# Intensive Math-Algebra I
# Mini-Lesson MA.912.A.2.3

## *Functions and Relations*

*Student Packet*

**Name: _____ Date: _____**

**Benchmark MA.912.A.2.3**

**Describe the concept of a function, use function notation, determine whether a given relation is a function, and link equations to functions.**

Also assesses MA.912.A.2.13 Solve real-world problems involving relations and functions

This benchmark will be assessed using **MC** and **FR** items.

**Students will:**

- Determine if a given relation is a function.
- Evaluate an equation given in function notation

**Content Limits**

- In items that require students to write a function, only continuous linear or quadratic functions of the form should be used.
- Relations can be given in various forms:
- Graphs (only continuous), Tables (no more than 8 rows), Sets of ordered pairs (no more than six), and Mapping diagrams (no more than 8 arrows).
- Items should utilize function notation as appropriate.
- Fill-in response items may require that students provide an element of the range (or domain) for a point of interest.

**Lesson MA.912.A.2.3**
**Textbook:** Prentice Hall Algebra 1

**I can …**

- Use Function Notation
- Identify Functions
- Link equations to Functions

**Vocabulary**

- Dependent Variable
- Independent Variable
- Input
- Output
- Relation
- Function
- Linear Function
- Vertical Line Test

**Essential Understanding**

- The value of one variable may be uniquely determined by the value of another variable. Such relationships may be represented using tables, words, equations. Set of ordered pairs, and graphs.

- Many real-world functional relationships can be represented by equations. You can use an equation to find the solution of a given real- world problem.
- A function is a special type of relation in which each value in the domain is paired with exactly one value of the range.

**Example # 1**: Textbook page: 242

**Guided Practice**: Textbook page 244: 11-13, 15, and 18

**Example # 2:** Textbook pages: 262 and 263

**Guided Practice**: Textbook page 265: 12 – 18 and page 266: 24, 27, and 28

**Example # 3:** Textbook page: 269

**Guided Practice**: Textbook page 271: 12 - 15

**Example # 4:** Textbook page: 269

**Guided Practice**: Textbook page 271: 16 and 17

**Small Group Practice:** Focus Practice MA912A23

**Mini-Assessment MA912A23** **Score: _____**

**Home Learning**: HL MA912A23

**Focus Practice MA.912.A.2.3**

1. A New York City taxi charges $3 per ride plus an additional $0.50 per mile. Write a function that shows how to calculate the total cost of a taxi ride that is $x$ miles long?

2. Given the function $f(x) = 2x + 2$, what is the value of $x$ if $f(x) = 6$?

| | | | | | | |
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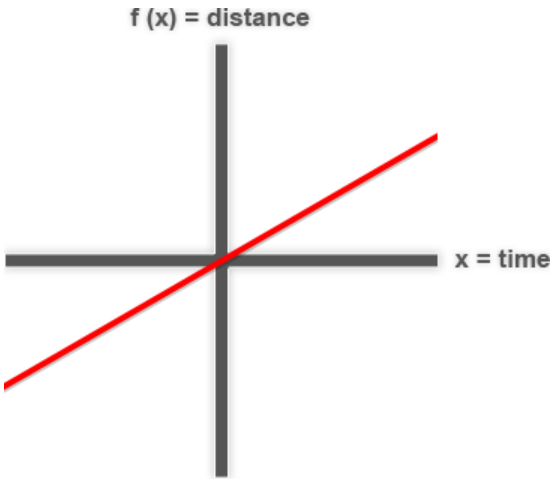
3. The students in Adam's science class are measuring the speed of a slow-moving snail. The snail moves at a constant rate, and after the investigation, the students use their data to create the following graph.
Based on this graph, which function would best represent the snail's speed if x = time and f(x) = distance?




A. $f(x) = 3x$
B. $f(x) = 2x^2$
C. $f(x) = -3x$
D. $f(x) = 3x + 2$

4. Jack wants to cook three microwave pizzas for himself and his two sisters at the same time. The instructions on the box say to cook one pizza for four minutes and add three minutes for each additional pizza.
Write a function that describes the relationship between *x*, the number of pizzas being microwaved, and *f*(*x*), the total time it takes to cook *x* pizzas.

5. Sammy is excited about a sale at the video game store. When one video game is purchased at full price, $\$30$, any additional game will cost only $12. The total amount spent on video games can be described by the function $f(x) = \$18 + \$12x$, where $x$ represents the number of video games purchased. If Sammy buys 3 video games, what is the value of $f(x)$?

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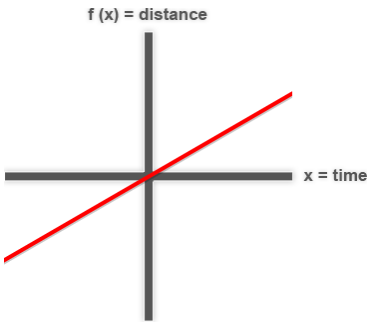
6. An ice cream shop charges $5 for an ice cream cone with one scoop of ice cream and an additional $0.75 for each extra scoop of ice cream. Which function represents the total cost of an ice cream cone with x extra scoops of ice cream?
   Write a function that represents the total cost of an ice cream cone with x extra scoops of ice cream?

7. Given the function $f(x) = 5 - 2x$, what is the value of $x$ if $f(x) = 3$?

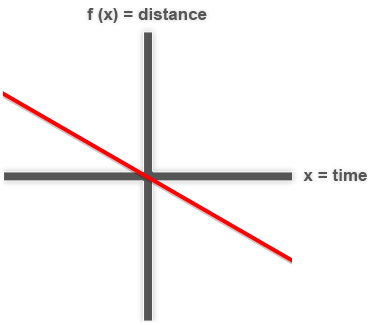
| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

8. Alejandro drove to his grandmother's house. He used the cruise control in his car to keep his speed constant. Which graph shows his speed as he drove to his grandmother's house?

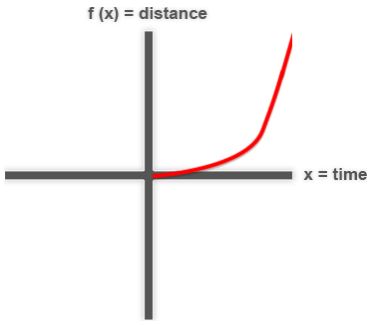
A.



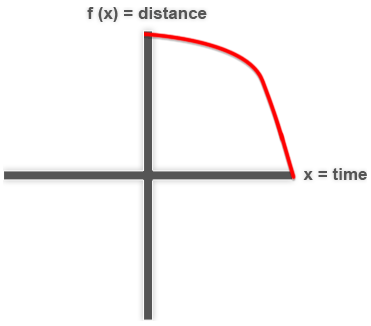

B.




C.




D.




9. At a local grocery store, watermelons are sold for $4 each plus an additional $0.25 per pound. Write a function that describes the relationship between *x*, the number of pounds of a watermelon, and *f*(*x*), the total cost of the watermelon

10. The cost of a New York City taxi fare can be described by the function $f(x) = \$3 + \$0.50x$, where *x* represents the number of miles the taxi drives. What is the value of $f(x)$ for a 12-mile taxi ride?

| | | | | | | |
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**Home Learning**

**MA.912.A.2.3: Functions and Relations**

1. Is the relation described by the values also a function? Justify your answer.

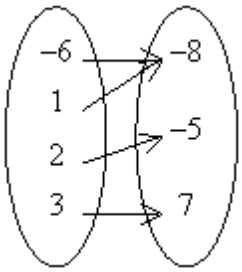
| $x$ | $y$ |
|---|---|
| −4 | 0 |
| −2 | 2 |
| 0 | 5 |
| −2 | −3 |
| 4 | −5 |
| 6 | 7 |
| 8 | 10 |

A. Yes, because all the output values are different.
B. Yes, because it is not linear.
C. No, because there is an input value that has two different output values.
D. No, because it is not linear.

2. Identify the mapping diagram that represents the relation and determine whether the relation is a function.

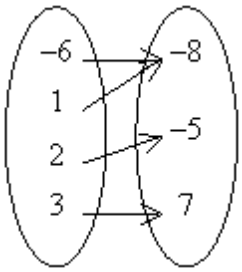
$$\{(-8,-6),(-5,2),(-8,1),(7,3)\}$$

A.



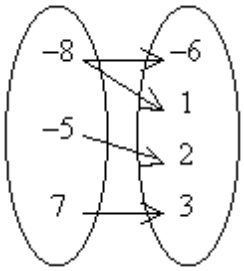

The relation is a function

B.



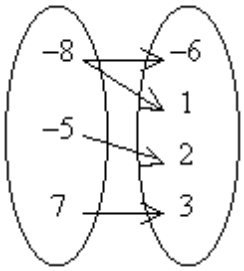

The relation is not a function

C.




The relation is a function

D.




The relation is a function

3. Evaluate $f(x) = -x + 1$ for $x = -2$.

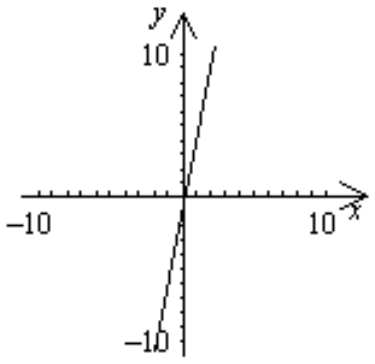
A. -3
B. 1
C. 2
D. 3

4. Which equation shows $y = 2x - 4$ written correctly in function notation?

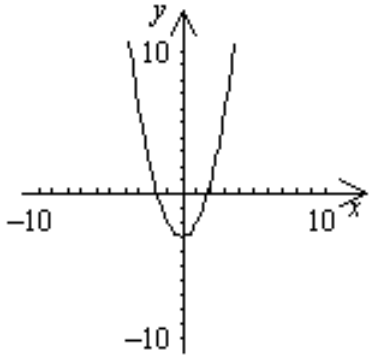
A. $y = 2f(x) - 4$
B. $y = f(2x) - 4$
C. $f(y) = 2x - 4$
D. $f(x) = 2x - 4$

5. Use the vertical-line test to determine which graph does NOT represent a function.

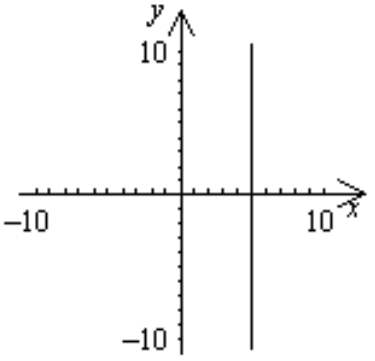
A.



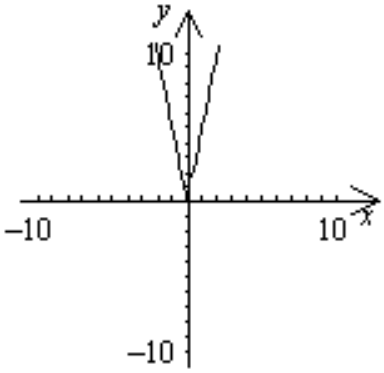

B.




C.




D.




6. For $f(x) = 2x + 8$, which represents $f(x)$ when $x = 6$?

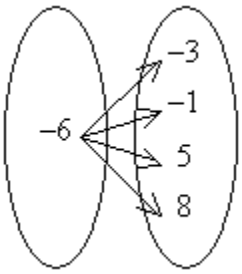
A. 16
B. 28
C. 20
D. 96

7. Which of the following sets of ordered pairs could be part of a linear function?

A. (0, 1), (3, 4), (6, 7), (10, 11)
B. (-2, 1), (1, -1), (3, -4), (5, 6)
C. (1, 5), (2, 6), (3, 6), (4, 8)
D. (0, 0), (1, 2), (3, 4), (5, 7)

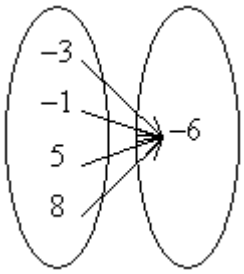
8. Identify the mapping diagram that represents {(–3, –6), (–1, –6), (5, –6), (8, –6)} and determine whether the relation is a function.

A.



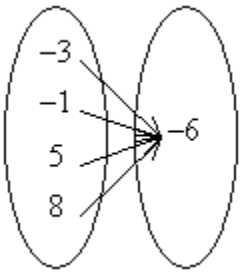

The relation is a function

B.



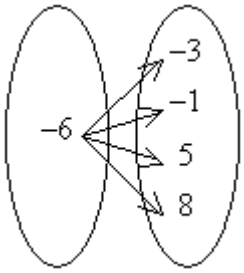

The relation is not a function

C.




The relation is a function

D.




The relation is not a function

9. The ordered pairs (1, 16), (2, 16), (3, 32), (4, 32), and (5, 48) represent the cost of buying various numbers of CDs through a music club. Is the relation a function?
Which of the following is a function?

A. {–8, –3, –5, 7}
B. {(–8, –3), (–3, –5), (–8, 7)}
C. {(–8, –3), (–5, 7), (–5, –8), (7, –5)}
D. {(–8, –3), (–3, –8), (7, 7)}

10. For Meg's long-distance calling plan, the monthly cost *C* in dollars is given by the linear function:

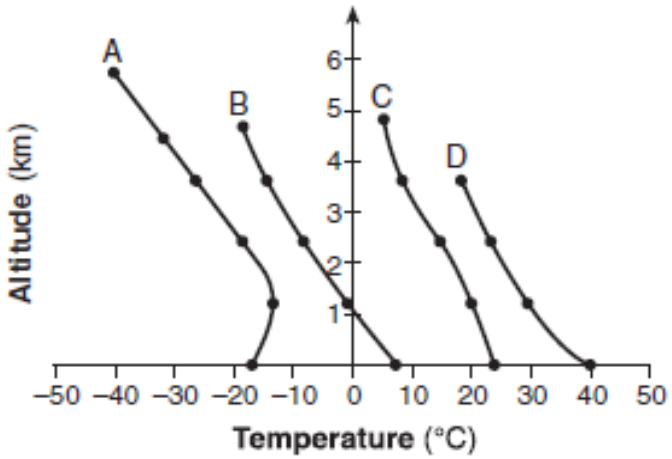
$$C(t) = 6 + 0.05t$$

where *t* is the number of minutes talked.

a) What is the total cost of talking 8 hours?

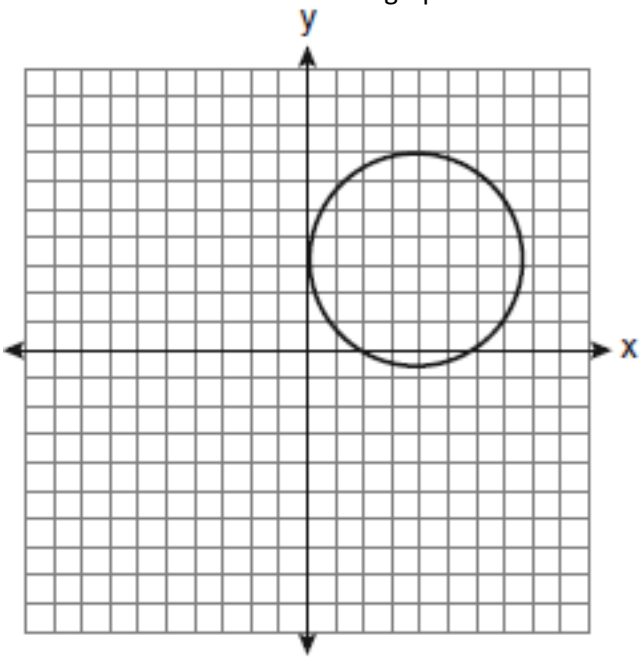
b) of talking 20 hours?

11. The accompanying graph shows the curves of best fit for data points comparing temperature to altitude in four different regions, represented by the relations *A*, *B*, *C*, and *D*. Which relation is *not* a function?




A. D
B. C
C. B
D. A

12. Which statement is true about the relation shown on the graph below?




A. It is *not* a function because there are multiple *x*-values for a given *y*-value.
B. It is a function because there is one *y*-coordinate for each *x*-coordinate.
C. It is a function because there is one *x*-coordinate for each *y*-coordinate.
D. It is *not* a function because there are multiple *y*-values for a given *x*-value.