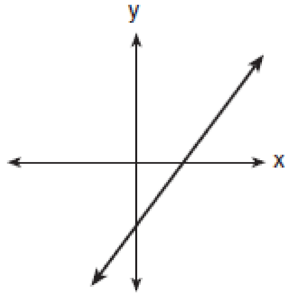
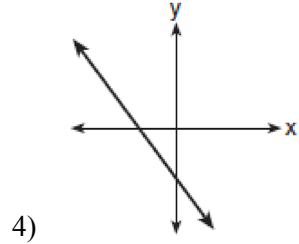
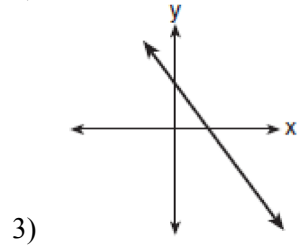
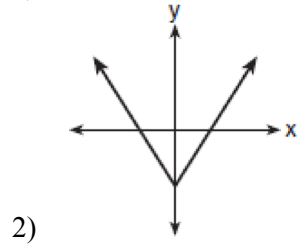
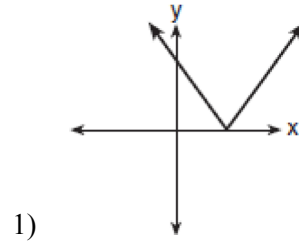


**A2.A.52: Graphing Functions and Relations: Identify relations and functions, using graphs**

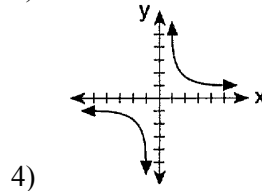
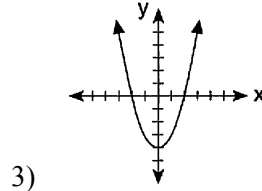
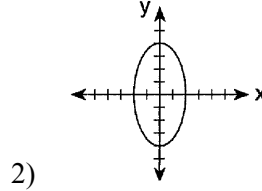
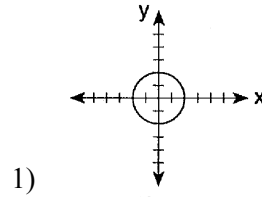
- 1 The graph below represents  $f(x)$ .



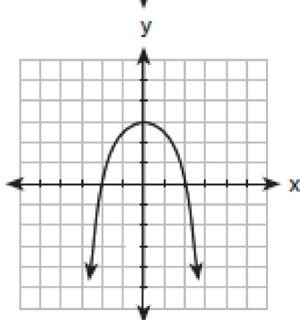
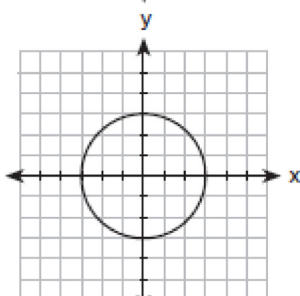
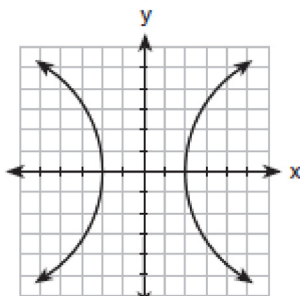
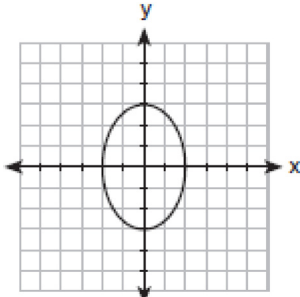
Which graph best represents  $|f(x)|$ ?



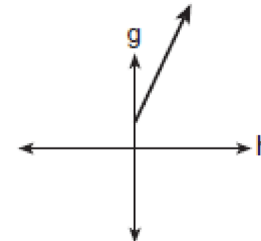
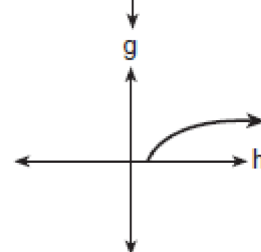
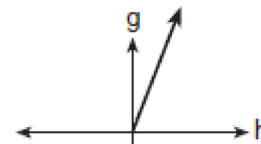
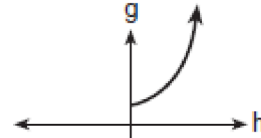
- 2 Which graph represents the equation  $\frac{x^2}{4} + \frac{y^2}{4} = 1$ ?



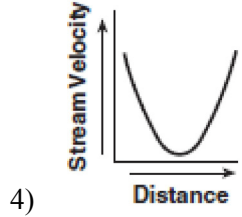
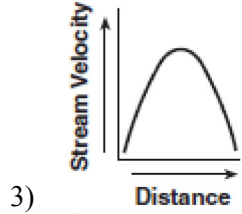
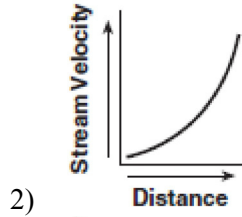
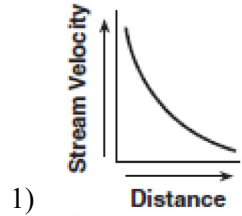
- 3 Which graph represents the equation  
 $9x^2 = 36 - 4y^2$ ?



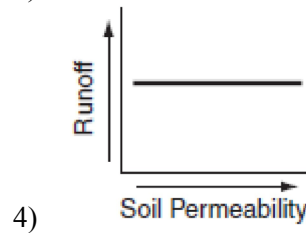
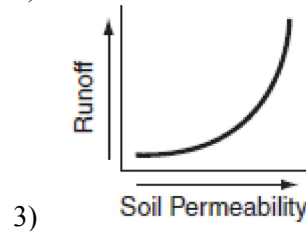
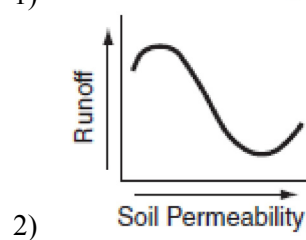
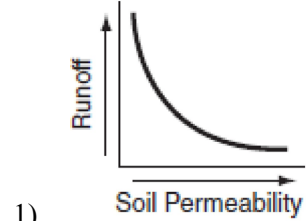
- 4 The cells of a particular organism increase logarithmically. If  $g$  represents cell growth and  $h$  represents time, in hours, which graph best represents the growth pattern of the cells of this organism?



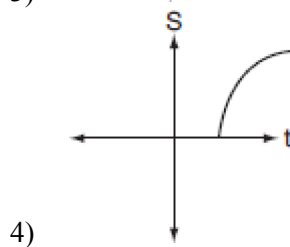
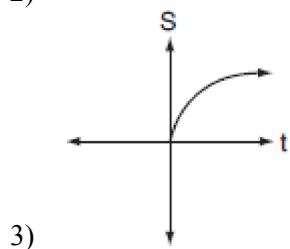
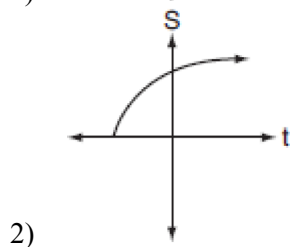
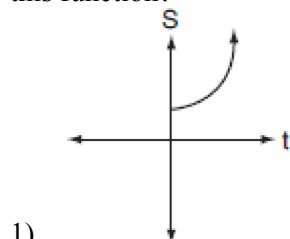
- 5 Which graph represents an inverse variation between stream velocity and the distance from the center of the stream?



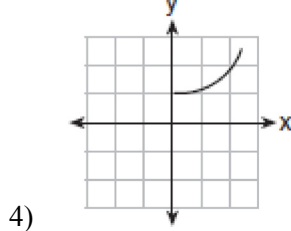
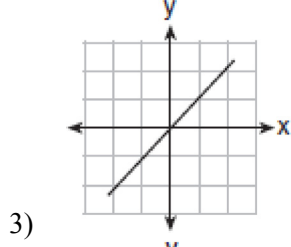
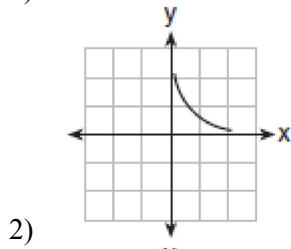
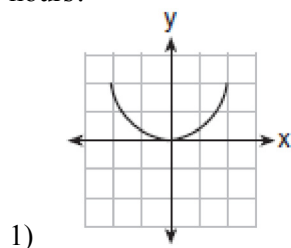
- 6 Which graph shows that soil permeability varies inversely to runoff?



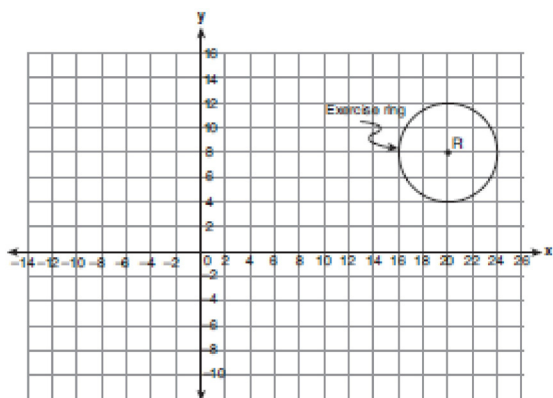
- 7 The formula  $S = 20\sqrt{t+273}$  is used to determine the speed of sound,  $S$ , in meters per second, near Earth's surface, where  $t$  is the surface temperature, in degrees Celsius. Which graph best represents this function?



- 8 Jack is driving from New York to Florida. The number of hours that he drives and the speed at which he drives are inversely proportional. Which graph could be used to describe this situation if one axis represents speed and the other represents hours?



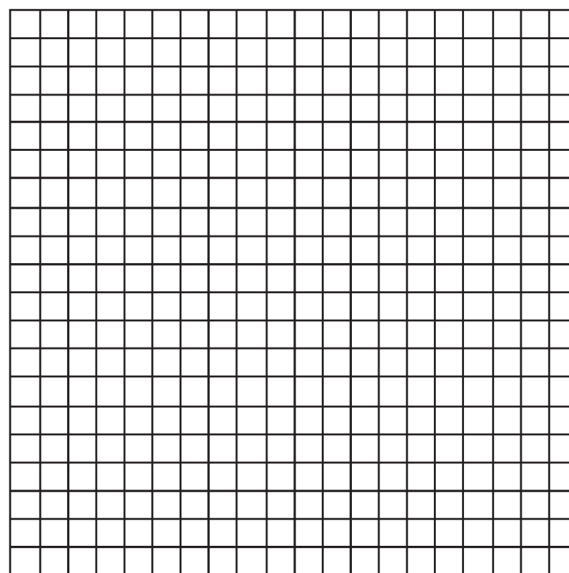
- 9 A landscape architect is working on the plans for a new horse farm. He is laying out the exercise ring and racetrack on the accompanying graph. The location of the circular exercise ring, with point  $R$  as its center, has already been plotted.



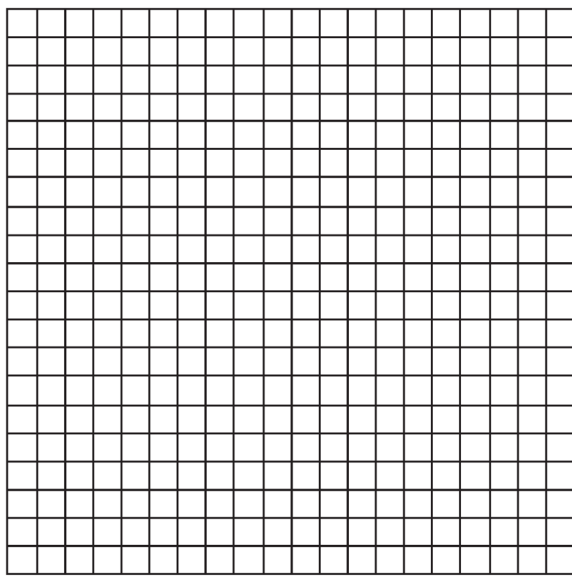
Write an equation that represents the outside edge of the exercise ring. The equation of the outside

edge of the racetrack is  $\frac{x^2}{144} + \frac{y^2}{36} = 1$ . Sketch the outside edge of the racetrack on the graph.

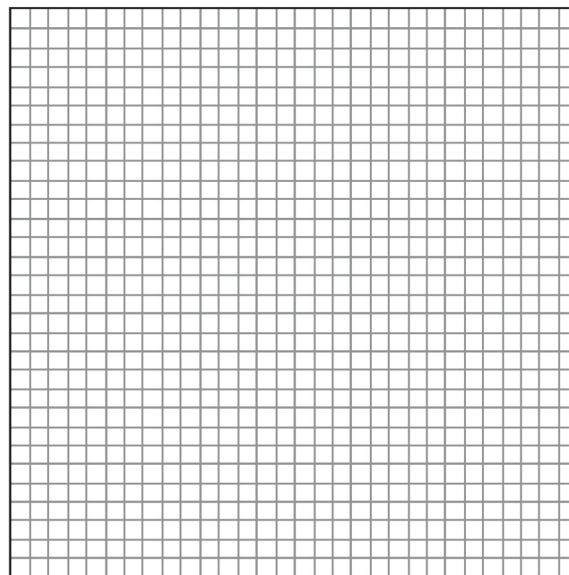
- 10 A baseball player throws a ball from the outfield toward home plate. The ball's height above the ground is modeled by the equation  $y = -16x^2 + 48x + 6$ , where  $y$  represents height, in feet, and  $x$  represents time, in seconds. The ball is initially thrown from a height of 6 feet. How many seconds after the ball is thrown will it again be 6 feet above the ground? What is the maximum height, in feet, that the ball reaches? [The use of the accompanying grid is optional.]



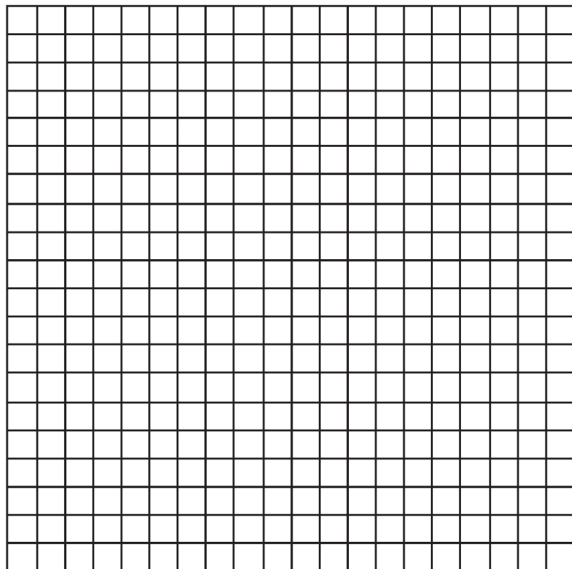
- 11 The path of a rocket fired during a fireworks display is given by the equation  $s(t) = 64t - 16t^2$ , where  $t$  is the time, in seconds, and  $s$  is the height, in feet. What is the maximum height, in feet, the rocket will reach? In how many seconds will the rocket hit the ground? [The use of the grid is optional.].



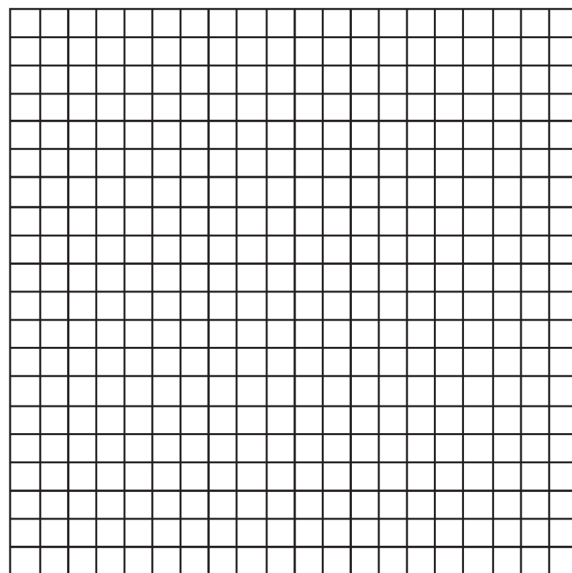
- 12 The members of the Lincoln High School Prom Committee are trying to raise money for their senior prom. They plan to sell teddy bears. The senior advisor told them that the profit equation for their project is  $y = -0.1x^2 + 9x - 50$ , where  $x$  is the price at which the teddy bears will be sold and  $y$  is the profit, in dollars. On the grid below, graph this relationship so that  $0 \leq x \leq 90$  and  $-50 \leq y \leq 160$ . How much profit can the committee expect to make if they sell the teddy bears for \$20 each? What price should they charge for the teddy bears to make the maximum profit possible?



- 13 Each year, the student council at Briarwood High School sponsors a community talent show to raise money. In previous years, the council has discovered that profit from ticket sales,  $P(x)$ , is a function of the amount charged per ticket,  $x$ , in dollars, as modeled by the equation  $P(x) = 120x - 12x^2$ . What amount should the council charge for a ticket to make the greatest profit? [The use of the grid is optional.]



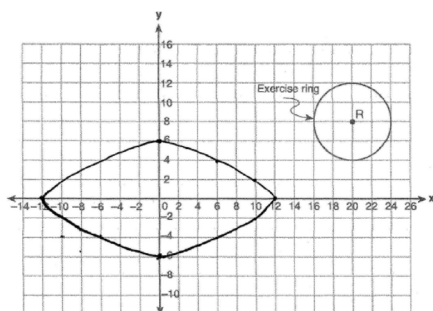
- 14 A rock is thrown vertically from the ground with a velocity of 24 meters per second, and it reaches a height of  $2 + 24t - 4.9t^2$  after  $t$  seconds. How many seconds after the rock is thrown will it reach maximum height, and what is the maximum height the rock will reach, in meters? How many seconds after the rock is thrown will it hit the ground? Round your answers to the *nearest hundredth*. [Only an algebraic or graphic solution will be accepted.]



## A2.A.52: Graphing Functions and Relations: Identify relations and functions, using graphs

### Answer Section

1	ANS: 1	PTS: 2	REF: 010414b
2	ANS: 1	PTS: 2	REF: 019724siii
3	ANS: 1	PTS: 2	REF: 010917b
4	ANS: 3	PTS: 2	REF: 010420b
5	ANS: 1	PTS: 2	REF: 060408b
6	ANS: 1	PTS: 2	REF: 010603b
7	ANS: 2	PTS: 2	REF: 060718b
8	ANS: 2	PTS: 2	REF: 080913b
9	ANS:		

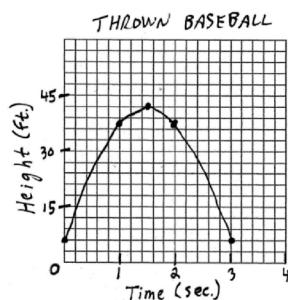


$(x-20)^2 + (y-8)^2 = 16$  . The center of the circle is (20,8) and the radius is 4.  
 Since  $a^2 = 144$ , the length of the semi-major axis is 12. Since  $b^2 = 36$ , the length of the semi-minor axis is 6.

PTS: 4      REF: 060730b



10 ANS:



3, 42.

$$6 = -16x^2 + 48x + 6$$

$$0 = -16x^2 + 48x$$

divide each term by -16

$$0 = x^2 - 3x$$

$$0 = x(x - 3)$$

$$x = 0 \quad x = 3$$

$$x = \frac{-b}{2a} = \frac{-(48)}{2(-16)} = 1.5$$

seconds after the ball is thrown.

$$y = -16(1.5)^2 + 48(1.5) + 6 = 42$$

The ball will again be 6 feet above the ground 3

The maximum height the ball reaches is

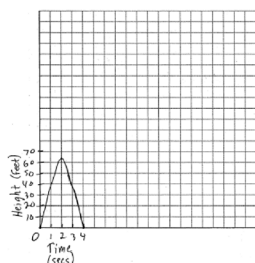
42 feet.



PTS: 4

REF: 060430b

11 ANS:



64, 4.

$$t = \frac{-b}{2a} = \frac{-(64)}{2(-16)} = \frac{-64}{-32} = 2$$

$$s = 64(2) - 16(2)^2 = 64$$

$$64t - 16t^2 = 0$$

$$16t(4 - t) = 0$$

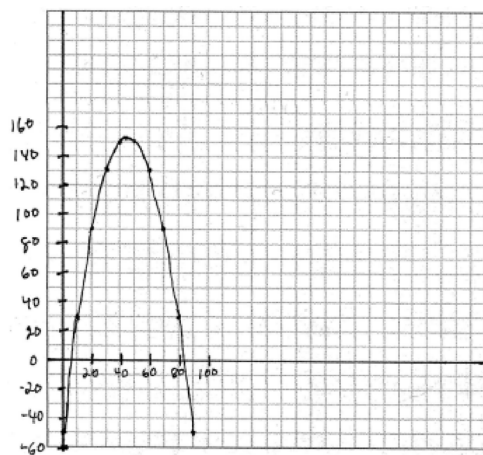
$$16t = 0 \quad 4 - t = 0$$

$$t = 0 \quad t = 4$$

PTS: 4

REF: 060732b

12 ANS:

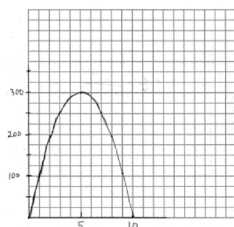


$$90, 45. \quad y = -0.1(20)^2 + 9(20) - 50 = 90. \quad x = \frac{-b}{2a} = \frac{-(9)}{2(-.1)} = 45$$

PTS: 6

REF: 010834b

13 ANS:

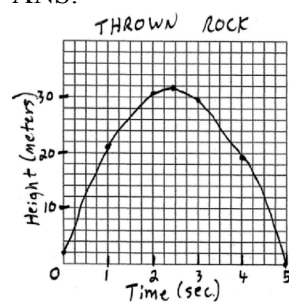


$$5. \quad x = \frac{-b}{2a} = \frac{-120}{2(-12)} = 5.$$

PTS: 2

REF: 080825b

14 ANS:

.  $t=2.45, h=31.39$ .

$$t = \frac{-b}{2a} = \frac{-(24)}{2(-4.9)} = \frac{120}{49} \approx 2.45$$

$$h = 2 + 24\left(\frac{120}{49}\right) - 4.9\left(\frac{120}{49}\right)^2 \approx 31.39$$

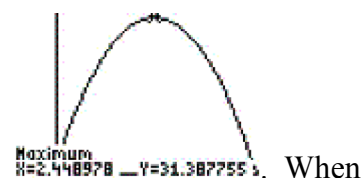
$$-4.9t^2 + 24t + 2 = 0$$

$$\frac{-24 \pm \sqrt{24^2 - 4(-4.9)(2)}}{2(-4.9)}$$

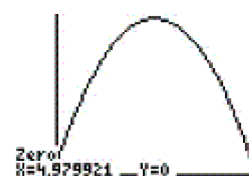
the rock hits the ground, the height is zero.

$$\frac{-24 - \sqrt{615.2}}{-9.8} \approx 4.98$$

$$\frac{-24 + \sqrt{615.2}}{-9.8} \text{ is negative.}$$



When



PTS: 4

REF: 080229b