

HW: Sage Practice #2

Name Key

1. Consider the function $f(x) = 3x^2 - 6x + 5$. Which of the following is a maximum or minimum of this function?

$$\frac{-b}{2a}$$

- A minimum of 2 at $x = 1$
- B maximum of 2 at $x = 1$
- C minimum of -4 at $x = 3$
- D maximum of -4 at $x = 3$

$$\frac{6}{2(3)} = (1, 2)$$

$$3(1)^2 - 6(1) + 5$$

$$3 - 6 + 5$$

$$2$$

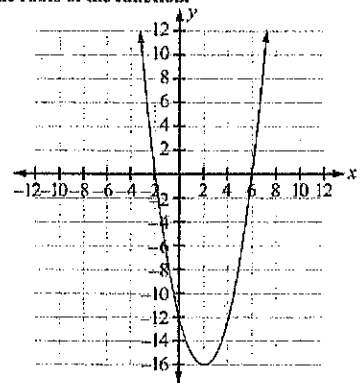
2. A quadratic function is shown.

A. Use the Add Point tool to identify the roots of the quadratic function.

B. Place one number in each box to complete the equation that represents this quadratic function.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

A. Identify the roots of the function.



$$(x+2)(x-6)$$

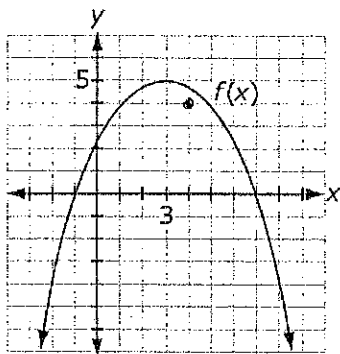
$$x^2 - 4x - 12$$

B. Fill in the equation.

$$y = x^2 - [4]x - [12]$$

3. A graph of $f(x)$ is shown. When $g(x) = -(x - 4)^2 + 4$ is graphed, which function achieves its maximum farther to the right?

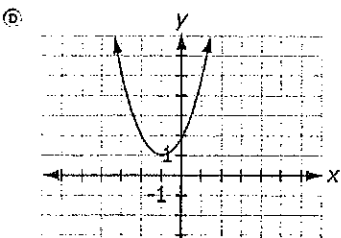
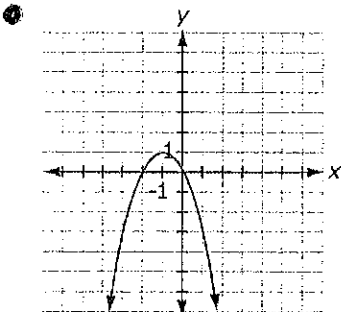
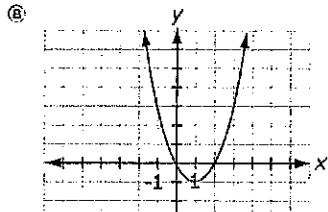
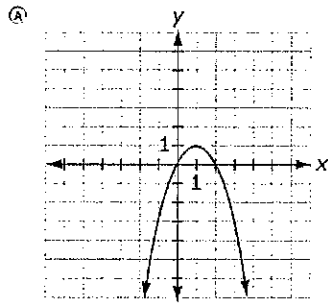
4 4



- A $f(x)$
- B $g(x)$
- C $f(x)$ and $g(x)$ achieve maxima at the same x -value.
- D $g(x)$ does not achieve a maximum, it reaches a minimum.

4. Identify the graph of $f(x) = -(x + 1)^2 + 1$.

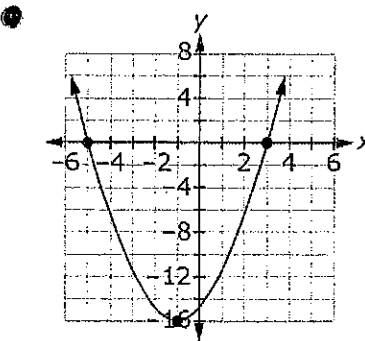
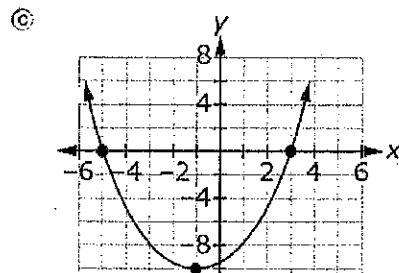
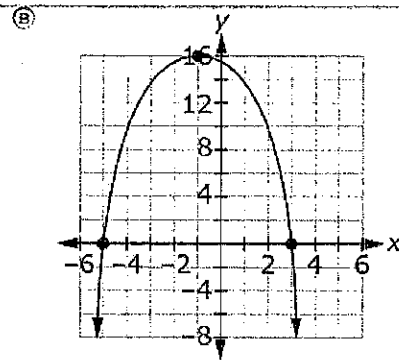
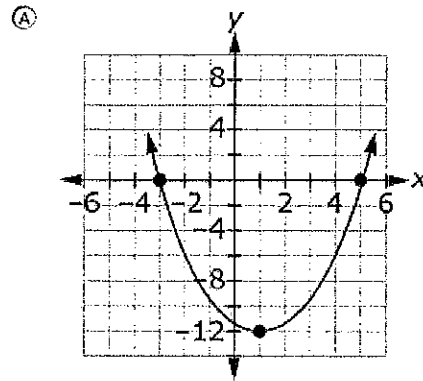
Identify the graph of $f(x) = -(x + 1)^2 + 1$.



5.

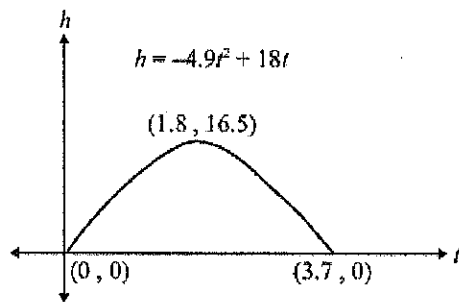
Which graph represents $f(x) = x^2 + 2x - 15$?

$$(x+5)(x-3)$$



6.

Joseph kicks a soccer ball into the air. The ball's height in meters, h , after t seconds, can be modeled by the quadratic equation $h = -4.9t^2 + 18t$. Its graph is shown.



Which interpretation of the information on the graph is correct?

- (A) The ball is in the air for 16.5 seconds.
- (B) The ball reaches its maximum height at 16.5 meters.
- (C) It takes 3.7 seconds for the ball to reach its maximum height.
- (D) The ball is 3.7 meters away from Joseph when it lands.

7.

Each table below represents sets of ordered pairs from three different functions.

x	$y = 8x$
0	0
1	8
2	16
3	24

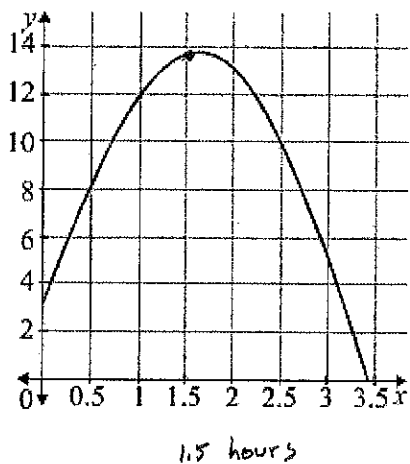
x	$y = x^3$
0	0
1	1
2	8
3	27

x	$y = 2^x$
0	1
1	2
2	4
3	8

As x increases in value, which function will eventually have the greatest value?

- (A) $y = 8x$
- (B) $y = x^3$
- (C) $y = 2^x$
- (D) There is not one function from the tables that will eventually have the greatest value.

8. The value of Stock A changes during the day. Its value f , in dollars is modeled by the function $f(x) = -4x^2 + 13x + 3$, where x is the time in hours since the market opened in the morning. A graph of this function f , is shown below.



The value of Stock B also changes during the day. Its value, h , in terms of time, x , is determined by the quadratic function $h(x)$. A table of values for Stock B is shown here.

x (hours)	$h(x)$ (dollars)
0	9
0.25	9.88
0.5	10.5
0.75	10.88
1	11
1.25	10.88
1.5	10.5
1.75	9.88
2	9
2.25	7.88
2.5	6.5
2.75	4.88
3	3
3.25	0.88

1 hour

Which stock hits a maximum value earlier in the day and at about what time?

- (A) Stock A at about 1.6 hours after opening
- (B) Stock B at about 11 hours after opening
- (C) Stock A at about 13.6 hours after opening
- (D) Stock B at about 1 hour after opening

9. What is the equation of a circle with a center of $(3, 4)$ and a radius of 2?

- (A) $(x + 3)^2 + (y + 4)^2 = 2$
- (B) $(x + 3)^2 + (y + 4)^2 = 4$
- (C) $(x - 3)^2 + (y - 4)^2 = 2$
- (D) $(x - 3)^2 + (y - 4)^2 = 4$

10. What are the center and radius of the circle described by this equation?

$$x^2 - 2x + y^2 + 4y = 4$$

$\begin{matrix} +1 \\ +4 \end{matrix}$

$$(x-1)^2 + (y+2)^2 = 9$$

- (A) $c = (1, -2)$ and $r = 3$
- (B) $c = (2, -4)$ and $r = 2$
- (C) $c = (-1, 2)$ and $r = 3$
- (D) $c = (-2, 4)$ and $r = 4$

11.

1

A circle with its diameter drawn is shown on a coordinate plane.

A. Use the Connect Line tool to draw a right triangle inscribed in the circle using the diameter provided and with legs 6 units and 8 units.

B. Complete the equation of the circle.

1

2

3

4

5

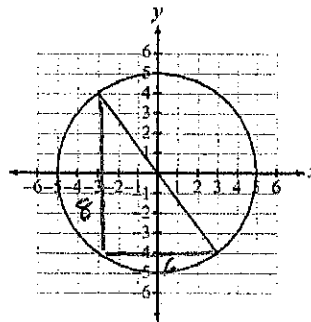
6

7

8

9

A. Draw a right triangle inscribed in the circle using the diameter provided and with legs 6 units and 8 units.



$$6^2 + 8^2 = c^2$$

$$36 + 64 = c^2$$

$$100 = c^2$$

$$10 = c$$

B. Complete the equation of the circle.

$$x^2 + y^2 = \boxed{25}$$

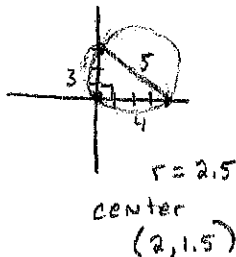
12. A circle circumscribes a triangle on a coordinate plane. The vertices of the triangle are (0, 3), (4, 0) and (0, 0). What are the center and radius of the circle?

(A) $c = (1, 1)$ and $r = \sqrt{2}$

(B) $c = (1, 1)$ and $r = 5$

(C) $c = \left(2, \frac{3}{2}\right)$ and $r = \sqrt{\frac{7}{2}}$

(D) $c = \left(2, \frac{3}{2}\right)$ and $r = \frac{5}{2}$



13.

The equation of a circle is shown.

$$(x - 2)^2 + (y + 3)^2 = 9$$

radius = 3
dilated by 2 = 6

The circle is translated 3 units up and 2 units to the left, then dilated by a factor of 2 about its center. What is the equation of the resulting circle?

$$x^2 + (y + 6)^2 = 36$$

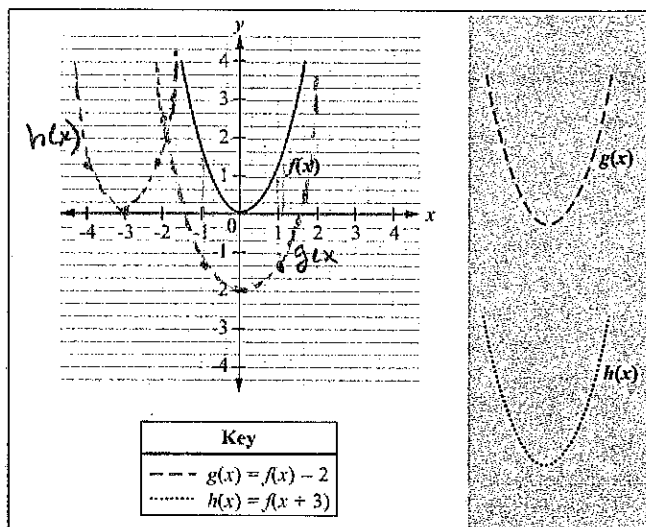
14.

1

A graph of the function $f(x)$ is shown.

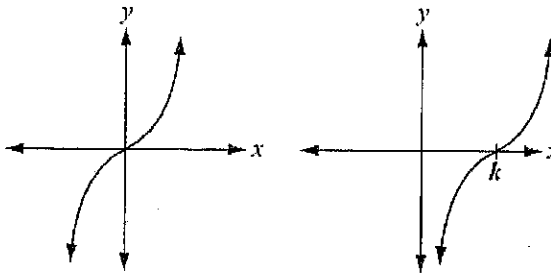
A. Place the red-dashed parabola on the coordinate plane to show the graph of the function $g(x) = f(x) - 2$.

B. Place the blue-dotted parabola on the coordinate plane to show the graph of the function $h(x) = f(x + 3)$.



15.

Consider the two graphs shown.



The first is a graph of the function $f(x)$.

Which function is shown in the second graph?

- (A) $f(x) + k$
- (B) $f(x) - k$
- (C) $f(x + k)$
- (D) $f(x - k)$

17. The domain of a function $f(x)$ is the set of positive integers. Select the function descriptions for which the set of positive integers is an appropriate domain.

- a function that calculates the height of the ball at a specific time
- a function that converts degrees Fahrenheit to degrees Celsius
- a function that calculates the cost of a bag of fruit based on its weight
- a function that takes a student's height in inches and returns the student's weight
- a function that calculates the revenue for a company based on the number of sales of a particular item
- a function that calculates the cost of a field trip based on the number of students attending

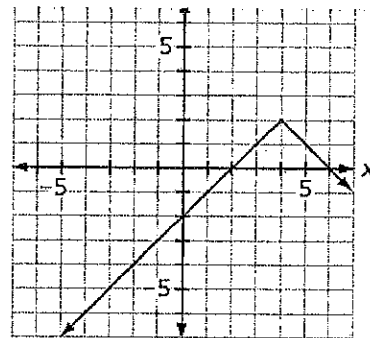
16. What is the domain of the function

$$f(x) = \sqrt{x^2 - 3x + 2} \quad \frac{(x-2)(x-1)}{}$$

- (A) $\{x : x \leq 1\}$
- (B) $\{x : 2 \leq x\}$
- (C) $\{x : x \leq 1 \text{ or } 2 \leq x\}$
- (D) $\{x : 1 \leq x \leq 2\}$



18.



Which function represents this graph?

- (A) $f(x) = -|x - 4| + 2$
- (B) $f(x) = -|x + 2| + 4$
- (C) $f(x) = -(x + 2) + 4$
- (D) $f(x) = -(x + 6) + 4$

19.

For what positive real numbers is x^2 greater than $100x$?

- A x^2 is greater when x is greater than 100.
- B x^2 is greater when x is less than 100.
- C x^2 is always less than $100x$.
- D x^2 is greater than $100x$ for all positive real numbers.

$$\begin{aligned}
 x^2 &> 100x \\
 x^2 - 100x &> 0 \\
 x(x-100) &> 0 \\
 \downarrow & \quad \downarrow \\
 0 & \quad 100
 \end{aligned}$$

21.

1

The graph of $x^2 + y^2 = 8$ is shown.

- A. Use the Add Arrow tool to graph $y = -x$.
- B. Place one number in each box and a negative symbol, if necessary, in each circle to show the solutions of the system of equations.

$$\begin{aligned}
 \begin{cases} x^2 + y^2 = 8 \\ y = -x \end{cases} \\
 x^2 + (-x)^2 = 8 \\
 2x^2 = 8 \\
 x^2 = 4 \\
 x = \pm 2 \\
 (2, -2) \\
 (-2, 2)
 \end{aligned}$$

20.

Solve this system of equations.

$$\begin{cases} y = 7x - 14 \\ y = x^2 + 4x - 32 \end{cases}$$

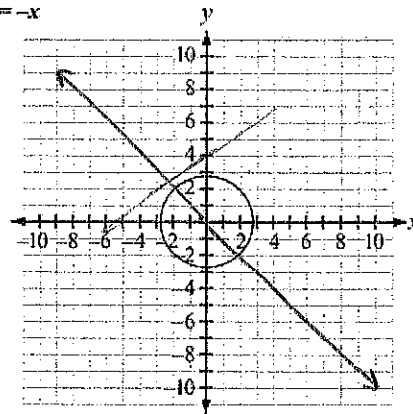
What are the x -coordinates of the solution?

- A $x = -3$ or 6
- B $x = -8, 2$, or 4
- C $x = -9$ or 2
- D $x = -35$ or 28

$$\begin{aligned}
 7x - 14 &= x^2 + 4x - 32 \\
 0 &= x^2 - 3x - 18 \\
 0 &= (x-6)(x+3) \\
 & \quad \quad \quad 6 \quad -3
 \end{aligned}$$

1
2
3
4
5
6
7
8
9
-

A. Graph $y = -x$



B. Solutions to $y = -x$ and $x^2 + y^2 = 8$

2 -2 and -2 2

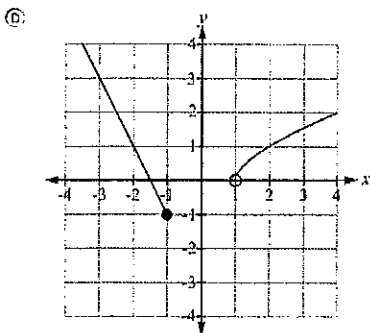
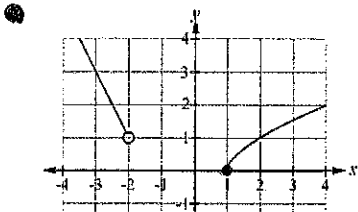
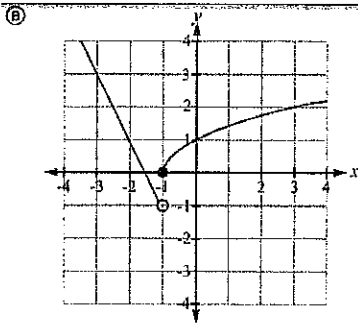
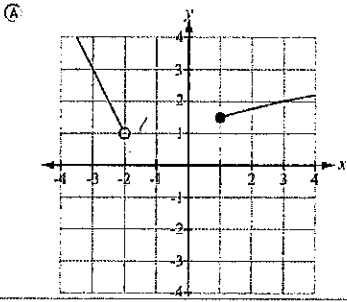
22. How many points of intersection are there when $y = x + 4$ and $x^2 + y^2 = 8$ are graphed on the same coordinate plane?

- A none
- B one
- C two
- D three

23. A function is shown.

$$f(x) = \begin{cases} -2x - 3, & x < -2 \\ \sqrt{x-1}, & x \geq 1 \end{cases}$$

Which graph represents this function?

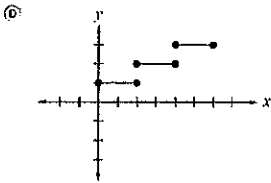
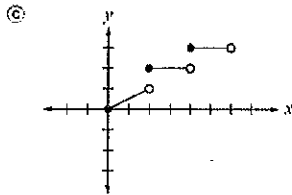
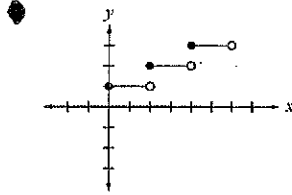
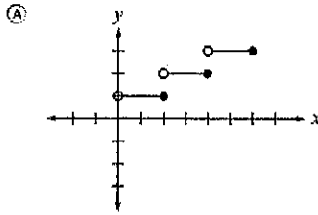


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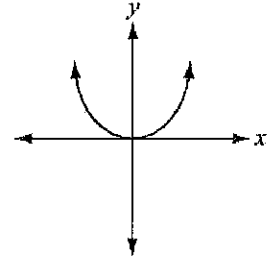
A function is shown.

$$f(x) = \begin{cases} 1, & 0 \leq x < 2 \\ 2, & 2 \leq x < 4 \\ 3, & 4 \leq x < 6 \end{cases}$$

Which is the graph of this function?



25. The graph of a function $f(x)$ is shown.



Which graph represents $f(kx)$, where k is real number greater than 1?

