reduction effort. By the end of 2006-07 school year, 123 students had conducted carbon footprint audits at their schools and/or homes and over 1300 students implemented energy efficient behaviors, recycling plans, and tree planting programs. These student-led programs generated a cognizable change in energy consumption behaviors and a measurable reduction in carbon emissions at each school.

In 2008, Dream in Green expanded Green Schools Challenge to include fifteen (15) additional schools (K-12) throughout Miami-Dade County. Through this expansion, Dream in Green will reach out to over 20,000 students and 2100 school staff members. Dream in Green is currently collaborating with the Alliance to Save Energy to develop an integrated environmental curriculum that will be provided to participating schools with future plans to launch a statewide program. As an added benefit, Dream in Green, in cooperation with the South Florida Water Management District, is expanding the focus of the project to include water conservation.

Fairchild Challenge

The science department has encouraged all schools to participate in the Fairchild Challenge annual environmental outreach program and competition since its inception. Partnership with the garden to provide green opportunities to our students on a regular basis has been instrumental in bringing environmental awareness to our communities and schools while at the same time providing opportunities for enrichment in science in all grade levels (K-12). The Fairchild Challenge has been an important part of the science curriculum for years because of its multidisciplinary competitions and activities aligned with the Next Generation Sunshine State Standards. The program was designed by the garden to serve students of diverse interests, abilities, talents and backgrounds.

In 2013, the *Fairchild Challenge Citizen Challenge* was added to further strengthen collaborative efforts to support the nature of science and the potential for project submission into the South Florida Regional Science and Engineering Fair. As described by their website, the Fairchild Challenge "allows students to research and critically evaluate environmental topics, become more actively engaged citizens, and come to appreciate the beauty and value of nature." This is done by the blending of content areas to create activities, projects, and 'authentic experiences' that use the environment as an integrating context for learning. (Fairchild Challenge website, 2013, http://www.fairchildgarden.org/education/fairchildchallenge/overview/)

Environmental Educator Providers

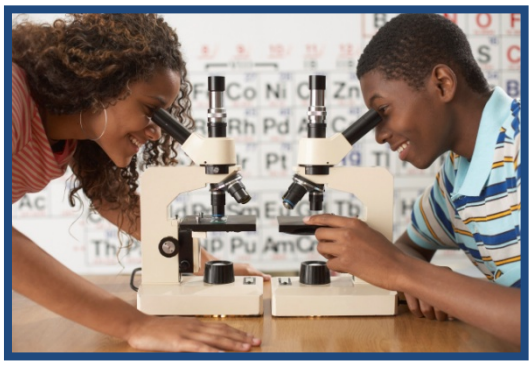
The Environmental Educators Providers (EEP) is an organization of environmental partners working together for the "greening" of the Earth. These partners include: Audubon, Museum of Science, South Florida Water Management, DERM, Fairchild, and Parrot Jungle, Miami-Dade College Green Buildings (School of Engineering and Architecture). Science staff currently receive regular updates from the EEP.

Chapter 5
Scientific Literacy and Numeracy

The United States (US) possesses the most innovative, technologically capable economy in the world, and yet its science, as well as other disciplines, is failing to ensure that all American students receive the skills and knowledge required for success in the 21st century work force. It is imperative that M-DCPS provide students with the scientific literacy and numeracy skills required to produce creative and critical thinkers with the problem-solving skills needed to lead productive lives. Through the adoption of the Common Core State Standards (CCSS), M-DCPS has integrated the Mathematics Standards and English Language Arts Standards throughout the science curriculum to ensure that literacy and numeracy skills are developed for all students at all grade levels.

Scientific literacy exemplifies a body of knowledge and the active participation of its stakeholders based on the respective disciplines of science and mathematics in a digital age. Scientifically literate citizens participate in public policy shaped by issues related to advances in technology. Twenty-first century skills enable everyday citizens to grasp big ideas related to scientific concepts and processes in a real world context. These skills allow for the understanding of the natural and designed world; it provides alternative explanations of events by independent and critical thinkers, and recognizes and deals with problems that involve evidence, numbers, patterns, logical arguments, and uncertainties (American Association for the Advancement of Science, 1989 & 2003).

"Numeracy is the ability of a person to make effective use of appropriate mathematical competencies for successful participation in everyday life, including personal life, at school, at work and in the wider community. It involves understanding real-life contexts, applying appropriate mathematical competencies, communicating the results of these to others, and critically evaluating mathematically based statements and results." (W. Alex Neill, Senior Research Officer for the New Zealand Council for Educational Research, in a paper prepared for New Zealand Association of Researchers in 2001)



Reading and Writing in Science

The Success Using Science Literature Connections in the Classroom list was developed in response to the expressed need of teachers for literature that will enhance the teaching of the Florida Next Generation Sunshine State Standards and Common Core state Standards. This ongoing list includes science-theme based literature and informational science text that are relevant to grade level science topics for reading and comprehension. These two modes of reading meet the Common Core State Standards in English Language Arts and are part of the state reading assessment. The Literature List is designed for all grade levels and was compiled over time by curriculum support, teachers, and science supervisors.. Each book on the list has been given the following designations: **Primary (P), Elementary – Intermediate (E), Middle (M) and Senior(S)**. The Literature List of science-related readings can be found in Appendix C.

Additionally, students need to write in a technical manner when reporting their data, lab results and conclusions. The Science Department has developed four technical writing processes that enable students to write a scientifically accurate response. **Claim, Evidence and Reasoning** writing is based upon the Common Core Writing Standards where students will be able to develop and support claims based upon evidence that demonstrate an understanding of discipline-specific content. **Power Writing in Science** leads students through a series of questions to develop their ideas for investigation and provide supporting evidence to reach a conclusion and application for their investigative results. **Comprehension Instructional Sequence (CIS)** writing provides students with multiple reading and learning opportunities within the content that encourage the development of critical and higher-order thinking skills. **Science journaling** provides students with opportunities to enhance their written communication skills through the combination of vocabulary development and recording investigation results and conclusions into a composition notebook. Vocabulary words specific to Science and Power Writing Strategies are included in the Science FCAT 2.0 Glossary by Grade Level and Biology EOC vocabulary from the item specifications.

Writing Templates

CER (Claim, Evidence, and Reasoning)

According to the Common Core Writing Standards for literacy in science for grades 6-12, students will be able to develop and support claims with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the discipline-specific content. Students should support their own written claims with appropriate justification. Science education should help prepare students for this complex inquiry practice where students seek and provide evidence and reasons for ideas or claims (Driver, Newton and Osborne, 2000). Engaging students in explanation and argumentation can result in numerous benefits for students. Research shows that when students develop and provide support for their claims they develop a better and stronger understanding of the content knowledge (Zohar and Nemet, 2002).

When students construct explanations, they actively use the scientific principles to explain different phenomena, developing a deeper understanding of the content. Constructing explanations may also help change students' view of science (Bell and Linn, 2000). Often students view science as a static set of facts that they need to memorize. They do not understand that scientists socially construct scientific ideas and that this science knowledge can change over time. By engaging in this inquiry practice, students can also improve their ability to justify their own written claims (McNeill et al., 2006).

Remember, when providing evidence to support a claim, the evidence must always be:

- Appropriate
- Accurate
- Sufficient

Claim: A conclusion that answers the original question

Evidence: Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.

Reasoning: A justification that links the claim and evidence. It shows why the data count as evidence by using appropriate and sufficient scientific principles.

CER Example:

Claim – *There is an uncertain probability that my offspring will look like me, depending on the dominant alleles that I possess.*

Evidence - *In the Human Variation Essential lab, only the parent's traits that were dominant were expressed in the offspring. The recessive trait was only expressed when both parents gave those alleles to their offspring. When Punnett Squares were generated, a 75% chance was calculated for each trait being the same as the parent when both parents were heterozygous for the trait.*

Reasoning - *My offspring will inherit 50 percent of my genes, as a result of sexual reproduction. There are dominant alleles and recessive alleles that determine the traits of an offspring. However, there is an uncertain probability that he/she will look like me because all the traits that are in my genotype are unknown. Although I am able to observe the phenotype, which is those traits that are visible, there are recessive traits that may be hidden by the dominant traits that are expressed. But, I still hope my baby looks like me with my husband's eyelashes*

Power Writing

POWER WRITING AND THE ART OF SCIENTIFIC CONCLUSIONS

With the onset of the Florida Comprehensive Assessment Test (FCAT 2.0) and End of the Course (EOCs) Exam in science, mathematics, reading, and writing it is imperative that schools take steps to prepare students for this battery of tests that will extend from grade three to grade twelve.

It is logical and inevitable that preparation for this testing will involve the entire instructional staff of schools in every subject area to insure maximum levels of student achievement at each grade level. Interconnections among instructional strategies in individual subject areas with respect to performance tasks and problem solving can serve to strengthen student performance on the FCAT 2.0. The students will receive more preparation for this testing if it is reinforced, in every class they take through activities that familiarize them with the style of questioning they are likely to see on the tests. The effect is potentially synergistic.

Writing scientific conclusions for laboratory investigations has always been one of the more challenging tasks for science students to do and for science teachers to grade. The Power Writing Model used in language arts instruction contains many similarities to good scientific conclusion writing. The Power Writing Model is intended to strengthen student performance on the writing portion of the FCAT 2.0 as well as in science. Although the conclusions will still answer the seven basic questions that all scientific conclusions must address, they will also serve as a model for students to perform with a score of 4 or better on the writing test. Practicing with this model should improve student's ability to raise their achievement level.

Teachers are highly encouraged to have their students conduct a complete scientific investigation and write a conclusion for that investigation using the Scientific Conclusion Power Writing Model to answer the seven essential questions that must be addressed in a well-written conclusion.

Power Writing Vocabulary as correlated to a Scientific Conclusion

Introduction: What you will prove and how you will prove it. A problem statement combined with a working hypothesis/trial solution.

Thesis statement: The single point of the entire essay (Problem to be solved).

Topic Sentence: The single point of a paragraph (In science the topic sentence varies with respect to the introductory, middle, and concluding paragraphs).

General Statement: One way to prove the topic sentence is true (supported or not supported). This is a general statement that is supported or not supported by the data collected and that will answer one of the seven questions that must be addressed when writing scientific conclusions.

Evidence: Portion of investigation that addressed each question to be answered in a conclusion. It will be in the form of data collected which has been analyzed and interpreted to determine the findings which will or will not support the hypothesis that has been tested.

Commentary: Opinion (inference or inferences made based on the data collected).

Concluding Sentence: One statement that is true (supported or not supported) for all the proof in the paragraph. Opinion (inference).

Concluding Paragraph: Statements that are true (supported or not supported) for all the proof in the entire essay. Opinion (inference).

Organization: All essays and all paragraphs have a beginning, a middle, and an end. All scientific conclusions answer the seven basic questions that must be addressed when conducting complete scientific investigations.

Power Writing in Science Model

Introductory Paragraph:

State what you will prove. In science conclusions you would write the problem statement in the form of a question. You would then write your hypothesis which is the trial solution you have selected (this takes care of **Question 1** in writing scientific conclusions which is "What was investigated?"). You are stating the ways you have proved your trial solution to be either supported or not supported by answering **Question 2** in science conclusions which is "Was the hypothesis supported or not supported by the data?" This is how the rest of the sentences in the introductory paragraph are linked. They will describe the data that was collected and the major findings of the investigation **Question 3** that supported or did not support the hypothesis as the solution to the restated problem.

Body Paragraphs:
The body of the paragraph supports the introductory paragraph by elaborating on the different pieces of information that were collected as data that either supported or did not support the original hypothesis. Using terms such as "as a matter of fact" or "for example" and "not only but also" for successive sentences is useful. Each finding needs its own sentence and relates back to supporting or not supporting the hypothesis. The body paragraphs may include **Question 4,** which describes how the findings compared with other researchers or groups investigating the same problem. The number of body paragraphs you have will depend on how many different types of data were collected. They will always refer back to the findings in the first paragraph. The concluding sentence can begin with a term such as "clearly" which would be followed by the statement that is true (support or non support) for the entire paragraph as it relates to the hypothesis. The commentary can include some inferences (opinions) although the major inferences should be reserved for the concluding paragraph.

Concluding Paragraph:
The concluding paragraph contains the major commentary about the problem statement and the hypothesis in the first paragraph of the conclusion. This is where **Question 5**, what possible explanations can you offer for your findings can be answered. The paragraph should also include answers to **Questions 6 and 7** that include what recommendations do you have for further study and for improving the experiment and some possible applications of the experiment? At the end of the paragraph the problem statement and hypothesis (introduction and thesis) is restated more specifically with an abbreviated version of the explanation of the findings to summarize the conclusion.

Writing Conclusions

Questions	Examples
1. What was investigated? (Describe the problem statement)	The relationship between the age of compost used in soil and the growth, health, and quality of the leaves of tomato plants were investigated.
2. Was the hypothesis supported by the data?	The data appears to support the hypothesis that the growth, health, and leaf quality of tomato plants would improve with increases in the age of compost mixed with soil.
3. What were the major findings?	As the age of the compost increased the health, quality of the leaves, and the mean height of the tomato plants increased. The mean height of plants grown in soil with compost aged for six months was greater than the control group, with plants exhibiting similar health. More plants grown in soil with six month old compost exhibited poor leaf quality than in the control.
4. How did your findings compare with other researchers?	No similar studies were found relating the age of compost to the growth of tomato plants.
5. What possible explanations can you offer for your findings?	As the compost decomposes, nutrients needed by the plant may be released thereby improving the growth of the plant.
6. What recommendations do you have for further study and for improving the experiment?	This experiment could be replaced with an increased number of different ages of compost. Measurements of soil temperature may help to understand what is happening to the compost.
7. What are some possible applications of the experiment?	The use of compost aged for longer than six months will improve the growth of tomato plants.

Assigning Student Inquiry-based Laboratory Investigations Correlated to the Next Generation Sunshine State Standards

Title

FSSS (Strands, Standards, Benchmarks): _____

_____

Science Concept (s): (Background information) _____

_____

_____

_____

Problem Statement: (Can be written as a question) _____

_____

_____

Hypothesis (es): (explanation to the Problem statement – should be written as an IF – THEN – BECAUSE statement) _____

_____

_____

Procedures: (as many as needed)

1. _____
2. _____
3. _____
4. _____
5. _____

Variables: _____

_____

Independent (Manipulated) Variable: (if not comparative or observational investigation)
_____

_____

Dependent (Responding) Variable: _____

Variables Held Constant: _____

Number of Trials: _____

Control Test: _____

Data: (Tables, Charts, etc.) _____

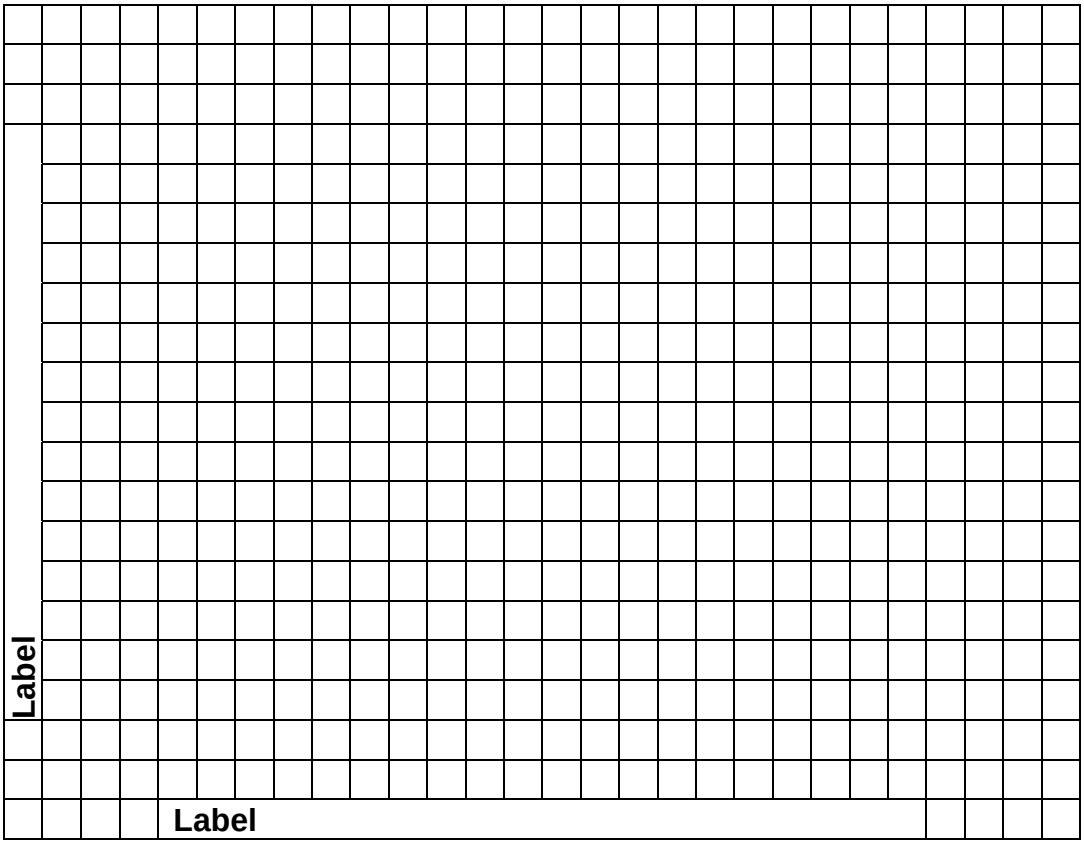
_____

_____

_____

Data Analysis and Interpretation of data: (Graph and/or written description of results)

Title



_____

_____

_____

_____

Conclusions: (Use Seven Question Conclusion Form)

References: (Bibliography, Interviews, etc.)

Use additional pages if necessary

Comprehension Instructional Sequence (CIS)

Through the use of the Comprehension Instructional Sequence writing and reading comprehension model in science, the secondary students will be career-ready and prepared for college and other opportunities in the future. In order to do this, students need support in interacting with complex content-area information and need to be challenged in how they search for information in their readings and other experiences. The Comprehension Instructional Sequence provides this opportunity.

The CIS lesson provides a multiple-strategy instruction promoting student development in reading comprehension, vocabulary, content-area knowledge, and critical thinking about complex texts. Students are provided with multiple reading and learning opportunities within the content that encourage critical thinking and higher order thinking. The lesson is delivered in three steps integrating text-based discussions and writing used throughout the lesson. Students then formulate opinions, discussions and defend statements based on their different text readings and learning experiences. (Just Read Florida, CIS Brochure, 2013, http://www.justreadflorida.com/pdf/CIS-Brochure.pdf)

*** * * CIS Step 1 * * ***

Hook Question: ***(question given to students to incite interest in the content reading)***

Predictive Written Response to Complex Text-Based Question:
(Open ended question given to students to answer before reading the article)
Vocabulary Instruction (categories on the charts are examples and may change based on content)

Para-graph #	Academic or Discipline Specific Vocabulary	Word Part or Context	Para-graph #	Academic or Discipline Specific Vocabulary	Word Part or Context

Directed Note-Taking (categories on the charts are examples and may change based on content)

Guiding Question: ***(Second open-ended question meant to provide student a goal for their note taking)***

Para-graph #	Statement or specific information from reading	Place check on corresponding column			
		+ Impact Society or Individual	- Impact Society or Individual	Ethical issues	New discovery

First Draft Written Response to Essential Question
(Student draft written response to the same second open-ended question from the guided note taking)

*** * * CIS Step 2 * * ***

Question Generation (categories on the charts are examples and may change based on content)

Question Generation: *(Article name)*					
Para-graph #	Questions	Check relevant categories below			
		+ Impact Society	- Impact Society	Ethical issues	New discovery

*** * * CIS Step 3 * * ***

Final Written Response to Complex Text-Based Question ***(Complex open ended question that asks the student to pull information from the different sources used)***

The Final Written Response will be used as an assessment for student learning.

Science Journaling

As we work to develop 21st Century skills in our students, communication is a key component which maximizes learning. One means to enhance communication in the classroom is through the use of science journals or science notebooks. Student science notebooks can mean many things from a collection of drawings and items placed on blank pages by early elementary students to a student's personal record of data from a classroom investigation to support and justify a claim made during class discussion (Klentschy 2005).

As described in the November/December 2005 Science and Children article (Gilbert and Kotelman), science journals/notebooks can serve five key purposes within the science classroom. The first is that notebooks are thinking tools that allow students to construct his or her own conceptual understandings. The journal/notebook can encourage students to use writing for thinking which creates a more active role in their learning. Second, the journals/notebooks provide access into the students' mode of thinking and processing of ideas.

Journals and notebooks allow the teacher to see what concepts they understand and what misconceptions they still hold onto. Third, journals/notebooks enhance communication skills through providing opportunities for students to develop their thoughts and ideas in a written and visual format. Fourth, journals/notebooks support differentiated instruction providing a structure so that all students can learn and achieve scientific success. Finally, journals/notebooks can enhance collegiality across curriculum areas through coordinated efforts to improve the communication skills of all students supporting Common Core State Standards in writing and speaking.

Rubric Templates for Writing in Science

CER (Claim, Evidence, and Reasoning)
Base Explanation Rubric

Component	Level		
	0	1	2
Claim - A conclusion that answers the original question.	Does not make a claim, or makes an inaccurate claim.	Makes an accurate but incomplete claim.	Makes an accurate and complete claim.
Evidence – Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.	Does not provide evidence, or only provides inappropriate evidence (evidence that does not support the claim).	Provides appropriate but insufficient evidence to support claim. May include some inappropriate evidence.	Provides appropriate and sufficient evidence to support claim.
Reasoning – A justification that links the claim and evidence. It shows why the data count as evidence by using appropriate and sufficient scientific principles.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim.	Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some – but not sufficient – scientific principles.	Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles.

McNeill, K. L. & Krajcik, J. (2008). Inquiry and scientific explanations: Helping students use evidence and reasoning. In Luft, J., Bell, R. & Gess-Newsome, J. (Eds.). Science as inquiry in the secondary setting. (p. 121-134). Arlington, VA: National Science Teachers Association Press.

Open Ended, Short Response Questions

(Taken from Florida Department of Education, FCAT Rubric)

2 points

A score of two indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, in a scientifically sound manner. When required, student explanations and/or interpretations are clear and complete. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.

1 point

A score of one indicates that the student has provided a response that is only partially correct. For example, the student may arrive at an acceptable conclusion or provide an adequate interpretation, but may demonstrate some misunderstanding of the underlying scientific concepts and/or procedures. Conversely a student may arrive at an unacceptable conclusion or provide a faulty interpretation, but could have applied appropriate and scientifically sound concepts and/or procedures.

0 points

A score of zero indicates that the student has provided a completely incorrect or un-interpretable response or no response at all.

Open Ended, Extended Response Questions

(Taken from Florida Department of Education, FCAT Rubric)

4 points

A score of four indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, used scientifically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from a demonstration of a thorough understanding.

3 points

A score of three indicates that the student has demonstrated an understanding of the scientific concepts and/or procedures embodied in the task. The student's response to the task is essentially correct, but the scientific procedures, explanations, and/or interpretations provided are not thorough. The response may contain minor flaws that reflect inattentiveness or indicate some misunderstanding of the underlying scientific concepts and/or procedures.

2 points

A score of two indicates that the student has demonstrated only a partial understanding of the scientific concepts and/or procedures embodied in the task. Although the student may have arrived at an acceptable conclusion or provided an adequate interpretation of the task, the student's work lacks an essential understanding of the underlying scientific concepts and/or procedures. The response may contain errors related to misunderstanding important aspects of the task, misuse of scientific procedures/processes, or faulty interpretations of results.

1 point

A score of one indicates that the student has demonstrated a very limited understanding of the scientific concepts and/or procedures embodied in the task. The student's response is incomplete and exhibits many flaws. Although the student's response has addressed some of the conditions of the task, the student has reached an inadequate conclusion and/or provided reasoning that is faulty or incomplete. The response exhibits many flaws or may be incomplete.

0 points

A score of zero indicates that the student has provided a completely incorrect solution or un-interpretable response, or no response at all.

Science Journaling/ Notebook Rubric

CRITERIA	4 – EXCELLENT	3 – VERY GOOD	2 – GETTING THERE	1 – NEEDS IMPROVEMENT
ORGANIZATION	The notebook is neat and organized. There is a Table of Contents. Pages are numbered. There is an entry, date and focus for each day. Notes are easy to read.	The notebook is neat and organized. There is a Table of Contents. Pages are numbered. A few entries are missing the date and/or focus. Notes are easy to read.	The notebook is messy. The Table of Contents is incomplete. There are *some* missing entries, dates and/or foci. Some notes are not in order.	The notebook is messy. The Table of Contents is incomplete. There are *many* missing entries, dates and/or foci. Notes are difficult to read.
CONTENT ACCURACY AND CLASS WORK	All notes are accurate and all class work is complete. Notes reflect a deep understanding of the topics covered.	Most notes are accurate and most class work is complete. Notes reflect understanding of topics covered.	Some notes are accurate and class work is incomplete. Notes do not reflect understanding of the topics covered.	Very little notes and/or class work is complete. Notes do not reflect understanding of the topics covered.
HANDOUTS	All handouts are complete and included in the notebook.	Most handouts are complete and included in the notebook.	Some handouts are complete and included in the notebook.	Few handouts are complete and included in the notebook.
VOCABULARY	All vocabulary words are accurate in spelling and used correctly.	Most vocabulary words are accurate in spelling and used correctly.	A few vocabulary words are missing and/or there are a few inaccuracies in spelling and use.	Minimal amount of vocabulary and/or too many inaccuracies in spelling and use.

COMMENTS:

1st Quarter score: ☐

_____

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2nd Quarter score:

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3rd Quarter score:

_____

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4th Quarter score:

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Chapter 6
Progress Monitoring and Assessment

The implementation of the K-12 Comprehensive Science Plan will be monitored by the Office of Academics and Transformation (Science Department). This office has been assigned to work with all schools, giving special assistance to schools performing below satisfactory based on yearly FCAT and EOC Exam data. The District will work in collaboration with the schools to ensure support is provided.

In order to monitor student progress, a baseline assessment will be administered in grades 5, 8, and in Biology courses. A Fall and Winter Interim Assessment (IA) will be provided for these same grades. The assessments are aligned with the Next Generation Sunshine State Standards (NGSSS) and the Curriculum Pacing Guide.

The Science Interim Assessments (Interims) are designed to monitor the progress of students and are aligned to the District's Science Curriculum Pacing Guides. The Interims are used as a diagnostic tool to determine student mastery or non-mastery of each Next Generation Sunshine State Standard (NGSSS) benchmark. The interim data provides teachers with the necessary information that will lead them to utilize the appropriate instructional intervention strategies that will assist students in gaining mastery of the NGSSS benchmarks.

In January 2008, the Florida Department of Education adopted the Next Generation Sunshine State Standards (NGSSS). Miami-Dade County Public Schools decided to roll-out the new standards by grade level over the course of three years in order to align instruction with the state administered FCAT that was in effect for grades 5, 8 and 11 through spring 2011. The measure of student progress on the achievement of the NGSSS will be measured by the spring 2012 administration of the Florida Comprehensive Assessment Test 2.0 (FCAT 2.0) in grades 5 and 8 and the Biology End of Course (EOC) assessment.

The Florida Comprehensive Assessment Test (FCAT) 2.0 was designed to measure student achievement of the NGSSS. In science, those standards analyze student achievement in the following Bodies of Knowledge (BOK) or the reporting categories: Earth/Space Science, Life Sciences, Physical Sciences, and Nature of Science. FCAT 2.0 Science is tested at grades 5, 8. The FCAT 2.0 Science Test was first administered in 2012 and the results were considered as baseline data for comparison purposes for future administrations of FCAT 2.0.

The District will also provide a Pretest and Quarterly Science Benchmark Assessments (QSBAs) for grades K, 1, 2, 3, 4, 6, 7, Physical Science, and Chemistry classes. Additionally, principal/assistant principals may monitor the utilization of the K-12 Comprehensive Science Plan with the use of the enclosed *Professional Standards for Teaching Science* form. District Science Curriculum Support Specialists and School site science leaders may also utilize the form in the same manner.

The data included in this report reflects student achievement by science clusters/reporting categories. A review of the data reveals that students are still performing below the expected targets on all clusters/reporting categories. Therefore, the critical need for a rigorous science curriculum, quality science instruction, communication and coordinated services for delivery and progress monitoring are the key areas of focus for this Plan.

2012-2013 FCAT and Biology EOC Results

FCAT 2.0 Science - Grade 5										
Year	Total Students Tested	% Levels 3-5	Nature of Science		Earth and Space Science		Physical Science		Life Science	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2013	25,560	51	10	60%	16	75%	16	63%	14	71%
2012	26,105	49	10	70%	16	69%	16	63%	14	71%

A review of the FCAT 2.0 Science-Grade 5 results from 2012-2013 reveals an increase of 2 percentage points for students scoring a level 3-5 on the FCAT Science Test. The data demonstrates a significant increase in percentage of correct responses by students in the Earth/Space reporting category by 6 percentage points. The Reporting Categories with the least amount of growth were Nature of science with a decrease of 10 percentage points and Physical Science and Life Science with no change for 2013.

FCAT 2.0 Science - Grade 8										
Year	Total Students Tested	% Levels 3-5	Nature of Science		Earth and Space Science		Physical Science		Life Science	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2013	25,605	42	11	55%	15	60%	15	60%	15	60%
2012	26,513	44	11	55%	15	60%	15	60%	15	60%

A review of the FCAT 2.0 Science-Grade 8 results from 2012-2013 reveals a decrease of 2 percentage points for students scoring a level 3-5 on the FCAT 2.0 Science Test. The data demonstrates no change in percentage of correct responses by students in the Nature of Science, Earth and Space Science, Physical Science, and Life Science reporting categories. The Earth and Space Science, Physical Science, and Life Science BOK had the largest percentage correct during this period.

Biology End of Course Exam (EOC)							
Year	Total Students Tested	% Levels 3-5	Percentage in Each Achievement Level				
			1	2	3	4	5
2013	25,665	63	13%	25%	38%	12%	13%
2012 (retro fitted)	25,858	51	20%	28%	34%	9%	8%

A review of the Biology EOC results from 2012-2013 reveals a significant increase of 12 percentage points for students scoring a level 3-5 on the Biology EOC Test. The data also demonstrates a significant increase in percentage of students scoring in levels 4 and 5 since 2012 in the Biology EOC in all grade levels.

Advanced Academic Programs

Strategies for increasing participation and performance:

- All senior high schools are required to offer and staff a minimum of eight Advanced Placement courses and test all students who enroll in an AP course.
- All elementary, middle, and senior high schools are required to provide gifted services to eligible students.
- The Advanced Placement Student Curriculum Review was held in March 2011 providing approximately 900 students with an overview of the Advanced Placement (AP) course curriculum and strategies for success in the AP exam.
- In partnership with Florida International University (FIU), the district established procedures for expanding Dual Enrollment (DE) course offerings on the high school campus. By accrediting Miami-Dade County Public School teachers with the Southern Association of Colleges and Schools (SACS) certification, Miami-Dade teachers are able to teach Dual Enrollment courses in Math, Social Science, and English, on the high school campus.
- On Wednesday, February 27, 2013, FIU hosted a PD day for all DE teachers. 89 DE teachers representing 30 high schools and 15 different DE curriculum areas.
- Expansion of the Dual Enrollment (DE) high school in collaboration with Florida International University (FIU), Academy for Advanced Academics (AAA at FIU), from 80 students in 2009-2010 to 4,189 students in 2012-2013.

Chapter 7
FCAT 2.0 and EOC Resources

The Office of Academics and Transformation (Science Department) is providing various FCAT intervention strategies to all schools. These interventions include material and human resources as well as enhancement programs. The resources consist of test prep and intervention materials for grades three through eleven. In addition, there is an Instructional Focus Calendar and plan for Elementary, Middle, FCAT 2.0 and High School Biology EOC review.

Instructional and Intervention Materials
Elementary School FCAT 2.0

All elementary schools are using the 2006 Scott Foresman Science textbook and resource materials including lab kits. Supplementary resource materials to teach the Next Generation Sunshine State Standards GAP benchmarks were provided to each school. These include AIMS Florida Specific Science Modules that cover all Big Ideas for Grade K & 1, Life Science for grade 2, Earth Science for grade 4, Physical Science for grade 5, and AIMS Primarily Plants for grade 3. The Newbridge Big Books: *Watching the Night Sky* for grades K, 1 and 3; *The Human Body* for grade 2, *Energy on Earth* and *Earth in Space* for grades 3-5 were also provided. Additional resources can be found at the Elementary Science Home page (http://science.dadeschools.net) under Instructional Resources. The District Pacing Guides provide online resources both for instruction and intervention through the Supplemental Resource page in all topics for all grades. Additional technology resources for Gizmos, and Science Builders are available on District's Learning Village. All grade 5 teachers have access to Success Academy FCAT Intervention materials through the Office of Academics and Transformation website (http://curriculum.dadeschools.net). Essential Laboratories addressing annually assessed benchmarks were developed. These rigorous labs were developed following the 5E model. Additional resources have been developed to address gap benchmarks and are available on the Science website: science.dadeschools.net

Middle School FCAT 2.0 and Senior High EOC Exam Prep, Instructional and intervention Materials

Instructional materials have been aligned to the NGSSS with consideration given to the reporting categories. The *District Pacing Guides* provide the necessary content and laboratory experiences essential for student mastery. The laboratory activities are written to infuse rigor into instruction. This compilation of lab activities are grouped as Essential Laboratory Activities for middle school and HOT (Higher Order Thinking) labs for senior high school. Technology resources, such as Gizmos and Discovery, are aligned to the *Pacing Guides* and NGSSS and can be used as an additional instructional resource.

Senior High Schools were given the Biology EOC exam for a baseline score in 2011-12.
Preparation for Grade 8 Science FCAT 2.0 and Biology EOC List of Resources

Lessons and Activities:

- Florida Department of Education (FLDOE) FCAT Explorer and Focus Achieves www.fcatexplorer.com
- Miami-Dade County Public Schools District Developed Curriculum Guides (*Pacing Guides*) and Seasonal Packets

- NSTA Scope, Sequence, and Coordination Micro Units http://dev.nsta.org/ssc/

Reading in the Content Area:

- Science News for Kids: http://www.sciencenewsforkids.org/
- ChemMatters Published by the American Chemical Society http://chemistry.org/chemmatters/cd3.html
- TCR Connections (The Curriculum Resource) http://www.tcrconnections.com
- Globe Fearon, Science Reading Strategies, Pearson Education, Inc. 2001.
- One Minute Reading. Dale Seymour Publications
- Coordinated Science-Physics. 2nd Edition, Cambridge University Press, 1997 (Includes Astronomy).
- Coordinated Science-Chemistry. 2nd Edition, Cambridge University Press, 1997 (Includes Earth Science).
- Globe Fearon. Science Workshop Series. Globe Fearon, Inc. 2000. (Earth Science and Biology - Recommended for differentiated instruction).

All Grade Levels:

FCAT 2.0 and Biology EOC Assessment Practice:

- Florida Department of Education FCAT 2.0 Test Items Specification http://fcat.fldoe.org/fcat2/itemspecs.asp
- Florida Department of Education EOC Test Items Specification http://fcat.fldoe.org/eoc/itemspecs.asp
- FCAT 2.0 Practice Assessments: http://fcat.fldoe.org/fcat2/fcatitem.asp
- EOC Computer-based Practice Assessment: http://www.pearsonaccess.com/cs/Satellite?c=Page&childpagename=Florida/flPALPLayout&cid=1205461226846&pagename=flPALPWrapper
- NAEP (National Center for Education Statistics) Released Questions http://nces.ed.gov/nationsreportcard/itmrls/
- TIMSS 2003 Released Item Sets http://isc.bc.edu/timss2003i/released.html
- TIMSS 1995 Released Item Sets http://isc.bc.edu/timss1995i/Items.html
- TIMSS 1999 Released Item Sets http://isc.bc.edu/timss1999i/timss_test.html
- Orange County Public Schools Assessments http://www.cs.ocps.net/Assessments

Websites that Support Teaching and Learning FCAT 2.0 and Biology EOC

http://www.firn.edu/doe/
http://www.firn.edu/doe/sas/fcat.htm
http://www./fcatexplorer.com
http://osi.fsu.edu/wavseries/index.html
http://www.coedu.usf.edu/-morris/coopsss.html

Enhancement Programs

The Office of Academics and Transformation provides enhancement programs that extend the science curriculum to provide greater rigor and relevance to the standards. Additionally, these enhancement programs provide schools, teachers, parents, and students with opportunities to engage in exciting, inquiry-based, real life science experiences. These programs have included: NASA SEMAA for grades K-12, P-SELL for elementary grades, Science Fair for grades K-12, SECME STARS before and after school program for elementary students, Outreach Science Competitions for grades K-12 hosted by a variety of Informal Science Institutions, Summer

Outreach Programs and SECME. All of these programs have been nationally recognized for their impact on teacher preparation and/or student achievement. They have also provided students and teachers the opportunity to win national awards in STEM categories.

What Every Teacher Should Know about the Science FCAT 2.0 and End of Course Assessments

- Use questions that require students to explain their answers. Make sure when responding that the answer is concise and scientifically sound.
- Use higher order thinking questions that are similar to the Science FCAT format. Most classroom-developed questions should be Cognitive Level II or higher, based on Webb's Depth of Knowledge.
- Use and develop questions for class discussions and tests that are of the same cognitive rigor as those on FCAT.
- Require students to collect, analyze and interpret data frequently and incorporate the Nature of Science in all activities.
- Whenever possible, include graphics on classroom-developed assessments, such as illustrations, flow charts, data tables, and graphs.

Hints for Students Taking the Science FCAT 2.0

Here are some hints to help you do your best when you take the FCAT 2.0 science test. Keep these hints in mind when you answer the sample questions.

- The FCAT Science Test will only have multiple-choice questions.
- Read each question carefully.
- Check each answer to make sure it is the best answer for the question asked.
- Answer the questions you are sure about first. If a question seems too difficult, skip it and go back to it later.
- Be sure to fill in the answer bubbles correctly. Do not make any stray marks around answer spaces.
- Think positively. Some questions may seem hard to you, but you may be able to figure out what to do if you reread the question carefully.
- When you have finished each question, reread it to make sure your answer is reasonable.
- Relax. Some people get nervous about tests. It's natural. Just do your best.

Adapted from Florida Department of Education (FLDOE)

Elementary – Additional Lesson Connections/Support
Additional activities that can be used for FCAT 2.0 Intervention

Reporting Category	Big Idea	Activity/Assessment
NATURE OF SCIENCE	1. The Practice of Science	• Compares recorded observations with other students to verify accuracy. • Develops a game that requires each participant to record the events of the same staged phenomena and compares the records for accuracy.
		• Produces oral and computer-generated written reports, diagrams, charts, maps, graphs, mathematical equations, and visual demonstrations of research.
		• Analyzes the conclusions of members of a team and reaches consensus.
		• Analyzes the conclusions of members of a team and reaches consensus.
		• Reads an article on the research of several teams of scientists on the same question and reports on how the data and results compare. • Designs an investigation for the class to do in groups and compares the data from each group's trial.
		• Calculates and reports the amount of energy used by the school each day and graphs the results, then compare the methods and results of the investigation done by other classmates.
	2. The Characteristics of Scientific Knowledge	• Makes valid observations of common substances.
		• Gives examples of how the processes of science can be used to select a new pair of tennis shoes.

Reporting Category	Big Idea	Activity/Assessment
	3. The Role of Theories, Laws, Hypotheses, and Models	• Develops models of the water cycle.
		• Predicts the changes in weather based on the appearance of the clouds.
		• Describes the research and development done by a company in the production of a new product • Compares the information that can be gained by a team to the information that can be gained by an individual
		• Compares the results of an investigation that involves more than one strategy and tests for discrepant events or results.
EARTH AND SPACE	5. Earth in Space and Time	• Demonstrates and relates day and night to the rotation of the Earth on its axis.
		• Uses a ball, globe, and light source to demonstrate the phases of the Moon and makes a chart to record observations and communicate the pattern observed.
		• Classifies planets by atmospheres, surface composition, temperature, sets of rings, and natural satellites and explains the classification.
		• Constructs models that demonstrate the positions and common characteristics of the Earth, Sun, comets, moons, and other planets.
	6. Earth Structures	• Investigates properties of rocks and minerals using hand lenses and microscopes. The student then develops systems to group minerals and rocks into sets that have similar properties and reports findings.
		• Predicts the outcome when a quart of water is dumped into one end of a sand-filled tank and makes observations to verify the prediction.
	7. Earth Systems and Patterns	• Graphs daily weather changes and then describes and compares weather situations in various places on Earth.

Reporting Category	Big Idea	Activity/Assessment
		• Writes the script and acts out a play demonstrating the impact of a natural disaster (e.g., hurricane, tornado, or flood) on all living things in an ecosystem, with emphasis placed on the interrelationships of organisms and how the fate of one affects the others. • Identifies and compares the ways that protists help and/or harm plants and animals. • Uses native plants to explain the regional climate and geography.
PHYSICAL SCIENCE	10. Forms of Energy	• Designs, builds, and uses a solar cooker to cook or warm food and reports on the experience.
	11. Energy Transfer and Transformations	• Identifies several processes that involve energy transformation.
		• Designs, conducts, and explains an experiment to show that some materials conduct heat better than others.
		• Gives examples of substances, situations, and materials that store energy and explains how that energy can be released.
	12. Motion of Objects	• Describes and compares the distance traveled and the speed and motion of various types and sizes of balls. • Describes the motion of an object traveling down an incline plane placed at various heights in terms of time, distance traveled, and direction.
	13. Forces and Changes in Motion	• Concludes which of several magnets exerts the largest force by counting how many paper clips it will pick up. The student then describes the motion of the clips toward the magnet. • Uses a spring to launch paper airplanes by applying different amounts of pressure. The student then determines and reports the speed, distance, and direction traveled.
		• Collects data and draws conclusions about the relationship between the mass of a ball and the distance traveled when pushed.
		• Identifies the forces that act on an object. • Determines, compares, and reports the distance traveled and the speed and motion of various kinds and sizes of balls as they are thrown.

Reporting Category	Big Idea	Activity/Assessment
LIFE SCIENCE	14. Organization and Development of Living Organisms	• Collects and compares a variety of insects attracted to a light at night and sorts them into groups based on structural characteristics. • Constructs food chains to show how animals are dependent on plants.
		• Observes a video-micrograph or microscope slide of a plant leaf and identifies the types of cells present. Collects and compares a variety of insects attracted to a light at night and sorts them into groups based on structural characteristics.
		• Constructs a model of the human body that shows major organ systems and makes a class presentation. on how these systems work. Observes a video-micrograph or microscope slide of a plant leaf and identifies the types of cells present.
		• Grows plants through a complete life cycle and experiments to identify the factors essential to plant life. • Prepares a list of characteristics that are inherited from parents and those that are learned from experiences in life.
		• Designs, conducts, and explains an experiment to identify the effects of heat, light and gravity on plant or animal growth. Writes the script and acts out a play demonstrating the impact of a natural disaster (e.g., hurricane, tornado, or flood) on all living things in an ecosystem, with emphasis placed on the interrelationships of organisms and how the fate of one affects the others. • Identifies and compares the ways that protists help and/or harm plants and animals.
	16. Heredity and Reproduction	• Prepares a list of characteristics that are inherited from parents and those that are learned from experiences in life. Uses native plants to explain the regional climate and geography.

Reporting Category	Big Idea	Activity/Assessment
	17. Interdependence	• Constructs food chains to show how animals are dependent on plants.
		• Investigates the extent to which everyday waste products (e.g., yard clippings, paper, plastic materials, and cans) decay naturally; keep records of observations, and uses findings to make specific suggestions on how to improve the appearance of the local environment. Grows plants through a complete life cycle and experiments to identify the factors essential to plant life.
		• Develops, implements, and reports on a plan to recycle in the home and in school.
		• Constructs a simple food chain for a specific habitat, shows how organisms are linked, and discusses the possible consequences arising from a break or interruption to the chain. • Invents and makes models of plants with special adaptations against predators (e.g., a lawnmower-proof plant or one that grazers will not eat).Investigates the extent to which everyday waste products (e.g., yard clippings, paper, plastic materials, and cans) decay naturally; keep records of observations, and uses findings to make specific suggestions on how to improve the appearance of the local environment.
		• Examines garden soil and isolates, identifies, and quantifies the contents. Constructs a simple food chain for a specific habitat, shows how organisms are linked, and discusses the possible consequences arising from a break or interruption to the chain. • Invents and makes models of plants with special adaptations against predators (e.g., a lawnmower-proof plant or one that grazers will not eat).
		• Designs and makes a model of a fictitious organism that possesses adaptations enabling it to succeed in unusual habitats (e.g., the bottom of the ocean, another planet, a cave, or a subterranean environment) and defends the needs and/or benefits of each adaptation.

Reporting Category	Big Idea	Activity/Assessment
		• Designs and makes a model of a local ecosystem and explains how the communities, populations, and individuals interact. Examines garden soil and isolates, identifies, and quantifies the contents.
		• Uses populations of brine shrimp, radish seeds, or other rapidly reproducing organisms to make observations, collect data, and make inferences about the results of uncontrolled growth in a population with limited resources in its environment. The student then reports on the processes used and the findings. • Designs an energy conservation public-service announcement, using a variety of communication and media formats. The student then presents the announcement to the class, the whole school, and/or the community. • Participates in an aluminum-recycling drive or a roadside or coastal clean-up project. Designs and makes a model of a fictitious organism that possesses adaptations enabling it to succeed in unusual habitats (e.g., the bottom of the ocean, another planet, a cave, or a subterranean environment) and defends the needs and/or benefits of each adaptation. • Designs and makes a model of a local ecosystem and explains how the communities, populations, and individuals interact.

Reporting Category	Big Idea	Activity/Assessment
Life Science (continued)	17.Interdependence (continued)	• Reports on the limited resources that are used by living things in order to survive. • Discusses the resources that limit the size of particular populations. • Uses populations of brine shrimp, radish seeds, or other rapidly reproducing organisms to make observations, collect data, and make inferences about the results of uncontrolled growth in a population with limited resources in its environment. The student then reports on the processes used and the findings. • Designs an energy conservation public-service announcement, using a variety of communication and media formats. The student then presents the announcement to the class, the whole school, and/or the community. • Participates in an aluminum-recycling drive or a roadside or coastal clean-up project.
		• Writes a story about an organism whose habitat has changed, describing the consequences of this change to the organism. • Explains how damage caused by rodents can be reduced by using poisons but how their use may harm other plants or animals. Reports on the limited resources that are used by living things in order to survive. • Discusses the resources that limit the size of particular populations. • Writes a story about an organism whose habitat has changed, describing the consequences of this change to the organism. • Explains how damage caused by rodents can be reduced by using poisons but how their use may harm other plants or animals.

Annually-Assessed Benchmarks

Grade 5 FCAT 2.0 Science Annually-Assessed Benchmarks

Benchmark Coding	FCAT 2.0 Annually Assessed Benchmark Description - Grade 5
SC.5.N.1.1	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.5.N.2.1	Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.
SC.5.N.2.2	Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.
SC.5.E.5.1	Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way. (Also assesses SC.3.E.5.1, SC.3.E.5.2, and SC.3.E.5.3.)
SC.5.E.5.3	Distinguish among the following objects of the Solar System — Sun, planets, moons, asteroids, comets — and identify Earth's position in it. (Also assesses SC.5.E.5.2.)
SC.4.E.5.4	Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected. (Also assesses SC.4.E.5.1, SC.4.E.5.2, and SC.4.E.5.3.)
SC.4.E.6.2	Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.
SC.4.E.6.3	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.4	Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.5.E.7.1	Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. (Also assesses SC.5.E.7.2.)
SC.5.E.7.3	Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. (Also assesses SC.5.E.7.4, SC.5.E.7.5, and SC.5.E.7.6.)
SC.5.P.8.1	Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature. (Also assesses SC.3.P.8.1, SC.3.P.8.2, SC.3.P.8.3, and SC.4.P.8.1.)
SC.5.P.8.3	Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (Also assesses SC.5.P.8.2.)
SC.5.P.9.1	Investigate and describe that many physical and chemical changes are affected by temperature. (Also assesses SC.3.P.9.1 and SC.4.P.9.1.)
SC.5.P.10.1	Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical. (Also assesses SC.3.P.10.1, SC.3.P.10.3, SC.3.P.10.4, SC.3.P.11.1, SC.3.P.11.2, SC.4.P.10.1, and SC.4.P.10.3.)

Benchmark Coding	FCAT 2.0 Annually Assessed Benchmark Description - Grade 5
SC.5.P.10.2	Investigate and explain that energy has the ability to cause motion or create change. (Also assesses SC.3.P.10.2, SC.4.P.10.2, and SC.4.P.10.4.)
SC.5.P.10.4	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion. (Also assesses SC.3.E.6.1, SC.4.P.11.1, SC.4.P.11.2, SC.5.P.10.3, SC.5.P.11.1, and SC.5.P.11.2.)
SC.5.P.13.1	Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. (Also assesses SC.3.E.5.4 and SC.4.P.8.4.)
SC.5.P.13.2	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. (Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, and SC.5.P.13.4.)
SC.3.L.14.1	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
SC.5.L.14.1	Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.
SC.5.L.14.2	Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support — some with internal skeletons others with exoskeletons — while some plants
SC.4.L.16.4	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.5.L.17.1	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.
SC.4.L.17.3	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

Grade 8 Science FCAT 2.0 Annually Assessed Benchmarks

Benchmark Coding	Science FCAT 2.0 Annually Assessed Benchmark Description - Grade 8
SC.8.N.1.1	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (Also assesses SC.6.N.1.1, SC.6.N.1.3, SC.7.N.1.1, SC.7.N.1.3, SC.7.N.1.4, SC.8.N.1.3, and SC.8.N.1.4.)
SC.7.N.1.2	Differentiate replication (by others) from repetition (multiple trials). (Also assesses SC.6.N.1.2, SC.6.N.1.4, and SC.8.N.1.2.)
SC.7.N.1.5	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. (Also assesses SC.7.N.3.2, SC.8.N.1.5, and SC.8.E.5.10.)
SC.6.N.2.2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. (Also assesses SC.7.N.1.6, SC.7.N.1.7, SC.7.N.2.1, and SC.8.N.1.6.)
SC.7.N.3.1	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. (Also assesses SC.6.N.3.1 and SC.8.N.3.2.)
SC.8.E.5.3	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition. (Also assesses SC.8.E.5.1 and SC.8.E.5.2.)
SC.8.E.5.5	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness). (Also assesses SC.8.E.5.6.)
SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. (Also assesses SC.8.E.5.4 and SC.8.E.5.8.)
SC.8.E.5.9	Explain the impact of objects in space on each other including: 1. the Sun on the Earth including seasons and gravitational attraction 2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.

Benchmark Coding	Science FCAT 2.0 Annually Assessed Benchmark Description - Grade 8
SC.7.E.6.2	Identify the patterns within the rock cycle and events (plate tectonics and mountain building). (Also assesses SC.6.E.6.1, SC.6.E.6.2, and SC.7.E.6.6.) relate them to surface events (weathering and erosion) and subsurface events (plate tectonics and mountain building). (Also assesses SC.6.E.6.1, SC.6.E.6.2, and SC.7.E.6.6.)
SC.7.E.6.4	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. (Also assesses SC.7.E.6.3.)
SC.7.E.6.5	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. (Also assesses SC.7.E.6.1 and SC.7.E.6.7.)
SC.6.E.7.4	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. (Also assesses SC.6.E.7.2, SC.6.E.7.3, SC.6.E.7.6, and SC.6.E.7.9.)
SC.6.E.7.5	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land. (Also assesses SC.6.E.7.1.)
SC.8.P.8.4	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample. (Also assesses SC.8.P.8.3.)
SC.8.P.8.5	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter. (Also assesses SC.8.P.8.1, SC.8.P.8.6, SC.8.P.8.7, SC.8.P.8.8, and SC.8.P.8.9.)
SC.8.P.9.2	Differentiate between physical changes and chemical changes. (Also assesses SC.8.P.9.1 and SC.8.P.9.3.)
SC.7.P.10.1	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors. (Also assesses SC.8.E.5.11.)

Benchmark Coding	Science FCAT 2.0 Annually Assessed Benchmark Description - Grade 8
SC.7.P.10.3	Recognize that light waves, sound waves, and other waves move at different speeds in different materials. (Also assesses SC.7.P.10.2.)
SC.7.P.11.2	Investigate and describe the transformation of energy from one form to another. (Also assesses SC.6.P.11.1 and SC.7.P.11.3.)
SC.7.P.11.4	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature. (Also assesses SC.7.P.11.1.)
SC.6.P.13.1	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational. (Also assesses SC.6.P.13.2 and SC.8.P.8.2.)
SC.6.P.13.3	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both. (Also assesses SC.6.P.12.1.)
SC.6.L.14.1	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from preexisting cells, and cells are the basic unit of life. (Also assesses SC.6.L.14.3.)
SC.6.L.14.4	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis. (Also assesses SC.6.14.6.)
SC.6.L.15.1	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

Benchmark Coding	Science FCAT 2.0 Annually Assessed Benchmark Description - Grade 8
SC.7.L.15.2	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms. (Also assesses SC.7.L.15.1 and SC.7.L.15.3.)
SC.7.L.16.1	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another. (Also assesses SC.7.L.16.2 and SC.7.L.16.3.)
SC.7.L.17.2	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism. (Also assesses SC.7.L.17.1 and SC.7.L.17.3.)
SC.8.L.18.4	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy. (Also assesses SC.8.L.18.1, SC.8.L.18.2, and SC.8.L.18.3.)

BIOLOGY End of Course (EOC) Assessment

The following lists the reporting categories for the Biology EOC exam. In total there are 61 benchmarks which are separated into twenty two Annually-Assessed Benchmark groups that will be tested each year on the Biology EOC. It should be noted that within specific benchmarks other benchmarks are embedded and could be tested annually. See the Item Specifications for further information.

Benchmark Code	Biology EOC Benchmark Clarification
Molecular and Cellular Biology (35%)	
SC.912.L.14.1	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science. (Also assesses SC.912.N.1.3, SC.912.N.2.1, SC.912.N.3.1, and SC.912.N.3.4)
SC.912.L.14.3	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.(Also assesses SC.912.L.14.2.)
SC.912.L.16.3	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. (Also assesses SC.912.L.16.4, SC.912.L.16.5, and SC.912.L.16.9)
SC.912.L.18.1	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. (Also assesses SC.912.L.18.11)
SC.912.L.18.9	Explain the interrelated nature of photosynthesis and cellular respiration. (Also assesses SC.912.L.18.7, SC.912.L.18.8, and SC.912.L.18.10)
SC.912.L.18.12	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

Classification, Heredity, and Evolution (25%)	
SC.912.L.14.7	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.15.1	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. (Also assesses SC.912.N.1.3, SC.912.N.1.4, SC.912.N.1.6, SC.912.N.2.1, SC.912.N.3.1, SC.912.N.3.4, and SC.912.L.15.10)
SC.912.L.15.6	Discuss distinguishing characteristics of the domains and kingdoms of living organisms. (Also assesses SC.912.N.1.3, SC.912.N.1.6, SC.912.L.15.4, and SC.912.L.15.5)
SC.912.L.15.8	Describe the scientific explanations of the origin of life on Earth. (Also assesses SC.912.N.1.3, SC.912.N.1.4, and SC.912.N.2.1)
SC.912.L.15.13	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. (Also assesses SC.912.N.1.3, SC.912.L.15.14, and SC.912.L.15.15)
SC.912.L.16.1	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. (Also assesses SC.912.L.16.2)
SC.912.L.16.17	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation. (Also assesses SC.912.L.16.8, SC.912.L.16.14, and SC.912.L.16.16)

	Organisms, Populations, and Ecosystems (40%)
SC.912.L.14.26	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. (Also assesses SC.912.L.14.6, SC.912.L.16.10, HE.912.C.1.4, and HE.912.C.1.8)
SC.912.L.16.13	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.5	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. (Also assesses SC.912.N.1.4, SC.912.L.17.2, SC.912.L.17.4, and SC.912.L.17.8)
SC.912.L.17.9	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. (Also assesses SC.912.E.7.1)
SC.912.L.17.20	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. (Also assesses SC.912.N.1.3, SC.912.L.17.11, SC.912.L.17.13 and HE.912.C.1.3)

Science FCAT 2.0 and Biology EOC Glossaries

Science FCAT 2.0 Glossary by Grade Level

Source: CPALMS Science Glossary Report www.floridastandards.org

This vocabulary list is a resource to assist teachers in the development of science concepts. These concepts and words can be introduced at the specified grade level initially and each subsequent grade thereafter. Complete understanding of scientific concepts may require multiple exposures to learn them well. These concepts spiral throughout the curriculum to enhance understanding and learning. Starting the use of key terminology as early as Kindergarten will support the acquisition of the terms and concepts by grade five.

Kindergarten	First grade	Second grade	Third grade	Fourth grade	Fifth grade
Gravity	Environment	Attract	Amphibian	Attraction	Adapt
Investigation	Gravity	Electricity	Arthropod	Axis	Asteroi
Law	Investigation	Energy	Boiling	Consumer	Atom
Moon	Law	Force	Condensation	Energy	Attraction
Observation	Motion	Gas	Energy	Environment	Barometric
Sense	Observation	Habitat	Evaporation	Erosion	Chemical
Sun	Organism	Inference	Force	Experiment	Circuit
Vibration	Sense	Investigation	Freeze	Fertilization	Comet
Weight	Space	Life cycle	Gravity	Food chain	Dissolve
	Sun	Liquid	Heat	Germination	Electricity
	Weight	Magnet	Invertebrate	Gravity	Energy
		Motion	Investigation	Heat	Environment
		Observation	Law	Heredity	Evaporation
		Power	Light	Igneous	Exoskeleton
		Precipitation	Liquid	Inference	Experiment
		Repel	Mass	Investigation	Force
		Scientist	Melting	Law	Galaxy
		Season	Model	Life cycle	Gas
		Solid	Motion	Light	Gravity
		Volume	Observation	Magnet	Heat
		Weight	Reproduction	Magnetic	Humidity
			Scientist	Mass	Investigation
			Season	Matter	Latitude
			Solid	Metamorphic	Life cycle
			Sun	Metamorphosis	Light
			Telescope	Mineral	Liquid
			Vertebrate	Model	Magnetic
			Volume	Moon	Mass
				Motion	Matter
				Observation	Model
				Pollination	Moon
				Producer	Motion
				Reproduction	Observation
				Scientific	Organ

Kindergarten	First grade	Second grade	Third grade	Fourth grade	Fifth grade
				Scientist	Planet
				Season	Precipitation
				Sedimentary	Scientific
				Space	Skeleton
				Speed	Solar system
				Sun	Solid
				Vibration	Speed
see previous page	***see previous page***	***see previous page***	***see previous page***	Volume	Sun
					Theory
					Variable
					Volume
					Water cycle

Middle Grade Science Glossary

Sixth Grade	Seventh Grade	Eighth Grade
Aesthetic	Aesthetic	Acid
Atmosphere	Asexual reproduction	Aesthetic
Atom	Biotechnology	Atmosphere
Bacteria	Cell	Atom
Biosphere	Chromosome	Attraction
Cell	Clone	Base
Chloroplast	Consumer	Boil
Circulatory system	Current	Cell
Condensation	Decomposer	Chemical change
Conduction	Deforestation	Compound
Convection	Dependent variable	Conductivity
Cytoplasm	Desertification	Conservation of Mass
Delta	Diversity	Convection
Deposition	DNA	Density
Diversity	Earthquake	Eclipse
Dune	Electricity	Electromagnetic spectrum
Energy	Energy	Electron
Erosion	Environment	Energy
Evaporation	Erosion	Environment
Evolution	Evolution	Experiment
Experiment	Experiment	Food chain
Force	Food chain	Force
Fungus	Force	Frequency
Geosphere	Fossil	Galaxy
Glacier	Genetic	Gas
Gravity	Genotype	Geocentric
Heat	Habitat	Gravity
Homeostasis	Heat	Heat
Humidity	Heredity	Heliocentric
Hydrosphere	Hypothesis	Hypothesis
Hypothesis	Independent variable	Inference
Inference	Inference	Investigation
Investigation	Infrared	Law
Kinetic energy	Investigation	Life science
Law	Law	Light
Life science	Life science	Liquid
Light	Light	Magnetic
Magnetic	Liquid	Mass
Mammal	Lithosphere	Matter
Mass	Matter	Melt
Matter	Meiosis	Milky Way Galaxy
Membrane	Mitosis	Model

Sixth Grade	Seventh Grade	Eighth Grade
Mitochondrion	Model	Molecule
Model	Natural selection	Moon
Molecule	Objectivity	Motion
Motion	Observation	Neutron
Natural selection	Offspring	Nucleus
Nucleus	Organism	Objectivity
Objectivity	Phenotype	Observation
Observation	Physical science	Organism
Organ	Plate tectonics	Periodic table
Organelle	Producer	Photosynthesis
Organism	Radiation	Physical change
Parasite	Radioactive dating	Physical science
Planet	Replication	Planet
Potential energy	Reproduction	Proton
Precipitation	Scientific method	Pseudoscientific
Radiation	Sedimentary	Replication
Reproduction	Sexual reproduction	Scientific method
Scientific method	Solid	Scientist
Scientist	Sound wave	Season
Sound wave	Space	Sense
Speed	Subjectivity	Solar system
Subjectivity	Sun	Solid
Sun	Supernatural	Solubility
Supernatural	Superposition	Space
Theory	Theory	Speed
Tissue	Ultraviolet	Subjectivity
Vacuole	Vacuum	Sun
Vacuum	Variable	Supernatural
Variable	Wavelength	Telescope
Virus		Theory
Water cycle		Tide
		Variable
		Volume
		Wavelength
		Weight

EOC Biology Science Glossary

Biology		
Abiotic	Fission :	Pollution:
Activation energy:	Fossil:	Polygenic:
Adenosine triphosphate (ATP):	Freeze:	Polysaccharide:
Aerobic:	Gamete:	Pons:
Amino acid:	Gas:	Producer :
Anaerobic :	Genetic:	Recessive:
Anatomy:	Haploid:	Replication:
Aquatic:	Heat:	Reproductive system:
Asexual reproduction:	Heredity:	Scientist:
Atmosphere:	Hominid:	Space:
Biotechnology:	Hypothalamus:	Steroid:
Biotic:	Hypothesis :	Thalamus:
Carbohydrate:	Immune system:	Theory :
Cardiovascular system:	Inference :	Tissue:
Catalyst:	Investigation :	Triglyceride:
Cell:	Kinetic energy:	Vaccine:
Cerebellum :	Law :	Variable:
Cerebrum :	Ligation:	
Chromosome:	Light:	
Clone:	Matter:	
Codominant:	Medulla:	
Compound:	Meiosis:	
Consumer:	Membrane:	
Current :	Meninx :	
Decomposer :	Microscope:	
Disaccharide:	Midbrain:	
Diversity:	Mitosis:	
DNA:	Model :	
Dominance:	Molecule:	
Electron:	Monosaccharide:	
Electrophoresis:	Mutation:	
Embryology:	Natural selection:	
Endosymbiosis:	Nonrenewable resource:	
Energy:	Observation :	
Environment:	Offspring:	
Enzyme:	Organ:	
Evolution :	Organism:	
Experiment:	Phospholipid:	
Fatty acid:	Photosynthesis:	
Fertilization:	Physiology:	

Chapter 8
Professional Development

Building Capacity

Florida State, F.S. 1012.98, states that "The purpose of the professional development system is to increase student achievement, enhance classroom instructional strategies that promote rigor and relevance throughout the curriculum, and prepare students for continuing education and the workforce. The system of professional development must align to the standards adopted by the state and support the framework for standards adopted by the National Staff Development Council".

Professional development offerings and activities of the Department of Mathematics and Science have been designed to support the implementation of the K – 12 Comprehensive Science Plan. The offerings address one or more of the three components embedded in the K-12 Science Plan. The components are designed to support teachers along a continuum from novice to experienced teacher-leaders, to develop the knowledge and skills of district instructional support staff, and to develop school-site administrators committed to and knowledgeable about high quality science instruction.

Component one addresses the pedagogy and content knowledge needs of new and experienced teachers.
Component two is comprised of a cadre of teacher leaders with expertise in a variety of science subjects at the elementary and secondary levels. Teacher-leaders at the elementary level were selected based on their involvement at their schools as formal or informal science resource teacher-leaders. At the secondary level, subject-area department chairpersons are the teacher-leaders.
Component three is a cohesive, collaborative model that provides support, on-going training, and monitoring of the implementation of the K-12 Comprehensive Science Plan.

Science Intervention Teams

The professional development activities have been designed in support of the implementation of the K-12 Comprehensive Science Plan. Support for the component three model will be provided by District, ETO, and Regional Center personnel.

This endeavor requires the leadership and commitment of The Office of Academics and Transformation, Professional Development, and School Operations staff to ensure that our collective efforts produce the student achievement goals detailed in the plan. The full implementation of this professional development proposal is also contingent upon available funding.

Professional Development Content Standards

Staff development will be geared to improve the learning of all students:

- Prepare science educators to understand and appreciate all students; create safe, orderly and supportive learning environments; and hold high expectations for their academic achievement. (Equity)

    1. Science teachers will learn how to create school-wide practices that convey respect for students, their families, and their cultural backgrounds.

    2. Professional development will prepare science teachers to establish learning environments that communicate high expectations for the academic achievement of all students.

    3. Science teachers will learn how to adjust instruction and assessment in order to better address the learning styles of individual students.

- Deepen the science content knowledge of teachers, provide them with research-based instructional practices, and prepare them to use assessments appropriately. (Quality Teaching)

    1. Science teachers will have opportunities to deepen science content knowledge and pedagogical understanding.

    2. Professional development will expand the teachers' instructional methods appropriate to science.

    3. Professional development will provide classroom teachers with the necessary skills to utilize data to drive instruction.

Sample Annual Professional Development Calendar

Professional Development Calendar

Title and Description	Target Audience	Delivery	Responsibility	Expected Outcome
Science Content and Pacing Strategies: Elementary, Middle and High School	K-12 science teachers	District Science Supervisors and Curriculum Support Specialist (CSS)	Department of Mathematics and Science	Teachers will be able to effectively implement the content of pacing guides and incorporate NGSSS
Water Odyssey: Water conservation and water cycle	Grades 3-5 teachers	Online workshop	Sponsored by FAU and MDCPS	Create awareness on water conservation issues
Science Textbook and NGSSS	Science Teachers	Textbook consultants	Department of Mathematics and Science	Familiarize teachers with resources from new textbook adoption
Creating Actionable Data for Schools	Science supervisors and curriculum support specialist	Dr. Yuwadee Wongbundhit	Office of Academics and Transformation	Utilize data to support data driven instruction at schools
Instructional Coaches workshop	Instructional coaches from identified support schools	District Supervisors	Office of Academics and Transformation	Discuss roles and responsibilities of instructional coaches
SECME Stars II APEX Science workshop (Museum of Science) (Grant Funded)	Elementary K-5 teachers	Museum of Science and MDCPS	Division of Mathematics, Science, and Advanced Academic Programs	Teach strategies and skills to improve performance in Science of lowest 25%
High School Science Coaches and Department Chairs Dialogue	High school science coaches, department chair	District Science Supervisor	Department of Mathematics and Science	Share information and provide content and strategies training
Middle School Science Coaches/Department Chair dialogue	Middle school science coaches	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Discuss middle school leadership information, professional learning communities, content and data analysis

Title and Description	Target Audience	Delivery	Responsibility	Expected Outcome
Elementary Science Leaders dialogue: NGSSS Pacing and Content	Elementary Science Leaders and Coaches	District Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Elementary Science Leadership has been established to support successful implementation of the science curriculum, instruction, programs and assessments in elementary schools.
Biology Inservice	High School Biology Teachers	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Discuss relevant content and resources in Biology and EOC information to include virtual dissections (ex. Digital Frog Dissection and Catworks)
Physical Science Inservice	Middle school and High School Physical Science Teachers	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Discuss relevant content and resources in Physical Science; training in adopted curriculum lab resources and books.
Other High school Science Content (i.e. Physics, Chemistry) Inservices	Middle school and High School Science Content (i.e. Physics, Chemistry) Teachers	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Discuss relevant content and resources in science content areas; training in adopted curriculum lab resources and books.
Science Summer Institute/Symposium	Science teachers (elementary, middle and senior)	Science Supervisors and Curriculum Support Specialist	Department of Mathematics and Science	Science pacing , content and strategies

Title and Description	Target Audience	Delivery	Responsibility	Expected Outcome
Science Competition Coordinators	Science teachers who assist in science fair	District Supervisors; community partners	Department of Mathematics and Science	Successful submission of projects, research papers, project boards, wood bridges
SECME STEM Seminars	Middle SECME coordinators, students, parents and teachers	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Design and build of various engineering projects (i.e., bridge, rocket, robotics, mousetrap car). Provide information to parents, students, and teachers competition
Science Extended Learning	Elementary, Middle and High School science teachers	Science Supervisor and Curriculum Support Specialist	Department of Mathematics and Science	Discuss curriculum to be followed at Science Success Academy

Community-based Organizations

These institutions contact the Department of Mathematics and Science throughout the year to provide information on the PD activities.

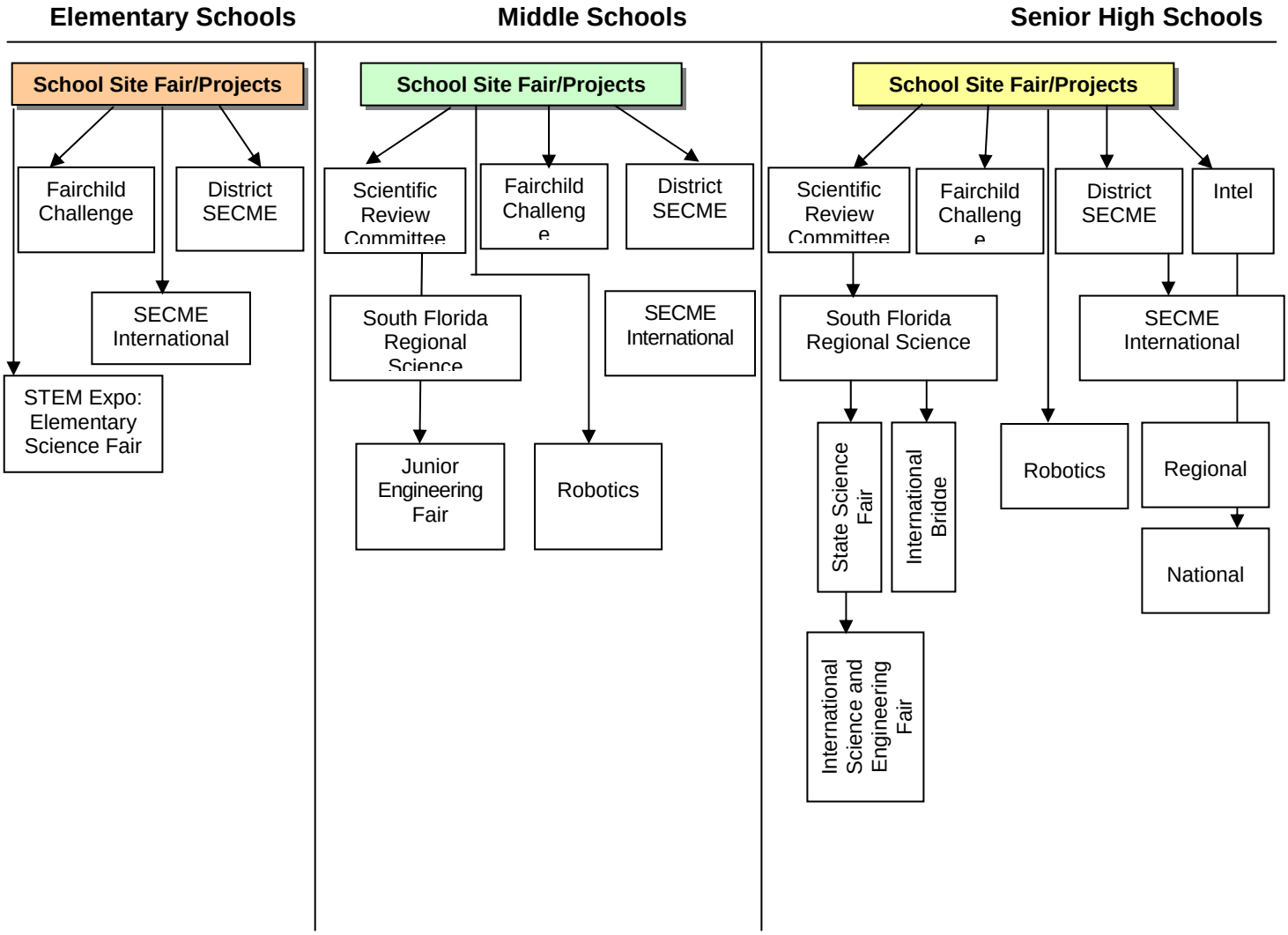
COMMUNITY-BASED ORGANIZATIONS, INFORMAL SCIENCE AND HIGHER EDUCATION INSTITUTIONS			
Community-based Collaborations			
Institution	**Target Audience**	**Delivery Method**	**Content Focus**
Fairchild Tropical Botanic Gardens Zoo Miami Deering Estate Miami Seaquarium Miami Museum of Science	Teachers - Grades K-12	• Face-to-face by community-based instructional staff	Students and teachers participate in science field studies at these community-based organizations to support STEM instruction and real-world applications of classroom curriculum.
Miami Dade College University of Miami Florida International University Florida Memorial College	Teachers and Students K - 12	• Face-to-face delivery by college/university faculty and/or graduate students	Students and teachers participate in college/university sponsored events to strengthen college preparedness, exposure and STEM content.

GRANT SPECIFIC				
SECME Stars 21st Century After School Programs				
Each four-year grant cycle, teachers in four (4) elementary schools that are participating in the 21st Century After School grant will be receiving training on materials and activities for students and parents. The grant will pay for the stipends.	Teachers Grades K -5	• Face-to-face delivery by Department of Mathematics and Science SECME Stars Staff	Department of Mathematics and Science	SECME Stars teachers will implement inquiry-based, hands-on science and mathematics activities with students in after- and before-school activities

University of Miami Science Made Sensible (SMS)					
Title and Description	**Target Audience**	**Timeline**	**Delivery**	**Responsibility**	**Expected Outcome**
Teachers from four underrepresented, low socioeconomic middle schools receive professional development from College of Education and the Biology Department faculty. A graduate student from the School of Biology is paired with a teacher during the professional development and works with the teacher for 15 hours/week in the science classroom to provide expertise, and build teacher content and capacity as related to science inquiry.	10 Middle School Teachers - Grades 6-8 *Participating middle schools have included:* *Allapattah* *Brownsville* *Carol City* *Charles Drew,* *Horace Mann* *Lake Stevens* *South Miami*	On-going	**Face-to-face delivery by:** • University of Miami Science and Education Faculty	Office of Academics and Transformation	Teachers of select schools and UM graduate students will co-teach in the science classroom Research projects will be implemented in the science classroom

Chapter 9
Science Department STEM Competitions

Science Competitions are an integral part of science instruction in Miami-Dade County Public Schools. Competitions provide opportunities and experiences for students to solve problems in their environment and advocate for change through science-based projects. The main competition is the Science Fair, however students have the opportunity to compete in other competitions that include: SECME (pre-college STEM program) Olympiad/ Festival; Robotics; and the Fairchild Challenge. The following diagram illustrates the competition process:



Miami-Dade County Public Schools

Several listed competitions have pre-requisite requirements and limited enrollments. These requirements, pre-requisites, and criteria are included in competitions announcements and materials provided to schools at the beginning of the school year and/or from the coordinator and/or site indicated in the chart below.

Contests and Competitions

Contest Name	Grade Level	Contest Information
Toshiba-ExploraVision Entry Due: January	Grades K-3 Grades 4-6 Grades 7-9 Grades 10-12	• The Toshiba/NSTA ExploraVision science competition encourages K – 12 students to imagine what technology might be like in the future. ExploraVision helps teacher sponsors meet many of the National Science Education Standards while letting students experience scientific process and discovery in an engaging, hands-on way. • Designed to encourage students (1) to combine their imagination with their knowledge of science and technology in order to explore visions of the future and (2) to learn how to work in collaborative groups on an interdisciplinary project, which is not limited to high achievers alone. • Students are required to (1) attend a public, private, or home school in the U.S., Canada, or U.S. Territories; (2) work in groups of 2-4, simulating research and development teams, together with a team coach and an optional mentor; (3) select a technology, researching how it works and why it was invented, and then projecting how that technology may change in the future; and (4) write a document and draw a series of web-page graphics to describe their idea.. • Regional winners make a Web site and a prototype of their future vision. • First Prize (4 teams): U.S. EE Savings Bond for each student worth $10,000 at maturity; Second Prize (4 teams): U.S. EE Savings Bond for each student worth $5,000 at maturity; Regional Prize (24 teams): A laptop computer for each regional winning school and a special gift for each student, teacher, and mentor; Honorable Mention Recognition also included. • Additional information may be found at: http://www.exploravision.org
The Internet Science and Technology Fair (ISTF) Enrollment: September-December Submission Deadline: February Winning Teams Announced: June Contact: Bruce Furino director@istf.ucf.edu	Grades 3-5 Grades 6-8 Grades 9-12	• (1) Challenges students to use information-technology tools to discover and explore the future of science and engineering; (2) provides science, math, and computer teachers with a means to integrate the Internet and research methods into their curricula; and (3) offers scientists and engineers working within corporations, federal/state agencies, and academic research centers an opportunity to invest their time online as technical advisors who become "digital mentors." • From October through February of each year, student teams apply technology to real-world problems when they participate in the ISTF and create a web page; they will employ technical applications from one of seven categories to solve a problem their team has identified or as the focus of their research. • Team sizes of 3 to 7 students work best. **NOTE:** There must be *at least three* students on a team. However, there is *not a maximum limit* on the number of students per team.
Christopher Columbus Awards Program Entry Due: February Semifinalists Announced: Early April	Grades 6-8	• Provides students with a cutting-edge competition that combines science and technology with community problem solving in a real-world setting. • With the help of an adult coach, students work in teams of 4 to identify an issue they care about and use science and technology to develop an innovative solution; they work with experts, conduct research, and put their ideas to the test just like adult scientists. • The top thirty entries are chosen as semifinalists. Eight finalist teams attend National Championship Week. Every finalist team and its coach

Contest Name	Grade Level	Contest Information
Finalists Announced: **Late April** **National Finalist Competition:** **June** **Orlando, FL** **Contact: TBA**		win an all-expense-paid trip to Walt Disney World® plus a $200 grant to further develop their ideas. • Two Gold Medal winning teams receive a $2,000 U.S. Savings Bond and a plaque for each team member along with a plaque for their school. • One team will receive the $25,000 grant as seed money to help bring its idea to life in the community. • Additional information may be found at: http://www.christophercolumbusawards.com
Discovery Youth Science Challenge (DYSC) **Entry Due:** **June** **Semifinalists Announced:** **August** **Finalist Competition:** **October** **Washington, D.C.**	Grades 6-8	• The competition is a middle-school version of the *Intel Science Talent Search.* • Students are nominated by affiliated fairs (M-DCPS selects nominees as a Special Area Award at the annual *South Florida Science and Engineering Fair*). • Students send in completed packets and receive pins and t-shirts. Superior written communication is essential for rounds 1-3. Round 4 is based on teamwork as well as individual oral communication. • Round 1 is scored according to a rubric; Round 2 selects the top 400 competitors based on the "rubric scoring"; and Round 3 selects the top 40 competitors. • Round 4 takes place at the Smithsonian Institute. The top 40 competitors receive an expense-paid trip to Washington, D.C., for the student and a parent to compete for place awards. • The Round 4 First-place award is $15,000; the Second-place award is $7,500; the Third-place award is $3,750; and students in places 4-40 receive a $500 scholarship.
Junior Solar Sprint **Florida Solar Energy Center (FSEC), Cocoa** **May** **National Competition** **Denver, Colorado** **June**	Grades 4-8	• Junior Solar Sprint challenges students to use scientific know-how, creative thinking, experimentation and teamwork to design and build high-performance solar electric vehicles. • Upper elementary and middle school students, 6th - 8th grades, are invited to design, build and race **J**unior **S**olar **S**print (JSS) cars. • The small model cars — powered entirely by solar energy and steered by wires — are built as team efforts guided by teachers. • At each event cars are judged on technology, craftsmanship and appearance. • Each car then competes in the track portion of the event. • Vehicles race until three winning teams in each category are determined. • Registration and additional information may be found at: http://www.fsec.ucf.edu/en/education/k-12/energywhiz_olympics/jss.htm
South East Regional Middle School Science Bowl **Florida Solar Energy Center (FSEC), Cocoa** **April** **National Competition** **Denver, Colorado** **June**	Grades 6-8	• Each competing team must consist of four student members. • There will be two separate parts to the Science Bowl competition at the Florida Regional – an elimination round and a double elimination contest. • Multiple Choice Questions will be used in the elimination round. • Toss-up and bonus questions will be used in the double elimination round. • Online registration: http://www.fsec.ucf.edu/ed/k12_std_act/flscibowl.htm
District Bridge Building Contest **January**	Grades 6-8 Grades 9-12	• Students in grades 6-8 build balsa wood bridges according to Dade County specifications, which remain the same from year to year. • Students in grades 9-12 build bass wood bridges according to International Rules. These rules change from year to year in various

Contest Name	Grade Level	Contest Information
		ways. • First- to third-place winners (by efficiency) in grades 6-12 receive medals. • The builders of the two most efficient bridges in grades 9-12 receive a trip to the international contest where they will represent Miami-Dade County.
District Research Paper Contest **February** **Location: TBA**	Grades 6-8 Grades 9-12	• Students in grades 6-12 may write individual Experimental Research Papers according to the *Intel* format. • Papers are submitted to a committee, and it is determined if an oral presentation will be made. • Oral presentations are 10 minutes for students in grades 6-8 and 12 minutes for students in grades 9-12. Presenters may use overhead transparencies, slides, or computers. (Students must provide their own computers.) • Judges are allowed 3 minutes for questions.
Science Olympiad Regional Competition: **February** **Florida State Competition:** **March** **National Competition:** **May**	Grades 6-8 Grades 9-12	• To create a passion for learning science by supporting elementary and secondary Science Olympiad tournaments at building, district, county, state and national levels with an emphasis on teamwork and a commitment to excellence. • To celebrate and recognize the outstanding achievement of both students and teachers in the areas of science and technology by awarding thousands of certificates, medals, trophies and scholarships. • To promote partnerships among communities, businesses, industries, government and education. • To make science education more exciting so more students will enroll in science courses and engage in other science activities like science reading, fairs, meetings and field trips. • To promote high levels of achievement and a commitment to excellence to demonstrate that American students can perform at levels that surpass expectations of even practicing scientists and engineers. • To attract more students, particularly females and minorities, to professional and technical careers in science and technology, including the teaching of those subject areas. • Each team is composed of 15 members who compete in one of five different scientific categories. • The top three middle and senior high schools attend the state competition which involves a total of 30 schools. • Additional information may be found at: http://www.floridascienceolympiad.org/ .
Florida Junior Academy of Science (FJAS) **January** **Location: TBA**	Grades 6-12	• Schools may form their own FJAS Chapter. • Individual *Experimental Research Papers* are sent to FJAS evaluators. Individual *Literary Research Papers* can also be submitted, evaluated, and selected for presentation. • Papers evaluated as superior are selected for presentation before peers and judges. Presentations can be oral and/or visual, the latter involving computers, slides, and/or overhead transparencies. • Winners are presented with plaques, cash and travel awards, i.e. National Youth Science Camp
NASA Space Settlement Contest **Submission: March**	Grades 6-12	• An international contest at which all participants receive a certificate. • Students develop space settlement designs and related materials. • The Grand Prize winner will have his/her space colony design placed on the NASA Ames website. • Additional information can be obtained at: http://settlement.arc.nasa.gov/Contest

Contest Name	Grade Level	Contest Information
South Florida Science and Engineering Fair (Projects) January	Grades 6-12	• There are 13 categories in which projects may compete, ranging from behavioral science, biochemistry, botany, chemistry, microbiology, and medicine to environmental science, earth science, computers, engineering, mathematics, physics, and zoology. • Schools are given specific allocations, and the best projects are selected to represent specific schools. • The Fair is supported by Miami Dade College and community partners • In 2006, 43 different organizations gave over $10,000 worth of prizes and awards to student participants.
State Science and Engineering Fair of Florida April Location: TBA	Grades 6-12	• Representatives are selected from regional contests (Miami-Dade County selects 30 representatives). • They receive travel and room expenses. • Individual or team experimental research from 13 categories is presented on student-created boards and is orally presented to judges. • Over $100,000 worth of scholarships, trips, work experiences, plaques, and other awards are presented to student participants.
District and State Envirothon February / March Location: TBA	Grades 9-12	• Schools receive information concerning a particular theme. In the past, topics such as fire and pollutants have been covered. • A team of 5 students compete together as a group. • The team competition involves hands-on activities in the "Great Outdoors." • The winner represents Miami-Dade at the State Envirothon.
National Canon Envirothon April Location: TBA		• The Canon Envirothon is an annual competition in which winning state teams compete for recognition and scholarships by demonstrating their knowledge of environmental science and natural resource management. • The teams, each consisting of five high school-aged students exercise their training and problem-solving skills in a competition centered on four universal testing categories (i.e., soils/land use, aquatic ecology, forestry, and wildlife) and a current environmental issue. • Additional information can be obtained at: http://www.envirothon.org
Junior Science, Engineering, and Humanities Symposium January / February University of Florida, Gainesville	Grades 9-12	• A 3-day event devoted to science, mathematics, and engineering and their interrelationship with the humanities. • Scientists sponsor tours of their laboratories, explaining the goals of their research and demonstrating their methods to small groups. • Scientists and engineers provide lectures and discussions on research of current interest. • To participate, students must have conducted individual experimental research and be able to present it orally, using slides, overhead transparencies, or computer presentations. • Nominated students receive packets to complete and transmit to University of Florida personnel who choose the speakers. • Ninth- and tenth-grade speakers must pay the registration fee of $175 and teachers must pay $200, unless they bring 10 or more students (fees include hotel costs for 2 nights plus 5 meals). • Eleventh- and twelfth-grade student speakers receive expense-paid trips as do their sponsoring teachers. They compete to represent Florida at the National Contest at which they can win a $4,000 scholarship to the college of their choice. • One speaker and 4 additional students are selected for the national trip. • Additional information can be obtained at: http://www.cpet.ufl.edu/students/jsehs/
International Bridge	Grades	• Participants are selected from regional contests.

Contest Name	Grade Level	Contest Information
Building Contest **April** **Location: TBA**	9-12	• Regional winners receive an expense-paid trip (except for some meals). • Bridge specifications change every year. • Bass wood is used because of the integrity of the bridge. • International winners receive trophies and the top 2 receive half scholarships to the Illinois Institute of Technology (if all other requirements are met). • Additional information can be obtained at: http://bridgecontest.phys.iit.edu
International Science and Engineering Fair **May** **Location: TBA**	Grades 9-12	• Participants are selected in Round 3 judging at the South Florida Regional Science and Engineering Fair. • A panel of judges interviews students. Up to 8 individual projects and 1 team project may be selected from Miami-Dade County/ • Students from the US and all over the world compete. • Research is placed on a board and orally presented to judges. • About $2,000,000 in scholarships, prizes, and other awards are presented. • The grand award is a trip to the Nobel Prize Awards in Sweden.
Regional Science Bowl **January – March** **Location TBA** **National Science Bowl** **April-May** **Washington, D.C.**	Grades 9-12	• Academic competition among teams of high school students who attend science and technology seminars, design, build and race hydrogen fuel cell model cars, and compete in a verbal forum to solve technical problems and answer questions in all branches of science and mathematics. • Each team is composed of four students, one alternate student, and a teacher who serves as an advisor and coach. • Each team winning its regional competition will represent its sponsoring entity at the National Science Bowl® in Washington, D.C • Each regional winning team's expenses for travel as well as accommodations and organized activities at the national competition are included.
Siemens Competition **Submission deadline:** **Early October** **Semifinalists announced:** **Mid-October** **Regional Finalists compete:** **November** **National Finalists compete:** **December**	Grades 9-12	• Students may write individual or team Experimental Research Papers. • Projects are 'blind read' by a panel of judges to determine semifinalists. • Semifinalists than make oral and poster-board presentations of projects followed by an intensive question-and-answer session in front of a panel of judges who will determine the national finalist. • Scholarships for winning projects range from $1,000 for regional finalists to $100,000 for national winners. Students can compete as an individual or as a member of a team. • Additional information can be obtained at: http://www.siemens-foundation.org/
The Regional Ocean Sciences Bowl: **February / March** **Location: TBA** **The National Ocean Sciences Bowl:** **May** **Location: TBA** **Contact: Laura Bracken** **305 421-4207**	Grades 9-12	• Fosters collegiality and teamwork, competition, imaginative thinking, and factual recollection. • Allows students to work side by side with experts in a wide variety of settings. • Excites and inspires our nation's teachers, providing them with new tools to capture the imagination of their students. • Timed competition for teams of high school students involves critical-thought questions. • Question topics cover the biology, physics, geology and chemistry of the oceans as well as related geography, technology, history, and current events. • Team consists of at least four student members and, in addition, may

Contest Name	Grade Level	Contest Information
		include one student alternate. • Once the competition day has started, the composition of the team must remain static. • To be eligible for the National Ocean Sciences Bowl finals, a student must have competed on the same team that won the Regional Ocean Sciences Bowl for that year. • Additional information can be obtained at: http://www.rsmas.miami.edu/outreach/student-educator/nosb
Intel Science Talent Search **Submission deadline: November** **Semifinalists announced: Mid-January** **Finalists announced: Late January** **Finalists compete: March** **Washington, D.C.**	Grade 12	• Individual students may submit Experimental Research Papers. • Research reports, entry forms, and official high school transcripts are evaluated by 3 or more scientists, mathematicians, or engineers. • Selection of semifinalists and finalists is done by judges, using all available evidence with the greatest weight being given to the Research Report. • Forty semifinalists are selected to compete at the national competition where the top finalists are chosen. • On the basis of interviews and presentation on research, 10 top scholarship winners are selected. • A total of $1.25 million is awards to the finalists. The first-place winner receives a $100,000 scholarship. • Statistics show that 95 percent of former finalists have pursued some branch of science as their major field of study. • More than 70 percent have gone on to earn PhDs or MDs. • For further information visit: http://www.societyforscience.org/STS
SECME Competitions **District Elementary and Secondary: January** **National: June**	Grades K-12	• Encourages minority students to in the areas of science, mathematics, and engineering • Involves "Saturday Seminars" to encourage students • Awards are presented at an Awards Breakfast • The National Event is a week-long convention including a competition • Olympiad and Festival Handbooks can be downloaded from the District SECME website at http://science.dadeschools.net/
Elementary Science Fair	Grades K-5	• Encourages students to become involved in science in action and science as inquiry. • The investigatory aspects of the M-DCPS Elementary Science Fair will be aligned with the current reforms in science as we move our students to forward as they compete in a global science environment. • The global environment is process-driven, inquiry-based, and allows for the use of critical Habits of Mind. • The elementary students who participate in the science fair will be able to extend their knowledge, use organizational practices, as well as generate, analyze, and assess the impact of their findings.
Junior FIRST LEGO League International (JFLL) **Registration: August** **Competition: September** **Location: TBA**	Grades 3-5	• Introduces children around the world to the fun and experience of solving real-world problems by applying math, science, and technology. • Created in partnership with the LEGO Group, JFLL is geared to children aged 6 to 9 years old and utilizes a modified *FIRST* LEGO League framework. • JFLL introduces children to the concepts of teamwork and basic design skills, creating an initial interest and hands-on approach to science and technology through the familiarity and fun of LEGO building. • Teams of up to 6 children and an adult mentor receive a mini-challenge, based on the annual FLL research project. Using an open-ended LEGO building set, the team and mentor will design a model to meet the current "quest" challenge.

Contest Name	Grade Level	Contest Information
		• Cost for participation is $90, which includes the LEGO building set. • Information and ordering instructions may be found at: http://www.firstlegoleague.org/default.aspx?pid=18130 .
***FIRST* LEGO League International (FLL)** **Registration: May-September** **Qualifying Events: November-December** **Florida State Tournament: January**	Grades 6-8	• The *FIRST* LEGO League (FLL), considered the "little league" of the *FIRST* Robotics Competition, is the result of a partnership between *FIRST* and the LEGO Group. • Extends the *FIRST* concept of inspiring and celebrating science and technology to children aged 9 through 14, using real-world context and hands-on experimentation. • Participants use the LEGO® MINDSTORMS™ Robotics Invention System™ technology to build a robot and compete in a friendly, *FIRST*-style robotics event. • Using LEGO bricks and other elements such as sensors, motors, and gears, teams gain hands-on experience in engineering and computer-programming principles as they construct and program their unique robot inventions. • A team consists of no more than ten participants and at least one adult coach. • A team must have access to a computer and the Internet, as well as the space to build and test the robot on the FLL Playing Field. The playing field is an 8' X 4' mat upon which LEGO pieces and various elements are arranged to create the Challenge missions. • Information and ordering instructions may be found at: http://www.firstlegoleague.org/default.aspx?pid=70.
National Engineers' Week Future City Competition **Registration Deadline: October** **Regional Competition: January** **Florida International University, Miami** **National Competition: February** **Washington, D.C.**	Grades 7-8	• Combines a stimulating engineering challenge with a "hands-on" application by which students can present their vision of a city of the future with the assistance of engineer mentors. • Fosters engineering skills, such as teamwork, communication, and problem solving. • Informs the community about the multi-disciplines within the engineering profession. • Inspiring students to explore futuristic concepts and careers in engineering. • Only one team from each registered school--consisting of three students, an engineer mentor, and a teacher--can compete in the final round at the regional competition. • Students design their city using *SimCity 3000*™ competition software. They design and build a scale model of a section of their city. • Additionally, students prepare a 500-700 word essay, a 300-500 word abstract, and a 5-7 minute presentation of their city. • The first-place teams in the regional competitions will travel to Washington, D.C., to participate in the national finals during National Engineers Week. • Additional information may be found at: http://www.futurecity.org/ .
West Point Bridge Design Competition **Registration: January** **Qualifying Round: January-March** **Semi-Final Round: April** **Final Round: May** **West Point, NY**	Grades 7-12	• Provides middle and high school students with a realistic, engaging introduction to engineering through the use of problem-solving experiences and the creation of devices and systems utilizing mathematics, science, and technology to meet human needs. • Students may compete individually or in teams of two members. Competing in teams of two is strongly encouraged. • Each member of the first-place team will receive a $10,000 cash scholarship. • Each member of the five finalist teams will win a notebook computer. • Additional information is available at: http://bridgecontest.usma.edu/index.htm .

Contest Name	Grade Level	Contest Information
***FIRST* Robotics Competition (FRC) Regional: March Championship: April Atlanta, GA**	Grades 9-12	• An exciting, multinational competition that teams professionals and young people to solve an engineering design problem in an intense and competitive way. • Combines the excitement of sports with science and technology to create a unique varsity sport for the mind. Helps high-school young people discover the rewarding and engaging world of innovation and engineering. • Teams comprised of 15-25 high-school-aged students. • Colleges, universities, corporations, businesses, and individuals provide scholarships to the participants worth $8 million. • Corporate sponsorship is required as the cost of the championship is approximately $15,000. • Information and ordering instructions may be found at: http://www.usfirst.org .
***FIRST* Tech Challenge (FTC) Regional: March Championship: April Atlanta, GA**	Grade 7-12	• Students get to design, build, and program robots • Apply real-world math and science concepts • Develop problem-solving, organizational, and team-building skills • Compete and cooperate in alliances and tournaments • Earn a place in the World Championship • Qualify for over $10.4 million in college scholarships • Additional information is available at: http://www.usfirst.org/roboticsprograms/ftc
JETS Contacts:	Grades 9-12	• Providing real-world engineering insight and challenges for high school students. • Students can take advantage of: student competitions, assessment tools, career guidance resources, an e-newsletter, and more. • Provides resource materials for parents and counselors, • The TEAMS competition is a one-day event that requires students to think critically. • The questions posed represent college freshman-level engineering coursework and team members should have knowledge of math, chemistry, physics, biology, and computer applications, but being an 'expert' is not required.
NAACP ACT-SO	Grades 9-12	• ACT-SO means “Afro-Academic, Cultural, Technological and Scientific Olympics. • A year-long enrichment program designed to recruit, stimulate, improve, and encourage high-academic and cultural achievement among African-American high school students. • 25 categories of competitions involving the sciences humanities, and performing and visual arts. • African-American high school students who participate must be citizens of the United States, be enrolled in grades 9-12, and be amateurs in the categories of competition. • Awards at the national level include cash scholarships up to $1,000 and medals.

Contest Name	Grade Level	Contest Information
Fairchild Challenge	Grades 6 - 12	• Sponsored by Fairchild Tropical Botanic Garden. • This series of year-long competitions encourage environmental awareness in students through a variety of multi-disciplinary competitions such as song-writing, poetry, art, habitat restoration, etc. • Challenges are designed to improve problem solving and critical thinking skills in order to develop responsible citizens. • Contest rules and registration can be found at: http://fairchildgarden.org
District Bridge Building Contest January	Grades 6-8 Grades 9-12	• Students in grades 6-8 build balsa wood bridges according to Dade County specifications, which remain the same from year to year. • Students in grades 9-12 build bass wood bridges according to International Rules. These rules change from year to year in various ways. • First- to third-place winners (by efficiency) in grades 6-12 receive medals. • The builders of the two most efficient bridges in grades 9-12 receive a trip to the international contest where they will represent Miami-Dade County.
District Research Paper Contest February 305-995-1976	Grades 6-8 Grades 9-12	• Students in grades 6-12 may write individual Experimental Research Papers according to the *Intel* format. • Papers are submitted to a committee, and it is determined if an oral presentation will be made. • Oral presentations are 10 minutes for students in grades 6-8 and 12 minutes for students in grades 9-12. Presenters may use overhead transparencies, slides, or computers. (Students must provide their own computers.) • Judges are allowed 3 minutes for questions.
National Science Decathlon East Coast Conference: March/April Location: TBA National Tournament: April/May	Grades 6-8 Grades 9-12	• Dedicated to promoting science education by organizing competitive, hands-on, science-based tournaments throughout the United States, each one made up of ten team events and up to four pilot events with sports names such as Bridge Building. • Each team consists of a maximum of five students and two alternates. At any given tournament, these teams are then broken up into smaller groups, usually pairs, who represent their team while competing in various events. • Additional information can be found at: http://www.sciencedecathlon.com/newsletters.htm .
Science Olympiad Regional Competition: January Location: TBA Florida State Competition: March Location: TBA National Competition: May Location: TBA	Grades 6-8 Grades 9-12	• To create a passion for learning science by supporting elementary and secondary Science Olympiad tournaments at building, district, county, state and national levels with an emphasis on teamwork and a commitment to excellence. • To celebrate and recognize the outstanding achievement of both students and teachers in the areas of science and technology by awarding thousand of certificates, medals, trophies and scholarships. • To promote partnerships among communities, businesses, industries, government and education. • To make science education more exciting so more students will enroll in science courses and engage in other science activities like science reading, fairs, meetings and field trips. • To promote high levels of achievement and a commitment to excellence to demonstrate that American students can perform at levels that surpass expectations of even practicing scientists and engineers.

Contest Name	Grade Level	Contest Information
		• To attract more students, particularly females and minorities, to professional and technical careers in science and technology, including the teaching of those subject areas. • Each team is composed of 15 members who compete in one of five different scientific categories. • The top three middle and senior high schools attend the state competition which involves a total of 30 schools. • Additional information may be found at: http://www.floridascienceolympiad.org/.
Florida Junior Academy of Science (FJAS) **March** **Location: TBA**	Grades 6-12	• Schools may form their own FJAS Chapter. • Individual *Experimental Research Papers* are sent to FJAS evaluators. Individual *Literary Research Papers* can also be submitted, evaluated, and selected for presentation. • Papers evaluated as superior are selected for presentation before peers and judges. Presentations can be oral and/or visual, the latter involving computers, slides, and/or overhead transparencies. • Winners are presented with plaques, cash and travel awards, i.e. National Youth Science Camp
South Florida Science and Engineering Fair (Projects) **January**	Grades 6-12	• There are 13 categories in which projects may compete, ranging from behavioral science, biochemistry, botany, chemistry, microbiology, and medicine to environmental science, earth science, computers, engineering, mathematics, physics, and zoology. • Schools are given specific allocations, and the best projects are selected to represent specific schools. • The Fair is supported by Miami Dade College and community partners. • In 2006, 43 different organizations gave over $10,000 worth of prizes and awards to student participants.
FIU/IHRC Wall of Wind (WOW) Challenge **May** **Contact:** **Erik Salna, esalna@fiu.edu**	Grades 9-12	• Teams of high school students are challenged to develop an innovative mitigation concept and solution within a well defined problem scope developed by the IHRC. • Student teams will prepare three components for the competition to address the hurricane wind mitigation challenge: a physical test, an oral presentation and a written paper. • The mitigation concepts will actually be tested by the real Wall of Wind, located at FIU's Engineering & Computing Center. • For additional information visit: http://www.ihc.fiu.edu/lwer/wowcontest/index.html
Future City Regional Competition **January** **National Competition** **February** **Regional Coordinator:** **Osama Mohammed, mohammed@fiu.edu**	Grades 6-8	• The Future City Competition is a national, project-based learning experience where students in 6th, 7th, and 8th grade imagine, design, and build cities of the future. • Students work as a team with an educator and engineer mentor to plan cities using SimCity™ software; research and write solutions to an engineering problem; build tabletop scale models with recycled materials; and present their ideas before judges at Regional Competitions in January. • For additional information visit: http://www.futurecity.org

Chapter 10
Parental Involvement

Parent Guide: Preparing Your Child for Science in the Elementary School

Science is not something mysterious. Being "scientific" involves being curious, observing, asking how things happen, and learning how to find the answers. Curiosity is natural to children, but they need help understanding how to make sense of what they see.

Bruno V. Manno, Acting Assistant Secretary Office of Educational Research and Improvement

Many people are frightened by science and see it as something that can only be understood by the minds of a genius. Often parents feel that science is too difficult and that they cannot help their children with it. However, as parents, we can help our children not only learn science, but also have a life-long love of the subject by encouraging their natural curiosity.

Increasing the number of people going into the fields of science and math is the national goal. However, even if a student is not planning to pursue a career in one of those fields, they have to be prepared to live and work in a world that is becoming increasingly complex and technical. We can begin by helping our children learn to read, write, count, calculate, and learn more about the world around them. This book will help you have fun with your children while you're helping them to learn about the wonders of science.

This guide will provide basic information about science in addition to a sample of activities and a list of books that parents can use with their children that will spark their interest. Many of these activities are simple.

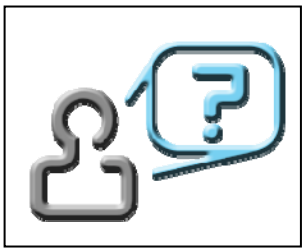
What Is Science?

Science is not just a collection of facts. Facts are a part of science. However, science is much more. It includes:

- Observing what's happening;
- Predicting what *might* happen;
- Testing predictions under controlled conditions to see if they are correct; and
- Trying to make sense of our observations.
- Science also involves trial and error--trying, failing, and trying again.

Science does not provide all the answers. Things are always changing and we learn something new every day, so we have to be willing to make changes and adjustments to our knowledge when we discover something new.

Children are a bundle of unending questions.



How do planes stay in the air?
Why does your hair turn gray?
What makes the sky blue?
Where does snow come from?

Children ask hundreds of questions like these. Where do the answers come from? Science answers many of these questions. Children are naturally curious and like to explore and investigate.

What Can Parents Do?

Science in the Home

It has been often said that parents are a child's first teacher; therefore we play an important role in how our children think about science. When we show enthusiasm for and excitement about their interest in science, we encourage their love of the subject and their desire to learn more.

Everything is a Lesson

Many people assume that all the science that a child needs to learn is taught in school, but the fact is, very little science is taught in elementary school. Because scientific knowledge builds on itself, it is important that our children begin learning as soon as possible, at home. And for those parents wondering, "No", you do not have to be a chemist or a rocket scientist to help your child learn science. Having a positive attitude about science and willingness to experience the world with your child is very important.

For those parents who do not have a lot of time due to work and multiple responsibilities, a trip to the supermarket or the laundry or on the way to the school bus can all provide opportunities to "teach science". Children can be introduced to science in their surroundings and encouraged to observe what goes on around them through every day activities such as:

- Watching the moon as it appears to change shape during a month and recording the changes.
- Watching a butterfly or bee go from plant to plant.
- Watching a drooping plant come alive after it gets watered.
- Watching a plane take off.
- Looking at the little bubbles that are in a bottle of soda.
- Watching the breath come out of your mouth on a cold day.

Learning to observe objects carefully is an important step in the scientific process. It is one of the ways we come up with answers to the many questions about our world.

Every day is filled with many opportunities to learn science. Something as simple as a small cut on your child's finger can become a lesson in science. If it becomes red and infected, you can teach your child that it is important to wash the cut and to keep it clean, and cover it with a band aid to keep dirt from entering the cut. After a few days when a scab is formed over the opening of the cut, you can explain that it is the body's way of helping to heal the cut. Another example is: if your child has a cough, you can teach that disease can spread from person to person; or that it is important to cover your mouth when you cough so that you do not spread germs to other people.

There are no stupid questions: Children should be encouraged to ask questions.

A friend once asked Isidor I. Rabi, a Nobel Prize winner in physics, "Why did you become a scientist, rather than a doctor or lawyer or businessman, like the other immigrant kids in your neighborhood?" Rabi responded: "My mother made me a scientist without ever intending it. Every other Jewish mother in Brooklyn would ask her child after school: "So? Did you learn anything today?" But not my mother. She always asked me a different question. "Izzy," she would say, "did you ask a good question today?" That difference--asking good questions-- made me become a scientist!"

It doesn't matter if we don't have all the answers. No one does. Children do not need long, complicated answers. However, when children ask questions, it offers an opportunity for us and our children to explore the answers together. Also, there are many ways to find answers- the library, the dictionary, books, the internet-are all ways to find answers.

Discuss and Listen

Children should be encouraged to talk to parents about their thoughts and ideas and parents should listen to their explanations. When you listen to we listen to our children, it helps them build confidence and skills, not only in science but also in idea building, and expressing their thoughts. It helps our children, and we the parents to figure out what our children knows.

In a nutshell, you can help your child learn science by:

- Having a **positive attitude** about science
- **Encouraging** your child's curiosity, interest in and questions about science
- **Talking** to and **sharing** ideas with your child about science
- **Listening** to your child's thoughts and ideas

It's important to repeat: Almost any situation can be used as an opportunity to teach science. For example, you can speak to your child and have him/her begin to observe the things around him/her when you're walking to school or the bus, or when you're driving in your car (the clouds or the sun, the insects and birds); when you're shopping in the supermarket (why do leafy vegetables wilt, the frost build-up in the frozen food compartment, etc…?); or while doing the laundry (the churning of the machine); or cooking dinner (what makes the steam?).

Science in the Community

The community provides many opportunities to learn and explore the world of science. Below are some examples of some of the science oriented community based organizations also known as Informal Science Institutes.

ZooMiami

A trip to the zoo can be fun as well as educational. The zoo offers an opportunity to learn about the natural world and the different types of animals, their behavior, and their environment. Inquire about the petting zoo where children are allowed to touch and feed the animals.

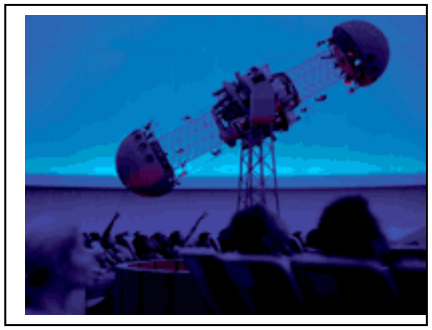
- **Guessing Game** - helps your child understand structure and function of animals:
  - "Why do you think seals have flippers?" (They use them to swim through the water).
  - "Why do you think turtles have hard shells?" (It protects them from their enemies).
  - "Why do you think the ibis had a long narrow beak?" (They use their long beaks to dig in the dirt for food).
  - "Why do you think apes have long dangling arms? (Their arms help them swing through trees).

- **Compare and contrast -** helps your child understand relationships. Have them compare sizes, shapes, feet, ears, feathers, claws, or scales of different animals.
  - "Does the house cat and the jaguar alike? How are they alike? How are they different?"
  - Does a chimpanzee look like a gorilla? How are the alike? How are they different?
  - How is the female lion different from the male lion?"

- **Tips to make your visit more fun:**
  - Talk to your child about the zoo before you get there. (What do you think you'll see there?")
  - Don't try to see everything in one visit. Zoos are large places, and children, particularly small ones can become overwhelmed and tired. Also, it makes anticipating the second trip very exciting.
  - Try to visit zoos at off times or hours. Very early on a Saturday may have less people than later in the day. Holidays may have more people. This gives the child a chance to see the animals without being blocked by crowds.

- **Plan follow-up activities:**
  - If your child especially liked the tigers, take him/her to the library and get books on tigers. Have him/her draw pictures of tigers or write a story about tigers.

Miami Science Museum and Planetarium



Museums can be found in most communities and there are many different types of museums. There are science and technology museums, natural history museums, and children museums. If possible, you should look for museums that offer hands-on opportunities, special science classes, and that have omni theaters. You will find all of these features at Miami Museum of Science. You can use your public library, the yellow pages, or the internet to find other museums that are located close to you and to find out about special events or exhibits. *Use the same tips given for the zoo visit with your museum visit.

There are approximately 1,000 planetariums in the United States that offer many exciting activities and exhibits for children. The Miami Museum of Science has a planetarium attached to it. At the planetarium you can do things like see the sky clearly, see the rings of Saturn, and step on a special scale and see how much you would weigh on the moon or on Mars.

Miami Seaquarium

Aquariums offer a chance to see different kinds of creatures from the ocean. The Miami Seaquarium is a marine-life entertainment park with eight different marine animal shows and presentations offered daily. Your child can see killer whales, dolphins, manatees, sea lions,

and endangered sea turtles. In addition to their educational programs during the year, they conduct an educational summer camp every summer. They also have a "**Swim with Our Dolphin Program."** Call before you go and find out when they are feeding the animals. Ask about the schedule for the seal and dolphin shows.

Jungle Island (formally Parrot Jungle Island*)*
Jungle Island is a theme park that offers animal stage shows, one-of-a-kind aviaries, plant nurseries, jungle trails, a petting farm and educational exhibits. In addition to other activities and programs, Jungle Island features an open-air arena, an Everglades Habitat, and a serpentarium with a huge collection of reptiles and amphibians, including an extremely rare albino alligator and a 21-foot crocodile.

Monkey Jungle
Monkey jungle is a unique park that is built so that people walk through a wired walk-way while the primates swing from trees and interact with each other unbothered by what's going on around them. Their theme is, "Where Humans Are Caged and monkeys run wild." It has an Amazonian Rain Forest that has hawks, raccoons, and yellow rat snakes, in addition to monkeys. Call to get the feeding schedule before you go.

Fairchild Tropical Botanic Garden
Fairchild Tropical Botanic Garden has a large assortment of plants from all over the world. It offers a wide variety of community and outreach programs in environmental education, conservation, and horticulture. Fairchild works closely with the schools in South Florida, both public and private. Two of its programs are the **LEAF ("Let's Explore at Fairchild") program** which is a weekly series of Saturday nature adventures in the Garden for 8- to 12-year-old children and **The Fairchild Challenge** is for middle and high school students.

Deering Estate
The Deering Estate at Cutler is a park and educational facility that has programs for children and adults. They have experienced Naturalists and Guides gives tours and programs to any grade level or interest. The park offers daily natural area tours through the park's protected habitats. For example, the Park's offshore island of Chicken Key, a restored bird rookery, can be visited via scheduled canoe tours. The park is made up of endangered pine rockland habitat, (among the largest blocks of this ecosystems remaining in the United States), as well as coastal tropical hardwood rockland hammocks, mangrove forests, salt marshes, a coastal dune island and the submerged resources of Biscayne Bay.

Farms
A visit to a farm is a fun way to teach science to your child. Some public parks have tiny farms with small farm animals that allow children to touch and feed the animals. Some offer pony rides for a small fee. **Amelia Earhart Park** in Hialeah is an example of this type of park. Also, there are private petting farms that are set up for the purpose of enabling children to learn about farm animals through touch and play under the supervision of adults. You can find out about other such farms through your public library, your local park service, 4-H Clubs, and the internet. A visit to a farm gives the child an opportunity to learn the difference between a cow, a heifer, and a calf; milk a cow; see farm equipment, sit on a tractor, and find out how tractors work. If you visit a farm that grows crops, the child gets to see how vegetables grow, how they look before they end up in the supermarket, and ask questions about the different ways plants grow.

Nature Hikes

Many communities have parks, forests, wooded or nature areas where you can go for walks.

Sometimes there is a guide that will take you out on a trail and gives information about the plant and animal life in the area as you walk. If this type of area is not available to you, take your child for a walk around the neighborhood and help him/her collect rocks, identify leaves, observe spiders, bees and ants, try to identify the different types of butterflies and birds, and talk about the different trees, plants, and flowers that you all see.

Science Camps

There are many organizations that run camps during the year. Organizations such as National Audubon Society, U.S. Space Camp, and the National Wildlife Federation operate camps for children who love ecology, nature, or space science.

Other Community Resources

Check to see if field trips can be arranged through your child's school, your child or community group to places such as botanical gardens, weather stations, hospital laboratories, sewage treatment plants, newspaper plants, or radio and television stations.

Library or bookstores

The library is a very good source of information on any and all areas of science. Available are books, videos, tapes, and DVDs that can be borrowed if your child is interested in exploring different areas of science. Your child can learn about science from "non-science" books, such as fiction, biographies, autobiographies, and history books, too.

Many bookstores today have reading areas or corners with sofas, chairs, or pillows that your child can use to sit and read quietly. If you need help selecting books for your child, speak to the librarian or bookstore personnel.

What's In Your Backpack? – Preparing for Middle School Science Success

HOW TO STUDY SCIENCE

Science knowledge is cumulative. That means that one bit of knowledge builds on another. For that reason, it is important that you understand each day's information, because what you learn tomorrow will depend on what you know today.

Learning

1. Figure out your learning style.
   - ❖ Some people are ***auditory learners***. Do you learn best when you hear information; for example, a teacher's lecture, class discussions, an auditory tape, or talking to yourself?
   - ❖ Some people are ***visual learners***. Do you learn best when you see the information; teacher's writing on the board, pictures, diagrams, graphs, written notes, flash cards, information on overhead projectors, etc.?
   - ❖ Some people are ***tactile learners***. Do you learn best when you move about and handle things? Do you do best in hands-on situations?
2. Use your learning style whenever you can. It is your strength.
3. Use all your senses. Combine styles whenever possible.

Let's Get Started

Before Class

1. Re-familiarize yourself with the information before class. Quickly re-read sections of the chapter that will be covered by the teacher.
2. Write down questions that were generated from your reading to ask your teacher in class.

During class

- ❖**Be prepared for anything**
  Collect the phone numbers of two or three of your classmates who can be called if you forget school information or have a question during the evening. Make sure that they are dependable.
- ❖**Stay Organized**
  Write all homework and assignments in your agenda book. Make sure to include all directions and dates that the assignments are due.
- ❖**Taking notes in class**
  1. Be on time and be prepared.
  2. Pay close attention and focus on what your teacher is saying.

3. Take good notes, but try to learn directly from what the teacher is saying in class.
4. Take class notes on the right side of your notebook page, and leave the facing left page to add related notes that you take from your text.
5. Write down as much as possible (don't assume that you'll remember).
6. Listen for "signal statements" that let you know that the teacher is about to say something important that you should write down in your notes. Some signal statements are "This is important because…", "Remember that…"
7. "The most important point…" Listen for concepts, rules, formulas or problems that the teacher emphasizes.
8. Include things that the teacher repeats or writes on the board.
9. To be sure that you get down all the important information, use short sentences, symbols ("%" instead of percentage, "&" instead of and, etc.), and abbreviations (w/o instead of without, b/w instead of between, etc.) whenever possible.
10. Put a question mark next to information you are not sure about.
11. If you miss something, write down key words and ask the teacher about it right after class.
12. Compare notes with other students to be sure that you didn't miss anything.
13. Ask questions if you do not understand something the teachers has said.

After Class at Home

Review of what you learned during the day begins after class and continues at home.

Reviewing what you've learned

1. Look over the notes you take in class every day.
2. Re-write your notes making them neater and more organized.
3. Look up any information that you have questions about and make any necessary corrections in your notes.
4. Combine your class notes with notes from your text book.
5. Make flash cards with terms you want to remember.

Reading the Text

1. Read your science book carefully. Do not skim or speed read.
2. Scan the chapter before you begin reading.
3. Read the title, introduction, headings, and the summary or conclusion.
4. Examine all visuals such as pictures, tables, maps, diagrams, charts, illustrations, and/or graphs and read the caption that goes with each.
5. Use the headings to form questions about what the section is about, asking what, where, why, how (A heading that says, "Types of Energy", you would ask, "What are the types of energy?").
6. Read the information under each heading.
7. As you read, highlight the headings and bolded words or words in italics.
8. Take notes and write the headings and the answers for the questions under each section (**stop at a new concept and write it down).
9. Write down terms you do not understand and look it up or ask the teacher.
10. Don't fall behind in your reading. Study skills build every day. Don't cram.

What is different about reading in science?

1. Readings contain large amounts of specific facts and details.
   You have to understand the information in order to process the details.
2. Science vocabulary is important. Understanding this vocabulary helps you to understand the information. Reviewing the terminology before you begin reading helps you to understand the information (science vocabulary is usually bolded or italicized).
3. There are numerous diagrams, figures, charts, and graphs. They help you to understand and remember the information (you should take time to study them before you begin to read).
4. Research is an additional part of the information. You must understand the basic ideas in order to read and understand the research. Research takes an idea, analyzes it, synthesizes it, and extends it.

How does one read science?

1. Look over the chapter before you start reading—look over titles, introductions, subheadings, the first few sentences beneath the subheadings, figures, diagrams, italicized or bolded words and terms, and summaries. As you look over the chapter, ask yourself:
   - What is this about?
   - What do you know (or don't know or don't remember) about this?
   - Where does the author begin and where is he going?
   - What is the organizational pattern (relationships, chronological, topics?)
   - How does it fit into what we are learning in this class?
   - How difficult or how easy is this?
   - Are there vocabulary words that are unfamiliar or that I need to review?
   - How important is this information (are there parts can skim and get the main idea?)?
   - Where can I make reasonable breaks in the reading to divide up my study time?
2. Read the chapter (Use tips provided in "Reading the Text".)





Preparing for class

1. Make it a habit to review your agenda every night.
2. Work on assignments right away (Begin with the ones that are due first).
3. Have all homework and assignments completed and ready to be turned in on time.
4. Have all your assigned reading done.
5. Place all homework/assignments in your bag as soon as they are completed.
6. Place everything needed for class the next day (agenda, textbooks, homework/assignments, supplies- notebook or paper, pens, pencils, sharpener) in your bag before you go to bed.
7. Place your bag in the same place at all times so you won't forget it.
8. Put out your clothes and whatever you're going to wear the night before.

Preparing to study

1. Find a place that is quiet and free from distractions.
2. Make sure it is comfortable and well lit.
3. Collect all the materials and supplies (pens, pencils, paper, erasers, calculators, reference sources such as a dictionary, thesaurus, atlas, etc.) that you need and place them in your study spot.

Studying for a Test

1. Use the same place for studying if possible.
2. Eat dinner and turn off your cell phone before you begin so that there is no major interruption to the process.
3. Use study techniques that emphasize your learning style.
   - ❖ Read over your notes and look for things that were stressed by the teacher.
   - ❖ Make a list of major concepts and formulas that were covered.
   - ❖ Read the headings and bolded words in your textbook and be sure you understand each section.
   - ❖ Explain it to yourself like a story.
   - ❖ Record yourself reading your notes on your IPOD/Mp3 player or recorder and play it back to yourself.
   - ❖ Explain the information to your parents, brother or sister.
   - ❖ Write the information on flash cards and have someone quiz you.
   - ❖ Use practice tests to test yourself.
4. Do not leave studying until the last minute.

Before the Test

1. Get a good night's sleep so that you are not tired when you're taking the test.
2. Eat a healthy breakfast (do not over-stuff yourself).

*** Breakfast ideas**







Test Anxiety

When someone has too much anxiety about a test, it is called **test anxiety**. It is normal to feel some anxiety when you have to take a test. In fact, a little anxiety can help keep you alert and motivated when you are preparing for and taking the test. However, too much anxiety can keep you from remembering what you need to know for the test and keep you from functioning. It can block your performance and keep you from demonstrating what you know on the test.

How do you know if you have Test Anxiety?

You probably have test anxiety if you answer **Yes** to four or more of the following:

1. I have a hard time getting myself to begin studying when I have to get ready for a test.
2. When I am studying for a test, I find many things that distract me.
3. I expect to do poorly on the test no matter how much or how hard I study.
4. When I am taking a test, I experience physical discomfort such as sweaty palms, an upset stomach, a headache, difficulty breathing, and tension in my muscles.

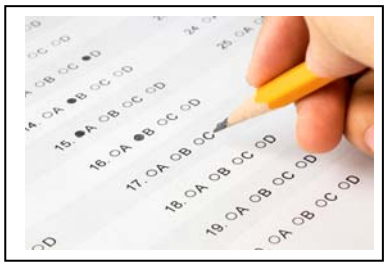
5. When I am taking a test, I find it difficult to understand directions and questions.
6. When I am taking a test, I have difficulty organizing my thoughts.
7. When I am taking a test, I often go blank.
8. When I am taking a test, I find my mind wondering to other things.
9. I usually score lower on tests than I do on other assignments, even when I know the material.
10. After the test, I remember all the information I could not remember during the test.

What can you do about Test Anxiety?

Here are some of the things that you can do before, during, and after the test to help you reduce some of the anxiety.

1. Do your best to prepare well for the test. This will help you go into the test more confidently. *Use the tips we provided in **"Preparing to Study" and "Studying for a Test".**
2. Get plenty of rest the night before the test.
3. Eat a light, but nutritious meal before the test (stay away from junk food).
4. Have a positive attitude as you study. Think about doing well, not failing.
5. Try to stay relaxed during the test. Taking slow, deep breaths can help. Focus on positive statements such as, "I can do this."
6. Follow a plan for taking the test. *Use the tips given in "Taking the Test". Don't panic even if you find the test difficult-**Stay with your plan!"**
7. Don't worry about other students finishing before you. Take the time you need to do your best.
8. When you are finished, turn in the test. While you wait for the results of the test, turn your attention to other assignments and tests that are coming up.
9. When the graded test is returned, look it over to see how you could have done better. Learn from your mistakes and from what you did well. Apply what you have learned when you take the next test.

Taking the Test



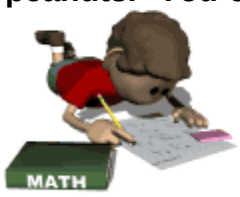
1. Read test directions very carefully.
2. Ask the teacher to explain anything in the directions that you do not understand before you begin the test.
3. Look over the test and see how much you have to do.
4. Once you've looked over the test, decide how much time you will spend on each part.
5. Complete the easy questions first, and then move on to the other problems in order of their difficulty.
6. If there are different points for sections, concentrate on the sections that are worth the most points first.
7. When working on a problem or question, show all the steps to maximize your chances of increasing your points.
8. If you have time, check your answers and make sure they are complete and accurate.
9. Check the directions again to make sure that you followed it correctly and that you answered all the questions you were supposed to.

General Science Study Tips

The main reason why students do poorly in science is not because the do not have the ability, but because of poor study habits and time management skills. Below are a few suggestions that may help you. It will take time and practice to develop good study skills. Don't give up. It's worth it in the long run.

BRAIN FOOD

Before you study science or take a test, eat some of the following foods. It has been shown that these foods help you remember and do better on tests. These foods are: **apples, pears, grapes, peaches, turkey, fish, lean beef, broccoli, and nuts, especially peanuts. You can also drink low fat milk and eat low fat yogurt**.



How Much Time Should You Spend Studying?

***** There is no specific amount of time that is ideal for studying.
***** You should study for as long as it takes you to understand (not memorize) the information.
***** The important thing is to understand the material, not put it a lot of time.

When Should You Study?

***** Studying should go on at all times. It should not be left until just before a test.
***** Review your notes later on the same day that information is given (it helps you to remember it longer).
***** You not mix study time and play time.
***** Don't get stressed out. For most people, studying for several shorter sessions over a long period of time is better than cramming during one long study session.

General Study Tips (for daily use)

***** Do all assignments right away, not the day (or minute) they are due (this includes reading assignments).
***** Keep a pen/pencil in your hand at all times (studying is an active process.
***** Write terms and concepts over and over in your own words (don't look at your notes or the text book).
***** Reading a textbook is not like reading a novel; read for detail, information, and understanding.
***** Pre-view the material before reading and break it into manageable sub-sections to be tackled one at a time.
***** Read your assignments (textbook also) with the objectives in mind.
***** Moving a card or pencil along as you read may help keep your attention focused on what you are reading.
***** Write key terms, concepts, and your own questions; do not highlight the entire pages of your text book.
***** If you do not understand something that you've read, write down questions to ask your teacher the next time you go to class.
***** Use all your senses write the information, tape it on your mp3 player or recorder, sing it, repeat it to yourself, discuss it with friends or family, draw diagrams or pictures, etc.
***** Study difficult material over and over again.
***** Study by yourself and with classmates.
* Choose a friend that is serious.
* Test each other on the information.
* Spend some time studying and concentrating on you especially to test time.
***** Participate in class activities.

*** Ask Questions, Ask Questions, Ask Questions!!!**

Basic Keys To Success

 **Believe in yourself.**

 **Like yourself the way you are, but always strive to be your best.**

 **Respect yourself and others. Look up the word, *INTEGRITY.***

 **Always do your best, it is a reflection of you.**

 **Have a dream and follow it, but be realistic.**

 **Set goals and work them.**

 **Be ready to make adjustments when necessary.**

 **Never give up. Remember the word, *PERSERVERANCE.***

 **Recognize your weaknesses, but build on your strengths.**

Chapter 11
Community-based Informal Science Institutions

CBO	Name	Address	Telephone	Email
AUDUBON OF FLORIDA	Margret Spontak	444 Brickell Ave #850 Miami, FL 33131	(305) 371-6399 Fax: (305) 371-6398	MSpontak@Audubon.org
BISCAYNE NATIONAL PARK	Maria Beotegui	9700 SW 328 St. Homestead, FL 33033	(305) 230-1144 x 004 Fax: (305) 371-6398	Maria_Beotegui@nps.gov
DEERING ESTATE AT CUTLER	Karen Solms	16701 SW 72 Ave Miami., FL 33157	(305) 235-1668 x 242	KSolms@miamidade.gov
DREAM IN GREEN	Karla Utting	3000 Biscayne Blvd. Ste. 211 Miami, FL 33173	(305) 576-3500	karla@dreamingreen.org
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Chapter 12
Closing the Achievement Gap in STEM

An underlying principle of the K-12 Comprehensive Science Plan is to eliminate the achievement gap of underserved and underrepresented students by fostering instructional programs and teaching strategies that serve all students and accommodate diverse needs and learning styles.

There are several initiatives implemented that support underserved and underrepresented student participation, motivation and interest in pursuing science, technology, engineering, and mathematics (STEM) studies and careers. These endeavors involve the community, businesses, institutions of higher learning (IHE), informal science institutions (ISI), and parents in supporting STEM exposure.

These initiatives provide quality STEM education to *all students* by establishing an integrated strategy to deliver relevant and engaging new knowledge and experiences, identify best STEM educational practices, form alliances with stakeholders that work to achieve the vision of M-DCPS and the National Science Foundation, and ensure that students have the knowledge and skills necessary for success in the global economy.

P-SELL

Promoting Science among English Language Learners (P-SELL) is a five-year research project (2004 – 2009) funded by the National Science Foundation (NSF). The University of Miami and M-DCPS have joined forces to improve elementary school teachers' knowledge, beliefs, and practices involving their teaching of science to all students, especially ELLs, within an environment driven by high-stakes testing and accountability. The four main target areas of the research are: (1) teachers' initial knowledge, beliefs, and practices; (2) professional development intervention; (3) policy contexts; and (4) improvement among teachers and their students, specifically ELLs. Selection of the schools was based on (1) high percentage of ELLs (Spanish or Haitian Creole), (2) high percentage of students on free and reduced price lunch programs, and (3) low-performing schools according to the state's accountability plan.

P-SELL was initially implemented in nine elementary schools in grades 3 through 5, including six treatment schools and three replication schools. Based on the Florida Science NGSSS, P-SELL promotes inquiry-based science focusing on hands-on and minds-on activities. In addition to science, P-SELL integrates English literacy and mathematics into its curriculum. Results from the first three years of implementation indicate a continued improvement in students' achievement gains in science as well as mathematics, reading, and writing. These results have prompted the development of the P-SELL Institute, a summer professional development initially aimed at 5th grade science teachers. After the initial five-year research project, the P-SELL collaboration has continued and expanded to thirty-one elementary schools during the 2012-2013 schools year. With this in place, the next step will be to integrate the P-SELL curriculum into the District's curriculum by choosing the best strategies and activities and aligning them to the Curriculum Pacing Guides and the Scott Foresman Series. Additional funding for scaling-up purposes is also likely.

SECME

SECME, formerly the Southeastern Consortium for Minorities in Engineering, is a national strategic alliance to renew and strengthen the professional capacity of K-12 educators, motivate and mentor underserved, underrepresented, differently-abled students, and empower parents so that all students can learn and achieve at higher levels. SECME encourages K-12 students to pursue careers in science, technology, engineering and mathematics (STEM) through partnerships with local universities, government and industry agents. The activities incorporated within the program are hands-on and require teamwork -- two strong characteristics of a rigorous, quality curriculum. The culminating competition is an annual engineering Olympiad for secondary schools and an Engineering Festival for elementary schools that showcases and tests STEM projects designed and constructed by students. SECME students and engineers have appeared on local television programs such as Club E and "Mathematics, Science & Engineering At Our Schools" that showcased SECME engineering activities and career tips for students.

Currently, SECME in Miami-Dade County Public Schools reaches more than 100 schools (K-12) and directly impacts teachers at those schools and over 2,000 students and their parents.

SECME Stars

SECME Stars is a 21st Century Grant Community Learning Center before/after-school program, with an emphasis on the STEM areas as well as reading readiness, physical fitness, nutrition, and character education. There were eight centers established in Miami-Dade County Public Schools. The SECME Stars I program was established 2004-2005 and ran through 2008-2009. Participating schools were, Hubert O. Sibley Elementary, Coconut Palm K-8, Barbara Hawkins Elementary, and Ernest Graham Elementary. The SECME Stars II program began in 2007-2008. The current schools are Carol City Elementary, Golden Glades Elementary, Miami Park Elementary, and W J Bryan Elementary. Each site serves a minimum of 120 students daily. The target population consists of K-5 students at Title I schools that did not meet AYP. All eight schools maintain a high percentage of families living below the poverty level and students scoring in the lowest performing levels of 1 and 2 on the Florida Comprehensive Assessment

SECME Stars III

SECME Stars III 21st Century Community Learning Center (CCLC) after school program serves students and their families from select Title I schools. The goal of SEMCE Stars III is to engage every one of our students and ultimately develop higher order thinking skills translating into academic achievement as we meet the challenges of the 21st century. SECME Stars III will utilize scientifically based academic components shown to contain coherent instructional designs, which enhances learning, increases student academic performance and student engagement.

DATA

The data included in this report reflects student achievement by science clusters/reporting categories. A review of the data reveals that students are still performing below the expected targets on all clusters/reporting categories. Therefore, the critical need for a rigorous science curriculum, quality science instruction, communication and coordinated services for delivery and progress monitoring are the key areas of focus for this Plan.

2012-2013 FCAT and Biology EOC Results

FCAT 2.0 Science - Grade 5										
Year	Total Students Tested	% Levels 3-5	Nature of Science		Earth and Space Science		Physical Science		Life Science	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2013	25,560	51	10	60%	16	75%	16	63%	14	71%
2012	26,105	49	10	70%	16	69%	16	63%	14	71%

A review of the FCAT 2.0 Science-Grade 5 results from 2012-2013 reveals an increase of 2 percentage points for students scoring a level 3-5 on the FCAT Science Test. The data demonstrates a significant increase in percentage of correct responses by students in the Earth/Space reporting category by 6 percentage points. The Reporting Categories with the least amount of growth was Nature of science with a 10 percentage point change and Physical Science and Life Science with no change for 2013.

FCAT 2.0 Science - Grade 8										
Year	Total Students Tested	% Levels 3-5	Nature of Science		Earth and Space Science		Physical Science		Life Science	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2013	25,605	42	11	55%	15	60%	15	60%	15	60%
2012	26,513	44	11	55%	15	60%	15	60%	15	60%

A review of the FCAT 2.0 Science-Grade 8 results from 2012-2013 reveals a change of 2 percentage points for students scoring a level 3-5 on the FCAT 2.0 Science Test. The data demonstrates no change in percentage of correct responses by students in the Nature of Science, Earth and Space Science, Physical Science, and Life Science reporting categories. The Earth and Space Science, Physical Science, and Life Science reporting categories had the largest percentages during this period.

Biology End of Course Exam (EOC)							
Year	Total Students Tested	% Levels 3-5	Percentage in Each Achievement Level				
			1	2	3	4	5
2013	25,665	63	13%	25%	38%	12%	13%
2012 (retro fitted)	25,858	51	20%	28%	34%	9%	8%

A review of the Biology EOC results from 2012-2013 reveals a significant increase of 14 percentage points for students scoring a level 3-5 on the Biology EOC Test. The data also demonstrates a significant increase in percentage of students scoring in levels 4 and 5 since 2012 in the Biology EOC in all grade levels.

FCAT Results

FCAT Science - Grade 5										
Year	Total Students Tested	% Levels 3-5	Physical / Chemical		Earth / Space		Life / Environmental		Scientific Thinking	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2011	26,422	49	13	69%	11	64%	13	69%	14	64%
2010	26,367	44	14	64%	10	70%	13	62%	14	57%
2009	25,801	42	12	58%	13	54%	13	62%	13	54%
2008	25,875	39	12	58%	14	50%	13	62%	12	58%
2007	25,993	34	12	50%	15	47%	12	50%	12	50%

A review of the FCAT Science-Grade 5 results from 2007-2012 reveals an increase of 14 percentage points for students scoring a level 3-5 on the FCAT Science Test. The data demonstrates a significant increase in percentage of correct responses by students in the Physical/Chemical, Earth/Space, Life/Environmental, and Scientific Thinking clusters since 2007.

FCAT Science - Grade 8										
Year	Total Students Tested	% Levels 3-5	Physical / Chemical		Earth / Space		Life / Environmental		Scientific Thinking	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2011	26,534	41	13	62%	11	55%	14	57%	13	62%
2010	26,250	34	14	57%	13	54%	14	57%	10	60%
2009	25,555	34	13	54%	11	45%	13	54%	14	57%
2008	22,885	35	13	54%	11	45%	13	54%	14	50%
2007	26,580	29	14	36%	12	58%	13	46%	12	50%

A review of the FCAT Science-Grade 8 results from 2007-2011 reveals an increase of 12 percentage points for students scoring a level 3-5 on the FCAT Science Test. The data demonstrates a significant increase in percentage of correct responses by students in the Physical/Chemical, Life/Environmental, and Scientific Thinking clusters since 2007. The Earth/Space cluster demonstrated a 3 percentage point decrease over the last five year period.

FCAT Science - Grade 11										
Year	Total Students Tested	% Levels 3-5	Physical / Chemical		Earth / Space		Life / Environmental		Scientific Thinking	
			Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct	Possible Points	Avg. % Correct
2011	20,617	37	13	62%	12	58%	15	53%	11	64%
2010	23,260	30	16	50%	12	58%	12	50%	11	55%
2009	21,764	29	13	46%	12	50%	14	50%	12	50%
2008	22,079	29	14	43%	12	50%	14	43%	11	55%
2007	22,136	26	13	38%	12	50%	12	42%	14	50%

A review of the FCAT Science-Grade 11 results from 2007-2011 reveals an increase of 11 percentage points for students scoring a level 3-5 on the FCAT Science Test. The data demonstrates a significant increase in percentage of correct responses by students in the Physical/Chemical, Earth/Space, Life/Environmental, and Scientific Thinking clusters since 2007. The cluster with the least amount of growth was Earth/Space with an 8 percentage point increase over the five year period.

Miami Dade County Public Schools Science Plan also provides college readiness programs for minorities and for low-income students. Access to AP, the most widely used college readiness program in the state, and other programs, such as International Baccalaureate (IB), Cambridge Academy, and Dual Enrolment remains the best option for exposing and challenging students to the rigor and content of the college curriculum. Data to support increasing participation and performance in Advanced Academic Programs

Closing the Achievement Gap

- The total number of students in the African American subgroup participating in gifted education increased by 65% from 3,492 in 2005 to 5,778 in 2010.
- The total number of students in the Hispanic subgroup participating in gifted education increased by 51% from 14,858 in 2005 to 22,401 in 2010.
- The total number of students in the African American subgroup participating in middle school advanced Program increased by 5% from 7,606 in 2006 to 7,961 in 2010.
- The total number of students in the Hispanic subgroup participating in middle school advanced Program increased by 28% from 19,770 in 2006 to 25,396 in 2010.
- The total number of students in the African American subgroup participating in Honors 9-12 Program increased by 168% from 3,643 in 2005 to 9,758 in 2010.
- The total number of students in the Hispanic subgroup participating in Honors 9-12 Program increased by 155% from 12,083 in 2005 to 30,843 in 2010.
- The total number of students in the African American subgroup participating in Advanced Placement Program increased by 58% from 2,305 in 2005 to 3,643 in 2010.
- The total number of students in the Hispanic subgroup participating in Advanced Placement Program increased by 58% from 9,742 in 2005 to 15,417 in 2010.
- The total number of students in the African American subgroup participating in the Dual Enrollment Program increased by 148% from 343 in 2005 to 850 in 2010.
- The total number of students in the Hispanic subgroup participating in the Dual Enrollment Program increased by 123% from 801 in 2005 to 1,788 in 2010.

Strategies for increasing participation and performance:

- All senior high schools are required to offer and staff a minimum of eight Advanced Placement courses and test all students who enroll in an AP course.
- All elementary, middle, and senior high schools are required to provide gifted services to eligible students.
- The Advanced Placement Student Curriculum Review was held in March 2011 providing approximately 900 students with an overview of the Advanced Placement (AP) course curriculum and strategies for success in the AP exam.
- In partnership with Florida International University (FIU), the district established procedures for expanding Dual Enrollment (DE) course offerings on the high school campus. By accrediting Miami-Dade County Public School teachers with the Southern Association of Colleges and Schools (SACS) certification, Miami-Dade teachers are able to teach Dual Enrollment courses in Math, Social Science, and English, on the high school campus.
- Expansion of the Dual Enrollment (DE) high school in collaboration with Florida International University (FIU), Academy for Advanced Academics (AAA at FIU), from 80 students in 2009-2010 to 98 students in 2010-2011.

APPENDICES

APPENDIX A
6-Year STEM Plan

The 6-Year STEM Plan

The Science Department has developed a 6-Year STEM Plan that began in 2008 and is comprised of the following three elements:

- A Rigorous Science Curriculum
- Quality Instruction
- Communication and Coordination of Services

STEM Initiative

Our Vision

Miami-Dade County Public Schools aspires to engage and prepare all our students in Science, Technology, Engineering and Mathematics (STEM) to ensure our community has the next generation of inventors, explorers, innovators and leaders.

Our Mission

The mission of Miami-Dade County Public Schools STEM is to leverage the expertise and capital of the Department of Career and technical Education and the Department of Mathematics and Science to increase student achievement in STEM curriculum to enhance career and college readiness.

Description

The focus of the sixth year of the plan will be to accelerate the sustained progress from the plan by incorporating a STEM Initiative. The future of the United States depends on our capacity to increase the number of professionals in the STEM fields. This can only be accomplished through students pursuing post secondary studies and careers in the areas of STEM. Some of the STEM initiatives M-DCPS supports through the Department of Mathematics and Science, and the Department of Career and Technical Education (CTE) include the STEM Expo, Mobile STEM Labs, Wall of Wind (FIU/IHC) Challenge, FCR-STEM institutes, and UF STEM Tips.

Many of the initiatives may be implemented across curriculum and the initiative encourage such collaboration. Schools will find the information on the district STEM website (stem.dadeschools.net) useful for creating School Improvement Plan (SIP) STEM strategies.

A Rigorous Science Curriculum

Description

The approval of the new Florida Next Generation Sunshine State Standards (NGSSS) for science by the State Board of Education in February 2008 was an effort by the State to improve student performance, reduce the achievement gap among underrepresented groups, and increase the number of high school graduates that are prepared to continue onto post-secondary education and into a global workforce. More recently, the Common Core State Standards for English Language Arts and Mathematics (CCSS) have been developed in collaboration with various state Departments of Education, businesses, and institutes of higher learning to increase the college and career readiness of students. The baseline of the 2008 NGSSS was assessed for the first time in the Science FCAT in the spring of 2012. In order to increase the level of rigor and infusion of literacy required by the state standards, the current District Curriculum Pacing Guides (CPGs) has undergone a gradual transformation to allow for the infusion of the NGSSS and English Language Arts Literacy and Mathematics CCSS.

Current Status
In M-DCPS, the CPGs have been developed and implemented for grades K-8. In grades 9-12, the CPGs focus on specific subject areas. The CPGs are aligned to the Florida NGSSS (2008). As of 2012, all District curriculum, professional development, and instruction for all grade levels were aligned to the NGSSS and CCSS for English Language Arts Literacy and Mathematics. In an effort to make this transition seamless, an implementation plan was designed to include a gradual roll-out from awareness to full implementation through professional development, and coordination of services among stakeholders.

Analysis and Development
Starting in 2008, the existing curriculum underwent systemic revisions to address the following issues: 1) the preparedness of high school graduates, 2) the alignment of the P-12 curricula and assessment to the NGSSS (2008), and 3) the instructional support of P-12 teachers to ensure that they remain current in STEM content knowledge and pedagogy. In addition, the revisions ensure the vertical alignment of curricula among the elementary, secondary, state, national, and international standards and assessment; and recommend that teachers receive a high level of instructional support. The existing CPGs are aligned to the NGSSS (2008). During the 2008-2009 school year, CPGs for grades K, 3, 6, and 9 were created to address a global STEM education aligned to the new NGSSS and were fully implemented in the 2009-2010 school-year. During the 2009-2010 school year, CPGs were aligned and ready for implementation the following year for grades 1, 4, 7, and 10. This process repeated each year until all grade levels have realigned CPGs in 2012 for the baseline assessment of the NGSSS. The final implementation phase of the new curricula occurred when all CPGs were in use for at least one year for all grades in the 2011-2012 school year. This year also marked the introduction of the CCSS into the pacing guides.

Quality Instruction

Description
Central to the collaboration between stakeholders and the capacity to sustain science programs, is the teacher. In order to build the instructional capacity of schools to implement effective science programs, school-site leaders must feel empowered to provide successful instructional strategies. According to the National Science Education Standards, science teaching is a complex activity that lies at the heart of the vision of science education. These standards provide criteria for making judgments about instructional progress and describe what teachers of science at all grade levels should get science students to understand and be able to do. However, to attain the vision of science education described in the standards, change is needed in the entire system, and stakeholders within the entire system must be included in the decision-making around science instruction (NRC, 2001).

Current Status
Currently, teachers in the Miami-Dade County Public Schools continue to be in need of professional development and instructional support to maintain the quality of instruction needed to prepare students in the fields of STEM and to compete in the global economy, specifically as it pertains to effective instructional planning to ensure rigor, scientific thinking, real-world connections, technology integration and engineering design infusion.

Analysis and Development

M-DCPS recognizes the need to develop a cadre of science leaders and master teachers in science to work with science professionals at the regional and District levels within professional learning communities (PLC). The goal of this PLC will be to develop teacher capacity for effective science content and pedagogical delivery at the school-sites. A science leader representative from each school, elementary to senior high, will work within feeder pattern groups to make decisions concerning curriculum and instruction at their respective schools. The coordination of this vertical articulation will be facilitated through a collaboration of Regional Centers and District science staff. The science leaders will also be referred to as Feeder Pattern Leaders (FPL). The work within feeder patterns is intended to be phased-in over the six-year period of the Science Plan. In year one, one feeder pattern per Regional Center will be identified through a consensus agreement between the District and Regional Center staff, and the interest and willingness of school-site administration. In subsequent years, additional feeder patterns were added until all schools were represented in the fifth year.

Communication and Coordination of Services

Description

The National Science Board (2007) has called for action to address the critical needs of the US as it pertains to STEM education through their National Action Plan. The Plan delineates a framework for and the role of the National Science Foundation (NSF) in STEM education. Parts of this framework include:

- Develop human capital
    - Develop programs that encourage students' interest in STEM fields at all grade levels, and
    - Continue to support and grow programs that build bridges between P-12 and higher education.
- Increase public appreciation for and understanding of STEM
    - Consider ways in which it [NSF] can promote partnerships both within NSF and the broader scientific community to increase public appreciation for an understanding of STEM.

Current Status

Currently, The Science Department manages the South Florida Science and Engineering Fair and the SECME Olympiad and Festival of competitions. Both events are designed to inspire and showcase student talents in STEM competition and research. There are alliances with industry and college/university partners that support the judging of the student projects. In preparation for the SECME Olympiad and FEstival; there are Saturday Engineering Design Seminars that are presented by these partners on university/college campuses to parents, teachers, and K – 12 students.

Analysis and Development

Communication and coordinated services will be seamlessly delivered by an action plan that is aligned to the national STEM initiative. The envisioned structure for delivery of the M-DCPS STEM Initiative integrates existing district and community activities and resources for effective delivery to schools through partnerships and school-site support while promoting exposure and engagement in STEM for students, parents, and teachers.

Vertical and Horizontal Alignment

The successful creation of scientifically literate students can only be achieved through the alliance of all the stakeholders in our community. The creation of the STEM P-16 /P-20 pipeline requires the vertical articulation among all schools in the Regional Center feeder patterns to ensure that all students are prepared for the transitions from the elementary to the secondary levels and to post-secondary experiences in IHE and ultimately, the workforce. Also, horizontal articulation must exist among divisions in the District and Regional Centers to ensure the effective implementation of the EINSTEIN Plan. Horizontal and vertical articulation is essential among the District, Regional Centers, students, parents, business community, IHE, and ISI for a comprehensive alignment of all resources.

In pace with the NRC, the National Science Board (NSB) issued recommendations to address student mobility and coordination of standards (NSB, 1999). Data shows that one, out of three students, changes schools more than once between grades 1 and 8. This suggests that instructional materials and curricula addressing the science standards must be coordinated throughout the school district. The NSB recommendations are:

- To implement its principal recommendation through instructional materials, the NSB urges (a) broad adoption of the principle of citizen review; (b) active participation on citizen advisory boards by educators and practicing mathematicians and scientists, as well as parents and employers from knowledge-based industries; and (c) use of public forums to foster dialogue between textbook publishers and advisory boards in the review process. Accompanying this process should be a national dialogue on appropriate measures for evaluation of textbooks and instructional materials for use in the classroom.

- To implement the principal recommendation through teacher preparation and professional development, the NSB urges formation of three-pronged partnerships: institutions that graduate new teachers working in concert with national and state certification bodies, and local school districts. These partnerships should form around the highest possible standards of subject content knowledge for new teachers, and aim at aligning teacher education, certification requirements and processes, and hiring practices. Mechanisms for the support of teachers, such as pay supplements for certification, should be implemented through partnerships.

- To implement the principal recommendation through the college admissions process, the NSB urges institutions of higher education to form partnerships with local districts/schools that create a more seamless K-16 system, increasing the congruence between high school graduation requirements in mathematics and science and undergraduate performance demands; and offer faculty and student incentives that motivate interactions to reveal linkages between classroom-based skills and experiences and the demands on thinking and learning in the workplace.

The 6-Year Science Plan addresses key issues for improving STEM education throughout the District, which includes effective coordination of STEM education activities, district-wide applied STEM content, horizontal and vertical alignment, and coherence of STEM education. This Plan supports the promotion of vertical alignment of STEM education across all grade levels P-16/P-20 by:

- Focusing on the coordination of implementation of the science curriculum across grade levels;
- Improving the linkage between elementary and middle school, middle school and high school, and high school and higher education and/or the workforce, by ensuring that each grade level coordinate their efforts so that teachers and students are presented with information that progressively builds upon previously learned concepts;
- Implementing science curriculum that supports students so that as they move from one grade level to the next they will be able to build on the foundational skills and knowledge needed to succeed at the subsequent grade level; and
- Encouraging alignment of STEM content throughout the P-12 education system of this District.
- In addition, this Plan recognizes the importance of horizontal alignment by:
    - Assuring that the classroom instruction (curriculum) supports grade-appropriate knowledge and skills (standards),
    - Focusing on the coordination and implementation of the science curriculum among schools and Regional Centers;
    - Assuring that the CPGs address specific concepts following the same time line at each grade level and across all schools;
    - Assuring that the Interim Assessments are a complement to the CPGs; and
    - Focusing on the degree of overlap among the content standards and assessments.

Professional Development for building capacity:

- Provide monthly/quarterly professional development to coaches/ science leaders on modeling Page Keeley's formative assessment and Dr. Erin Furtak's questioning cycle
- Model the implementation of Formative Assessment Classroom Techniques and formative assessment probes in science classrooms to department chairs, coaches, lead teachers, and support staff
- Content focus will address deficient objectives as determined by FCAT 2.0 and EOC Exam results from previous years and quarterly test.
- Provide monthly/quarterly professional development to coaches/science leaders on science content, instructional strategies and pacing per grade level
- Provide summer professional development for classroom teachers at the Elementary, Middle and High school levels; these inservices included content and pedagogy.

Outcome Goals:

- Increase teachers' content and pedagogical knowledge
- Make students aware of their misconceptions and change teachers' belief about their role in addressing student misconceptions
- Increase knowledge and use of Formative Assessment Classroom Techniques and formative assessment probes in daily lesson plans
- Collaborative discourse between students and teachers
- Evidence of learning progression in classrooms while engaging students in inquiry
- Increase the percentage of students passing the FCAT and Biology EOC Exam

APPENDIX B
Pacing Guide Year-at-a-Glance

Grade Kindergarten	**COURSE CODE: 5020010**

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 1 should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.K.N.1.1 Collaborate with a Partner to Collect information
- SC.K.N.1.2 Use Five Senses to Make Observations about the Natural World
- SC.K.N.1.3 Keep Records as Appropriate
- SC.K.N.1.4 Observe and Create a Visual Representation of an Object
- SC.K.N.1.5 Recognize that Learning can come from Careful Observation

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
Big Idea I: The Practice of Science I. Practicing Science (08/19-08/30) **Big Idea 14: Organization and Development of Living Organisms** II. SC.K.L.14.1 Five Senses and Related Body Parts **HE.K.C.1.5** Recognize there are body parts inside and outside of the body. (09/03-09/20) **Big Idea 8: Properties of Matter** III. SC.K.P.8.1 Sort Objects by Observable Properties (09/23-10/11) **Big Idea 9: Changes in Matter** IV. SC.K.P.9.1 Changing Matter's Shape (10/14-10/24)	**Big Idea 13: Forces and Changes in Motion** **V.** SC.K.P.13.1 Push or Pull (10/28-11/15) **Big Idea 12: Motion of Objects** VI. SC.K.P.12.1 Ways Objects Move (11/18-12/06) **Big Idea 10: Forms of Energy** VII. SC.K.P.10.1 Sound (12/09-12/20) **Big Idea 14: Organization and Development of Living Organisms** VIII. SC.K.L.14.3 Similarities and Differences of Plants and Animal (01/06-01/16)	**Big Idea 14: Organization and Development of Living Organisms** IX. SC.K.L.14.3 Characteristics of Animals (01/21-02/06) X. SC.K.L.14.3 Characteristics of Plants (02/10-02/21) XI. SC.K.L.14.3 Plant and Animal Comparisons (02/24-03/07) XII. SC.K.L.14.2 Animal and Plant Portrayals (03/10-03/20)	**Big Idea 5: Earth in Space and Time** XIII. SC.K.E.5.1 Law of Gravity (03/31-04/11) XIV. SC.K.E.5.3 Day Sky SC.K.E.5.4 Day and Night Sky (04/14-04/25) XV. SC.K.E.5.2 Repeating Patterns (04/28-05/09) XVI. SC.K.E.5.5 Big and Small Objects in the Sky SC.K.E.5.6 Objects Near or Far in the Sky (05/12-06/05)

Grade 1	**COURSE CODE: 5020020**

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation .
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 1 benchmarks should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom.

- SC.1.N.1.1 Question, Investigate, Explain
- SC.1.N.1.2 Use Five Senses to Observe, Describe, and Compare Objects
- SC.1.N.1.3 Keep Records
- SC.1.N.1.4 Communication

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
Big Idea I: The Practice of Science I. Practicing Science (08/19-08/30) **Big Idea 8: Properties of Matter** II. SC.1.P.8.1. Sort Matter by Observable Properties (09/03-09/20) **Big Idea 12: Motion of Objects** III. SC.1.P.12.1 Demonstrate and Describe Various Ways Objects Can Move (09/23-10/04) **Big Idea 13: Forces and Changes in Motion** IV. SC.1.P.13.1 Demonstrate that the Motion of an Object Changes by Applying a Push or Pull (10/07-10/24)	**Big Idea 5: Earth in Space and Time** V. SC.1.E.5.2 Explore the Law of Gravity by Demonstrating that the Earth's Gravity Pulls on Objects Near and Far Without Touching Them (10/28-11/22) VI. SC.1.E.5.1 Observe and Discuss the Vast Number of Stars Scattered Unevenly in the Sky SC.1.E.5.3 Investigate Magnifiers and Their Uses (11/25-12/20) VII. SC.1.E.5.4 Identify Beneficial and Harmful Effects of the Sun (01/06-01/16)	**Big Idea 14: Organization and Development of Living Organisms** VIII. SC.1.L.14.3 Differentiate between Living and Nonliving Things (01/21-02/06) IX. SC.1.L.14.1 Use the Five Senses to Observe Living Things and Their Environments (02/10-02/21) X. SC1.L.14.2 Identify Plant Structures (02/24-03/07) XI. SC.1.L.16.1 Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population. (03/10-03/20)	**Big Idea 17: Interdependence** XII. SC.1.L.17.1 Plants and Animals Interact and Depend on Each Other and the Environment for Basic Needs (03/31-04/17) **Big Idea 6: Earth Structures** XIII. SC.1.E.6.1 Recognize Components Found on Earth's Surface (04/21-05/02) XIV. SC.1.E.6.3 Recognize Earth's Fast and Slow Changes to Land (05/05-05/23) XV. SC.1.E.6.2 Water (05/27-06/05)

Grade 2 — COURSE CODE: 5020030

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 1 benchmarks should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.2.N.1.1 Question, Investigate, Explain
- SC.2.N.1.2 Compare Observations, Explain Differences
- SC.2.N.1.3 Reason and Explain
- SC.2.N.1.4 Repetition of Experiment and Similar Conclusions
- SC.2.N.1.5 Empirical Observation and Inferences
- SC.2.N.1.6 Investigation by Scientists

1ST Nine Weeks

Big Idea 1: The Practice of Science
I. Practicing Science
(08/19 – 08/30)

Big Idea 8: Properties of Matter
II. SC.2.P.8.1 Observe and Measure Objects According to Their Properties*
SC.2.P.8.5 Measure and Compare Temperatures
SC.2.P.8.6 Measure and Compare Volumes of Liquids
(09/03 – 09/20)

III. SC. 2.P.8.2 States of Matter
SC.2.P.8.3 Characteristics of a Solid, Liquid, and Gas
(09/23 – 10/04)

IV. SC.2.P.8.4 Observe and Describe Water as a Solid, Liquid, and Gas
(10/07 – 10/11)

Big Idea 9: Changes in Matter
V. SC.2.P.9.1 Investigate How Matter Can Change
(10/14 – 10/24)

2nd Nine Weeks

Big Idea 10: Forms of Energy
VI. SC.2.P.10.1 Uses of Electricity and Other Forms of Energy
(10/28 – 11/07)

Big Idea 13: Forces and Changes in Motion
VII. SC.2.P.13.1 Effect of Pushes and Pulls on Objects
(11/12 – 11/27)

VIII. SC.2.P.13.3 Effects of Gravity
SC.2.P.13.4 Demonstrate that the Greater the Applied Force, the Greater the Change in Motion
(12/02 – 12/20)

IX. SC.2.P.13.2 How Magnets Work
(01/06 – 01/16)

3rd Nine Weeks

Big Idea 14: Organization and Development of Living Organisms
X. SC.2.L.14.1 Distinguish Human Body Parts and Their Functions
HE.2.C.1.6 Recognize the locations and functions of major human organs.
(01/21 – 02/06)

Big Idea 17: Interdependence
XI. SC2.L.17.1 Compare and Contrast Basic Needs of Living Things for Survival
(02/10 – 02/21)

XII. SC.2.L.17.2 Recognize and Explain that Habitats Must Provide Basic Needs
(02/24 – 03/07)

Big Idea 16: Heredity and Reproduction
XIII. SC.2.L.16.1 Major Stages of Life Cycles In Plants and Animals
(03/10 – 03/20)

4th Nine Weeks

Big Idea 6: Earth Structures
XIV. SC.2.E.6.1 Earth is Made of Rocks That Come In Many Shapes and Sizes
SC.2.E.6.2 How Soil Forms
SC.2.E.6.3 Classify Soil Types
(03/31 – 04/17)

Big Idea 7: Earth Systems and Patterns
XV. SC.2.E.7.2 The Sun's Energy
SC.2.E.7.3 Investigate, Observe, and Describe How Water Evaporates
SC.2.E.7.4 Air and Wind
(04/21 – 05/02)

XVI. SC.2.E.7.1 Compare and Describe Changing Patterns in Nature
(05/05 – 05/16)

XVII. SC.2.E.7.5 Preparing for Severe Weather
(05/19 – 06/05)

Grade 3 — COURSE CODE: 5020040

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models
The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science.

Big Ideas 1 and 3 benchmarks should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom.

- SC.3.N.1.1 Question, Investigate and Explain
- SC.3.N.1.2 Compare Observations, Explain Differences
- SC.3.N.1.3 Record Keeping
- SC.3.N.1.4 Communication
- SC.3.N.1.5 Scientist Collaboration
- SC.3.N.1.6 Inferences
- SC.3.N.1.7 Empirical Evidence
- SC.3.N.3.1 Words in Science
- SC.3.N.3.2 Models to Explain
- SC.3.N.3.3 Models are Approximations

1ST Nine Weeks

Big Idea 1: The Practice of Science
I. Practicing Science (08/19-08/23)

Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models
II. Working Like a Scientist (08/26-09/06)

Big Idea 8: Properties of Matter
III. SC.3.P.8.3 Comparing Properties of Materials (09/09-09/20)

IV. SC.3.P.8.2 Mass and Volume of Solids and Liquids
SC.3.P.8.1 Temperatures of Solids and Liquids
(09/23-10/04)

Big Idea 9: Changes in Matter
V. SC.3.P.9.1 Water Changing States (10/07-10/24)

2nd Nine Weeks

Big Idea 10: Forms of Energy
VI. SC.3.P.10.1 Identify Forms of Energy
SC.3.P.10.2 Energy's Ability to Cause Motion and Create Change
(10/28-11/22)

VII. SC.3.P.10.3 How Light Travels
SC.3.P.10.4 Reflection, Refraction and Absorption of Light
(11/25-12/20)

Big Idea 11: Energy Transfer and Transformations
Big Idea 6: Earth Structures

VIII. SC.3.P.11.1 Things that give off Light often Give off Heat
SC.3.P.11.2 Heat Produced by Rubbing Objects
SC.3.E.6.1 Radiant Energy from the Sun can Heat Objects
(01/06-01/16)

3rd Nine Weeks

Big Idea 5: Earth in Space and Time
IX. SC.3.E.5.1 Stars – Size and Appearance
SC.3.E.5.5 Using Telescopes and other Observational Tools
(01/21/01/31)

X. SC.3.E.5.3 Sun Appears Large and Bright because it's Earth's Closet Star
SC.3.E.5.2 Identify the Sun as a Star that emits Light
(02/03-02/14)

XI. SC.3.E.5.4 Gravity is a Force (02/18-02/28)

Big Idea 15: Diversity and Evolution of Living Organisms

XII. SC.3.L.15.1 Animal Classification (03/03-03/20)

4th Nine Weeks

Big Idea 14: Organization and Development of Living Organisms

XIII. **SC.3.L.14.1** Roles of Plants Structures **AA***
SC.3.L.17.2 Photosynthesis
SC.3.L.14.2 Response to Stimuli - **Assessed as SC.3.L.14***
(03/31-05/02)

Big Idea 15: Diversity and Evolution of Living Organisms
XIV. SC.3.L.15.2 Plant Classification (05/05-05/16)

Big Idea 17: Interdependence
XV. SC.3.L.17.1 Plant and Animal Response to Seasons (05/19-06/05)

***These Fair Game benchmark are assessed on the Grade 5 FCAT 2.0.**

Grade 2	**COURSE CODE: 5020030**

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 1 benchmarks should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.2.N.1.1 Question, Investigate, Explain
- SC.2.N.1.2 Compare Observations, Explain Differences
- SC.2.N.1.3 Reason and Explain
- SC.2.N.1.4 Repetition of Experiment and Similar Conclusions
- SC.2.N.1.5 Empirical Observation and Inferences
- SC.2.N.1.6 Investigation by Scientists

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks

Grade 4	**COURSE CODE: 5020050**

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 2: The Characteristics of Scientific Knowledge
A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion. B: Scientific knowledge is durable and robust, but open to change. C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.

Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science.

Big Ideas 1, 2, and 3 should be introduced during the first nine weeks, and then embedded in all science lessons throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.4.N.1.1 Question, Investigate, Explain
- SC.4.N.1.2 Compare Observations, Explain Differences
- SC.4.N.1.3 Observations and Evidence
- SC.4.N.1.4 Answer Scientific Questions and Cite Evidence
- SC.4.N.1.5 Communication
- SC.4.N.1.6 Keep Records
- SC.4.N.1.7 Empirical Evidence
- SC.4.N.1.8 Use Creativity
- SC.4.N.2.1 Recognize that Science Focuses solely on the Natural World
- SC.4.N.3.1 Different Types of Models can be Used

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks

Grade 2	**COURSE CODE: 5020030**

Big Idea 1: The Practice of Science
A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

Big Idea 1 benchmarks should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.2.N.1.1 Question, Investigate, Explain
- SC.2.N.1.2 Compare Observations, Explain Differences
- SC.2.N.1.3 Reason and Explain
- SC.2.N.1.4 Repetition of Experiment and Similar Conclusions
- SC.2.N.1.5 Empirical Observation and Inferences
- SC.2.N.1.6 Investigation by Scientists

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
Big Idea 1: The Practice of Science Practicing Science – Process Skills (08/19-08/23) **Big Idea 2: The Characteristics of Scientific Knowledge** **Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models** Practicing Science – Scientific Method (08/26-08/30) III. Thinking Like a Scientist (09/03-09/13) **Science Fair Project Timeline Begins 09/23/13** **Big Idea 8: Properties of Matter** IV. SC.4.P.8.1 Measure and compare objects based on their physical properties. SC.4.P.8.2 Identify Properties and Uses of Water in its Three States SC.4.P.8.3 Explore the Law of Conservation of Mass (09/16-09/27) V. SC.4.P.8.4 Investigate Magnetic Properties (09/30-10/11) **Big Idea 9: Changes in Matter** VI. SC.4.P.9.1 Changes in Matter (10/14-10/24)	**Big Idea 10: Forms of Energy** VII. SC.4.P.10.1 Forms of Energy SC.4.P.10.2 Energy (10/28-11/07) VIII. SC.4.P.10.3 Sound (11/12-11/22) IX. SC.4.P.10.4 Uses of Energy (11/25-12/06) **Big Idea 11: Energy Transfer and Transformation** X. SC.4.P.11.1 Transfer of Heat Energy SC.4.P.11.2 Materials that Conduct Heat (12/09-12/20) **Big Idea 12: Motion of Objects** XI. SC.4.P.12.1 Objects in Motion SC.4.P.12.2 Speed (01/06-01/16)	**Big Idea 17: Interdependence** XII. SC.4.L.17.I Seasonal Changes in Florida's Plants and Animals. SC.4.L.16.2 Plant and animal characteristics are affected by the environment SC.4.L.16.3 Animal Behaviors and Characteristics SC.4.L.17.4 How Living Things Impact the Environment (01/21-02/06) XIII. **SC.4.L.17.3 Flow of Energy (AA)*** SC.4.L.17.2 Transfer of Energy in a Biotic System SC.4.L.17.1 (02/10-02/21) **Big Idea 16: Heredity and Reproduction** XIV. **SC.4.L.16.1** Sexual Reproduction in Flowering Plants -pollination, fertilization, seed dispersal, and germination **(AA as SC.3.L.14.1)** (02/24-03/07) XV. **SC.4.L.16.4 Major Stages of Life Cycles of Florida Plants and Animals (AA)*** (03/10-03/20)	**Big Idea 6: Earth Structures** XVI. **SC.4.E.6.2 Properties of Minerals (AA)*** SC.4.E.6.1 Types of Rocks SC.4.P.8.1 Measure and compare objects (rocks) based on their properties SC.4.E.6.5 Tools and Technology (03/31-04/17) XVII. **SC.4.E.6.4 Weathering and Erosion (AA)*** (04/21-05/02) XVIII. **SC.4.E.6.3 Natural Resources (AA)*** SC.4.E.6.6 Florida's Natural Resources (05/05-05/16) **Big Idea 5: Earth in Space and Time** XIX. **SC.4.E.5.4 Relationship among Earth, Moon, Sun and Stars (AA)*** SC.4.E.5.1 Patterns in the Sky SC.4.E.5.3 Earth's Movement SC.4.E.5.2 Phases of the Moon SC.4.E.5.5 Effects of Space Research on Florida's Economy and Culture (05/19-06/05)

Grade 5	**COURSE CODE: 5020060**
Big Idea 1: The Practice of Science A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.	Big Idea 2: The Characteristics of Scientific Knowledge A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion. B: Scientific knowledge is durable and robust, but open to change. C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery. The science skills taught in Big Ideas 1 and 2 will help prepare students in developing their science fair projects for the District Elementary Science Fair held in January. It is suggested that schools conduct their Science Fair during the first week of December.

Big Ideas 1 and 2 should be **introduced during the first nine weeks, and then embedded in all science lessons** throughout the year as they blend easily with teaching inquiry and are the basis of an activity/lab-based science classroom:

- SC.5.N.1.1 Define a Problem, Do Research, Investigate, Defend Conclusions
- SC.5.N.1.2 Compare use of Experiments and other Types of Investigations
- SC.5.N.1.3 Recognize and Explain the Need for Repeated Experimental Trials
- SC.5.N.1.4 Identify a Control Group and Explain its Importance
- SC.5.N.1.5 Recognize that Steps of the Scientific Method can Vary
- SC.5.N.1.6 Understand the difference between personal interpretation and verified observations
- SC.5.N.2.1 Empirical Observations and Linked to Evidence
- SC.5.N.2.2 Recognize that Evidence Produced should be Replicated

1ST Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
Big Idea 1: The Practice of Science **Big Idea 2: The Characteristics of Scientific Knowledge** IV. Practicing Science **AA** (08/19-08/23) V. Thinking Like a Scientist **AA**(08/26-8/30) **Big Idea 8: Properties of Matter** VI. SC.5.P.8.1 - Properties of Solids, Liquids and Gases. AA (09/03-09/06) IV. SC.5.P.8.3 Mixtures of Solids can be Separated. **AA** SC.5.P.8.2 - Materials that Dissolve in Water. AA SC.5.P.8.4 – Atoms (09/09-09/20) V. **Science Fair Project Introduction** Suggested Timeline begins 09/23 with projects due 11/25 for Dec. school site fair. **Big Idea 9: Changes in Matter** VI. SC.5.P.9.1 - Physical and Chemical Changes. AA (09/30-10/11) **Big Idea 13: Forces and Changes in Motion** VII. SC.5.P.13.1- Forces **AA** SC.5.P.13.2- Changes in Motion **AA** SC.5.P.13.3- Forces that Move objects AA SC.5.P.13.4- Balanced and Unbalanced Forces AA (10/14-10/24)	**Big Idea 10: Forms of Energy** VIII. SC.5.P.10.1 - Forms of Energy **AA** SC.5.P.10.2 - Energy can cause motion or create change. **AA** (10/28-11/07) **Big Idea 11: Energy Transfer** IX. SC.5.P.10.4- Electrical energy can be transformed. **AA** SC.5.P.8.4- Protons, Neutrons, Electrons SC.5.P.10.3 – Electrically charged objects AA SC.5.P.11.1 – Flow of Electricity AA SC.5.P.11.2 – Conductors and Insulators AA (11/12-11/27) **Big Idea 5: Earth in Space and Time** X. SC.5.E.5.1- Our Galaxy **AA** SC.5.E.5.3- Solar system **AA** SC.5.E.5.2- Planet Characteristics AA SC.4.E.5.4- Movement in Space (Also assesses SC.4.E.5.1; SC.4.E.5.2) **AA** (12/02-12/20**)** **Big Idea 6: Earth Structures** XI. SC.4.E.6.2-Minerals and Rocks (Also assesses SC.4.E.6.1) **AA** SC.4.E.6.3- Earth's Resources (Also assesses SC.4.E.6.6) **AA** SC.4.E.6.4- Weathering/Erosion **AA**(01/06-01/16)	**Big Idea 7: Earth Systems and Patterns** XII. SC.5.E.7.1 - Water Cycle **AA** (01/21-01/31) SC.5.E.7.2 - Water Cycle Processes AA XIII. SC.5.E.7.3 - Weather **AA** SC.5.E.7.4 - Forms of Precipitation AA SC.5.E.7.5 - Weather Conditions AA SC.5.E.7.6 - Climate Zones AA (02/3-02/14) **Big Idea 14: Organization & Dev. of Living Organisms** **Big Idea 16: Heredity and Reproduction** XIV. SC.3.L.14.1- Plant Structures and Functions (Also assesses SC.3.L.14.2; SC.4.L.16.1) **AA** SC.5.L.14.2- Comparing Plant and Animal Organ functions (Also assesses SC.3.L.15.1; SC.3.L.15.2 **AA** SC.4.L.16.4- Life Cycles **AA** (02/18-02/28) **Big Idea 17: Interdependence** XV. SC.5.L.17.1-Animal Adaptations **AA** SC.5.L.15.1- Environmental Changes AA (03/03-03/14) XVI. SC.4.L.17.3 Food Chain **AA** (Also assesses SC.4.L.17.2, SC.3.L.17.2) (03/17-03/20)	**Big Idea 14: Organization & Dev. of Living Organisms** XVII. SC.5.L.14.1- Human Body Organs **AA** (03/31-04/04) XVIII. FCAT Crunch Time Review (04/07-4/21) XIX. Health Literacy: Concept Human Growth and Development HE.5.C.1.6 Explain how human body parts and organs work together in healthy body systems, including the endocrine and reproductive systems. HE.5.C.1.1; HE.5.C.1.2 HE.5.C.1.5; HE.5.C.2.4 (04/28-05/16) XX. SC.5.E.7.7- Natural Disaster Plans (05/19-06/05)

M/J COMPREHENSIVE SCIENCE 1			**COURSE CODE: 200204001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
XVII. Natural Disasters and their Effects on Floridians (SC.6.E.7.7, SC.6.E.7.8, SC.6.N.1.2, SC.6.N.1.5, SC.6.N.2.1, SC.6.N.2.2, SC.6.N.3.4, LACC.68.RST.3.7; LACC.68.WHST.1.2) A. Hurricanes B. Other Natural Disasters C. Models D. Emergency Preparedness E. Effects of sun Exposure XVIII. Thermal Energy Transfer (SC.6.E.7.1, SC.6.E.7.2, SC.6.N.1.1, SC.6.N.1.4; SC.6.N.3.4, MACC.6.SP.2.5 a and b) A. Heat Transfer in Earth's Systems B. Temperature vs. Thermal Energy C. Water Cycle XIX. Climate and Global Patterns (SC.6.E.7.3, SC.6.E.7.5, SC.6.E.7.6, SC.6.N.1.1, MACC.SP.1.3) A. Global Patterns that Affect Weather B. Influences on Local Weather XX. Causes of Weather (SC.6.E.7.3, SC.6.E.7.6, SC.6.N.1.1, LACC.68.RST.3.7) A. Weather B. Air Mass/Fronts C. Atmospheric Conditions D. Predicting the Weather V. Atmosphere and Spheres of the Earth (SC.6.E.7.3, SC.6.E.7.4, SC.6.E.7.5, SC.6.E.7.6, SC.6.E.7.9, SC.6.N.3.1, SC.6.N.3.4) A. Earth's Spheres B. Composition, Structure, and Function of the Atmosphere C. Weather vs. Climate D. Human Activities and Climate Change E. Quarterly Assessment	VI. How Weathering and Erosion Affect the Earth (SC.6.E.6.1, SC.6.N.1.1, LACC.68.WHST.1.2, MACC.6.EE.3.9) A. Weathering B. Erosion C. Deposition VII. Landforms of the Geosphere (SC.6.E.6.2, SC.6.N.1.1, SC.6.N.1.4, SC.6.N.2.2, SC.6.N.3.4, LACC.68.RST.3.7) A. Types and Formation B. Florida Landforms VIII. Potential and Kinetic Energy (SC.6.P.11.1, SC.6.N.1.1, LACC.68.RST.1.3, LACC.68.WHST.1.2, LACC.68.WHST.3.9) A. Potential Energy B. Kinetic Energy C. Forms of Energy IX. Energy Transfers and the Law of Conservation of Energy (SC.6.P.11.1, SC.6.N.2.2, SC.6.N.3.2, LACC.68.RST.1.3, LACC.68.RST.2.4) A. Law of Conservation of Energy B. Energy Transformations C. Scientific Investigations D. Quarterly Assessment	X. Motion of Objects (SC.6.P.12.1, SC.6.N.1.1, MACC.6.EE.3.9) A. Measuring Speed and Distance B. Constructing and Analyzing Line Graphs XI. Types of Forces (SC.6.P.13.1, SC.6.N.1.1, LACC.68.RST.4.10, LACC.68.WHST.1.2, MACC.6.SP.2.5) A. Contact Forces B. Forces Acting at a Distance XII. Law of Universal Gravitation (SC.6.P.13.2, SC.6.N.1.3, SC.6.N.1.5, SC.6.N.2.1, SC.6.N.3.2, SC.6.N.3.3, MACC.6.SP.2.5d) A. Gravitational Force B. Mass vs. Weight C. Newton's Law of Universal Gravitation XIII. Forces and Motion (SC.6.P.13.3, SC.6.N.1.3, MACC.6.SP.2.5a, b, c and d) A. Forces B. The Effects of an Unbalanced Force on an Object XIV. Levels of Organization (SC.6.L.14.1, SC.6.L.15.1, SC.6.N.1.3, SC.6.N.2.2, LACC.68.RST.3.7) A. Hierarchical Organization of Organisms B. Linnaean Classification System C. Scientific Name D. History of Classification E. Quarterly Assessment	XV. Cell Theory (SC.6.L.14.2, SC.6.N.2.3, LACC.68.RST.4.10, LACC68.WHST.1.2, LACC.68.WHST.3.9) A. Cell Theory XVI. Cell Structure and Organelles (SC.6.L.14.4, SC.6.N.3.4, LACC.68.RST.2.4, LACC.68.RST.3.7, LACC.68.WHST.3.9) A. Prokaryotic and Eukaryotic Cells B. Structure of Cells C. Plant and Animal Cell Comparison XVII. Homeostasis (SC.6.L.14.3, LACC.68.RST.2.4, LACC.RST.3.7) A. Energy Extraction from Food B. Removal of Waste By Cells C. Cell Reproduction Overview XVIII. Human Body Systems (SC.6.L.14.5, HE.6.C.1.7, HE.6.C.1.8, LACC.68.RST.4.10, LACC.68.WHST.1.2, LACC.68.WHST.3.9) A. Major Body Systems B. Interactions of Body Systems to Maintain Homeostasis C. Effects of Drugs on Body Systems XIX. Pathogens Comparison (SC.6.L.14.6, HE.6.C.1.3, HC.6.C.1.5, HE.6.C.1.8, LACC.68.RST.4.10) A. Viruses B. Bacteria C. Fungi and Parasites D. Disease Prevention E. Sexually Transmitted Infections (STI) F. HIV/AIDS XX. Substance Abuse, Health, and Decision Making (HE.6.P.1.1, HE.6.P.1.2, HE.6.B.2.2; HE.6.B.3.1, HE.6.B.3.4) A. Social and Emotional Growth B. Child Abuse and Sexual Abuse C. Risk Reduction D. Peer Pressure E. Tobacco Use F. Refusal Skills XXI. Human Growth and Development (HE.6.C.1.7, HE.6.C.1.8, HE.6.P.1.3, HE.6.C.1.3) A. The Body B. Social and Emotional Growth C. Child Abuse and Sexual Abuse D. Quarterly Assessment

M/J COMPREHENSIVE SCIENCE 1, Advanced			**COURSE CODE: 200205001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
XXI. Natural Disasters and their Effects on Floridians (SC.6.E.7.7, SC.6.E.7.8, SC.912.E.7.5, SC.912.E.7.6, SC.6.N.1.2, SC.6.N.1.5, SC.6.N.2.1, SC.6.N.2.2, SC.6.N.3.4, LACC.68.RST.3.7, LACC.68.WHST.1.2) A. Hurricanes B. Other Natural Disasters C. Models F. Emergency Preparedness G. Effects of Sun Exposure H. Pretest XXII. Thermal Energy Transfer (SC.6.E.7.1, SC.6.E.7.2, SC.912.P.10.4, SC.6.N.1.1, SC.6.N.1.4; MACC.6.SP.2.5c and d) A. Heat Transfer in Earth's Systems B. Temperature vs. Thermal Energy C. Water Cycle XXIII. Global Patterns Influences on Weather (SC.6.E.7.3, SC.6.E.7.5, SC.6.E.7.6, SC.912.E.7.6, SC.8.E.5.9, SC.6.N.1.1, MACC.6.SP.1.3) A. Global patterns that Affect Weather B. Influences on Local Weather C. Seasons XXIV. Weather Patterns (SC.6.E.7.2, SC.6.E.7.3, SC.6.E.7.6, SC.912.E.7.6, SC.8.E.5.9, SC.6.N.1.1, LACC.68.RST.3.7) E. Weather F. Air Mass/Fronts G. Atmospheric Conditions H. Predicting the Weather I. Tides VI. Atmosphere and Spheres of the Earth (SC.6.E.7.1, SC.6.E.7.3, SC.6.E.7.4, SC.6.E.7.5, SC.6.E.7.6, SC.6.E.7.9, SC.912.P.10.4, SC.8.E.5.7, SC.6.N.3.4) A. Earth's Spheres B. Composition, Structure, and Function of the Atmosphere C. Weather vs. Climate D. Human Activities and Climate Change E. Atmospheric Conditions of Other Planets F. Quarterly Assessment	XXII. How Weathering and Erosion Affect the Earth (SC.6.E.6.1, SC.6.N.1.1, SC.912.E.7.3, LACC.68.WHST.1.2 MACC.6.EE.3.9) D. Weathering E. Erosion F. Deposition XXIII. Landforms of the Geosphere (SC.6.E.6.2, SC.912.E.7.6, SC.6.N.1.1, SC.6.N.1.4, SC.6.N.2.2, SC.6.N.3.4, LA.CC.68.RST.3.7) C. Types and Formation D. Florida Landforms XXIV. Potential and Kinetic Energy (SC.6.P.11.1, SC.912.P.10.4, SC.6.N.1.1, LACC.68.RST.1.3, LACC68.WHST.1.2, LACC.68.WHST.3.9) D. Potential Energy E. Kinetic Energy F. Forms of Energy G. Transfer of Heat XXV. Energy Transfers and the Law of Conservation of Energy (SC.6.P.11.1, SC.912.P.10.4, SC.6.N.2.2, SC.6.N.2.3, SC.6.N.3.2, SC.6.N.3.3, LACC.68.RST.1.3, LACC.68.RST.2.4) E. Law of Conservation of Energy F. Energy Transformations G. Scientific Investigations H. Quarterly Assessment	XXVI. Motion of Objects (SC.6.P.12.1, SC.6.N.1.1, SC.8.E.5.3, SC.8.E.5.1, MACC.6.EE.3.9) C. Measuring Speed and Distance D. Constructing and Analyzing Line Graphs E. Distances in Space XXVII. Types of Forces (SC.6.P.13.1, SC.6.N.1.1, LACC.68.RST.4.10, LACC.68.WHST.1.2, MACC.6.SP.2.5a) C. Contact Forces D. Forces Acting at a Distance XXVIII. Law of Universal Gravitation (SC.6.P.13.2, SC.8.E.5.4, SC.8.E.5.7. SC.8.E.5.8, SC.8.E.5.9. SC.6.N.1.3, SC.6.N.1.5, SC.6.N.2.1, MACC.6.SP.2.5d) D. Gravitational Force E. Mass vs. Weight F. Newton's Law of Universal Gravitation G. Roles of Gravity H. Models of Solar Systems I. Tides XXIX. Forces and Motion (SC.6.P.13.3, SC.6.N.1.3, MACC.6.SP.1.3, MACC.6.SP.2.5a, b, c and d) C. The Effects of an Unbalanced Force on an Object D. Forces XXX. Levels of Organization (SC.6.L.14.1, SC.6.L.15.1, SC.6.N.1.3, SC.6.N.2.2, LACC.68.RST.3.7) F. Hierarchical Organization of Organisms G. Linnaean Classification System H. Quarterly Assessment	XXXI. Cell Theory (SC.6.L.14.2, SC.6.N.2.3, LACC.68.RST.4.10, LACC.68.WHST.1.2, LACC.68.WHST.3.9) B. Cell Theory XXXII. Cell Structure and Organelles (SC.6.L.14.4, SC.912.L.14.3, SC.6.N.3.4, LACC.68.RST.2.4, LACC.68.RST.3.7, LACC.68.WHST.3.9) D. Prokaryotic and Eukaryotic Cells E. Structure of Cells F. Plant and Animal Cell Comparison XXXIII. Homeostasis (SC.6.L.14.3, SC.912.L.16.14, , LACC.68.RST.2.4, LACC.68.RST.3.7) D. Energy Extraction from Food E. Removal of Waste F. Cell Reproduction Overview XXXIV. Human Body Systems (SC.6.L.14.5, HE.6.C.1.7, HE.6.C.1.8, LACC.68.RST.4.10, LACC.68.WHST.1.2, LACC.68.WHST.3.9) D. Major Body Systems E. Interactions of Body Systems to Maintain Homeostasis F. Effects of Drugs on Body Systems XXXV. Pathogens Comparison (SC.6.L.14.6, HE.6.C.1.3, HC.6.C.1.5, HE.6.C.1.8, LACC.68.RST.4.10) G. Viruses H. Bacteria I. Fungi and Parasites J. Disease Prevention K. Sexually Transmitted Infections (STI) L. HIV/AIDS XXXVI. Substance Abuse, Health, and Decision Making (HE.6.P.1.1, HE.6.P.1.2, HE.6.B.2.2; HE.6.B.3.1, HE.6.B.3.4) G. Social and Emotional Growth H. Child Abuse and Sexual Abuse I. Risk Reduction J. Peer Pressure K. Tobacco Use L. Refusal Skills XXXVII. Human Growth and Development (HE.6.C.1.7, HE.6.C.1.8, HE.6.P.1.3, HE.6.C.1.3) E. The Body F. Social and Emotional Growth G. Child Abuse and Sexual Abuse H. Quarterly Assessment

M/J COMPREHENSIVE SCIENCE 2			**COURSE CODE: 200207001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Practice of Science and Heat Energy (SC.7.P.11.1; SC.7.P.11.4; SC.7.N.1.1; SC.7.N.1.2; SC.7.N.1.3; SC.7.N.1.4) A. Heat and Temperature B. Properties of Matter C. States of Matter D. Changes in Matter E. Practice of Science F. Pretest II. Conservation of Energy and Energy Transformations (SC.7.P.11.2; SC.7.P.11.3; LACC.68.RST.4.10) A. Energy B. Potential Energy and Kinetic Energy Review C. Law of Conservation of Energy III. Properties of Waves (SC.7.P.10.1; SC.7.N.1.3; SC.7.N.1.4; MACC.6.SP.2.5a, b and c, LACC.68.RST.1.3) A. Electromagnetic vs. Mechanical B. The Sun's Energy as Radiation: Electromagnetic Spectrum C. Scientific Investigations IV. Properties of Light (SC.7.P.10.2; SC.7.P.10.3; SC.7.N.1.3; SC.7.N.1.4; LACC.68.RST.1.3, LACC.68.RST.2.4, MACC.6.SP.2.5d) A. Light Properties B. Materials and Light C. Wave Speed in Different Materials D. Quarterly Assessment	V. Layers of Earth (SC.7.E.6.1; SC.7.E.6.5; SC.7.N.3.2, MACC.6.SP.2.5b) A. Crust B. Mantle C. Core D. Structural Zones VI. Changes in Earths Surfaces (SC.7.E.6.2; SC.7.E.6.5; SC.7.N.2.1, SC.7.N.3.2, LACC.68.WHST.1.2) A. Rock Cycle B. Scientific Theory of Plate Tectonics C. Tectonic Plate Movement D. Surface Features VII. Rock Cycle and Processes That Shape the Earth's Surface (SC.7.E.6.2; SC.7.E.6.6; SC.7.E.6.5; SC.7.E.6.7; LACC.68.RST.3.7) A. Rocks and the Rock Cycle B. Types of Rocks C. Processes That Change Earth's Surface D. Landforms on Earth E. Landforms in Florida F. How Humans Impact the Earth VIII. Age of Earth/ Geological Time (SC.7.E.6.4; SC.7.E.6.3, LACC.6.8.WHST.1.2, LACC.68.WHST.3.9) A. Law of Superposition B. Absolute Age C. Geologic Time D. Quarterly Assessment	IX. Fossils (SC.7.L.15.1; SC.7.N.1.2, LACC.68.RST.1.3) A. Formation of Fossils B. Index Fossils C. Evidence of Species Change D. Evidence of the Scientific Theory of Evolution X. Evidence of Species Change (SC.7.L.15.1; SC.7.L.15.2; SC.7.L.15.3; SC.7.N.3.1) A. Evidence of Scientific Theory of Evolution B. Adaptations/Natural Selection C. Extinction XI. Environmental Factors and Evolution (SC.7.L.15.2; SC.7.L.15.3; SC.7.L.17.3; SC.7.E.6.6) A. Scientific Theory of Evolution B. Natural Selection C. Limiting Factors D. Limiting Factors Affecting the Everglades E. Human Activities and the Everglades XII. Relationships in Ecosystems (SC.7.L.17.2; SC.7.L.17.1; SC.7.L.17.3) A. Relationships B. Food Web C. Energy Flow in Ecosystems D. Revisit Limiting Factors (see Topic XI) XIII. Human Impact on Earth (SC.7.E.6.6; SC.7.N.1.2; MACC.6.SP.2.5c and d) A. Resources B. Biodiversity C. Land D. Air E. Water F. Quarterly Assessment	XIV. Meiosis and Mitosis (SC.7.L.16.3, LACC.68.RST.3.7, LACC.68.RST.4.10, HE.7.C.1.4) A. Asexual-Mitosis B. Sexual-Meiosis C. Effects on Natural Selection XV. Genetic Traits and Heredity (SC.7.L.16.1) A. Review Cell Structure B. DNA /RNA C. Replication D. Chromosomes XVI. Genetic Traits and Heredity (SC.7.L.16.2), LACC.68.RST.2.4 A. Mendelian Genetics B. Genotype/Phenotype C. Punnett Squares and Pedigrees XVII. Biotechnology (SC.7.L.16.4; SC.7.N.1.5; SC.7.N.1.7) A. Cloning B. Genetic Engineering C. Artificial Selection D. Impact on Society XVIII. Health and Disease Prevention (HE.7.C.1.1; HE.C.1.2; HE.C.1.8; HE.7.B.3.1; HE.7.B.3.6) A. Reproductive Health B. Stress Management C. Heredity D. Communicable Disease and Infection E. Healthy Decisions F. Healthy Goals XIX. Human Growth and Development (HE.7.C.1.7; HE.C.1.8; HE.P.1.2; HE.7.P.1.3; HE.7.B.3.6) A. Body Systems B. Mental Health C. Dating D. HIV/AIDS E. Abstinence F. Quarterly Assessment

M/J COMPREHENSIVE SCIENCE 2 ADVANCED			**COURSE CODE: 200208001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
XVII. Practice of Science and Heat Energy (SC.7.P.11.1; SC.7.P.11.4; SC.7.N.1.1; SC.7.N.1.2; SC.7.N.1.3; SC.7.N.1.4) G. Heat and Temperature H. Properties of Matter I. States of Matter J. Changes in Matter K. Practice of Science L. Pretest XVIII. Conservation of Energy and Energy Transformations (SC.7.P.11.2; SC.7.P.11.3; SC.912.P.10.1; SC.8.L.18.1; SC.8.L.18.2; SC.8.L.18.3; SC.8.L.18.4, LACC.68.RST.4.10) A. Energy B. Potential Energy and Kinetic Energy Review C. Law of Conservation of Energy D. Matter and Energy Transformation E. Conservation of Mass and Energy XIX. Properties of Waves (SC.7.P.10.1; SC.7.N.1.3; SC.7.N.1.4; MACC.6.SP.2.5a, b, and c, LACC.68.RST.1.3) D. Electromagnetic vs. Mechanical E. The Sun's Energy as Radiation: Electromagnetic Spectrum F. Planetary Images and Satellite Photographs G. Scientific Investigations XX. Properties of Light (SC.7.P.10.2; SC.7.P.10.3; SC.7.N.1.3; SC.7.N.1.4; LACC.68.RST.2.4, MACC.6.SP.2.5d) E. Light Properties F. Materials and Light G. Wave Speed in Different Materials	XXI. Layers of Earth (SC.7.E.6.1; SC.7.E.6.5; SC.7.N.3.2; SC.912.E.6.1; SC.8.E.5.7, SC.7.N.3.2;, MACC.6.SP.2.5b) E. Crust F. Mantle G. Core H. Structural Zones XXII. Changes in Earth's Surface (SC.7.E.6.2; SC.7.E.6.5; SC.912.E.6.2; SC.912.E.6.3; SC.8.N.3.2 , SC.7.N.3.2;SC.7.N.2.1, LACC.68.WHST.1.2) E. Rock Cycle F. Scientific Theory of Plate Tectonics G. Tectonic Plate Movement H. Surface Features XXIII. Rock Cycle and Processes That Shape the Earth's Surface (SC.7.E.6.2; SC.7.E.6.6; SC.7.E.6.5; SC.7.E.6.7; LACC.68.RST.3.7) G. Rocks and the Rock Cycle H. Types of Rocks I. Processes That Change Earth's Surface J. Landforms on Earth K. Landforms in Florida L. How Humans Impact the Earth XXIV. Age of Earth/ Geological Time (SC.7.E.6.4; SC.7.E.6.3, LACC.68.WHST.1.2, LACC.68.WHST.3.9) E. Law of Superposition F. Absolute Age G. Geologic Time H. Quarterly Assessment	XXV. Fossils (SC.7.L.15.1; SC.7.N.1.2; LACC.68.RST.1.3) E. Formation of Fossils F. Index Fossils G. Evidence of Species Change H. Evidence of the Scientific Theory of Evolution XXVI. Evidence of Species Change (SC.7.L.15.1; SC.7.L.15.2; SC.7.L.15.3; SC.7.N.3.1) D. Evidence of Scientific Theory of Evolution E. Adaptations/Natural Selection F. Extinction XXVII. Environmental Factors and Evolution (SC.7.L.15.2; SC.7.L.15.3; SC.7.L.17.3; SC.7.E.6.6) A. Scientific Theory of Evolution B. Natural Selection C. Limiting Factors D. Limiting Factors Affecting the Everglades E. Human Activities and the Everglades XXVIII. Relationships in Ecosystems (SC.7.L.17.2; SC.7.L.17.1; SC.7.L.17.3; SC.912.L.15.6; SC.9.12.L.17.6; SC.912.L.17.9) E. Relationships F. Food Web G. Energy Flow in Ecosystems H. Revisit Limiting Factors (see Topic XI) XXIX. Human Impact on Earth ((SC.7.E.6.6; SC.7.N.1.2; MACC.6.SP.2.5c and d) G. Resources H. Biodiversity I. Land J. Air K. Water L. Quarterly Assessment	XXX. Meiosis and Mitosis (SC.7.L.16.3; LACC.68.RST.3.7, LACC.68.RST.4.10, HE.7.C.1.4) D. Asexual-Mitosis E. Sexual-Meiosis F. Effects on Natural Selection XXXI. DNA, Chromosomes and Heredity (SC.7.L.16.1) A. Review Cell Structure B. DNA /RNA C. Replication D. Chromosomes XXXII. Genetic Traits and Heredity (SC.7.L.16.2; Sc.912.l.16.2, LACC.68.RST.2.4) D. Mendelian Genetics E. Genotype/Phenotype F. Punnett Squares and Pedigrees XX. Biotechnology (SC.7.L.16.4; SC.7.N.1.5; SC.7.N.1.7) E. Cloning F. Genetic Engineering G. Artificial Selection H. Impact on Society XXI. Health and Disease Prevention (HE.7.C.1.1; HE.C.1.2; HE.C.1.8; HE.7.B.3.1; HE.7.B.3.6) A. Reproductive Health B. Stress Management C. Heredity D. Communicable Disease and Infection E. Healthy Decisions F. Healthy Goals XXII. Human Growth and Development (HE.7.C.1.7; HE.C.1.8; HE.P.1.2; HE.7.P.1.3; HE.7.B.3.6) A. Body Systems B. Mental C. Dating D. HIV/AIDS E. Abstinence F. Quarterly Assessment

M/J COMPREHENSIVE SCIENCE 3			**COURSE CODE: 200210001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Matter (SC.8.P.8.2, SC.8.P.8.3, SC.8.N.1.1; SC.8.N.1.2: SC.8.N.1.4, SC.8.N.1.5, SC.8.N.1.6) A. What is Matter? B. Review Forces C. Weight vs. Mass D. Density E. Scientific Measurement F. Designing an Experiment G. Baseline Testing II. Physical Properties of Matter (SC.8.P.8.4; SC.8.P.9.2; SC.8.P.9.3, SC.8.N.1.1; SC.8.N.1.2, SC.8.N.1.6) A. Physical Properties B. Chemical Properties C. Physical and Chemical Changes III. Matter – Phase Change (SC.8.P.8.4; SC.8.P.8.1; SC.8.N.1.1; SC.8.N.1.2) A. States of Matter B. Changes of State C. Law of Conservation of Mass D. How Scientists Work IV. Atoms (SC.8.P.8.7; SC.8.P.8.1; SC.8.N.1.4; ;SC.8.N.3.2; LACC.68.WHST.1.2; LACC.68.WHST.3.9) A. Scientific Models and Systems B. Scientific Theories C. Describing Matter D. Atoms V. Atoms and the Periodic Table (SC.8.P.8.6 SC.8.P.8.7; SC.8.N.1.1; SC.8.N.1.4; SC.8.N.1.6; SC.8.N.3.2) 1. Periodic Table 2. Atomic Models 3. Interim Assessment	VI. Chemical Properties and Changes of Matter (SC.8.P.8.5; SC.8.P.8.6; SC.8.P.8.8; SC.8.P.9.1; SC.8.P9.2; SC.8.P.9.3; SC.8.N.2.2; LACC.68.RST.1.3) A. Compounds B. Chemical Changes VII. Mixtures and Solutions (SC.8.P.8.4; SC.8.P.8.9; SC.8.N.1.1; SC.8.N.1.6; LACC.68.RST.4.10; LACC.68.WHST.1.2) A. Pure Substances and Mixtures B. Solutions C. What Factors Affect Solubility? VIII. Photosynthesis and Cellular Respiration (SC.8.L.18.1; SC.L.18.2; SC.L.18.4; SC.8.N.1.1; SC.8. P.8.5) A. Cell Structure Overview B. Photosynthesis (reactants) C. Photosynthesis (products) D. Law of Conservation of Mass and Energy E. Review Electromagnetic Spectrum F. Cell Respiration G. Process and Pathways IX. Cycles of Matter (SC.8.L.18.3; SC.8.L.18.4; SC.8.N.1.1; SC.8.P.8.5; LACC.68.RST.3.7) A. Cycles in Nature B. Recycling Carbon, Oxygen and Nitrogen C. Conservation of Matter and Energy X. Stars and Galaxies (SC.8.E.5.2; SC.8.E.5.1; SC.8.E.5.5; SC.8.E.5.3; SC.8.E.5.4; SC.8.E.5.11; SC.8.E.5.10; LACC.68.RST.2.4) A. Objects in Space B. Distances in Space C. Properties of Stars D. Astronomical Bodies E. Law of Universal Gravitation and the Formation of Stars F. Interim Test	XI. The Sun (SC.8.E.5.4; SC.8.E.5.5; SC.8.E.5.6; LACC.68.RST.3.7; MACC.8.F.2.5) A. Scientific Knowledge B. The Sun's Characteristics C. Energy from the Sun XII. Solar System (SC.8.E.5.8; SC.8.E.5.7; SC.8.E.5.3; SC.8.N.1.3; SC.8.N.3.2) A. Introduction to the Solar System B. Earth's Moon C. Planets D. Other Objects (Asteroids, Comets, Meteor, Meteorite) E. Models of the Solar System XIII. Sun, Earth, and Moon (SC.8.E.5.9; SC.8.E.5.10; SC.8.E.5.11; SC.8.N.1.6); LACC.68.RST.3.7; LACC.68.RST.4.10 A. The Impact of Gravity on Earth B. Earth in Space C. Seasons D. Phases and Eclipses E. Tides F. Benchmark Assessment	XIV. Review Annually Assessed Benchmarks (Fair Game SC.7.E.6.2 ; SC.6.E.6.1; SC.6.E.6.2; SC.7.E.6.6; SC.7.E.6.4; SC.7.E.6.3; SC.7.E.6.5; SC.7.E.6.1; SC.7.E.6.7; SC.6.E.7.4; SC.6.E.7.2; SC.6.E.7.3; SC.6.E.7.6; SC.6.E.7.9; SC.6.E.7.5; SC.6.E.7.1; SC.7.P.10.3; SC.7.P.10.2; SC.7.P.11.2; SC.6.P.11.1 SC.7.P.11.3; SC.7.P.11.4; SC.7.P.11.1; SC.6.P.13.1; SC.6.P.13.2; SC.8.P.8.2; SC.6.L.14.1; SC.6.L.14.2; SC.6.L.14.3; SC.6.L.14.4; SC.6.L.14.5; SC.6.L.14.6; SC.6.L.15.1; SC.7.L.15.2; SC.7.L.15.1; SC.7.L.15.3; SC.7.L.16.1; SC.7.L.16.2; SC.7.L.16.3, SC.7.L.17.2) XV. Human Regulation and Reproduction (HE.8.C.1.7; HE.8.C.1.8; HE.8.C.2.7; HE.8.C.2.8; HE.8.C.2.9; HE.B.3.1; HE.B.3.6; HE.B.3.7; HE.8.B.4.1; HE.8.P.1.1; HE.8.P.1.2; HE.8P.1.3) A. Endocrine System B. Reproductive System C. Human Life Stages D. Planning for Marriage and Parenthood E. Abstinence F. Sexually Transmitted Disease G. HIV/AIDS XVI. Substance Abuse - Personal Health Relationships (HE.8.P.1.1; HE.8.B.3.4; HE.8.B.3.7; HE.8.B.2.1; HE.8.C.2.2; HE.8.C.2.7; HE.8.C.1.1; HE.8.C.1.5) A. Family and Peers B. Substance Abuse Prevention C. Peer Pressure D. Communication E. Personal Health

M/J COMPREHENSIVE SCIENCE 3, ADVANCED			**Course Code: 200211001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
XVII. Matter (SC.8.P.8.2, SC.8.P.8.3 ; SC912.P.8.2; SC.8.N.1.1; SC.8.N.1.2: SC.8.N.1.4; SC.8.N.1.5; SC.8.N.1.6) H. What is Matter? I. Review Forces J. Weight vs. Mass K. Density L. Scientific Measurement M. Designing an Experiment N. Baseline Testing XVIII. Properties and Changes of Matter (SC.8.P.8.4; SC.912.P.8.2; SC.912.P.8.1; SC.8.P.9.2; SC.8.P.9.3; SC.8.N.1.1; SC.8.N.1.2; SC.8.N.1.6) A. Physical properties B. Chemical properties C. Physical and Chemical Changes XIX. Matter – Phase Change (SC.8.P.8.4; SC.8.P.8.1; SC.8.N.1.1; SC.8.N.1.2) E. States of Matter F. Changes of State G. Law of Conservation of Mass H. How Scientists Work XX. Atoms (SC.8.P.8.7; SC.8.P.8.1; SC.912.P.8.5; SC.912.P.8.7; SC.8.N.1.4; SC.8.N.3.2; LACC.68.WHST.1.2; LACC68.WHST.3.9) E. Scientific Models and Systems F. Scientific Theories G. Describing Matter H. Atoms XXI. Atoms and the Periodic Table (SC.8.P.8.6 SC.8.P.8.7; SC.912.P.8.5; SC.8.N.1.1; SC.8.N.1.4; SC.8.N.1.6; SC.8.N.3.2) 4. Periodic Table 5. Interim Test 6. Interim Assessment	XXII. Chemical Properties and Changes of Matter (SC.8.P.8.5; SC.8.P.8.6; SC.8.P.8.8; SC.912.P.8.11; SC.8.P.9.1; SC.8.P9.2; SC.8.P.9.3; SC.8.N.2.2; SC.8.N.3.1; LACC.68.RST.1.3) A. Compounds B. Chemical Changes XXIII. Mixtures and Solutions (SC.8.P.8.4; SC.8.P.8.9; SC.8.N.1.1; SC.8.N.1.6; LACC.68.WHST.1.2) D. Pure Substances and Mixtures E. Solutions F. What Factors Affect Solubility? XXIV. Photosynthesis and Cellular Respiration (SC.8.L.18.1; SC.L.18.2; SC.L.18.4; SC.912.L.18.7; SC.912.L.18.8; SC.912.L.18.9; SC.8.N.1.1; SC.8. P.8.5) H. Cell Structure Overview I. Photosynthesis (reactants) J. Photosynthesis (products) K. Law of Conservation of Mass and Energy L. Review Electromagnetic Spectrum M. Cell Respiration N. Process and Pathways XXV. Cycles of Matter (SC.8.L.18.3; SC.8.L.18.4; SC.8.N.1.1; SC.8.P.8.5; LACC.68.RST.3.7) D. Cycles in Nature E. Recycling Carbon, Oxygen and Nitrogen F. Conservation of Matter and Energy XXVI. Stars and Galaxies (SC.8.E.5.2; SC.8.E.5.1; SC.8.E.5.5; SC.8.E.5.3; SC.8.E.5.4; SC.8.E.5.11; SC.8.E.5.10; LACC.68.RST.2.4) G. Objects in Space H. Distances in Space I. Properties of Stars J. Astronomical Bodies K. Law of Universal Gravitation and the Formation of Stars L. Interim Test	XXVII. The Sun (SC.8.E.5.4; SC.8.E.5.5; SC.8.E.5.6; SC.912.E.5.4; LACC.68.RST.3.7; MACC.8.F.2.5) A. Scientific Knowledge B. The Sun's Characteristics C. Energy from the Sun XXVIII. Solar System (SC.8.E.5.8; SC.8.E.5.7; SC.8.E.5.3; SC.8.E.5.4; SC.8.N.1.3; SC.8.N.3.2) F. Introduction to the Solar System G. Earth's Moon H. Planets I. Other Objects (Asteroids, Comets, Meteor, Meteorite) J. Models of the Solar System XXIX. Models of the Solar System Solar System: Sun, Earth, and Moon (SC.8.E.5.9; SC.8.E.5.10; SC.8.E.5.11; SC.912.E.5.4; SC.8.N.1.6; LACC.68.RST.3.7; LACC.68.RST.4.10) G. The Impact of Gravity on Earth H. Earth in Space I. Seasons J. Phases and Eclipses K. Tides L. Benchmark Assessment	XXX. Review Annually Assessed Benchmarks (Fair Game SC.7.E.6.2 ; SC.6.E.6.1; SC.6.E.6.2; SC.7.E.6.6; SC.7.E.6.4; SC.7.E.6.3; SC.7.E.6.5; SC.7.E.6.1; SC.7.E.6.7; SC.6.E.7.4; SC.6.E.7.2; SC.6.E.7.3; SC.6.E.7.6; SC.6.E.7.9; SC.6.E.7.5; SC.6.E.7.1; SC.7.P.10.3; SC.7.P.10.2; SC.7.P.11.2; SC.6.P.11.1 SC.7.P.11.3; SC.7.P.11.4; SC.7.P.11.1; SC.6.P.13.1; SC.6.P.13.2; SC.8.P.8.2; SC.6.L.14.1; SC.6.L.14.2; SC.6.L.14.3; SC.6.L.14.4; SC.6.L.14.5; SC.6.L.14.6; SC.6.L.15.1; SC.7.L.15.2; SC.7.L.15.1; SC.7.L.15.3; SC.7.L.16.1; SC.7.L.16.2; SC.7.L.16.3, SC.7.L.17.2) XXXI. Human Growth and Development (HE.8.C.1.7; HE.8.C.1.8; HE.C.2.7; HE.C.2.8; HE.C.2.9; HE.8.B.3.1; HE.8.B.3.6; HE.8.B.3.7; HE.8.B.4.1; HE.8.P.1.1; HE.8.P.1.2; HE.8P.1.3) A. Endocrine System B. Reproductive System C. Human Life Stages D. Planning for Marriage and Parenthood E. Abstinence F. Sexually Transmitted Disease G. HIV/AIDS XXXII. Substance Abuse - Personal Health Relationships (HE.8.P.1.1; HE.8.B.3.4; HE.8.B.3.7; HE.8.B.2.1; HE.8.C.2.2; HE.8.C.2.7; HE.8.C.1.1; HE.8.C.1.5) A. Family and Peers B. Substance Abuse Prevention C. Peer Pressure D. Communication E. Personal Health

Physical Science			**Course Code: 200331001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Introduction **(What keeps the Universe together and changing?)** A. Develop Interest in Physical Science B. Lab Safety C. Develop the logic and sequence of the Scientific Process D. Lab Report writing and expectations **II.** Measurement **(How do you find out the mass of one grain of rice?)** A. Develop the logic of using Metric Units B. Practice "Measurements" by measuring C. SI Units Conversions D. Data analysis, graphing and Interpretation E. Develop the concepts of mass, volume and density relationships **III.** Motion **(How does a rocket ship get into orbit?)** A. Develop the concept of motion B. Position C. Speed D. Velocity E. Acceleration F. Graphs of Motion **IV.** Forces **(Why do we wear a seatbelt?)** A. Develop the concept of Forces and equilibrium B. Newton's First Law C. Newton's Second Law D. Newton's Third Law E. Law of Universal Gravitation	**V.** Energy **(How much energy is in a chocolate bar?)** A. Develop the concept of Energy B. Forms of Energy C. Energy Transformation D. Law of Conservation of Energy E. Energy Resources F. Review Energy Pyramid and trophic Levels **VI.** Work & Machines **(How do you move a refrigerator to the second floor?)** A. Develop the concept of Work B. Observe examples of Work and Power C. Analyze and synthesize qualitative Work scenarios D. Identify and Build Simple Machines **VII.** Waves: Sound & Light **(If you scream in space, do you hear the sound?** A. Develop the concept of waves B. Properties of sound C. Sound Waves D. Electromagnetic spectrum and optics E. Speed of light **VIII.** Electricity-Static Current **(Why do socks stick together when you take them out of the dryer?)** A. Develop the concept of Electricity B. Conductors, Semiconductors, and insulators C. Electric Circuits and systems **IX.** Magnetism **(Why should we not put magnets near our cell phones or computers?)** A. Develop the concept of magnetism B. Properties and Interactions of Magnets C. Electromagnets D. Electric Motors and Generators	**X.** Matter **(How does the sun make energy?)** A. Nature of Matter B. Atoms, elements, and compounds C. Phases of Matter D. Classification of Matter (homogeneous and heterogeneous) E. Properties of Matter **XI.** Temperature **(Which will increase in temperature at a higher rate; a bucket of water or a swimming pool?)** A. Develop the concept of temperature B. Temperature conversions C. Heat and Thermal Energy D. Transfer of Heat **XII.** Behavior of Gases **(Why do your ears pop when you are in an airplane?)** A. Atmosphere and Pressure B. Factors affecting pressure C. Gas Laws (Boyle's law, Charles law, Gay-Lussac's law) **XIII.** Atomic Structure **(Why is the water from prehistoric time the same as the water we drink today?)** A. Structure of the Atom B. Atomic Models C. Periodic Table	**XIV.** Compounds **(If the parents have brown eyes how can their child have blue eyes?)** A. Chemical Bonds and electrons B. Chemical Formulas C. Building Blocks of Life D. Organic Compounds E. Macromolecules **XV.** Chemical Reactions **(How are the colors of fireworks created?)** A. Chemical Reactions B. Classifying Reactions C. Photosynthesis and Cellular Respiration D. Biogeochemical Cycles E. Processes Related to Cycles F. Human Impact **XVI.** Energy and Chemical Reactions **(Why do glow sticks glow?)** A. Types of Reactions B. Required Energy C. Reaction Systems D. Reaction Rate E. Nuclear Reactions **XVII.** Solutions **(How do bugs walk on water?)** A. Properties of Water: The Universal Solvent B. Solutions C. Acids, Bases, and pH **XVIII.** Ramping-Up for Biology **(What is the smallest living organism?)** A. Equipment and Procedures B. Cells Types C. Review of the Scientific Process D. Famous Biologists E. Biology Vocabulary

Physical Science Honors			**Course Code: 200332001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
XIX. Introduction **(What keeps the Universe together and changing?)** A. Develop Interest in Physical Science B. Lab Safety C. Develop the logic and sequence of the Scientific Process D. Lab Report writing and expectations **XX.** Measurement **(How do you find out the mass of one grain of rice?)** A. Develop the logic of using Metric Units B. Practice "Measurements" by measuring C. SI Units Conversions D. Data analysis, graphing and Interpretation E. Develop the concepts of mass, volume and density relationships **XXI.** Motion **(How does a rocket ship get into orbit?)** A. Develop the concept of motion B. Position C. Speed D. Velocity E. Acceleration formula F. Graphs of Motion **XXII.** Forces **(Why do we wear a seatbelt?)** A. Develop the concept of Forces and equilibrium B. Newton's First Law C. Newton's Second Law D. Newton's Third Law and Momentum (linear and angular) E. Law of Universal Gravitation	**XXIII.** Energy **(How much energy is in a chocolate bar?)** A. Develop the concept of Energy B. Forms of Energy C. Energy Transformation D. Law of Conservation of Energy E. Non-renewable and renewable resources F. Energy Pyramid and trophic Levels **XXIV.** Work & Machines **(How do you move a refrigerator to the second floor?)** A. Develop the concept of work B. Observe examples of work and power C. Analyze and synthesize qualitative work scenarios D. Identify and Build Simple Machines E. Mechanical advantage **XXV.** Waves: Sound & Light **(If you scream in space, does it make a sound?)** A. Develop the concept of waves B. Properties of sound C. Sound Waves D. Electromagnetic spectrum and optics E. Speed of light **XXVI.** Electricity-Static Current **(Why do socks stick together when you take them out of the dryer?)** A. Develop the concept of Electricity B. Conductors and insulators C. Electric Circuits and systems **XXVII.** Magnetism **(Why should we not put magnets near our cell phones or computers?)** A. Develop the concept of Magnetism B. Properties and Interactions of Magnets C. Electromagnets D. Electric motors and generators	**XXVIII.** Matter **(How does the sun make energy?)** A. Nature of Matter B. Atoms, elements, and compounds C. Phases of Matter D. Classification of Matter (homogeneous and heterogeneous) E. Physical and chemical properties **XXIX.** Temperature **(Which will increase in temperature at a higher rate; a bucket of water or a swimming pool?)** A. Concept of temperature B. Temperature conversions C. Heat and Thermal Energy D. Transfer of Heat E. Specific Heat **XXX.** Behavior of Gases **(Why do your ears pop when you are in an airplane?)** A. Atmosphere, attitude and Pressure B. Properties affecting pressure C. Gas Laws (Boyle's law, Charles law, Gay-Lussac's law) **XXXI.** Atomic Structure **(Why is the water from prehistoric time the same as the water we drink today?)** A. Structure of the Atom B. Atomic Models C. Periodic Table D. Biogeochemical Cycles E. Processes Related to Cycles F. Human Impact on the Cycles F.	**XXXII.** Compounds **(If the parents have brown eyes can their child have blue eyes?)** G. Chemical Bonds and electrons H. Chemical Formulas I. Building Blocks of Life J. Organic Compounds K. Macromolecules **XXXIII.** Chemical Reactions **(How are the colors of fireworks created?)** A. Chemical Reactions B. Classifying Reactions C. Photosynthesis and Cellular Respiration **XXXIV.** Energy and Chemical Reactions **(Why do glow sticks glow?)** A. Types of Reactions B. Required Energy C. Reaction Systems D. Reaction Rate E. Nuclear Reactions **XXXV.** Solutions **(How do bugs walk on water?)** A. Water: The Universal Solvent 1.Polarity 2.Cohesion, adhesion, and capillarity 3.Ability to Regulate Temperature B.Solutions 1.Solubility 2.Temperature Solubility graphs C.Acids, Bases, and pH 1. pH in the environment 2. pH in the body **XXXVI.** Ramping-Up for Biology **(What is the smallest living organism?)** F. Microscopes G. Cells Overview: Prokaryotic and Eukaryotic H. Famous Scientists I. Common Prefixes & Vocabulary

BIOLOGY I — COURSE CODE: 200031001

1st Nine Weeks

XXIX. Introduction to Biology/Nature of Life**
- A. What is Biology
- B. Science in the real world

ECOLOGY (How do interactions among organisms impact the changing environment?)

XXX. Ecosystems (17.5)
- A. Review of community Interactions**
- B. Distribution of life in aquatic systems (17.2)
- C. Succession and changes (17.4)
- D. Predict impact from catastrophic events: Climate change, Human activity, Invasive species (17.8)

XXXI. Populations in an ecosystem (17.5)
- A. Population dynamics and graphs
- B. Carrying capacity
- C. Limiting Factors

XXXII. Energy Flow (17.9)
- A. Food Chains and Food Webs
- B. Trophic levels and energy reduction
- C. Biogeochemical Cycles: water and carbon (E.7.1, 18.12)

XXXIII. Human Impact on Environment (17.20)
- A. Costs and benefits of renewable and non-renewable resources (17.11)
- B. Sustainability and environmental policy (17.11)

EVOLUTION (How do scientists think life began and continues to change on Earth?)

XXIV. Origins of Life (15.8)
- A. Law vs. theories in science
- B. Contribution of scientists (Pasteur, Oparin, Miller and Urey, Margulis, Fox)
- C. Endosymbiotic theory (conceptual)
- D. Role of amino acids and proteins (18.1)

XXXV. Theory of Evolution (15.1)
- A. Evidence for the theory of evolution
- B. Trends in human evolution: brain size, jaws, tools (15.10, 14.26)
- C. Brain structures (14.26)

XXVI. Mechanisms of Evolution (15.13)
- A. Darwin's Natural Selection
- B. Introduction to other Mechanisms (15.14, 15.15)

2nd Nine Weeks

CLASSIFICATION (Why do scientists classify living things the way they do?)

XXVII. Taxonomy (15.6)
- A. Hierarchical classification based on evolutionary relationships (15.4)
- B. Domains and Kingdoms (15.6)
- C. Reasons for changes in how organisms are classified. (15.5)

XVIII. What defines a plant (14.7)
- A. Overview of Plants: Organs, tissues, evolution (14.7)
- B. Physiological Processes of Plants (Growth, Reproduction, Transpiration, Photosynthesis, Cellular respiration) (14.7)
- C. Properties of Water (18.12)

XXIX. Cell energy: Photosynthesis (18.9)
- A. General equation of Photosynthesis (18.7)
- B. Where it occurs(14.7)
- C. Non plant examples of photosynthetic organisms (15.6)
- D. Role of carbohydrates as a source of energy (18.1)

XL. Cell energy: Cellular Respiration (18.9)
- A. General Equation for Cellular Respiration(18.8, 18.9)
- B. ADP/ATP cycle(18.10)
- C. Aerobic vs. Anaerobic respiration (18.8)
- D. Krebs cycle and Electron Transport Chain (Aerobic Respiration)**

HUMAN BODY (How are human body systems different?)

XLI. Circulatory System (14.36)
- A. Factors affecting blood pressure, blood volume, blood flow and viscosity

XLII. Immune System (14.52)
- A. Specific and non-specific responses
- B. Significance of factors: genetic, environmental, and pathogenic
- C. Use of antibiotics and vaccines
- D. Antibiotic resistance

REPRODUCTION (How do organisms grow and reproduce?)

XLIII. Human Reproductive system (16.13)
- A. Basic Anatomy and Physiology: male and female
- B. Human Development – Fertilization to Birth (all stages)
- C. External Membranes

3rd Nine Weeks

XLIV. Review of Cells (14.1, 14.3)
- A. Cell theory and discovery (14.1)
- B. Compare/contrast cell types(14.3)(prokaryote, eukaryotic, plant, animal)
- C. Organelles and membrane: roles and functions
- D. Role of lipids in cell membrane (18.1)
- E. Role of membrane: Highly selective barrier (14.2)

XLV. Comparing Cell Processes: Mitosis (16.17)
- A. Cell Cycle (16.14)
- B. Process of Mitosis (16.14)
- C. Mistakes in Mitosis (16.8)
- D. Asexual vs. sexual effect on genetic variation

XLVI. Comparing Cell Processes: Meiosis (16.17)
- A. Process: creating gametes and independent assortment (16.16)
- B. Crossing over and non-disjunction(16.16)
- C. Genetic variation resulting from meiosis (16.15)
- D. Comparison of Mitosis and Meiosis (16.17)

GENETICS (How do inherited traits lead to variations?)

XLVII. Review Heredity - Mendelian (16.1)
- A. Law of segregation and independent assortment (16.1)
- B. Other patterns of inheritance: co-dominance, incomplete dominance, polygenic, sex-linked, multiple alleles (16.2)
- C. Punnett Squares: Mono-,Dihybrid (16.1)
- D. Predict and analyze pedigrees
- E. Genetic Drift/Gene flow (15.14)

XLVIII. Biotechnology (16.10)
- A. Predicting impact on society, individual, and environment (16.10)
- B. Medical and ethical issues (16.10)

MOLECULAR GENETICS (How does your genetic code determine an organism's physical appearance?)

XLIX. DNA and Replication (16.3)
- A. Experiments and History**
- B. Universal code for all organisms (16.9)
- C. Review of structure of DNA and chromosomes and location in cell**
- D. Role of Nucleic acids (18.1)
- E. DNA Replication in prophase (16.3, 16.17)
- F. Types of mutations and effects (16.4)

L. RNA and Protein Synthesis (16.3)
- A. RNA synthesis: Transcription (16.5)
- B. Protein synthesis: Translation (16.5)
- C. Types of mutations: harmful, beneficial, variation, neutral (16.4)

4th Nine Weeks

BIOCHEMISTRY (What are the basic building blocks)

LI. Review of macromolecules (18.1)
- A. Types (carbohydrates, proteins, lipids, and nucleic acids)
- B. Structure and function

LII. Role of Proteins in the Body: Enzymes (18.11)
- A. As a catalyst to reduce activation energy
- B. Factors affecting enzyme function: pH temperature, concentration

LIII. *BIOLOGY EOC AA BENCHMARKS CRUNCH TIME (3 weeks)*

FACTORS THAT AFFECT HUMAN HEALTH

LIV. Pathogens: Prokaryotes, Viruses, Protists, and Fungi**

LV. Review of Animal Kingdom

LVI. Genetic Diseases and Human Genetics**

****Denotes content necessary for in depth understanding of the content matter but will not be assessed on the EOC exam.**

BIOLOGY I HONORS — COURSE CODE: 200032001

1st Nine Weeks

. Introduction to Biology/Nature of Life**
- A. What is Biology
- B. Science in the real world

ECOLOGY (How do interactions among organisms impact the changing environment?)

II. Ecosystems (17.5)
- A. Review of community Interactions**
- B. Distribution of life in aquatic systems (17.2)
- C. Succession and changes (17.4)
- D. Predict impact from catastrophic events: Climate change, Human activity, Invasive species (17.8)

III. Populations in an ecosystem (17.5)
- A. Population dynamics and graphs
- B. Carrying capacity
- C. Limiting Factors

IV. Energy Flow (17.9)
- A. Food Chains and Food Webs
- B. Trophic levels and energy reduction
- C. Biogeochemical Cycles: water, carbon, and nitrogen (E.7.1, 18.12)

V. Human Impact on Environment (17.20)
- A. Costs and benefits of renewable and non-renewable resources (17.11)
- B. Sustainability and environmental policy (17.11)

EVOLUTION (How do scientists think life began and continues to change on Earth?)

VI. Origins of Life (15.8)
- A. Law vs. theories in science
- B. Contribution of scientists (Pasteur, Oparin, Miller and Urey, Margulis, Fox)
- C. Endosymbiotic theory (conceptual)
- D. Role of amino acids and proteins (18.1)

VII. Theory of Evolution (15.1)
- A. Evidence for the theory of evolution
- B. Trends in human evolution: brain size, jaws, tools (15.10, 14.26)
- C. Brain structures (14.26)

VIII. Mechanisms of Evolution (15.13)
- A. Darwin's Natural Selection
- B. Introduction to other Mechanisms (15.14, 15.15)

2nd Nine Weeks

CLASSIFICATION (Why do scientists classify living things the way they do?)

IX. Taxonomy (15.6)
- A. Hierarchical classification based on evolutionary relationships (15.4)
- B. Domains and Kingdoms (15.6)
- C. Reasons for changes in how organisms are classified. (15.5)

X. What defines a plant (14.7)
- A. Overview of Plants: Organs, tissues, evolution (14.7)
- B. Physiological Processes of Plants (Growth, Reproduction, Transpiration, Photosynthesis, Cellular respiration) (14.7)
- C. Properties of Water (18.12)

XI. Cell energy: Photosynthesis (18.9)
- A. General equation of Photosynthesis (18.7)
- B. Where it occurs(14.7)
- C. Non plant examples of photosynthetic organisms (15.6)
- D. Role of carbohydrates as a source of energy (18.1)

XII. Cell energy: Cellular Respiration (18.9)
- A. General Equation for Cellular Respiration(18.8, 18.9)
- B. ADP/ATP cycle(18.10)
- C. Aerobic vs. Anaerobic respiration (18.8)
- D. Krebs cycle and Electron Transport Chain (Aerobic Respiration)**

HUMAN BODY (How are human body systems different?)

XIII. Circulatory System (14.36)
- A. Factors affecting blood pressure, blood volume, blood flow and viscosity

XIV. Immune System (14.52)
- A. Specific and non-specific responses
- B. Significance of factors: genetic, environmental, and pathogenic
- C. Use of antibiotics and vaccines
- D. Antibiotic resistance

REPRODUCTION (How do organisms grow and reproduce?)

XV. Human Reproductive system (16.13)
- A. Basic Anatomy and Physiology: male and female
- B. Human Development – Fertilization to Birth (all stages)
- C. External Membranes

3rd Nine Weeks

XVI. Review of Cells (14.1, 14.3)
- A. Cell theory and discovery (14.1)
- B. Compare/contrast cell types(14.3)(prokaryote, eukaryotic, plant, animal)
- C. Organelles and membrane: roles and functions
- D. Role of lipids in cell membrane (18.1)
- E. Role of membrane: Highly selective barrier (14.2)

XVII. Comparing Cell Processes: Mitosis (16.17)
- A. Cell Cycle (16.14)
- B. Process of Mitosis (16.14)
- C. Mistakes in Mitosis (16.8)
- D. Asexual vs. sexual effect on genetic variation

XVIII. Comparing Cell Processes: Meiosis (16.17)
- A. Process: creating gametes and independent assortment (16.16)
- B. Crossing over and non-disjunction(16.16)
- C. Genetic variation resulting from meiosis (16.15)
- D. Comparison of Mitosis and Meiosis (16.17)

GENETICS (How do inherited traits lead to variations?)

XIX. Review Heredity - Mendelian (16.1)
- A. Law of segregation and independent assortment (16.1)
- B. Other patterns of inheritance: co-dominance, incomplete dominance, polygenic, sex-linked, multiple alleles (16.2)
- C. Punnett Squares: Mono-,Dihybrid (16.1)
- D. Predict and analyze pedigrees
- E. Genetic Drift/Gene flow (15.14)

XX. Biotechnology (16.10)
- A. Predicting impact on society, individual, and environment (16.10)
- B. Medical and ethical issues(16.10)
- C. DNA Technology and recombinant DNA (16.12)

MOLECULAR GENETICS (How does your genetic code determine an organism's physical appearance?)

XXI. DNA and Replication (16.3)
- A. Experiments and History**
- B. Universal code for all organisms (16.9)
- C. Review of structure of DNA and chromosomes and location in cell**
- D. Role of Nucleic acids (18.1)
- E. DNA Replication in prophase (16.3, 16.17)
- F. Types of mutations and effects (16.4)

XXII. RNA and Protein Synthesis (16.3)
- A. RNA synthesis: Transcription (16.5)
- B. Protein synthesis: Translation (16.5)
- C. Types of mutations: harmful, beneficial, variation, neutral (16.4)

4th Nine Weeks

BIOCHEMISTRY (What are the basic building blocks)

XXIII. Review of macromolecules (18.1)
- A. Types (carbohydrates, proteins, lipids, and nucleic acids)
- B. Structure and function

XXIV. Role of Proteins in the Body: Enzymes (18.11)
- A. As a catalyst to reduce activation energy
- B. Factors affecting enzyme function: pH, temperature, concentration

XXV. *BIOLOGY EOC AA BENCHMARKS CRUNCH TIME (3 weeks)*

FACTORS THAT AFFECT HUMAN HEALTH

XXVI. Pathogens: Prokaryotes, Viruses, Protists, and Fungi**

XXVII. Review of Animal Kingdom

XXVIII. Genetic Diseases and Human Genetics**

****Denotes content necessary for in depth understanding of the content matter but will not be assessed on the EOC.**

CHEMISTRY I			**COURSE CODE: 200334001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Introduction **(What are things made of and how do they change?)** A. Develop Interest in Chemistry B. Lab Safety/Classroom Expectations **II.** Describing Matter **(How are properties used to describe matter?)** A. Classification of Matter B. Properties of Matter C. Density calculations D. Separation Techniques **III.** Periodic Table **(What Is the stuff that the universe is made of?)** A. Describe Changes in the Atomic Model Over Time B. Explore The Scientific Theory of Atoms C. Relate Properties of Atoms and Their Position in the Periodic Table **IV.** Electrons In Atoms **(Why do metals emit different colors when heated?)** A. Electron Configuration B. Electromagnetic Spectrum and Atomic Emission Spectra C. Quantum of Energy D. Calculating Frequency, Wavelength and Energy **V.** Chemical Bonding and Molecular Structures **(What keeps substances together?)** A. Develop the Concept of Bonding B. Types of Bonds C. Bonding Structures D. Intermolecular Forces	**VI.** Nomenclature and Formulas **(How do we name compounds?)** A. Writing Formulas B. Naming Ionic and Covalent Compounds **VII.** Energy and States **(How can matter change its form?)** A. Develop concept of molecular motion (Kinetic-Molecular Theory (KMT)) B. Review concept of Forces of Attraction C. Develop concept of phase changes VIII. Chemical Reactions **(How do things change over time?)** A. Chemical changes B. Develop the concept of conservation of mass as introduction to chemical reactions C. Classification of Chemical Reactions D. Balancing Chemical Reactions **IX.** The Mole **(How do we count very small particles?)** A. Develop the concept of the Mole B. Conversions with the Mole C. Empirical and Molecular Formulas	X. Stoichiometry **(How do scientists predict and calculate quantities?)** A. Mole Ratios in Chemical Reactions B. Stoichiometric Calculations XI. Solutions **(Why does salt dissolve in water?)** A. The Special Properties of Water B. Water as a Universal Solvent C. How substances dissolve in other substances (Like dissolves like) D. Components of a Solution E. Concentration vs. Dilution XII. Acids and Bases **(How do antacids neutralize stomach acid?)** A. Acids and bases B. Properties of Acids and Bases C. pH Scale D. Strengths of Acids and Bases E. Neutralization F. pH Based On Hydronium And Hydroxide Concentrations	XIII. Reaction Rates **(Why do some reactions occur faster than others?)** A. Develop the concept of Collision Theory B. Factors Affecting Reaction Rates C. Energy Diagrams D. Develop the Concept of Reversible Reactions and Equilibrium XIV. Gas Behavior **(Why is the atmospheric pressure low during a hurricane?)** A. Review KMT and Properties of Gases B. Gas Laws **XV.** Nuclear Chemistry **(What are the risks of living near a nuclear power plant?)** A. Nuclear Radiation B. Chemical and nuclear reactions. C. Real world examples of chemical and nuclear reactions

CHEMISTRY I HONORS			**COURSE CODE: 200335001**
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
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PHYSICS I			COURSE CODE: 2003390
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
I. Scientific Thinking/Graphical Methods **(How do scientists model the physical world?)** A. Develop the Modeling Cycle through Lab Activities B. Use Linearization to Develop Relationships C. Use Dimensional Analysis to Give Meaning to Physical Quantities **II.** Constant Velocity Particle Model **(How do you describe motion?)** A. Derive the Meaning of Velocity B. Represent Motion in Multiple Ways C. Develop the Concept of Relative Motion **III.** Uniform Acceleration **(How do you describe a change in motion?)** A. Derive the Meaning of Acceleration B. Analyze Motion of Objects in Free Fall **IV.** Inertia and Free Particle Model **(What keeps an object in motion?)** A. Review the Concept of Force B. Apply Newton's First Law C. Apply Newton's Third Law D. Newton's Law of Universal Gravitation	**V.** Constant Force Particle Model **(What causes a change in motion?)** A. Newton's Second Law B. Friction **VI.** Two-Dimensional Particle Motion **(Can an object simultaneously have constant and changing velocity?)** A. Projectile Motion B. Kepler's 3rd Law **VII.** Energy **(How does energy transfer explain change?)** A. First Law of Thermodynamics B. Law of Conservation of Energy C. Work-Energy Theorem D. Power **VIII.** Momentum **(What affect does mass have on the result of a collision?)** A. Linear Momentum B. Conservation of Momentum	**IX.** Charge Behavior and Interactions **(What causes electric shock?)** A. Develop a Model of Charges B. Conductors and Insulators C. Coulomb's Law D. Electrical Fields **X.** Electric Potential **(Can an Electric Field Store Energy?)** A. Energy Implications of the Field B. Potential as a characteristic of the Field C. Equipotential **XI.** Electric Current and Circuits **(What makes charges move?)** A. Electric Current B. Ohm's Law C. DC and AC Current D. Electric Power E. Diagrams and Circuits	**XII.** Waves and Sound **(Can you hear sound in space?)** A. Vibrations and Waves B. Types of Waves C. Interference D. Standing Waves E. Sound **XIII.** Light **(Is light a wave or a particle?)** A. Nature of Light B. Color C. Electromagnetic Waves **XIV.** Optics **(Why do you see yourself in the mirror?)** A. Reflection B. Refraction C. Lenses and Mirrors D. Diffraction

PHYSICS I HONORS			COURSE CODE: 2003390
1ST Nine Weeks	**2nd Nine Weeks**	**3rd Nine Weeks**	**4th Nine Weeks**
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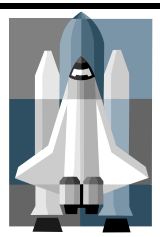
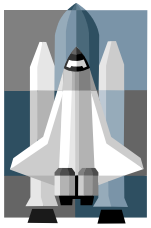
APPENDIX C
Reading List

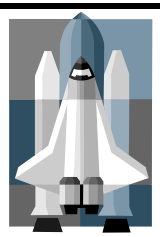
Success Using Science Literature Connections in the Classroom

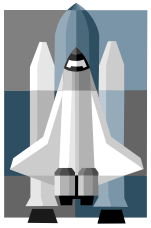
P = Primary
E = Elem (Interm.)
M = Middle School
S = Sr. High

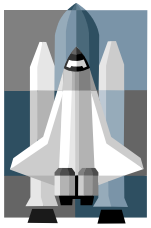


Name of Book	ISBPN:	Author	Physical Science			Earth/Space Space		Life Science		Nature of Science
			Properties of Matter/Changes in Matter Big Idea/Standard(s) 8 & 9	Forms of Energy Energy Transfer/Transformations Big Idea/Standard(s) 10 & 11	Forces and Changes in Motion Big idea/Standard(s) 12 & 13	Earth Structures/Systems and Patterns Big Idea/Standard(s) 6 & 7	Earth in Space and Time Big Idea/Standard 5	Organization & Dev. of Living Things Reproduction Big Idea/Standard(s) 14, 15 & 16	Interdependence Matter and Energy Transformation Big Idea/Standard(s) 17 & 18	Practice of Science/Characteristics of Scientific Knowledge/Role of Theories… Big Idea/Standard(s) 1 - 4
A Brief History of Time	0553346148	Stephen Hawking					S			
A Butterfly is Patient	9780811864794	Dianna H. Aston							E	
A Dolphin Named Bob	0064420795	George C. Twig							E	
A River Ran Wild	0152163727	Lynne Cherry	E			E			E	
A Tree is Nice	0064431479	Janice May Udry					E	E	E	
A Wrinkle in Time	0440498058	Madeline L'Engle		EM					EM	
About Arachnids: A Guide for Children	1561450383	John Sill						PE		
About Habitats: Grasslands	1978561455591	Cathryn Sill							P	
Alas, Babylon	0060931396	Pat Frank				S			S	
Alien Deep	9781426310676	Bradley Hague							E	
Almost Astronauts	978-0763636111	Tanya Lee Stone								M

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
			Properties of Matter/Changes in Matter Big Idea/Standard(s) 8 & 9	**Forms of Energy Energy Transfer/Transformations Big Idea/Standard(s) 10 & 11**	**Forces and Changes in Motion Big idea/Standard(s) 12 & 13**	**Earth Structures/Systems and Patterns Big Idea/Standard(s) 6 & 7**	**Earth in Space and Time Big Idea/Standard 5**	**Organization & Dev. of Living Things Reproduction Big Idea/Standard(s) 14, 15 & 16**	**Interdependence Matter and Energy Transformation Big Idea/Standard(s) 17 & 18**	**Practice of Science/Characteristics of Scientific Knowledge/Role of Theories… Big Idea/Standard(s) 1 - 4**
American Women Inventors	076601936	Carole Anne Camp								MS
Amigo	0766019136	Byrd Baylor							P	
Amphibians, Reptiles, and their Conservation	0208025111	Marty Crump						M		M
An American Plague: The True and Terrifying Story of the Yellow Fever Epidemic of 1793	0395776082	Jim Murphy						M		M
An Island Like You	014038068X	Judith Ortiz Cofer						M	M	
And So they Build	1564025020	Bert Kitchen							E	
And the Earth Did Not Devour Him	0613179595	Tomas Rivera				S	S			

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High**			Physical Science			Earth/Space Space		Life Science		Nature of Science
Name of Book	**ISBPN:**	**Author**	**Properties of Matter/Changes in Matter Big Idea/Standard(s) 8 & 9**	**Forms of Energy Energy Transfer/Transformations Big Idea/Standard(s) 10 & 11**	**Forces and Changes in Motion Big idea/Standard(s) 12 & 13**	**Earth Structures/Systems and Patterns Big Idea/Standard(s) 6 & 7**	**Earth in Space and Time Big Idea/Standard 5**	**Organization & Dev. of Living Things Reproduction Big Idea/Standard(s) 14, 15 & 16**	**Interdependence Matter and Energy Transformation Big Idea/Standard(s) 17 & 18**	**Practice of Science/Characteristics of Scientific Knowledge/Role of Theories… Big Idea/Standard(s) 1 - 4**
Animal Defenses: How Animals Protect Themselves	1-55074-421-6	Etta Kaner							PEM	
Animal Lives: The Rabbit	0-7534-5214-6	Sally Tagholm						PE		
Animal Talk	039458337X	Eugene Morton						M	M	
Animal Prey: Octopuses	9780822560630	Sandra Markle							PEM	
Animals on the Trail with Lewis and Clark	0395914159	William Muñoz						S	S	S
Ant Attack	1575651173	Anne James						E	E	
Antarctica	0374403716	Helen Cowcher				P		P		
Arctic Explorer	0876145071	Jeri Ferris				M	M			
Arctic Lights, Arctic Nights	0802788564	Debbie S. Miller						E	E	E
Are We Alone? Scientist Search for Life in Space	079226567X	Gloria Skurzynski					M			M

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
			Properties of Matter/Changes in Matter Big Idea/Standard(s) 8 & 9	**Forms of Energy Energy Transfer/Transformations Big Idea/Standard(s) 10 & 11**	**Forces and Changes in Motion Big idea/Standard(s) 12 & 13**	**Earth Structures/Systems and Patterns Big Idea/Standard(s) 6 & 7**	**Earth in Space and Time Big Idea/Standard 5**	**Organization & Dev. of Living Things Reproduction Big Idea/Standard(s) 14, 15 & 16**	**Interdependence Matter and Energy Transformation Big Idea/Standard(s) 17 & 18**	**Practice of Science/Characteristics of Scientific Knowledge/Role of Theories… Big Idea/Standard(s) 1 - 4**
Around the World: Who's Been Here?	0688152686									
Arrowhawk	0805063714	Lola M. Schaefer							M	M
At Home in the Rain Forest	088106484X	Diane Willow						E		
Barrier Breakers	079108437X	Ian Rohr		M	M					
Beaks!	1570913870	Sneed Collard III						E	E	
Belly-Busting Worm Invasions!	9780531120682	Thomasine E. Lewis Tilden							MS	MS
Benjamin Banneker: Pioneering Scientist	0876149166	Ginger Wadsworth								PE
Biggest, Highest, Fastest	0791084329	Sharon Dagleish		M	M					M
Birds Build Nests	1570915016	Yvonne Winer						P	P	
Body Actions	9780823423668	Shelley Rotner						P		
Bodyscope: Movers and Shapers	0753457911	Patricia Macnair						E		

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High**			Physical Science			Earth/Space Space		Life Science		Nature of Science
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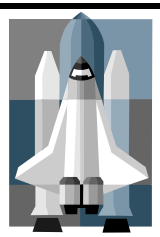
Brainstorm! The Story of Twenty American Kid Inventors	0374409285	Tom Tucker								M
Brave New World	0060929871	Aldous Huxley						S		
Brilliant Bees	0761319433	Linda Glaser						PE		
Bronx Masquerade	0142501891	Nikki Grimes								S
Bugs for Lunch	0881062723	Margery Facklam						P		
Building A House	0688093566	Byron Barton								E
Built for Speed	0762404418	Bob Latford			S					S
Buried in the Backyard	1575651262	Gail Herman						E	E	
Buried Onions	0064407713	Gary Soto	S					S	S	S
Butterflies	9780061914935	*Seymour Simon*						E	E	
Butterflies in the Garden	0688174795	Carol Lerner							P	
Cactus Hotel	0805029605	Brenda Guiberson				E		E	E	
Caterpillar and the Polliwog	0671662813	Jack Kent						P		
Charles Darwin	0823414949	Dorothy H. Patent								S

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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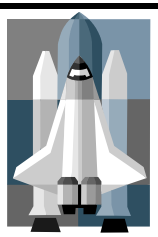
Chicken Soup for the Teenage Soul	1558746161	Jack Canfield						S	S	S
Chipmunk Song	0525671919	Joanne Ryder						E	E	
Citizen Scientists	9780805095173	Loree Griffin Burns								E
Choo Choo	0395479428	Virginia L. Burton		E						
Cloudy with a Chance of Meatballs	0689707495	Judi Barrett	P						P	
Come See the Earth Turn: The Story of Léon Foucault	9781582462844	Lori Mortensen					EM			EM
Contact	1857235800	Carl Sagan					S			
Cool Salsa	044970436X	Lori Carlson							M	
Cool Stuff Exploded: Get Inside Modern Technology	0756640288	Chris Woodford								E(5)MS
Copernicus: Founder of Modern Astronomy	0766017559	Catherine M. Adronik					M			M
Corn Is Maize: The Gift of the Indians	0064450260	Aliki						E	E	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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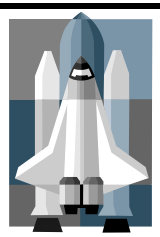
Cosmos	0394715969	Carl Sagan					S			
Crazy Weekend	0892552867	Gary Soto								M
Dear Mr. Henshaw	068802405X	Beverly Cleary		E						
Dear Rebecca, Winter is Here	0064434273	Jean George				PE		PE		
Decoding Life: Unraveling the Mysteries of the Genome	0822511967	Ron Fridell						E		E
DK Space Encyclopedia	0789447088	Heather Couper					S			S
Dr. Frankenstein's Human Body Book		Richard Walker						E		
Dr. Franklin's Island	0440237815	Ann Halam						MS	MS	
Dr. Jenner and the Speckled Monster: The Search for the Smallpox Vaccine	0525469222	Albert Marrin								EM
Dyes: From Sea Snails	0761321128	Ruth G. Kassinger	M							M

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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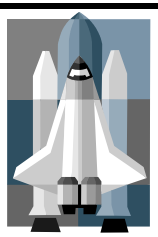
to Synthetics										
Ebola Virus (Disease and People)	0766015955	Edward Willett						S		S
Eliza and Dragonfly	1584690607	Susie C. Rinehart						E		E
Encantado: Pink Dolphin of the Amazon	0618131035	Sy Montgomery						MS	MS	MS
Earth Then and Now: Amazing Images of Our Changing World		Fred Pearce				E				
Endangered Planet	0753457768	David Burnie				M			M	M
Energy Island	9780374321840	Allan Drummond		E						
Ender's Game	0812550706	Orson Card							MS	MS
Esperenza Rising	043912042X	Pam Muñoz						S		
Essential Chemistry	0746007272	Clive Gifford	S							
Eureka! Great Inventions and How They Happened	0753455803	Richard Platt								E

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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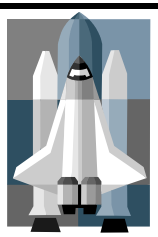
Everybody Needs a Rock	0684138999	Byrd Baylor				E	E			
Exploring Our Solar System	0375812040	Sally Ride and Tam O'Shaughnessy					M			
Eyes and Ears	0688153038	Seymour Simon	S					S		
Fabulous Fluttering Tropical Butterflies	0802788386	Dorothy Hinshaw						E		
Fantastic Feats and Failures	1553376331	Editors of YES Magazine			E					E
Faraway Worlds, Planets Beyond Our Solar System	1570916160	Paul Halpern					EM			EM
Feed	0763622591	M.T. Anderson							S	S
Field Trips: Bug Hunting, Animal Tracking, Bird-	0688151728	Jim Arnosky							M	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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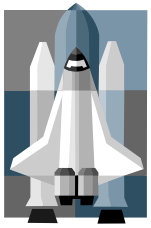
Watching, Shore Walking with J. Arnosky										
Fireflies!	0689710550	Julie Brinkloe						P	P	
Flip	0765340488	David Lubar							M	
Flowers for Algernon	015603008X	Daniel Keyes							S	S
Following the Coast	0688171176	Jim Arnosky							E	E
Footprints on the Moon	1570914087	Alexandra Siy					E			E
Forces of Nature: The Awesome Power of Volcanoes, Earthquakes, and Tornadoes	0792263286	Catherine O'Neill Grace				M	M			M
Forest Explorer: A Life-Size Field Guide	04391747815	Nick Bishop							E	E
Fossil Fish Found Alive: Discovering the Coelacanth	1575055368	Sally M. Walker						S	S	S
Garden of the Spirit	0618212590	Dorothy Henshaw						E	E	E

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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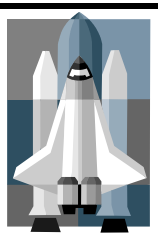
Bear: Life in the Great Northern Rainforest		Patent								
Genes and DNA (Kingfisher Knowledge)	0753456214	Richard Walker						M		M
Gentle Giant Octopus	076361730X	Karen Wallace						P	P	
Giant Pandas	0823418286	Gail Gibbons						PE	PE	PE
Gotcha!	0439365406	Gail Jorgensen			E					
Gregor the Overlander	0439678137	Suzanne Collins							M	
Gregory the Terrible Eater	0590433504	Mitchell Sharmat						E	E	
Hill of Fire	0064440400	Thomas P. Lewis					EM		E	E
Honeybees	0792266781	Carla Golembe						PE	PE	PE
How Big Is a Foot?	0440404959	Rolf Myller								E
How to Dig a Hole to the Other Side of the World	0064432181	Faith McNulty			PE	PE				
How Tall, How Short, How Faraway		David A. Adler	PE							PE

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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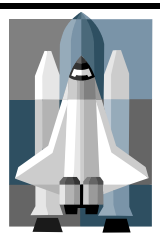
How to Make an Apple Pie and See the World	0679880836	Marjorie Priceman					PE	PE		
How to Think Like a Scientist	978-0-690-04565-9	Stephen P. Kramer								E
Human Body	0794506283	Usborne-Internet linked						S		
I Face the Wind	0688178413	Vicki Cobb				PE				
I Fall Down	0688178367	Vicki Cobb			P					P
I have a Sister, My Sister is Deaf	0064430596	Jeanne W. Peterson							E	E
I Know What You Did Last Summer	0440228441	Lois Duncan	S							S
In Front of the Ant, Walking with Beetles and Other Insects	1929132638	Satoshi Kuwahara						P	P	
International Space Station	0064452093	Franklyn Branley			E		E		E	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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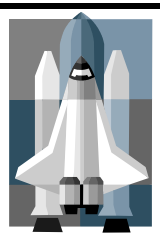
Inventing the Future: A Photobiography of Thomas Alva Edison	0792267214	Marfé Ferguson Delano								MS
It Came from Outer Space	0803710984	Tony Bradman					E			
It's Mine	0679880844	Leo Lionni								E
Jackie's Wild Seattle	0380733110	Will Hobbs						MS	MS	MS
Jacques Cousteau	0-8225-4979-4	Lesley A. DuTemple								E(5)M
Jubela	0689866909	Cristina Kessler						PE	PE	
Just a Dream		Chris Van Allsburg				E				
Keep the Lights Burning, Abbie	0876144547	Connie Roop		E			E			
Killer Rocks from Outer Space: Asteroids, Comets, and Meteorites	082252861	Steven N. Koppes					MS			MS
Knots on a Counting		Bill Martin Jr. and	PE							

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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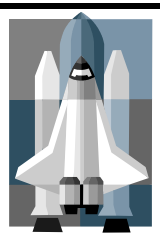
Rope		John Archambault								
Linus Pauling: Advancing Science, Advocating Peace	0766021300	Naomi Pasachoff								MS
Little Panda	068986616X	Joanne Ryder						PE	PE	
Lizards	0761415807	Dan Greenberg						M		
Looking for the Seabirds: Journal from an Alaskan Voyage	0618212353	Sophie Webb						M	M	M
Love and the other Four-letter Words	044022831X	Carolyn Mackler						S		
Magic School Bus Inside a Beehive	0590446843	Joanne Cole						E	E	E
Make Way for Ducklings	0670451495	Robert McCloskey						E	E	E
Maria Mitchell: The Soul of an Astronomer	0802850995	Beatrice Gormley					M			M

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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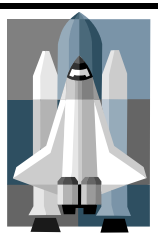
Marie Curie: A Brilliant Life	1553375718	Elizabeth MacLeod								M
Measuring Penny	0-8050-6572-5	Loreen Leedy	PE							PE
Michael Bird Boy	0671664697	Tomie dePaola						E	E	E
Mississippi River	1563977567	Peter Lourie				E	E	E		
Mixtures and Compounds	0613750977	Judy Usborne	S							
Monster Bug	1575651351	Linda Haywrd			E					
Movers and Shapers		Patricia Macnair						E		
Mr. Grumpy's Motorcar	0805007083	John Burningham			E					
Nature in the Neighborhood	0618352155	Gordon Morrison							E	
Nature's Paintbrush	0-689-81081-4	Susan Stockdale						PEM		PEM
Newton and Me	9781607180678	Lynne Mayer			P					
On the Beach	0345311485	Nevil Shute							S	
On the Same Day in March	0064435288	Marilyn Singer				PE				

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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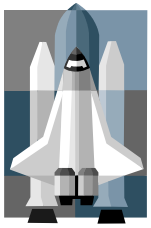
On the Way to the Beach	0688175155	Henry Cole							P	P
One Bean	0802775721	Anne Rockwell						PE		
One Small Place in a Tree	068817180X	Barbara Brenner							S	
Outside and Inside Killer Bees	0802789064	Sandra Markle						EM		EM
Phineas Gage: A Gruesome but True Story about Brain Science	0618052526	John Fleishman						MS	MS	MS
Polar Bears	0823417689	Gail Gibbons						E	E	
Prey	0061015725	Michael Crichton				S			S	
Probing Volcanoes	0761327002	Laurie Lindop					M			M
Puffins Climb, Penguins Rhyme	0152024433	Bruce McMillan						P	P	
Real-World Robots	0791084418	Paul McEvoy			MS					S

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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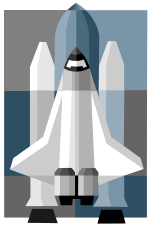
Rocket Man: The Mystery Adventure of John Glenn	1561453234	Ruth Ashby					E			E
Rocks: Hard, Soft, Smooth, and Rough		Natalie M. Rosinsky				E				
S is for Scientists: A Discovery Alphabet	9781585364701	Larry Verstraete								EM
Sadie and the Snowman	0590418262	Allen Morgan				E				
Sam the Sea Cow	0802773737	Francine Jacobs						PE	PE	
Saving Birds: Heroes Around the World	0884482375	Pete Salmansohn and Stephen W. Kress						EM	EM	EM
Saving the Peregrine Falcon	0876145233	Caroline Arnold						E	E	
Scholastic Atlas of Weather	0439419026	QA International/ Scholastic				E	E			E

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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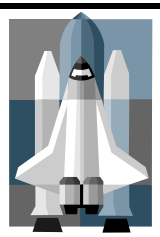
Science Detectives: How Scientists Solved Six Real-Life Mysteries	1553379942	Editors of YES Magazine								PEM
Science of the Past: Science in the Renaissance	0531115267	Brendan January								MS
Scientists Ask Questions	0-516-24662-3	Ginger Garrett								P
Sea Horses (Early Bird Nature)	0822530511	Sally M. Walker						E	E	E
Search for the Golden Moon Bear: Science and Adventure in the Asian Tropics	0618356509	Sy Montegomery							M	M
Seeds, Stems, and Stamens: The Ways Plants Fit into Their World	0761318747	Susan E. Goodman						E		

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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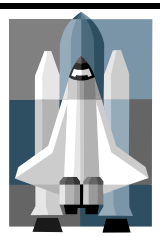
Seven Spiders Spinning	0064405958	Maguire						EM	EM	
Shadows	0684172267	Blaise Cendrars				E				
Simon Underground	0060251565	Joanne Ryder				E	E			
Slow Down, Sara	1575651254	Laura Driscoll			E					
Snails and Slugs	1863747036	Jill McDougall						E	E	
Snake Pits, Talking Cures and Magic Bullets: A History of Mental Illness	0761327075	Deborah Kent						S		S
Snakes! Strange and Wonderful	1590780035	Laurence Pringle						E		E
Space Innovations: Rockets	9780822571537	Ron Miller			M		M			
Spectacles	0689203527	Ellen Raskin		E						
Spiders and Their Webs	0792269799	Darlyne A. Murawski						P		
Spinning Spiders	0060286962	Melvin Berger							P	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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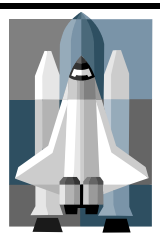
Spring Thaw	0670879614	Steven Schnur	P							
Starry Messenger	0374470278	Peter Sis						EM	EM	EM
Starting Life Butterfly	1559718684	Claire Llewellyn						PE	PE	
Strega Nona's Magic Lessons	0152817867	Tomie dePaola	E							
SuperCroc and the Origin of Crocodiles	0792266919	Christopher Sloan				S				S
T. Rex	0763621846	Vivian French				P				P
The 5,000 Year-Old Puzzle: Solving a Mystery of Ancient Egypt	0374323356	Claudia Logan								EM
The Alien Files	1862041350	Gregory Van Dyk					M			
The Amazing Int'l Space Station	1553373804	Rose Cowles			E					
The Big Balloon Race	1559942215	Eleanor Coerr	E							
The Big Dig: Reshaping	0316605980	Peter			E	E				E

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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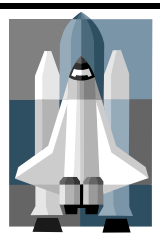
an American City		Vanderwarker								
The Biggest Pumpkin Ever	0590411136	Steven Kroll							P	
The Bionic Bunny Show	0316109924	Marc Brown								E
The Boy Who Harnessed the Wind	9780803735118	William Kamkawamba		PE						
The Bug Scientist	0618108688	Donna M. Jackson								EM
The Case of the Monkeys That fell from the Trees: And Other Mysteries in Tropical Nature	1563979020	Susan E. Quinlan						M	M	M
The City of Ember	0375822747	Jeanne DuPrau							M	
The Complete Human Body: The Definitive Visual Guide	9780756667337	*Alice Roberts*						MS		
The Cure	038073298X	Sonia Levitin							MS	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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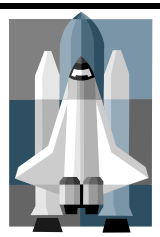
The Desert is Theirs	0689711050	Byrd Baylor						EM	EM	
The Drop in My Drink: The Story of Water on Our Planet		Meredith Hooper and Chris Coady	E							
The Elements: What You Really Want to Know	0761327940	Ron Miller	E(5) M							
The Emperor's Egg	0763618713	Martin Jenkins						PE	PE	
The Face on the Milk Carton	0440220653	Caroline B. Cooney						S		
The Flower Hunter: William Bartram, America's First Naturalist	0374345899	Deborah Kogan Ray						E	E	E
The Forest in the Clouds	0881069868	Sneed B. Collard					E	E		

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High**			Physical Science			Earth/Space Space		Life Science		Nature of Science
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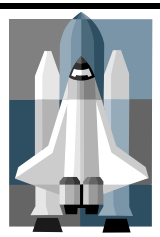
The Glorious Flight	0808591746	Alice Provensen	E							
The Gold Cadillac	0140389636	Mildred D. Taylor			M					
The Great Kapok Tree	0152026142	Lynne Cherry				P		P		
The Heart: Our Circulatory System		Seymour Simon						E		
The Hitchhiker's Guide to the Galaxy	0345391802	Douglas Adams					MS			MS
The House of the Scorpion	0689852231	Nancy Farmer							MS	
The Human Story: Our Evolution from Prehistoric Ancestors to Today	0792263251	Christopher Sloan						M		M
The Incredible Record-Setting Deep-Sea Dive of the Bathysphere	0766021882	Brad Matsen						M		M
The Last Book in the	0439087597	Rodman Philbrick							M	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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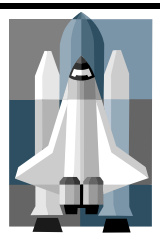
Universe										
The Magic School Bus at the Waterworks	0590403605	Joanna Cole		E			E			E
The Martian Chronicles	0553278223	Ray Bradbury							MS	
The Moon	0-689-83563-9	Seymour Simon					PEM			
The Moonflower	156145138X	Loewer & Loewer						E		
The Most Beautiful Roof in the World	0152008977	Kathryn Lasky				E		E		
The New Butterfly	1863746609	Nigel and Josephine Croser						E		
The Nose Knows	1575651203	Ellen Weiss						E		E
The Rainbow Mystery	157565119X	Jennifer Dussling		E						
The Rainbow Fish	0735817480	Marcus Pfister	P							
The Same Stuff as Stars	0060557125	Katherine Paterson							M	
The Secret Birthday Message	006443099	Eric Carle	E							

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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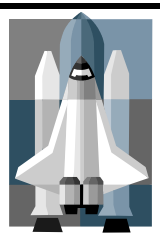
The Shaman's Apprentice	0152024867	Lynne Cherry				E			E	
The Skin I'm In	0786813075	Sharon G. Flake						S		
The Tarantula Scientist	0618147993	Sy Montgomery						E		E
The Temperate Forest: A Web of Life	076602198X	Philip Johansson							E	
The Three Little Pigs Go into Town	0740609416	Mark Cressman		E						
The Time Machine	0553213512	H.G. Wells						M	M	M
The Tiny Seed	0689842449	Eric Carle						E		
The Transall Saga	0440219760	Gary Paulsen		MS			MS			
The Very Last First Time	088899043X	Jan Andrews								E
The War of the Worlds	0375759239	Wells & Clarke					S			
The Woods Scientist	0-618-04602-X	Stephen Swinburne								PEM
Tiger Math, Learning to Graph from a Baby	080507161X	Nagda & Bickel							E	E

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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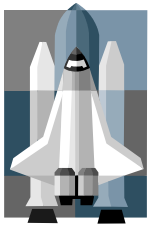
Tiger										
Tigers	0822530104	Lynn M. Stone						E		
Time Zones	1854375490	Jessica Morgan		M						
Track that Scat!	9781585365364	Lisa Morlock								P
Trino's Choice	1558852689	Diane G. Bertrand						S		
Turning up the Heat: Energy	1403448175	Ann Fullick		EM						
Uluru: Australia's Aboriginal Heart	0618181814	Caroline Arnold							S	S
War of the Worlds	0451522761	H.G. Wells							MS	MS
Water Dance	0152163964	Thomas Locker	E	E		E				
Weather Forecasting		Gail Gibbons				E				
Welcome to the River of Grass	0399232214	*Jane Yolen*						E	E	
What Does a Wheel Do?	0761327223	Jim Pipe			P					P

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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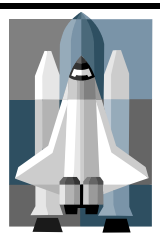
What Homework? (Science Solves It!)	1575651165	Linda Hayward								E
What Is a Scientist?	9780761312987	Barbara Lehn								P
What Is the World Made Of?	0060271434	Kathleen W. Zoefeld	PE							
What's the Big Idea Ben Franklin?	0698113721	Jean Fritz		E						E
Who Sank the Boat?	069811373X	Pamela Allen	E							E
Why Do Leaves Change Color?	0064451267	Betsy Maestro				PE		PE		
Wildflowers Around the Year	0395858143	Hope Ryden						EMS	EMS	
Wild Man Island	068817436	Will Hobbs								S
World of Biomes: The Temperate Forest	076602198X	Philip Johansson							PE	
Will We Miss Them?	0881064882	Alexandra Wright				PE			PE	

P = Primary **E = Elem (Interm.)** **M = Middle School** **S = Sr. High** **Name of Book**	**ISBPN:**	 **Author**	Physical Science			Earth/Space Space		Life Science		Nature of Science
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Endangered Species										
Z for Zachariah	0020446500	Robert C. O'Brien	MS						MS	MS
2001: A Space Odyssey	1568494173	Arthur C. Clarke					S			
2010: Odyssey Two	0345413970	Arthur C. Clarke					S			
2061: Odyssey Three	0345358791	Arthur C. Clarke					S			

APPENDIX D
Science Leaders Handbook

Science Leaders' Handbook

A Practical Guide for
Science Coaches
Elementary Science Leaders
Secondary Science Department Chairs
(Updated 2012)

Division of Mathematics, Science, and Advanced Academic Programs

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Executive Director (Science)
Department of Mathematics and Science
Office of Academics and Transformation

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Appendices

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Mission Statement

Vision

Improve science teaching and learning for all.

Mission

Provide high quality science education and empower teachers to deliver instruction that will develop responsible, scientifically literate, globally competitive, life-long learners.

Goals

- Empower teachers to deliver high-quality instruction utilizing pedagogical strategies that effectively allow for the implementation of a standards-based curriculum.
- Provide District-wide scientific curriculum leadership.
- Encourage scientifically rich classroom environments.
- Promote the rigor, relevance, and integration of other disciplines in the science classrooms.
- Involve the community, businesses, universities, informal science institutions, and parents in supporting science competence throughout the District.

Underlying Principles

- We foster instructional programs and teaching strategies that serve all students and accommodate diverse needs and learning styles to eliminate the achievement gap.

- We share a commitment with teachers, students, parents, administrators, and the community at large to enhance and improve scientific teaching and learning.

- We believe that learning is a lifelong process and that successful learners are lifelong learners.

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Introduction

Welcome to a leadership position in the field of science!

The positions of Science Coaches, Elementary Science Leaders, and Secondary Science Department Chairpersons are leaders in the field of science and your effectiveness and success depends to a great extent on the collaboration among all science leaders in the District.

The Science Leaders' Handbook was designed with the intent of providing you with the necessary tools, knowledge, and information that science leaders need to run an effective science program at their school. This handbook offers a range of background materials, ideas, strategies, research, and other resources to better align science teaching and learning. It is a resource for the preparation of professional development, department and grade level meetings, and coaching and instruction.

The underlying goal of this document is to create a framework of support for inquiry-based instruction and pedagogical content knowledge in science. This document seeks to facilitate the development and understanding of scientific thinking and aligns with the District's goals of promoting scientific literacy and research-based instructional strategies through the use of a standards-based curriculum and effective assessments. The view of science in M-DCPS is not only as a body of knowledge, but as a way to process information globally.

The handbook provides information on:

- Science leadership
- Science coaching
- Exemplary science practices
- Instructional materials, resources, and strategies
- Science programs and competitions

Additionally, this handbook contains embedded tasks for Data-Driven Decision Making and practical assessment ideas. Teachers and administrators may use these materials as a guide for:

- leading a school-based science program.
- leading Science Professional Learning Communities (PLC).
- providing teacher support.
- enhancing science teaching and learning.

The Division of Mathematics, Science, and Advanced Academic Programs believes that all students need and deserve an enriching science education. The importance of relevant experiences in science is essential for students to develop problem-solving skills in order to empower them to participate in an increasingly scientific and technological global society.

The science classroom must provide students with opportunities to develop scientific skills and conceptual understanding. Therefore, science educators must include the following experiences in the science instruction:

- First-hand explorations and investigations;
- Inquiry and process skills;
- Interdisciplinary skills and basic science concepts;
- Conceptual knowledge development;
- Problem solving skills Identify and solve problems, formulate hypotheses, analyze data, and draw conclusions.

It is essential that the learning environment fosters a positive attitude towards science, supports differentiated instruction, and gives students ample opportunities to share ideas. In addition, it is important to support teachers through professional development that promotes skill development, provides content support, and encourages a positive teaching and learning environment. Parents play an essential role in ensuring a quality science education by encouraging their children to participate in science activities through various science programs and competitions.

We hope that you take this handbook as your companion in your journey through science leadership. Thank you for accepting this challenge!

Roles and Responsibilities

ROLES AND RESPONSIBILITIES OF SCIENCE LEADERS OVERVIEW

Science Leaders undertake roles and responsibilities that are integral in the coordination of effective teaching and learning. All instructional leaders have the inherent responsibility to establish professional learning communities (PLC), reflect on instructional practices, and maintain collaborative discourse among members of the science department.

Professional Learning Communities

In education circles, the term *Professional Learning Communities* (PLC) has become commonplace and there are several variations of this model. However, in science education we refer to the type of activity where the teachers in a school and its administrators continuously seek and share learning and then act on what they learn. The goal of their actions is to enhance their effectiveness as professionals for the benefit of all teachers and students. As an organizational arrangement, the professional learning community is seen as a powerful staff development approach and a potent strategy for school change and improvement.

Professional Learning Communities provide a powerful way for teachers and administrators to work together to affect the practices of schools and improve student achievement. The core principles of a professional learning community ensure students learn, provide a culture of collaboration in the school, and focus on the results of continuous improvement efforts of learning teams. (DuFour, 2005)

School and department missions promise that “all students can learn”. In order to achieve this mission, teachers and administrators engage in ongoing dialogues with each other exploring the critical questions of “what do we want our students to learn,” “how will we know when the students have learned it,” and most importantly, “how will we respond when a student experiences difficulty in learning?” (DuFour, 2005).

The answer to the third question separates traditional school cultures from the collaborative culture of a learning community. As a school or group of teachers begin to function as a learning community, strategies are designed to ensure that the struggling

learners receive additional time and support. Learning communities develop strategies in which the intervention/response to the student is timely and provides help for the student as soon as the student begins to struggle rather than relying on remediation, retention, or summer school. This intervention is required for the student until they have mastered the necessary content.

Recognition that the faculty must work together to achieve the goal of "all students can learn," is necessary in building a professional learning community. Teachers work in teams analyzing their data, develop student interventions, and engage in an ongoing dialogue that promotes a collective learning experience and improves student achievement. This result-focused culture moves teachers beyond their individual knowledge and experience to embrace a shared culture of instruction.

Professional Learning Communities determine their successes by looking at their team's results. Learning teams continually identify the current level of student achievement, establish goals to improve the current status, work together toward achieving the goal that was set, and provide evidence of progress. These learning communities turn their data into useful and relevant information. As learning teams begin to develop common assessments, teachers begin to identify how their students are doing as compared to other students and ask their colleagues to help them reflect on areas of concern. Ideas, strategies, materials, and talents of the entire team are shared. This represents the most potent professional learning available for teachers, improving content knowledge and pedagogy.

As educators collaborate in promoting an environment of scientific inquiry, they stimulate a positive change in the instructional practice of the school. Implementation of learning communities increases student achievement and the love of learning.

Data Driven Decision Making

Data Driven Decision Making is the practice of using data to update instruction in the classroom.

In Miami-Dade County Public Schools, all fourth, fifth, seventh, eighth, tenth and eleventh grade students take a science Baseline Benchmark Assessment and two science Interim Assessments (IA) each year. Data collected from the science Interim Assessments provides science teachers with meaningful and timely information about the academic achievement and needs of their students. The goal is to improve the quality of student learning and enhance instructional practices by using data to make curricular decisions. These tests also provide valid, reliable information regarding content mastery of the Sunshine State Standards.

In elementary and middle school, the assessments are aligned to the District Pacing Guides. For senior high schools, the tenth grade is aligned to the Biology Pacing Guides and the eleventh grade to the Integrated Science III and Physical Science Pacing Guides. The Interim Assessments also include an item bank that can be used to monitor

student progress for intervention. For more information on the item bank, please visit: http://oada.dadeschools.net/IAP/ItemBankNewsletter.pdf

Examples of useful data

- FCAT test results
- Interim assessments results
- Performance assessment results
- Samples of student work
- Teacher surveys on classroom practice
- Teacher surveys on concerns and needs
- Surveys on student aspirations
- Records of the use of the Scott Foresman science kits and materials
- Demographic breakouts of students
- Demographic breakouts of students taking advanced or gifted science
- Interviews with teachers, administrators, students, parents
- Science classroom observations

Questions we want data tools to answer:

- Who are the students who are not achieving, and why not?
- What are the contributing causes of their lack of proficiency
- Which fourth and fifth grade students may not pass the Science FCAT?
- Do we have instructional coherence?
- Are we adding value to our students learning?
- Which programs are most effective for all students?

Data can be either quantitative or qualitative. Data are quantitative when they take numerical form and are collected using standardized instruments. Whether the data come from test scores, course enrollments, interviews, observations, or surveys, they are considered quantitative if they are analyzed and reported in this way. Data are qualitative when unstructured interviewing or observational techniques are used and analysis and reporting take the shape of narrative rather than numbers.

One of the most powerful uses of data is to disaggregate findings according to specific groups. This means taking a look at how specific subgroups of students perform in addition to looking at the group as a whole.

"Data enable us to be educational detectives. We are 'Columbos.' We get clues as to how students are doing. We look at how to improve." Joe O'Reilly

Disaggregating the Data

- By class, schools, feeder patterns
- Grade levels
- Proficiency in English
- Length of time in District
- Race
- Gender
- Quartiles
- Socioeconomic status
- Course-taking experience
- Teacher professional development
- ESE, Bilingual, and Title I

A science leader is key to the success of the data-driven decision-making process and learning communities. Therefore, the science leader must communicate effectively with colleagues and administrators at the school-site, Regional Centers, and District offices. In some instances, an Elementary Science Leader and/or Department Chairperson may assume the role of Science Coach as well. The following pages describe these individual roles and responsibilities in further detail.

"Disaggregation is a practical, hands-on process that allows a school's faculty to answer the two critical questions: 'Effective at what? Effective for whom?' It is not a problem-solving but a problem-finding process." Lezotte and Jacoby

SCIENCE COACH

ROLE

A science coach is usually a fellow-teacher with strong science content, organizational skills, and pedagogical knowledge in order to support the more experienced peers in a non-threatening, reflective approach that accommodates all learning styles.

RESPONSIBILITIES

The science coach is responsible for providing peer support to improve teaching and learning through the analysis of data, student support, and professional development. The routine monitoring and documentation of teacher support is an integral responsibility of the science coach (see sample report templates).

Peer Support

1. Work with teachers to analyze their areas of instructional need (i.e., content, pedagogy, knowledge of standards).
2. Provide daily peer support to teachers in the area of science.
3. Provide resources to teachers (i.e., expertise, materials, etc.).
4. Assist in creating a "professional learning team" through individual guidance and group meetings.
5. Meet with teachers on a regular basis in learning teams for professional development and collaboration.
6. Support student learning through observation and classroom demonstrations.
7. Conduct peer observations of classroom instruction and provide prompt feedback to teachers regarding the lessons that are observed.
8. Consult and offer feedback about classroom observations.
9. Model "best practices" in a classroom setting. The coach teaches one or two classes while the teacher being coached observes. This is followed by a "debriefing" with the teacher.
10. Maintain peer support logs and weekly coaching calendar.
11. Collaborate with Reading and Mathematics Coaches and the Science Department Chairperson.

Data Analysis

1. Analyze and assist teachers with the analysis of informal and formal data to include student, teacher, department, and/or school data.
2. Analyze data to target student achievement, lower-performing subgroups in an ongoing effort to close the achievement gap, bubble groups in an effort to attain level 3 and higher, and high performing to ensure continued success and growth.

3. Assist the administrative team in developing corrective action plans based on data analyses.

Student Support

1. Conduct individualized or small group instruction to students in various settings (pull-out or in classroom differentiated instruction model) for remediation or enrichment.

Professional Development

1. Encourage participation in and conduct staff development activities that help the teachers improve their ability to teach science.
2. Ensure that teachers are utilizing and implementing District and State adopted instructional materials and standards.
3. Develop and conduct professional development sessions that target teacher deficiencies in content, instructional strategies, and/or data analysis.
4. Professional development provided should include but not be limited to:
    a. Effective Instructional Strategies
    b. Unwrapping the benchmarks
    c. Content
    d. Strategies to facilitate student's depth of knowledge and understanding
    e. Differentiated instruction
    f. High-order questioning strategies
    g. Data-driven instruction
    h. Formative Assessment
    i. The Continuous Improvement Model
5. Disseminate information and knowledge gained through participation in professional development activities and monthly meetings to the science staff.

A science coach **SHOULD NOT**:

1. Perform a teacher evaluation.
2. Become the primary instructor in the classroom of a teacher that is being coached.
3. Have a full-time classroom teaching assignment.

ELEMENTARY SCIENCE LEADER

ROLE

Every elementary school has a science leader. This person may be the designated science coach, lab teacher, department chair, grade level chair, or science enthusiast designated by the principal. This individual is usually the guiding force and advocate for excellence in the science curriculum, instruction, teaching and learning. Science Leaders attend professional development inservices and carry lessons learned back to the school site to share with colleagues and school site administrators.

RESPONSIBILITIES

The Science Leader focuses on the implementation of best practices in science and is usually at the forefront of Science Professional Learning Communities (PLC). The Science PLC are forums in which science teachers are able to collaborate and share personal experiences in science, build on their own knowledge of the change process in science education and become experienced practitioners under the guidance of the Science Leader. The responsibilities of the Science Leader include the following:

1. Coordinate the development and implementation of the science program.
2. Review science test scores and use data-driven decision-making practices to recommend instructional strategies needed to meet requirements and improve test scores.
3. Assess professional development needs and make recommendations to the school site administration about appropriate development activities via inservices or peer instruction.
4. Inventory the science materials at the school site and suggest replacement of any missing or needed materials to the school site administration.
5. Interact and communicate with parents, coworkers, administrators, committees, teachers, and the District Science Department.
6. Attend grade level meetings, inservices, science meetings, science competitions and conferences.
7. Host *Science Nights* for parents and students.
8. Disseminate information and knowledge gained through participation in professional development activities and monthly meetings to the science staff.

SECONDARY SCIENCE DEPARTMENT CHAIRPERSONS

ROLE

The Secondary Science Department Chairperson plays an extremely important role in the school. The success of a great science program is in a greater extent due to the dedication and leadership of the Science Department Chairperson. It is the Department Chairperson's role as the science leader to set the standards of high expectations for teachers and students and an invigorating professional learning environment.

RESPONSIBILITIES

The main roles and responsibilities of the Secondary Science Department Chair can be classified into the following three categories:

1. Liaison

As the liaison, the Secondary Science Department Chairperson communicates on a regular basis with the school administration and the District Science office. The Chairperson is informed of all rules regulations, education updates from the State and the Nation, and conferences and Professional Development available for science teachers.

The Secondary Science Department Chairperson meets periodically with the science teachers to communicate information from the school, the District, and the State and to keep teachers updated in recent educational research and developments in science education, professional development, and new science programs.

2. Communication Facilitator

One of the main roles of the Secondary Science Department Chairperson is to ensure that course-alike teachers or teachers of the same grade level meet on a regular basis to map and plan the curriculum and activities and share Best Practices.

The Secondary Department Chairperson's professional learning community consists of teacher leaders who meet as a community of learners to share ideas and reflect on their current practice. The department chairperson engages in strategies to build learning communities as modeled by district staff at learning community gatherings. This process provides the conduit for communication and continued learning among teacher leaders. They continue this dialogue with colleagues at their home schools developing a learning community within their departments. These collaborative conversations allow community members to:

- collectively analyze individual teacher and school data;
- set common goals and actions;
- discuss instructional strategies and materials;
- discuss pacing of content and courses;
- share questions and concerns about content and procedures; and
- review results.

These discussions provide every science teacher with someone to turn to and talk to, and are explicitly structured to improve the classroom practice of teachers both individually and collectively.

3. Resource Provider

The Secondary Science Department Chairperson makes sure that all teachers have all the resources need to conduct an effective science classroom and program. Science teachers must have the following:

- The updated ***District Pacing Guides***
- The ***State Standards***. Due to the present transition from the 1996 Sunshine State Standards (SSS) to the 2008 Next Generation Sunshine State Standards (NGSSS), all teachers must be aware and have copies of both sets of standards.
- ***Item Specifications***. This is a very important document from the State which states the specific topics that every teacher must cover in reference to each one of the standards.
- Other State documents such as ***Lessons Learned*** and ***Florida Inquires!*** Are highly recommended tools for teachers.
- Adopted ***Science textbooks*** with its ancillary materials.
- The ***Essential Labs*** documents.
- ***Laboratory materials*** such as glassware, chemicals, microscopes, dissection equipment, etc. The Secondary Science Department Chairperson must ensure that all equipment needed is available and in good working conditions. Also, the stockrooms must be kept clean and organized. It is the role of the science leader to work with teachers and collaboratively assign and delegate responsibilities such as establishing a way to keep all lab materials clean, in working conditions, and available to all teachers.
- ***Instructional materials.*** A sufficient number of science instructional materials are vital to a good science program. When funds allow, order additional instructional materials per subject area to account for lost materials and/or new students. During March, project instructional materials needed for the following year by conducting a "Textbook Inventory Day." When funds for state- adopted instructional materials or funds from student laboratory fees are available, individual student laboratory books can be ordered with prior approval for advanced honors science classes. Require all students to cover textbooks. This will decrease the number of new books that need to be purchased. Instructional materials adoption cycles occur every six years.
- ***Technology***. The Secondary Science Department Chair must ensure that all teachers are embedding technology in their science classrooms. All teachers must have access to computers, projectors, and/or SMART Boards and passwords needed to effectively access technology programs available from the District for science.

Other Responsibilities
The science department chairperson performs other responsibilities as necessary for the coordination of a successful science program at the school.

SCIENCE DEPARTMENT CHAIRPERSON PROCEDURES FOR MATERIALS INVENTORY AND FEES

Instructional Materials Inventory Procedures
While procedures vary from school to school, the following suggested procedures will assist with the maintenance of an effective instructional materials inventory:

1. Use a master departmental/teacher instructional materials inventory record form to record the number of instructional materials issued to each member of the science department. Update this form whenever a teacher requests additional materials.
2. Get the assistance of students to place "the teacher's" name in "x" number of "biology" textbooks. This is time-consuming; however, it will assist with the tracking of materials. At the completion of this process, issue materials to teacher #1.
3. New materials should be numbered by the department chairperson or designee, prior to issuing texts to teachers.
4. Supply teachers with a class instructional materials inventory form. Teachers should complete the form and provide the science department chairperson with a copy.
5. Instructional materials should be stored in a secure location while they are being issued.
6. If class sets of materials are issued, use the same procedures, following numbers 1, 2, and 3 above 7. When instructional materials are issued to students, teachers should instruct their students to print their name, the date, condition, and their teacher's name in the margin.
7. Have students enter NEW for the condition of new materials and expect them to be returned in good condition. Provide a copy of the instructional materials inventory list with the quantities issued to each teacher. When instructional materials are collected at the end of the year .have teachers balance their instructional materials issued against the instructional materials returned and the lost textbook payment form.

Disposal of Obsolete Instructional Materials
http://im.dadeschools.net/obsolete_disposal.htm
Instructional materials that have become unserviceable or obsolete and are no longer on State contract may be disposed of as stated in Board Rule 6Gx13- 6A-1.26 Section VII as follows:

1. Offered to teachers to cut up or otherwise use as resource materials;
2. Given free to Miami-Dade County Public Schools students;

3. Offered to private and parochial schools in Miami-Dade County;
4. Made available to any governmental agency, charitable organization or any individual;
5. Sold to used book dealers, recycling plants, pulp mills or other persons or firms, at the discretion of the Superintendent of Schools, or designee. Funds received will be added to the school's instructional materials allocation; or
6. Returned to the Stores and Mail Distribution used textbook warehouse for disposal.

To request for pick-up of used or unserviceable textbooks to the surplus materials warehouse, forward a memorandum to S&MD identifying the number of boxes to be removed. See Appendix J [Instructional Materials Handbook] for a sample copy of this type of request. Items that have been disposed of must be removed from the school's inventory by making the necessary adjustments in the *Student Textbook Automated Inventory Reporting System* (STAIRS).

Special Fees and Charges

Any consideration of new strategies for acquiring funds for the science department should be fully discussed with the principal and/or his/her designee. The cost per student per year is a key figure that you can use to focus attention on your budget problems. An informal assessment throughout the district revealed the following:

1. The amount of money spent in science departments ranged from $0 to $17,000 per year. The cost per student per year increases over the years depending on the amount of activities done in the classroom.
2. Schools charged students in honors science classes and in some non-honors classes from $0 to $15.00 in fees for special materials.
3. Some schools engaged in approved fund-raising drives to place money in a special fund for science department expenditures.

Board Rules Governing Student Fees In Secondary Schools (Fees/Materials - 6GX13 -3B-I.O4)

The Board will make every effort to provide all instructional equipment, books, materials, and services needed to maintain the desired instructional program so that pupils, parents, or school fund-raising activities are not used to provide such items. However, should it be necessary to collect fees from pupils enrolled in certain academic subjects or engaged in certain activities to maintain the desired instructional and activities program in each school center, a schedule setting the maximum fee which can be charged for any subject area, activity, or service, shall be developed, approved by the Superintendent of Schools, and submitted to the Board as a report.

Fees/School-Level Determination - 6GX13 -3B-I.OS
Fees charged to students should be kept to an absolute minimum. Where school centers find it necessary to charge student fees to maintain the desired instructional program, provide necessary services, or maintain the desired program of activities, such fees shall not exceed the maximum established by the Superintendent of Schools.

REFERENCES

DuFour, Eaker, R., & DuFour, R. (Eds.) 2005. *On common ground: The power of professional learning communities*. Bloomington, IN: Solution Tree.

Elementary science coaching model. Retrieved online August 1, 2009. http://www.statweb.org/TCES/ElemCoaching.html

Instructional coaching. Retrieved online August 1, 2009. http://www.annenberginstitute.org/pdf/InstructionalCoaching.pdf

SAMPLE TEMPLATES

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CHECKLIST OF BEST PRACTICES IN SCIENCE

School: _____ **Teacher/Class:** _____

For TEACHER Reflection Purposes Only **Date:** _____ **Per.:** _____

❑ Capturing and maintaining student's attention ❑ Instilling motivation and purpose in students ❑ Using cooperative learning strategies ❑ Using the scientific method of problem solving (Inquiry Approach)-(Constructivist Approach) ❑ Students identifying problem to be solved ❑ Students hypothesizing or predicting solution and results ❑ Students experimenting and testing trial solutions ❑ Students organizing data ❑ Students analyzing and interpreting information ❑ Students discussing results ❑ Students writing and communicating conclusions ❑ Students maintaining a daily journal ❑ Using manipulatives and hands-on investigations	**Comments:**

❑ Communicating with and involving parents ❑ Providing for real-life applications ❑ Problem Experimental Design by students ❑ High teacher expectations ❑ Delivering standards-based curriculum using appropriate pedagogy/instructional materials. ❑ The teacher shows a constructivist instructional approach to inquiry methods the students use. ❑ The students test solutions to problems with each group member highly involved. ❑ During the investigative activities, the teacher constantly moves around the room guiding the cooperative learning groups in formulating their solutions and in the appropriate use of manipulatives and technology that she has provided thereby keeping everyone engaged in productive work. ❑ Helps all students explore career opportunities that use the science that they are learning. ❑ Uses assessments that focus on problem solving and understanding rather than on memory. ❑ Communicates with other teachers to improve themselves and make connections between disciplines.	

Professional Learning Communities

Best Practices:

- Teachers work together, plan together, and share best practices.
- Develop a focus calendar and come to departmental consensus on the instruction of the benchmark of the week.
- Teachers participate in professional development that can be immediately implemented in the classroom, such as differentiated instruction, reading in the content area, data analysis, and science content and pedagogy.
- Data chats: All teachers in the science department should meet periodically to look at data trends and adjust instruction accordingly.

Date	Time	Topic(s) of Meeting	Teachers Present	Description of Topics Covered and Comments

Science Department PLC										
ATTENDANCE ROLL										
Participants Information		Dates of Attendance								
#	Print Name									
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Lab Coordination

Best Practices:

- Lab coordination is in place to assure that everyone is doing the required labs (Essential Labs) on a weekly basis.
- All labs must adhere to the Safety Handbook (see Appendix A)
- All the teachers of each course collaborate and map all the lab activities for the school year.
- Lab coordination model samples:
  - Model 1: A lab Assistant. Hired specifically to do this work.
  - Model 2: One teacher who is pro-active in lab work and is given a one-period supplement to set-up all the labs.
  - Model 3: Once the labs for the year are planned, a rotation schedule is prepared to have each teacher in charge to set-up and put away each lab.

Which Lab Coordination Model Is Used at Your School?:

Week	Teacher #1	Teacher #2	Teacher #3	Teacher #4	Teacher #5	Teacher #6	Teacher #7

Bell Ringers

Best Practices:

- Bell ringers are more effective when they are done in the context of the topic being discussed.
- The recommended tool is the Glencoe Science FCAT Transparencies Grade 11.
- Bell Ringers/Do Now activities implemented at the beginning of class.
- Science FCAT Transparencies are incorporated.
- Bell Ringers/Do Now activities are aligned to the Sunshine State Standards and in context with the topics being discussed.

Week	Teacher #1	Teacher #2	Teacher #3	Teacher #4	Teacher #5	Teacher #6	Teacher #7

FCAT Review

Suggested activities:

- Conduct reviews that are exciting and ongoing throughout the year.
- Weekly competitions among students on the benchmark of the week.
- Students are rewarded for achievement in the weekly competitions.
- Motivate students through explorations, science field trips, and competitions.
- Plan extra activities that enhance the learning and the excitement for the benchmark of the week. (Example: Have student prepare a video where they act, somehow, the benchmark of the week.)
- FCAT Saturday reviews - motivated with food and extra credit for attendance.
- Review sessions are no longer than two hours.
- Gizmos are used for FCAT review.
- Low performing students that do not attend Saturday reviews are identified and pulled, once in a while, from other elective classes or activities and conduct his review using the Explorelearning Gizmos.
- Constant, immediate incentives are available to students scoring 3 and above (Nintendo Wii, IPODs, Homecoming tickets, laptops, etc.).
- Conduct assemblies several times a year and prior to FCAT.

Date	Is this Saturday or After School?	Time	# of Students Attending (attach Sign-in Sheet)	What percentile of achievement for targeted student group (lowest 25%, 50%, 75%)	Type of Review (Explain)

FCAT Review Sign-In

			Dates of Attendance							
	Print Name	**Student ID #**								
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

Reading In Science							
Best Practices:							
Evidence of weekly implementation of reading strategies in science Recommended strategies: Anticipation Guide, Jigsaw, Concept Map, Highlighting, Marginal Notes							
Week	**Teacher #1**	**Teacher #2**	**Teacher #3**	**Teacher #4**	**Teacher #5**	**Teacher #6**	**Teacher #7**

Anticipation Guide - Consists of a list of statements that are related to the topic of the text your students will be reading.
Jigsaw - A group activity in which each member is dependent on the others for part of the information.
Concept Map - A graphical tool and diagram showing the relationships among concepts.
Highlighting - Students use a highlighter to highlight as they read, identify the important points, and are pay close attention to what they are reading.
Marginal Notes - Marginal annotations that are simple pencil notes in the blank spaces of the text that promote interactive reading.

Writing in Science							
Best Practices:							
Evidence of implementation of weekly writing assignments in science. Some of the recommended strategies are: Lab Report using Power Writing Science Conclusions, Journal Writing, etc.							
Week	**Teacher #1**	**Teacher #2**	**Teacher #3**	**Teacher #4**	**Teacher #5**	**Teacher #6**	**Teacher #7**

Instructional Strategies

BEST PRACTICES OF EFFECTIVE SCIENCE CLASSROOMS

An effective science program must provide appropriate instruction, high expectations, and the same standards for all students. The content must be challenging, stimulating for everyone, and based on the assumption that all students can achieve these standards if given adequate opportunities to learn. The science program must be responsive to the demands of a technological society and the needs of an increasingly diverse population. Innovative, active learning experiences for the students are desired over the more traditional, passive learning. The program should foster conceptual convergence of the sciences, mathematics, and technology with other disciplines. Current research delineates specific instructional strategies that should be present for exemplary science programs. The following **Essential Science Components** are appropriate for all grade levels.

Preparing Students for Learning and Prior-Knowledge Assessment
Teachers should inquire about students' understandings of concepts before sharing their own understanding about the topic. The technique of "frontloading" to elicit prior knowledge related to real-life experiences and applications can create a direct connection to the content for students. *Strategies: Using graphic organizer, e.g., Concept Mapping, KWL, showing a video clip, conducting a demonstration, using literature.*

Developing Active Learners
Students can become active learners by providing opportunities for them to construct their own understanding. These situations should require students to organize, classify, interpret, and draw conclusions about real-life mathematical and scientific problems. Students must communicate their ability to problem-solve through oral, written, and physical demonstrations. Strategies*: Posing open-ended questions, real-life scenarios to solve, or situations requiring higher order thinking skills.*

Teaching to Diversity
Teachers, as the facilitators of the learning should provide a variety of activities that address learning, language, and cultural differences. Activities within the classroom should reflect a variety of cultures, learning styles, and multiple intelligences. This will help students become aware that there are different ways of knowing and learning. Strategies: *Using graphic organizers such as concept mapping or KWL; incorporating verbal/linguistic, logical/mathematical, body/kinesthetic, visual/spatial, and musical/rhythmic activities; providing opportunities to work individually as well as in small and large groups.*

Orchestrating Collaborative Discourse
There should be encouragement of student discourse within the classroom through students engaging in dialogue, both with the teacher and especially with one another. Teachers should encourage and accept student autonomy and initiative by allowing

student responses to drive lessons, shift instructional strategies, and alter the lesson plans. The manner in which students apply process skills to support their ideas is central to their understanding of science. Strategies: *Posing questions and tasks that elicit, engage, and challenge thinking; asking students to clarify and justify issues; encouraging elaboration during discussions.*

Vary the Instructional Format

A variety of instructional formats should be used in classrooms to make sense of the content and to construct meanings from new situations. Science classrooms should provide the opportunity for inquiry-based instruction. Instead of traditional lecture-type instruction, opportunities should be provided for small-group work, individual exploration, peer instruction, and whole class discussion. Strategies: *Using scientific laboratory equipment, hands-on activities, and technology-based activities.*

Use of the Learning Cycle Instructional Model

Teachers need to develop techniques that move their students from concrete to abstract concepts through frequent use of the learning-cycle model. First, the teacher provides an opportunity for students to generate questions and hypotheses through an open-ended discovery activity. This is followed by the concept- introduction lesson(s) provided by the teacher. Finally, students must be provided with opportunities to demonstrate their understanding of the learned concept by transferring it successfully to other situations through solving a scenario, or by doing a demonstration or project. Strategies: *Posing scenarios to be solved.*

Integrated Teaching

Multi- and interdisciplinary activities should be included within the classroom that provides connections for students. Students must recognize the various roles that science plays in real life. The connection and application of science will motivate, give meaning to, and reinforce student learning. These activities should involve students in critical thinking, process skills, and product development. Strategies: *Posing authentic problems to solve; bridging.*

Critical Thinking and Higher-Order Questioning

Use effective, open-ended questioning techniques that encourage student inquiry. Encourage students to pose their own questions, evaluate the information presented, and make informed decisions about the information. Examples would include, “How would you solve a similar situation?” or “What criteria would you use to . . . ?” Strategies: *Elaborating, analyzing, hypothesizing, and evaluating.*

Continuous Assessment of the Learning

Assessment should reflect how and what is being taught. It should be embedded at various points in the lesson to guide the instructional planning and pacing. There is a clear alignment between curriculum, instruction, and how students are assessed. Strategies: *Using performance tasks, essays, portfolios, video presentations, and demonstrations.*

Promotion of Collegiality
Teacher collaboration is essential for effective teaching practices. Teachers should collaborate to establish long-range plans, prioritize curriculum, share best practices, mentor, and model lessons for each other. Strategies: *Participating in team, departmental and grade-level planning; study groups; peer coaching; and mentoring.*

TEACHER ROLE IN INQUIRY

Plan an Inquiry-Based Science Program for Students

- Inquiry into authentic questions generated from student experiences is the central strategy for teaching science.
- Teachers focus inquiry on real phenomena, in classrooms, outdoors, or in laboratory settings, where students are given investigations or guided toward investigations that are demanding but within their capabilities.
- Activities provide a basis for observations, data collection, reflection, and analysis of events and phenomena and encourage the critical analysis of secondary sources, including media, books, and journals.

Guide and Facilitate Learning

- Teachers guide, challenge, and encourage student learning and inquiry.
- Successful teachers are skilled observers of students, as well as knowledgeable about science and how it is learned.
- Teachers continually create opportunities that challenge students and promote inquiry by asking questions.
- Although open exploration is useful for students when they encounter new materials and phenomena, teachers need to intervene to focus and challenge the students, or the exploration might not lead to understanding.
- A teacher who engages in inquiry with students models the skills needed.
- An important stage of student science learning is the oral and written discourse that focuses the attention of students on how their knowledge connects to larger ideas and the world beyond the classroom.
- Teachers promote many different forms of communication (e.g., spoken, written, pictorial, graphic, mathematical, and electronic).
- Teachers give students opportunities to make presentations of their work and to engage with their classmates in explaining, clarifying, and justifying what they have learned.

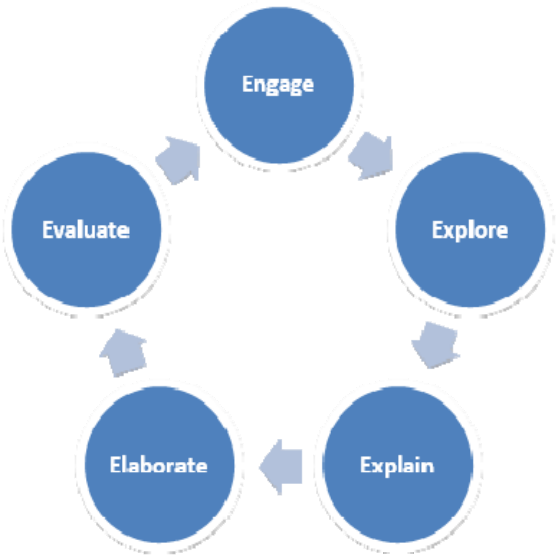
Engage in Ongoing Assessment of own Teaching and Student Learning

- Teachers observe and listen to students as they work individually and in groups
- They examine portfolios of student work, performance tasks, as well as more traditional paper-and-pencil tests.

Instruction
The successful science classroom begins with effective science instruction. The effective science teacher has the ability to plan and prepare for the delivery of engaging lessons to the diverse elementary students of Miami-Dade County Public Schools in order to improve student achievement and understanding.

It is essential that students are engaged in activities that support inquiry-based teaching and learning and translates to student understanding of science concepts. Lessons must be differentiated and supported by clear learning goals. Responding to the learning needs of students leads to understanding the developmental needs of all students. The science curriculum supports the achievement of scientific literacy. This is done seamlessly through the incorporation of the Five E Instructional Model.

Five E Instructional Model
The science curriculum will be taught utilizing the Five E Instructional model of learning cycle (Trowbridge, Bybee, & Powell, 2000), which is a constructivist model that has five essential phases of instruction:



Engage
Before starting a lesson or unit capture the students' attention by "engaging "them. This can be achieved in a variety of ways, such as KWL charts or by reading fiction or nonfiction stories related to the subject. This is also the time to begin uncovering student conceptions, misconceptions, prior knowledge and experiences.

Explore
Once you have your students excited put that energy to work for you. Let them "explore". This is the time for labs designed to "show, not tell" how things work. They will be amazed and full of questions about their results.

Explain
Students, not the teacher explain. The teacher is the facilitator, the guide to knowledge, not the giver. Lead open-ended discussions; provide web sites and periodicals, which lead to not only the answers, but to many more questions.

Elaborate
After students complete an inquiry-lab activity, sometimes they still may not have a clear understanding of what they were to learn. This is when the teacher needs to "elaborate". Design your inquiry-activity or project so that it will require more practice with the skills that you are aiming for, or want to expand upon.

Evaluate
There are a myriad of ways in which to evaluate students. There are times when paper and pencil are absolutely the best mode, but knowledge can be shown just as clearly with other authentic assessments such as a diorama, a flip and fold booklet, or a letter written to a friend to explain how to conduct an experiment.

Lab Roles and Their Descriptions

Cooperative learning activities are made up of four parts: group accountability, positive interdependence, individual responsibility, and face-to-face interaction. The key to making cooperative learning activities work successfully in the classroom is to have clearly defined tasks for all members of the group. An individual science experiment can be transformed into a cooperative learning activity by using these lab roles.

Project Director (PD)

The project director is responsible for the group.

Roles and responsibilities:

- Reads directions to the group
- Keeps group on task
- Is the only group member allowed to talk to the teacher
- Assists with conducting lab procedures Shares summary of group work and results with the class

Materials Manager (MM)

The materials manager is responsible for obtaining all necessary materials and/or equipment for the lab.

Roles and responsibilities:

- Picks up needed materials
- Organizes materials and/or equipment in the work space
- Facilitates the use of materials during the investigation
- Assists with conducting lab procedures
- Returns all materials at the end of the lab to the designated area

Technical Manager (TM)

The technical manager is in charge of recording all data.

Roles and responsibilities:

- Records data in tables and/or graphs
- Completes conclusions and final summaries
- Assists with conducting the lab procedures
- Assists with the cleanup

Safety Director (SD)

The safety director is responsible for enforcing all safety rules and conducting the lab.

Roles and responsibilities:

- Assists the PD with keeping the group on-task
- Conducts lab procedures
- Reports any accident to the teacher
- Keeps track of time
- Assists the MM as needed.

When assigning lab groups, various factors need to be taken in consideration:

- Always assign the group members, preferably trying to combine in each group a variety of skills. For example, you can place an “A” student with a “B”, “C”, and a “D” and or “F” student.
- Evaluate the groups constantly and observe if they are on task and if the members of the group support each other in a positive way. Once you realize that a group is dysfunctional, re-assign the members to another group.

Instructional Science Block

Miami-Dade County Public Schools (M-DCPS) elementary teachers will be able to enhance the District's science curriculum by providing students with differentiated instruction opportunities in the science classroom. Elementary students will be able to enhance their conceptual understanding of the science standards via varying entry points of instruction, learning tasks, and outcomes that are tailored to the individual needs of students throughout the District.

In addition, the teachers will also be able to differentiate science content and pedagogical instruction in order to meet the needs of students. This type of instruction will allow students to explore the elementary science benchmarks through inquiry-based explorations, expanded research skills, and scientific reflection.

Instructional Elementary Science Block

(Scott Foresman)

Science Lesson Plan Framework					
Time	Monday	Tuesday	Wednesday	Thursday	Friday
15 Minutes	Teacher Guided **E**ngagement	Teacher Guided **E**ngagement	Benchmark Assessment (30 Mins)	**Social Studies**	**Social Studies**
30 Minutes	Group Instruction (**E**xplore and **E**xplain)	Group Instruction (**E**xplore and **E**xplain)		**Social Studies**	**Social Studies**
			Social Studies	**Social Studies**	**Social Studies**
15 Minutes	Whole Group Instruction (**E**laborate and **E**valuate)	Whole Group Instruction (**E**laborate and **E**valuate)	**Social Studies**	**Social Studies**	**Social Studies**

This is a sample instructional science block

The focus of differentiated instruction in science will be in the following:

Group Instruction (Tiered Instruction)

- Directed Inquiry
- Guided Inquiry
- Full Inquiry

Core Science Instruction

<table>
<tr><td>Engage</td><td colspan="3">Teacher Guided <u>E</u>ngagement (15 Minutes)
• Discuss with students how to describe the kind of investigation they could conduct to answer the question in the activity title.
• Engage students with scientific questions and/or defining problems about an event or phenomenon.
• Encourage students to make connections with what they already know.
• Set the ground work for the day's activities.</td></tr>
<tr><td rowspan="2">Explore and Explain</td><td colspan="3">Group Instruction(30 Minutes)</td></tr>
<tr><td>Directed Inquiry

A Directed Inquiry activity begins each chapter.

• Teacher guides students to <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems.
• Teacher guides students to analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained.</td><td>Guided Inquiry

A Guided Inquiry activity closes each chapter.

• Students <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems in cooperative group(s).
• Students analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained in cooperative group(s).</td><td>Full Inquiry

Experiments and Science Fair Projects at the end of each unit provide opportunities for full Inquiry.

• Students <u>e</u>xplore science concepts through hands-on experiences, formulate and test hypotheses, and solve problems independently.
• Students analyze and interpret data, synthesize ideas, build models and <u>e</u>xplain their conceptual understanding of scientific knowledge gained independently.</td></tr>
<tr><td rowspan="2">Evaluate (and elaborate)</td><td colspan="3"><u>E</u>valuate (15 Minutes)</td></tr>
<tr><td colspan="3">Whole Group Instruction

• Students will <u>e</u>valuate and elaborate on the concepts they learned in their perspective inquiry sessions, make connections to related concepts and the teacher will be able to continue to assess student learning through one or more of the following methods.
o Whole group open forums
o Science Journaling
o Research
o Inquiry-based lab report</td></tr>
<tr><td rowspan="2">Extend</td><td colspan="3"><u>E</u>xtend through Home Learning</td></tr>
<tr><td colspan="3">Structured Independent Extension

• Students <u>e</u>xtend their new conceptual understanding and apply what they learned through the home learning assignment</td></tr>
</table>

This is a sample instructional model

Instructional Block for Secondary Science with Essential Features of Classroom Inquiry Variations

5E Model *		Student Role	Inquiry Variations **			
More ←----- Amount of Learner Self-Direction -----→ Less						
Less ←----- Amount of Direction from Teacher or Material -----→ More						
Engagement (10 minutes)		Learner engages in scientifically oriented *questions*	Learner poses a question	Learner selects among questions, poses new questions	Learner sharpens or clarifies questions provided by teacher, materials, or other source	Learner engages in question provided by teacher, materials, or other source
Exploration	**(40 minutes)**	Learner gives priority to *evidence* in responding to questions	Learner determines what constitutes evidence and collects it	Learner directed to collect certain data	Learner given data and asked to analyze	Learner given data and told how to analyze
Explanation		Learner formulates *explanations* from evidence	Learner formulates explanation after summarizing evidence	Learner guided in process of formulating explanations from evidence	Learner given possible ways to use evidence to formulate explanations	Learner provided with evidence
Extension, Expansion, & Elaboration	**(10 minutes)**	Learner *connects* explanations to scientific knowledge	Learner independently examines other resources and forms the links to explanations	Learner directed toward areas and sources of scientific knowledge	Learner given possible connections	
		Learner *communicates* and justifies explanations	Learner forms reasonable and logical arguments to communicate explanations	Learner coached in development of communications	Learner provided broad guidelines to sharpen communication	Learner givens steps and procedures for communications
Evaluation		Appropriate formal and informal evaluations are identified throughout lesson.				

**Adapted from National Academy of Science (2000). *Inquiry and the National Science Education Standards,* Washington. D.C. National Academy Press.

* Bybee, R.W. 1997. *Achieving Scientific Literacy*. Portsmouth, N.H.: Heinemann

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Materials & Instructional Resources

Each Science Department Leader should have, maintain, and annually distribute to faculty, a copy of the District's science curriculum. The latest versions of the Curriculum Pacing Guides and resources can be found at the following District websites:

Curriculum and Instruction
http://curriculum_materials.dadeschools.net/pacing_guides/

Division of Mathematics, Science, and Advanced Academic Programs
Science Department
http://science.dadeschools.net/

Additionally, teachers can access the Next Generation Sunshine State Standards and other valuable instructional resources at:

State of Florida Department of Education Florida Comprehensive Assessment Test Information for Educators:
The Florida Comprehensive Assessment Test Information for Educators website provides access to all the FCAT/FCAT 2.0/EOC publications for educators (i.e., released tests, items, Item Specifications, Lessons Learned, etc.). http://fcat.fldoe.org/

State of Florida Department of Education Office of Mathematics and Science:
The State of Florida Department of Education Office of Mathematics and Science provides resources for teachers, students, school districts and policy makers. http://www.fldoe.org/bii/oms.asp

CPALMS
CPALMS is a portal built for Florida's science and mathematics educators offering customized resources and tools aligned and linked to the Next Generation Sunshine State Standards (NGSSS). www.cpalms.org

Official website for the Next Generation Sunshine State Standards
This is the official website for the Next Generation Sunshine state Standards. http://www.floridastandards.org/index.aspx

Florida PROMiSE
Florida PROMiSE uses a 3-Tier approach to its work that will span the 3-year development and implementation period of the Next Generation Sunshine State Standards (NGSSS). Tier 1, the focus on Year 1, addressed the need to increase teachers' understanding of the NGSSS for mathematics and science (M/S), and their implications for instruction, and raise teacher awareness and use of available curriculum resources for planning standards-based M/S instruction. http://flpromise.org/

District Approved Instructional Materials
(through 2016)

ELEMENTARY SCHOOL

Elementary Science Grades K – 5

- *Scott Foresman Science,* Pearson/Scott Foresman Grades K - 5

MIDDLE SCHOOL

M/J Comprehensive Science I, II, and III

A. Comprehensive Science I – Regular and Advanced

- *Pearson Interactive Science,* Florida Edition, Course 1, Pearson Education, Inc., publishing as Prentice Hall, Padilla, et al, 2012/1st ed.

B. Comprehensive Science II – Regular and Advanced

- *Pearson Interactive Science,* Florida Edition, Course 2, Pearson Education, Inc., publishing as Prentice Hall, Padilla, et al, 2012/1st ed.

C. Comprehensive Science III – Regular and Advanced

- *Pearson Interactive Science,* Florida Edition, Course 3, Pearson Education, Inc., publishing as Prentice Hall, Padilla, et al, 2012/1st ed.

HIGH SCHOOL

Biology

A. Biology I – Regular

- *Miller Levine Biology*, Florida Edition, Miller and Levine, Pearson Education, Inc., publishing as Prentice Hall, 2012/1st edition

B. Biology I – Honors

- *Miller Levine Biology, Florida Edition, Miller and Levine, Pearson Education, Inc., publishing as Prentice Hall, 2012/1st edition*

C. Biology – Advanced Placement

- *Biology AP*, Florida Edition, Campbell, et al, Pearson Education, Inc., publishing as Prentice Hall, 2011/9th edition

Chemistry

A. Chemistry I – Regular and Honors

- *Pearson Chemistry – Florida Edition*, Wilbraham, et al, Pearson Education, Inc., publishing as Prentice Hall, 2012/1st edition

B. Advanced Placement Chemistry

- *Chemistry: The Central Science*, Brown, et al Pearson Education, Inc., publishing as Prentice Hall, 2009/11th edition

Earth Space Science

A. Earth/Space Science – Regular and Honors
- *Florida Earth Science: Geology, the Environment and the Universe*, Glencoe, School Education Group (SEG), a division of The McGraw-Hill Companies, Inc., 2012/1st edition

Integrated Science

A. Integrated Science I – III, Series
- *Conceptual Integrated Science*, Florida Edition, Hewitt, Pearson Education, Inc., publishing as Prentice Hall, 2012/1st edition

Physical Science

A. Physical Science – Regular
- *Foundations of Physical Science, Florida Edition*, Tom Hsu, CPO, 2010

B. Physical Science – Honors
- *Foundations of Physical Science, Florida Edition, Tom Hsu, CPO, 2010*

Physics

A. Physics I – Regular
- *Prentice Hall Conceptual Physics*, Hewitt, Pearson Education, Inc., publishing as Prentice Hall, 2012/4th edition

B. Physics I – Honors
- *Physics: Principles with Applications*, Updated AP Edition, Giancoli, Pearson Education, Inc., publishing as Prentice Hall, 2009/6th edition

C. Advanced Placement Physics B
- *Physics Advanced Edition for High Schools*, John D. Cutnell and Kenneth W. Johnson, John Wiley & Sons, Inc., c/o Peoples Education, Inc., 2010/8th edition

D. Advanced Placement Physics C
- *Fundamentals of Physics: Regular Edition,* Halliday, Resnick, and Walker, John Wiley & Sons, Inc., c/o Peoples Education, Inc., 2011/9th edition

Marine Science

A. Marine Science – Regular and Honors
- *Life on an Ocean Planet*, Alexander, et al, Current Publishing Corp., 2011/1st edition

Environmental Science

A. Environmental Science –Regular

- *Environmental Science: Your World, Your Turn*, Florida Edition, Withgott, **Pearson Education, Inc.,** publishing as Prentice Hall, 2012/1st edition

B. Advanced Placement Environmental Science

- *Living in the Environment*, Miller, et al, Holt McDougal, 2012/17th edition

Anatomy and Physiology

A. Anatomy and Physiology – Regular

- *Florida Hole's Essentials of Human Anatomy & Physiology*, Shier, Butler, Lewis, School Education Group (SEG), a division of The McGraw-Hill Companies, Inc., NASTA Edition, 2011/10th edition

B. Anatomy and Physiology – Honors

- *Human Anatomy and Physiology*, Florida Edition, Marieb and Hoehn, Pearson Education, Inc., publishing as Prentice Hall, 2012/8th edition

Zoology

- *Zoology 8e,* Florida Edition, Miller and Harley, School Education Group (SEG), a division of The McGraw-Hill Companies, Inc., 2010/8th edition

For more in depth information on the District policies on instructional materials, please visit www.dadeschools.net then click on e-handbooks then click on Instructional Materials Handbook.

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THE FLORIDA
NEXT GENERATION SUNSHINE STATE STANDARDS

The following lists the Annually-Assessed NGSSS Benchmarks that will be tested each year on the Grades 5, 8 and 11 Science FCAT starting in 2012. It should be noted that within specific benchmarks other benchmarks are embedded and could be tested annually.

The NGSSS Benchmarks are grouped by Bodies of Knowledge (BOKs):

N: NATURE OF SCIENCE
E: EARTH AND SPACE SCIENCE
P: PHYSICAL SCIENCE
L: LIFE SCIENCE

Grade 5 Annually Assessed Benchmarks for the FCAT 2.0 Science Assessment

Annually Assessed Benchmarks (AA)	Description of Benchmarks
SC.5.N.1.1	SC.5.N.1.1 - Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions (Also assesses SC.3.N.1.1 , SC.4.N.1.1 , SC.4.N.1.6 , SC.5.N.1.2 , SC.5.N.1.4) (See Item Specifications for more details)
SC.5.N.2.1	SC.5.N.2.1 - Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence (SC.3.N.1.7, SC.4.N.1.3 , SC.4.N.1.7, SC.5.N.1.5, SC.5.N.1.6)
SC.5.N.2.2	SC.5.N.2.2 - Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others (Also assesses: SC.3.N.1.2 , SC.3.N.1.5, SC.4.N.1.2 , SC.4.N.1.5, SC.5.N.1.3)
SC.5.E.5.1	SC.5.E.5.1 - Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way (Also assesses: SC.3.E.5.1,

Annually Assessed Benchmarks (AA)	Description of Benchmarks
	SC.3.E.5.2, SC.3.E.5.3)
SC.5.E.5.3	SC.5.E.5.3 - Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it. (Also assesses: SC.5.E.5.2)
SC.5.E.7.1	SC.5.E.7.1 - Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. (Also assesses: SC.5.E.7.2)
SC.5.E.7.3	SC.5.E.7.3 - Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. (Also assesses: SC.5.E.7.4, SC.5.E.7.5, SC.5.E.7.6,)
SC.4.E.5.4	SC.4.E.5.4 - Relate that the rotation of Earth (day and night) and apparent movements of the sun, moon, and stars are connected. (Also assesses: SC.4.E.5.1, SC.4.E.5.2, SC.4.E.5.3)
SC.4.E.6.2	SC.4.E.6.2 - Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks (Also assesses: SC.4.E.6.1)
SC.4.E.6.3	SC.4.E.6.3 - Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. (Also assesses: SC.4.E.6.6)
SC.4.E.6.4	SC.4.E.6.4 - Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).
SC.5.P.8.1	SC.5.P.8.1 - Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature. (Also assesses: SC.3.P.8.1, SC.3.P.8.2, SC.3.P.8.3, SC.4.P.8.1)
SC.5.P.8.3	SC.5.P.8.3 - Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (Also assesses SC.5.P.8.2)
SC.5.P.9.1	SC.5.P.9.1 - Investigate and describe that many physical and chemical changes are affected by temperature. (Also assesses SC.3.P.9.1, SC.4.P.9.1)
SC.5.P.10.1	SC.5.P.10.1 - Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical (Also assesses SC.3.P.10.1, SC.3.P.10.3, SC.3.P.10.4, SC.3.P.11.1, SC.3.P.11.2, SC.4.P.10.1,

Annually Assessed Benchmarks (AA)	Description of Benchmarks
	SC.4.P.10.3)
SC.5.P.10.2	SC.5.P.10.2 - Investigate and explain that energy has the ability to cause motion or create change. (Also assesses SC.3.P.10.2, SC.4.P.10.2, SC.4.P.10.4)
SC.5.P.10.4	SC.5.P.10.4 - Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion (Also assesses SC.3.E.6.1, SC.4.P.11.1, SC.4.P.11.2, SC.5.P.10.3, SC.5.P.11.1, SC.5.P.11.2)
SC.5.P.13.1	SC.5.P.13.1 - Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. (Also assesses SC.3.E.5.4, SC.4.P.8.4)
SC.5.P.13.2	SC.5.P.13.2 - Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. . (Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, SC.5.P.13.4)
SC.3.L.14.1	SC.3.L.14.1 - Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction. (Also assesses SC.3.L.14.2, SC.4.L.16.1)
SC.5.L.14.1	SC.5.L.14.1 - Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.
SC.5.L.14.2	SC.5.L.14.2 - Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support. (Also assesses SC.3.L.15.1, SC.3.L.15.2)
SC.4.L.16.4	SC.4.L.16.4 - Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
SC.4.L.17.3	SC.4.L.17.3 - Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers. (Also assesses SC.3.L.17.2 , SC.4.L.17.2)
SC.5.L.17.1	SC.5.L.17.1 - Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics (Also assesses SC.3.L.17.1,

Annually Assessed Benchmarks (AA)	Description of Benchmarks
	SC.4.L.16.2 , SC.4.L.16.3, SC.4.L.17.1, SC.4.L.17.4 , SC.5.L.15.1)

Grade 8 Annually Assessed Benchmarks for the FCAT 2.0 Science Assessment

Annually Assessed Benchmark (AA)	Description of Benchmark
SC.8.N.1.1	SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (Also assesses SC.6.N.1.1, SC.6.N.1.3, SC.7.N.1.1, SC.7.N.1.3, SC.7.N.1.4, SC.8.N.1.3, and SC.8.N.1.4.)
SC.7.N.1.2	SC.7.N.1.2 Differentiate replication (by others) from repetition (multiple trials). (Also assesses SC.6.N.1.2, SC.6.N.1.4, and SC.8.N.1.2.)
SC.7.N.1.5	SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. (Also assesses SC.7.N.3.2, SC.8.N.1.5, and SC.8.E.5.10.)
SC.6.N.2.2	SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. (Also assesses SC.7.N.1.6, SC.7.N.1.7, SC.7.N.2.1, and SC.8.N.1.6.)
SC.7.N.3.1	SC.7.N.3.1 Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. (Also assesses SC.6.N.3.1 and SC.8.N.3.2.)
SC.8.E.5.3	SC.8.E.5.3 Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition. (Also assesses SC.8.E.5.1 and SC.8.E.5.2.)

Annually Assessed Benchmark (AA)	Description of Benchmark
SC.8.E.5.5	SC.8.E.5.5 Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness). (Also assesses SC.8.E.5.6.)
SC.8.E.5.7	SC.8.E.5.7 Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. (Also assesses SC.8.E.5.4 and SC.8.E.5.8.)
SC.8.E.5.9	SC.8.E.5.9 Explain the impact of objects in space on each other including: 1. the Sun on the Earth including seasons and gravitational attraction 2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.
SC.7.E.6.2	SC.7.E.6.2 Identify the patterns within the rock cycle and events (plate tectonics and mountain building). (Also assesses SC.6.E.6.1, SC.6.E.6.2, and SC.7.E.6.6.) relate them to surface events (weathering and erosion) and subsurface events (plate tectonics and mountain building). (Also assesses SC.6.E.6.1, SC.6.E.6.2, and SC.7.E.6.6.)
SC.7.E.6.4	SC.7.E.6.4 Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes. (Also assesses SC.7.E.6.3.)
SC.7.E.6.5	SC.7.E.6.5 Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. (Also assesses SC.7.E.6.1 and SC.7.E.6.7.)
SC.6.E.7.4	SC.6.E.7.4 Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. (Also assesses SC.6.E.7.2, SC.6.E.7.3, SC.6.E.7.6, and SC.6.E.7.9.)
SC.6.E.7.5	SC.6.E.7.5 Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land. (Also assesses SC.6.E.7.1.)

Annually Assessed Benchmark (AA)	Description of Benchmark
SC.8.P.8.4	SC.8.P.8.4 Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample. (Also assesses SC.8.P.8.3.)
SC.8.P.8.5	SC.8.P.8.5 Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter. (Also assesses SC.8.P.8.1, SC.8.P.8.6, SC.8.P.8.7, SC.8.P.8.8, and SC.8.P.8.9.)
SC.8.P.9.2	SC.8.P.9.2 Differentiate between physical changes and chemical changes. (Also assesses SC.8.P.9.1 and SC.8.P.9.3.)
SC.7.P.10.1	SC.7.P.10.1 Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors. (Also assesses SC.8.E.5.11.)
SC.7.P.10.3	SC.7.P.10.3 Recognize that light waves, sound waves, and other waves move at different speeds in different materials. (Also assesses SC.7.P.10.2.)
SC.7.P.11.2	SC.7.P.11.2 Investigate and describe the transformation of energy from one form to another. (Also assesses SC.6.P.11.1 and SC.7.P.11.3.)
SC.7.P.11.4	SC.7.P.11.4 Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature. (Also assesses SC.7.P.11.1.)
SC.6.P.13.1	SC.6.P.13.1 Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational. (Also assesses SC.6.P.13.2 and SC.8.P.8.2.)
SC.6.P.13.3	SC.6.P.13.3 Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both. (Also assesses SC.6.P.12.1.)
SC.6.L.14.1	SC.6.L.14.1 Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.

Annually Assessed Benchmark (AA)	Description of Benchmark
SC.6.L.14.2	SC.6.L.14.2 Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from preexisting cells, and cells are the basic unit of life. (Also assesses SC.6.L.14.3.)
SC.6.L.14.4	SC.6.L.14.4 Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.L.14.5	SC.6.L.14.5 Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis. (Also assesses SC.6.14.6.)
SC.6.L.15.1	SC.6.L.15.1 Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.7.L.15.2	SC.7.L.15.2 Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms. (Also assesses SC.7.L.15.1 and SC.7.L.15.3.)
SC.7.L.16.1	SC.7.L.16.1 Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another. (Also assesses SC.7.L.16.2 and SC.7.L.16.3.)
SC.7.L.17.2	SC.7.L.17.2 Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism. (Also assesses SC.7.L.17.1 and SC.7.L.17.3.)
SC.8.L.18.4	SC.8.L.18.4 Cite evidence that living systems follow the Laws of Conservation of Mass and Energy. (Also assesses SC.8.L.18.1, SC.8.L.18.2, and SC.8.L.18.3.)

Biology 1 End-of-Course (EOC) Annually Assessed Benchmarks by Reporting Category

Molecular and Cellular Biology (35%)	
Benchmark Code	**Biology EOC Benchmark Clarification**
SC.912.L.14.1	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science. (Also assesses SC.912.N.1.3, SC.912.N.2.1, SC.912.N.3.1, and SC.912.N.3.4)
SC.912.L.14.3	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells. (Also assesses SC.912.L.14.2.)
SC.912.L.16.3	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. (Also assesses SC.912.L.16.4, SC.912.L.16.5, and SC.912.L.16.9)
SC.912.L.16.17	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation. (Also assesses SC.912.L.16.8, SC.912.L.16.14, and SC.912.L.16.16)
SC.912.L.18.1	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. (Also assesses SC.912.L.18.11)
SC.912.L.18.9	Explain the interrelated nature of photosynthesis and cellular respiration. (Also assesses SC.912.L.18.7, SC.912.L.18.8, and SC.912.L.18.10)
SC.912.L.18.12	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Classification, Heredity, and Evolution (25%)
Benchmark Code	**Biology EOC Benchmark Clarification**
SC.912.L.15.1	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. (Also assesses SC.912.N.1.3, SC.912.N.1.4, SC.912.N.1.6, SC.912.N.2.1, SC.912.N.3.1, SC.912.N.3.4, and SC.912.L.15.10)
SC.912.L.15.6	Discuss distinguishing characteristics of the domains and kingdoms of living organisms. (Also assesses SC.912.N.1.3, SC.912.N.1.6,

	SC.912.L.15.4, and SC.912.L.15.5)
SC.912.L.15.8	Describe the scientific explanations of the origin of life on Earth. (Also assesses SC.912.N.1.3, SC.912.N.1.4, and SC.912.N.2.1)
SC.912.L.15.13	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. (Also assesses SC.912.N.1.3, SC.912.L.15.14, and SC.912.L.15.15)
SC.912.L.16.1	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. (Also assesses SC.912.L.16.2)
	Organisms, Populations, and Ecosystems (40%)
Benchmark Code	**Biology EOC Benchmark Clarification**
SC.912.L.14.7	Relate the structure of each of the major plant organs and tissues to physiological processes.
SC.912.L.14.26	Identify the major parts of the brain on diagrams or models.
SC.912.L.14.36	Describe the factors affecting blood flow through the cardiovascular system.
SC.912.L.14.52	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. (Also assesses SC.912.L.14.6, HE.912.C.1.4, and HE.912.C.1.8)
SC.912.L.16.10	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.16.13	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
SC.912.L.17.5	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. (Also assesses SC.912.N.1.4, SC.912.L.17.2, SC.912.L.17.4, and SC.912.L.17.8)
SC.912.L.17.9	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. (Also assesses SC.912.E.7.1)
SC.912.L.17.20	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. (Also assesses

	SC.912.N.1.3, SC.912.L.17.11, SC.912.L.17.13 and HE.912.C.1.3)
	Can be Addressed in All Reporting Categories
Benchmark Code	**Biology EOC Benchmark Clarification**
SC.912.N.1.1	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world; 2. conduct systematic observations; 3. examine books and other sources of information to see what is already known; 4. review what is known in light of empirical evidence; 5. plan investigations; 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs); 7. pose answers, explanations, or descriptions of events; 8. generate explanations that explicate or describe natural phenomena (inferences); 9. use appropriate evidence and reasoning to justify these explanations to others; 10. communicate results of scientific investigations; and evaluate the merits of the explanations produced by others. **(**Also assesses SC.912.N.1.4, SC.912.N.1.6, SC.912.L.14.4, LA.910.2.2.3, LA.910.4.2.2, MA.912.S.1.2, and MA.912.S.3.2)

Next Generation Sunshine State Standards (NGSSS) and End-of-Course (EOC) Assessments

The NGSSS were added to the Curriculum Pacing Guides in 2008 to provide a correlation between the existing FSSS Benchmarks to the new science standards. **These new standards will be assessed in 2012.**

The Department of Education recognized the need for a systematic approach to review and revise all of the academic standards, and on January 17, 2006, the State Board of Education adopted a six-year cycle that set forth a schedule for the regular review and revision of all K-12 content standards. This move set the stage for higher levels of rigor and higher academic achievement for years to come. Eighteen Big Ideas thread throughout all grade levels and build in rigor and depth as students advance. Each grade level includes benchmarks from the four Bodies of Knowledge

(Nature of Science, Life Science, Earth Science, and Physical Science). The rollout of the new standards for M-DCPS will occur over a three year cycle 2008-2011. Year one will be awareness of the new standards, followed by the replacement of the old SSS at targeted grade levels each year as described below:

Year 1: 2008 - 2009 - Awareness for all grades
Year 2: 2009 - 2010 - Grades K, 1, 2, 3, 6, 9 (Earth/Space Science and Physics)
Year 3: 2010 - 2011 - Grades 4, 7, 10
Year 4: 2011 - 2012 - Grades 5, 8, 11

The Biology End-of-Course (EOC) assessments are computer-based, criterion referenced assessments developed by the state of Florida "for the purpose of increasing student achievement and improving college and career readiness." They are intended to measure attainment of the Next Generation Sunshine State Standards for specific courses, as outlined in their course descriptions. The first administration of the Biology 1 EOC Assessment is May 2012.

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Safety First!

Safety comes first, in the all K-12 science classrooms. Teachers need to establish and maintain a safe working and learning environment. Rules must be explained and discussed at the beginning of each school year and reinforced during each activity all year long. Teachers should allow plenty of time to discuss why each one of these rules and regulations are extremely important. Zero tolerance for safety violations need to be stressed in all science classrooms. To prevent injuries, teachers must attempt to foresee problems, address them immediately and concentrate on safe practices for teaching science. Adequate supervision is needed during all hands-on, inquiry and process-based science investigations and equipment items need to be properly maintained.

A *Safety Contract* must be signed by all students and their parents/guardians and placed in the classroom file. This reinforces the expectations of conduct and safety procedures in the science laboratory setting.

Elementary Classroom: Use the bookmarks provided on the next page to ensure your school is using Safety First.

Secondary Science Classroom: Refer to **Appendix A**

The tips listed below are general safety rules for *students*. Always review these rules with *students* before a science investigation begins.

1. Never do any experiment without the approval and direct supervision of your teacher.
2. Always wear safety goggles when your teacher tells you to do so. Never remove your goggles during an activity.
3. Know the location of all safety equipment in or near your classroom. Never play with safety equipment.
4. Tell your teacher immediately if an accident occurs.
5. Tell your teacher if a spill occurs.
6. Tell your teacher immediately about any broken, chipped, or scratched glassware so it may be properly cleaned up and disposed of correctly.
7. If instructed to do so, wear your laboratory apron or smock to protect your clothing.
8. Never taste anything during a laboratory activity.
9. Clean up your work area upon completion of your activity.
10. Wash your hands with soap and water upon completion of an activity.

The tips listed below are safety tips for the *teacher* in an elementary science classroom setting.

1. Find out if any students have allergies that might raise serious health concerns, such as allergies to latex or to plant or animal specimens.
2. Be sure that equipment and supplies needed for foreseen emergencies are available in or near the classroom.
3. Establish procedures for the notification of appropriate authorities and response agencies in the event of an emergency.
4. Take necessary and appropriate precautions and safety measures for all science investigations.
5. Do not allow “horse play” or practical jokes.
6. Review the teacher’s edition of the textbook for safety information on the activities.
7. Teachers should wear safety goggles whenever there is a possibility of flying objects or projectiles, such as when working with rubber bands.
8. Never tell, encourage, or allow students to place any materials in or near their mouth, nose, or eyes.
9. Clean up any spill immediately and properly as soon as it occurs.
10. Wash hands after working with seeds and plants. Many store-bought seeds have been coated with insecticides and/or fertilizers.
11. Teachers should wash their hands upon completion of any experimental activity or at the end of the instructional session.
12. Make sure students are dressed appropriately. Make sure long hair, loose clothing, or jeweler do not cause any safety concerns.

Programs and Competitions

Curriculum Enhancement Programs

PROGRAM	DESCRIPTION
Elementary Science Fair	The Elementary Science Fair is celebrated every year and sponsored by Miami-Dade County Public Schools. There is a school-site fair, in which K-5 students are asked to participate. One fourth grade and one fifth grade winner's project is submitted to the District Fair. The student projects include charts, experiments, demos, diagrams, and collections with a scientific objective. ***(See Appendix D)***
Science Fair	The Regional Science, Mathematics, and Engineering Fair is celebrated every year sponsored by Miami-Dade County Public Schools. All students submit projects which undergo a scrutiny process for acceptance. Projects are then judged by qualified professionals from local universities, research institutions, and corporations. Secondary school winners of this competition have the opportunity to participate in the State Science and Engineering Fair and in the International Science and Engineering Fair (ISEF). ***(See Appendix C)***
SECME	SECME is a strategic alliance with SECME, Inc., government agencies, private engineering companies, Florida International University (FIU), Miami Dade College (MDC), St. Thomas University, and the University of Miami (UM). It supports K-12 education for science, technology, engineering, and mathematics (STEM) as well as the Engineering Departments of UM and FIU through professional-development activities, District pre-engineering competitions, $500 mini-grants from NASA, Saturday Engineering Design Seminars for students, and workshops for parents. ***(See Appendix B)***
Science Made Sensible	Science Made Sensible is a 4-year grant (2007 – 2011) awarded to the University of Miami that partners graduate fellows in ecological disciplines with middle school science teachers. Graduate fellows and participating teachers attend a two-week summer workshop on effective communication and how students learn. Teachers participating in the program will deepen their science content knowledge, increase the rigors of the science curriculum, and change their practices; therefore, increasing teacher capacity through quality instruction. Additionally, teachers are encouraged to take advantage of a Masters/Specialist degree in science education through the University of Miami at a reduced tuition. The program also supports a seamless coordination of services from middle to high school.

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Professional Organizations

PROGRAM	DESCRIPTION
National Science Teachers Association (NSTA)	The National Science Teachers Association (NSTA) mission is to promote excellence and innovation in science teaching and learning for all. NSTA is the largest organization in the world committed to promoting excellence and innovation in science teaching and learning for all. The organization's membership of 60,000 includes science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in and committed to science education. http://www.nsta.org
Florida Association of Science Teachers (FAST)	The Florida Association of Science Teachers (FAST) is the state's largest non-profit professional organization dedicated to improving science education at all levels, pre-school through college. The association's membership includes science teachers, science supervisors, administrators, scientists, representatives of business and industry, and others interested in science education. They host an annual conference in the Fall (October) and provide awards for excellence in science teaching at the elementary, middle and senior high school levels. http://www.fastscience.org/Default.aspx
Dade County Science Teachers Association (DCSTA)	The Dade County Science Teachers Association is the local organization for science teachers whose purpose is to provide into the program of education any and all essential elements of the science fields and to develop the principles, methods and attitudes by which they are promoted. The organization offers professional growth opportunities, grants, an annual conference and awards teachers at the elementary, middle and senior high levels. http://science.dadeschools.net/dcsta/default.htm
American Educational Research Association (AERA)	AERA is the most prominent international professional organization, with the primary goal of advancing educational research and its practical application. Its more than 25,000 members are educators; administrators; directors of research; persons working with testing or evaluation in federal, state and local agencies; counselors; evaluators; graduate students; and behavioral scientists. http://www.aera.net/
National Association of Research in Science Teaching (NARST)	National Association of Research in Science Teaching (NARST) is a worldwide organization of professionals committed to the improvement of science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy. http://www.narst.org/

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Appendix A
Safety and Animal Use Guidelines

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Please visit the District Science Website for latest documents:

Laboratory Safety Handbook

Guidelines for the Use of Animals

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix

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Appendix B
SECME

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Please visit the District Science Website for latest documents:

SECME

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix

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Appendix C
Elementary Science Fair

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Please visit the District Science Website for latest documents:

Elementary Science Fair

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix

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Appendix D
Regional Science and Engineering Fair

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Please visit the District Science Website for latest documents:

South Florida Regional Science and Engineering Fair

Please complete the Science Leaders Handbook by attaching listed documents to the appropriate Appendix

Revised 05/09/03

The School Board of Miami-Dade County, Florida, adheres to a policy of nondiscrimination in employment and educational programs/activities and programs/activities receiving Federal financial assistance from the Department of Education, and strives affirmatively to provide equal opportunity for all as required by:

Title VI of the Civil Rights Act of 1964 - prohibits discrimination on the basis of race, color, religion, or national origin.

Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

Title IX of the Education Amendments of 1972 - prohibits discrimination on the basis of gender.

Age Discrimination in Employment Act of 1967 (ADEA), as amended – prohibits discrimination on the basis of age with respect to individuals who are at least 40.

The Equal Pay Act of 1963, as amended - prohibits sex discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

Section 504 of the Rehabilitation Act of 1973 -prohibits discrimination against the disabled.
Americans with Disabilities Act of 1990 (ADA) - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations and telecommunications.

The Family and Medical Leave Act of 1993 (FMLA) - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

The Pregnancy Discrimination Act of 1978 - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

Florida Educational Equity Act (FEEA) - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

Florida Civil Rights Act of 1992 - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

School Board Rules 6Gx13- 4A-1.01, 6Gx13- 4A-1.32, and 6Gx13- 5D-1.10 – prohibit harassment and/or discrimination against a student or employee on the basis of gender, race, color, religion, ethnic or national origin, political beliefs, marital status, age, sexual orientation, social and family background, linguistic preference, pregnancy, or disability.
Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulate categorical preferences for employment.

Revised 05/09/03