FUNCTIONS Math 3 EOC Review (12)

Interpreting Functions

1. Which of the following statements are true?

   I. Any set of ordered pairs is a relation.

   II. The range of a relation is the set containing the first members of its ordered pairs.

   III. The dependent variable in a relation is the variable used for the range.

   IV. A function is a relation in which each range value is paired with exactly one domain value.

   A. I B. II

   C. I and III D. II and IV

2. Which of the following is always true for all functions?

   I. For every x there is only one y.

   II. For every y there is only one x.

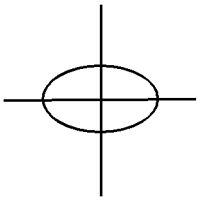
   III. The domain is the set of real numbers.

   A. I only B. II only

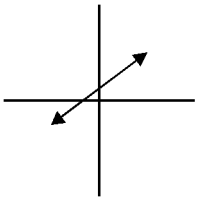
   C. I and III only D. II and III only

3. The vertical line test is a quick way to check if a graph is a function. If a vertical line can be drawn which touches the graph at more than one point, then the graph is *not* a function. Use the vertical line test to determine which of the following graphs represents a function.

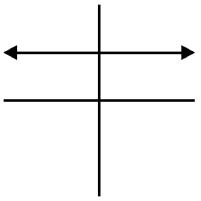
   I.

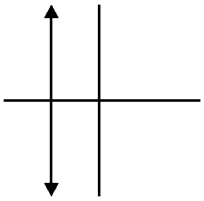
   II.

   III.

   IV.

   A. I and II B. II and III

   C. II and IV D. IV only

4. What is the range of the function

   $f(x) = 2x + 3$

   when the domain is $\{-3, -1, 1\}$?

   A. $\{9, 5, 3\}$ B. $\{3, -1, -5\}$

   C. $\{-3, 1, 5\}$ D. $\{3, 1, 5\}$

5. What is the range of the function

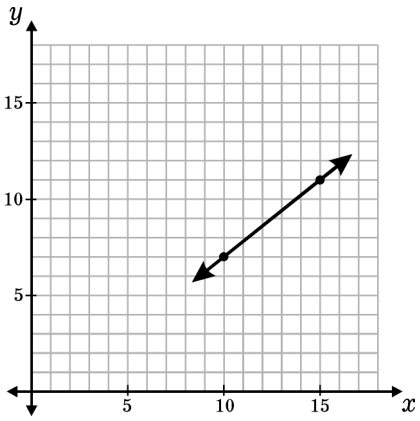
$$f(x) = (-x)^2 - 2$$

when the domain is $\{-4, -2, 1\}$?

A. $\{-18, -6, -1\}$ B. $\{14, 2, -2\}$

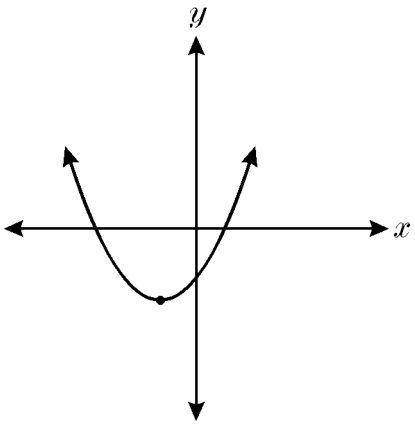
C. $\{-6, -4, -1\}$ D. $\{14, 2, -1\}$

6. In the figure, the line contains the point $(-5, n)$. Find the value of n.



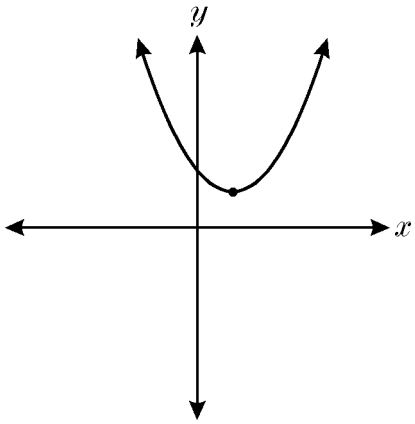
A. -2 B. -3.5 C. -5 D. -5.5

7. How many solutions are shown by the graph of the quadratic function?



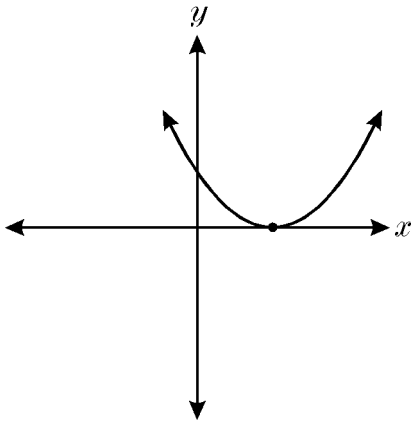
A. zero B. one C. two D. three

8. How many solutions are shown by the graph of the quadratic function?



A. zero B. one C. two D. three

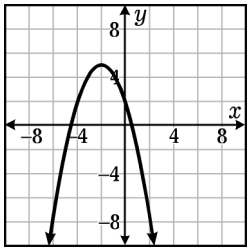
9. How many solutions are shown by the graph of the quadratic function?



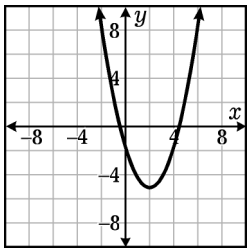
A. zero B. one C. two D. three

10. Which of the following is the graph of $f(x) = (x + 2)^2 - 5$?

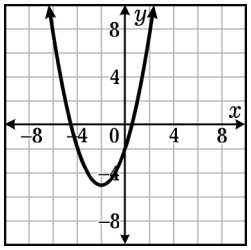
A.



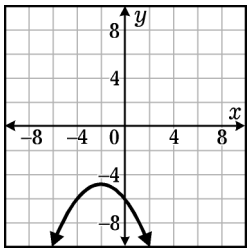
B.



C.

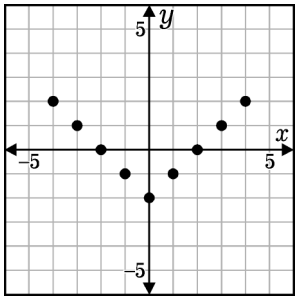


D.

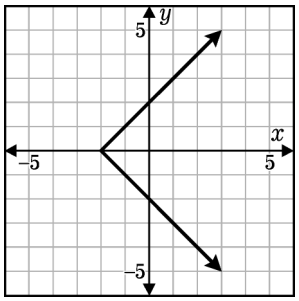


11. When x is a real number, which of the following is the graph of $y = -|x| + 2$?

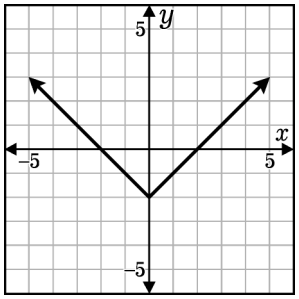
A.



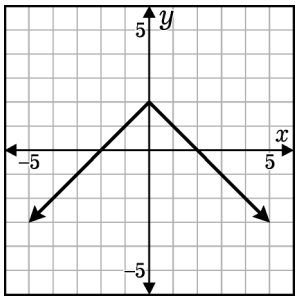
B.



C.

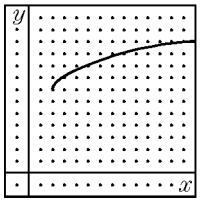


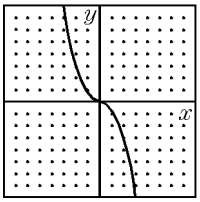
D.

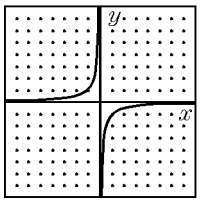


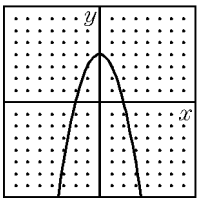
12. Sketch the graph of a square root function.

13. Which of the following is the graph of a cubic function?

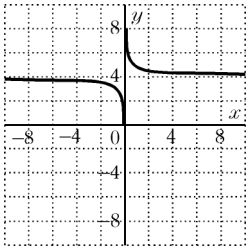
A. 

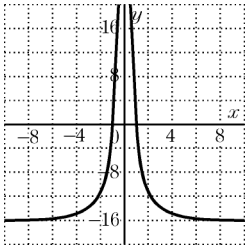
B. 

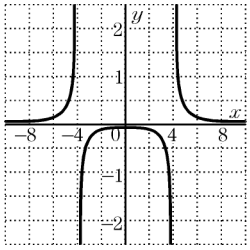
C. 

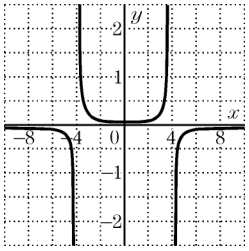
D. 

14. Which of the following represents the graph of $y = \dfrac{1}{x^2 - 16}$?

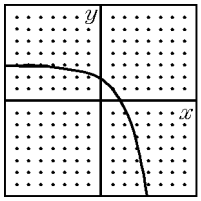
A. 

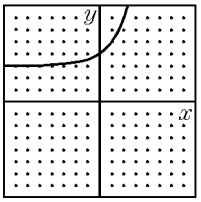
B. 

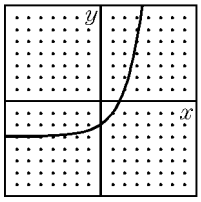
C. 

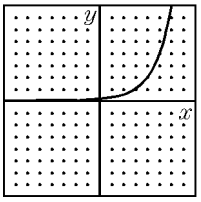
D. 

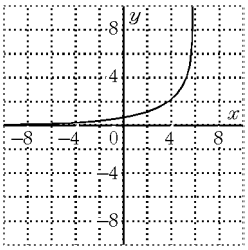
15. Which one of the following sketches is a reasonable graph of $y = 2^x + 3$?

A. 

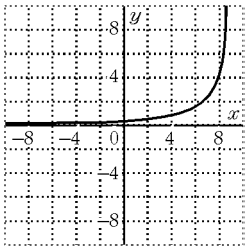
B. 

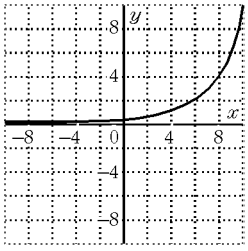
C. 

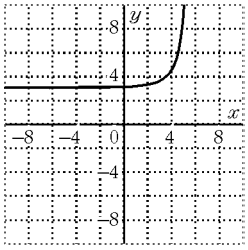
D. 

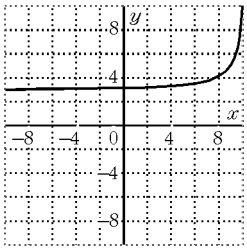
16. 

The graph of $y = 4^{x-4}$ is given. Which is the graph of $y = 4^{x-7}$?

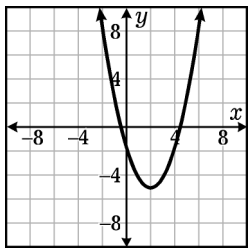
A. 

B. 

C. 

D. 

17. Given the graph for one quadratic function and the table of values for another, determine which has a smaller minimum.



x	$g(x)$
−3	35
−2	21
−1	11
0	5
1	3
2	5
3	11

A. $g(x)$, minimum = 3

B. $g(x)$, minimum = −3

C. $f(x)$, minimum = −3

D. $f(x)$, minimum = −5

Building Functions

18. Which cubic equation represents the data shown in the table?

x	−5	−4	−3	−2	−1	0	1
y	−24	−6	0	0	0	6	24

A. $y = x^3 + 6x^2 + 11x + 6$

B. $y = x^3 - 6x^2 - 11x - 6$

C. $y = x^3 + 6x^2 + 11x - 6$

D. $y = x^3 - 6x^2 + 11x + 6$

19. If $f(x) = 2x^2$, write $f(x - 2)$ as a polynomial without parentheses.

A. $2x^2 - 8x + 8$ B. $2x^2 - 8x + 12$

C. $2x^2 - 8x - 8$ D. $2x^2 - 8x - 12$

20. Simplify the product of $f(x)$ and $g(x)$, given $f(x) = \dfrac{2x^2 + x - 6}{3x^2 + 7x + 2}$ and $g(x) = \dfrac{3x^2 + 4x + 1}{2x^2 - x - 3}$.

A. 1 B. -1

C. $\dfrac{x+2}{x+1}$ D. $\dfrac{(2x-3)}{x+1}$

21. If $f(x) = 2x + 1$ and $g(x) = x^2 + 2x + 1$, find $f(g(x))$.

A. $x^2 + 2x + 3$ B. $2x^2 + 4x + 3$

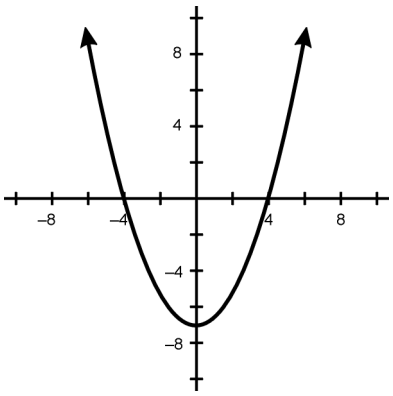
C. $4x^2 + 2x + 2$ D. $4x^2 + 8x + 4$

22. If $f(x) = 2x + 1$ and $g(x) = x^2 + 2x + 1$, find $g(f(x))$.

A. $4x^2 + 8x + 4$ B. $-16x^2 + 8x + 4$

C. $16x^2 + 8x - 4$ D. $-4x^2 - 8x + 4$

23. Given the graph of $g(x) = f(x) - 7$. What is the name for the parent function $f(x)$?



A. linear B. exponential

C. square root D. quadratic

24. Which function does *not* have $y = x$ as its parent function?

A. $y = 2x + 5$ B. $y = \dfrac{x}{2} - 1$

C. $y = 3x^2 - 1$ D. $y + 3 = x - 2$

25. What happens to the graph of a function if you replace x with $\frac{1}{2}x$ in its equation?

A. vertical expansion by a factor of 2

B. vertical shifting by 2 units down

C. horizontal compression by a factor of $\frac{1}{2}$

D. horizontal expansion by a factor of 2

26. Which statement describes the effect on the vertex of the parabola $y = x^2 - 3$, if the equation is changed to $y = x^2 + 5$?

A. The vertex is translated upward 5 units.

B. The vertex is translated upward 8 units.

C. The vertex is reflected downward 2 units.

D. The vertex does not change its position.

27. The inverse of the relation $y = \frac{1}{4}x - 3$ is:

A. $y = -4x - 3$ B. $y = -4x + 3$

C. $y = 4x - 12$ D. $y = 4x + 12$

28. Find the inverse function for $f(x) = 3x^3 - 4$

A. $\sqrt[3]{\dfrac{x-4}{3}}$ B. $\sqrt[3]{\dfrac{x+4}{3}}$

C. $\dfrac{\sqrt[3]{x-4}}{3}$ D. $\dfrac{\sqrt[3]{x+4}}{3}$

29. Given $f(x) = x^3 - 5$, find $f^{-1}(x)$.

A. $\sqrt[3]{x} - 5$ B. $\sqrt[3]{x} - \sqrt[3]{5}$

C. $\sqrt[3]{x+5}$ D. $\sqrt[3]{x-5}$

30. Which pair of functions are inverses of each other?

A. $y = \frac{1}{3}x + 2, y = 3x + \frac{1}{2}$

B. $y = 5x + 1, y = x + 5$

C. $y = 2x - 3, y = \frac{1}{2}x + \frac{3}{2}$

D. $y = 5(x - 2), y = \frac{1}{5}(x + 2)$

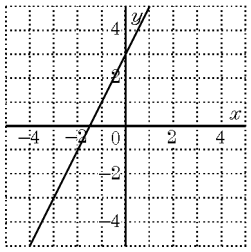
31. Which pair of functions are inverses of each other?

A. $y = \frac{1}{3}x + 2, y = -2x + 3$

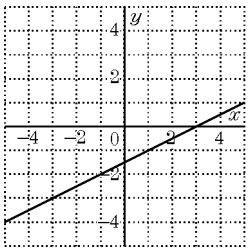
B. $y = -4x + 2, y = -\frac{1}{4}x - 2$

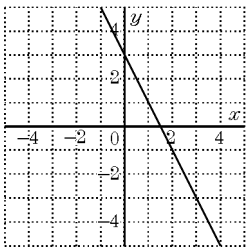
C. $y = -2x + 4, y = \frac{1}{2}x - 4$

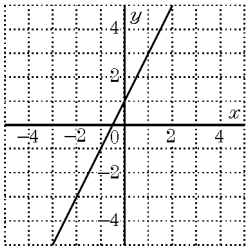
D. $y = \frac{1}{5}x + 1, y = 5x - 5$

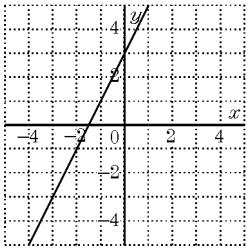
32. 

The graph of $f(x) = 2x + 3$ is shown above. Which graph represents $f^{-1}(x)$?

A. 

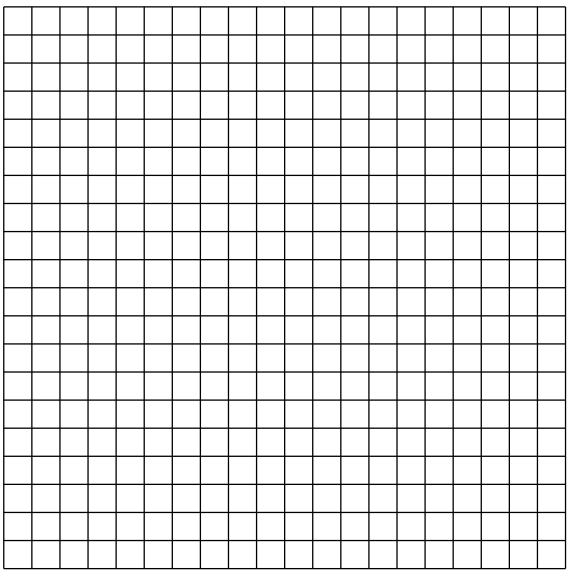
B. 

C. 

D. 

Linear and Exponential Models

33. Graph the functions $f(x) = 9x + 5$ and $g(x) = (\frac{5}{3})^x - 2$, where $x \geq 2$. Which point is closest to where $g(x)$ begins to exceed $f(x)$?



A. $x = 3$ B. $x = 6$

C. $x = 10$ D. $x = 9$

34. The temperature of a machine as it cools is described by the equation

$$T = 189 \times 0.73^t + 45$$

where T is temperature in degrees Celsius and t is time in minutes. How long does it take the machine to cool down to 76° C?

A. 2.1 min B. 3.1 min

C. 5.7 min D. 57.7 min

35. The number of bacteria in a culture is given by the formula:

$$B(t) = 2,000,000e^{-0.025t}$$

where B is the number of bacteria t days later. After how many days will more than half of the bacteria be eliminated?

A. 20 B. 24 C. 28 D. 32

36. A city starts with a population of 500,000 people in 2007. Its population declines according to the equation

$$P(t) = 500,000e^{-0.099t}$$

where P is the population t years later. Approximately when will the population be one-half the initial amount?

A. 2010 B. 2014 C. 2056 D. 2147

Trigonometric Functions

37. Convert x radians to degrees.

A. $\frac{\pi}{180x}$ B. $\frac{180}{\pi x}$ C. $\frac{180x}{\pi}$ D. $\frac{90}{\pi x}$

38. Convert to radians: 315°

A. $\frac{7\pi}{4}$ B. $\frac{5\pi}{4}$ C. $\frac{11\pi}{6}$ D. $\frac{5\pi}{3}$

39. Express $\frac{11\pi}{3}$ radians in degrees.

A. 145° B. 300° C. 330° D. 660°

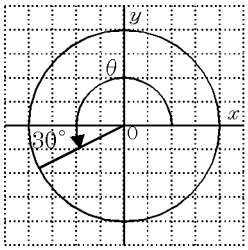
40. Convert 130° to radians (to 2 decimal places).

A. 0.87 radians B. 4.54 radians

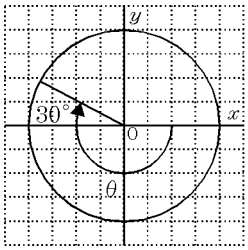
C. 2.27 radians D. 4.01 radians

41. Which graph shows the angle $\theta = -210^\circ$ in standard position?

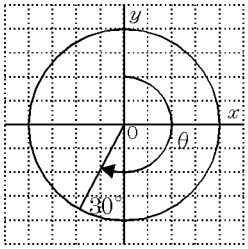
A.



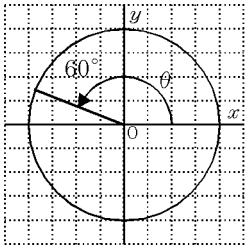
B.



C.



D.



42. What is the reference angle of -820°?

A. -80° B. -60° C. 60° D. 80°

43. What is the amplitude of the function $y = \pi \sin 4x - 3$?

A. $\frac{\pi}{2}$ B. π C. 2π D. 4π

44. What is the period of the graph which represents the function $y = 3\cos\frac{1}{2}x$?

A. π B. 2π C. $\frac{\pi}{2}$ D. 4π

45. Find the phase shift and period for the function $y = 3\cos 4\left(x + \frac{\pi}{3}\right) - 2$.

A. phase shift: $\frac{\pi}{3}$; period: $\frac{\pi}{2}$

B. phase shift: $-\frac{\pi}{3}$; period: $\frac{\pi}{2}$

C. phase shift: $-\frac{\pi}{3}$; period: $-\frac{\pi}{2}$

D. phase shift: $-\frac{\pi}{3}$; period: 4

FUNCTIONS Math 3 EOC Review (12) 5/17/2019

1.
Answer: C
Objective: F.IF.1
Points: 1

2.
Answer: A
Objective: F.IF.1
Points: 1

3.
Answer: B
Objective: F.IF.1
Points: 1

4.
Answer: C
Objective: F.IF.2
Points: 1

5.
Answer: D
Objective: F.IF.2
Points: 1

6.
Answer: C
Objective: F.IF.4
Points: 1

7.
Answer: C
Objective: F.IF.4
Points: 1

8.
Answer: A
Objective: F.IF.4
Points: 1

9.
Answer: B
Objective: F.IF.4
Points: 1

10.
Answer: C
Objective: F.IF.7A
Points: 1

11.
Answer: D
Objective: F.IF.7B
Points: 1

12.
Answer: [graph]
Objective: F.IF.7B
Points: 1

13.
Answer: B
Objective: F.IF.7C
Points: 1

14.
Answer: C
Objective: F.IF.7D
Points: 1

15.
Answer: B
Objective: F.IF.7E
Points: 1

16.
Answer: A
Objective: F.IF.7E
Points: 1

17.
Answer: D
Objective: F.IF.9
Points: 1

18.
Answer: A
Objective: F.BF.1A
Points: 1

19.
Answer: A
Objective: F.BF.1B
Points: 1

20.
Answer: A
Objective: F.BF.1B
Points: 1

21.
Answer: B
Objective: F.BF.1C
Points: 1

22.
Answer: A
Objective: F.BF.1C
Points: 1

23.
Answer: D
Objective: F.BF.3
Points: 1

24.
Answer: C
Objective: F.BF.3
Points: 1

25.
Answer: D
Objective: F.BF.3
Points: 1

26.
Answer: B
Objective: F.BF.3
Points: 1

27.
Answer: D
Objective: F.BF.4A
Points: 1

28.
Answer: B
Objective: F.BF.4A
Points: 1

29.
Answer: C
Objective: F.BF.4A
Points: 1

30.
Answer: C
Objective: F.BF.4B
Points: 1

31.
Answer: D
Objective: F.BF.4B
Points: 1

32.
Answer: A
Objective: F.BF.4C
Points: 1

33.
Answer: D
Objective: F.LE.3
Points: 1

34.
Answer: C
Objective: F.LE.4
Points: 1

35.
Answer: C
Objective: F.LE.4
Points: 1

36.
Answer: B
Objective: F.LE.4
Points: 1

37.
Answer: C
Objective: F.TF.1
Points: 1

38.
Answer: A
Objective: F.TF.1
Points: 1

39.
Answer: D
Objective: F.TF.1
Points: 1

40.
Answer: C
Objective: F.TF.1
Points: 1

41.
Answer: B
Objective: F.TF.2
Points: 1

42.
Answer: D
Objective: F.TF.2
Points: 1

43.
Answer: B
Objective: F.TF.5
Points: 1

44.
Answer: D
Objective: F.TF.5
Points: 1

45.
Answer: B
Objective: F.TF.5
Points: 1