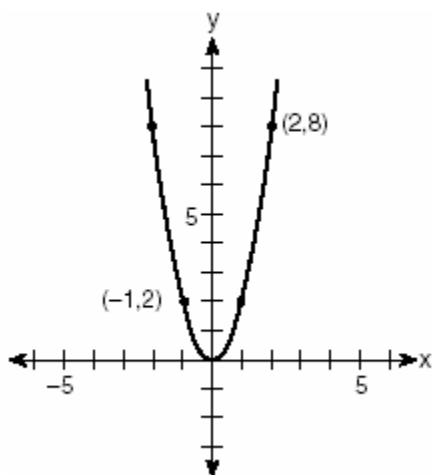


CHAPTER 7-1

QUADRATIC FUNCTIONS

1. 060404b, P.I. A.G.4

Which quadratic function is shown in the accompanying graph?

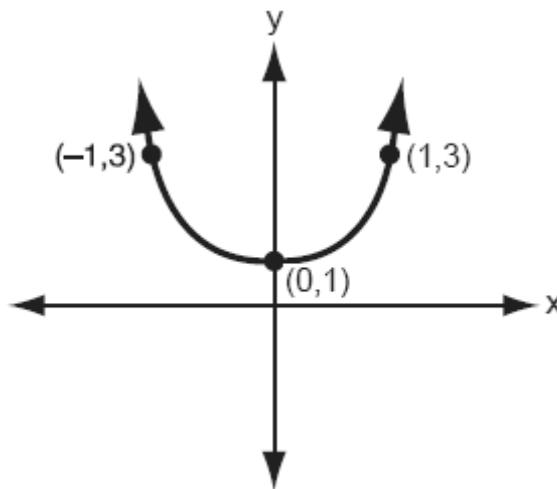


- [A] $y = 2x^2$ [B] $y = -\frac{1}{2}x^2$
[C] $y = -2x^2$ [D] $y = \frac{1}{2}x^2$

CHAPTER 7-2

2. 010801b, P.I. A.G.4

Which equation is represented by the accompanying graph?



- [A] $y = 2x^2 + 1$ [B] $y = 2x^2$
[C] $y = x^2$ [D] $y = 2(x^2 + 1)$

CHAPTER 7-3

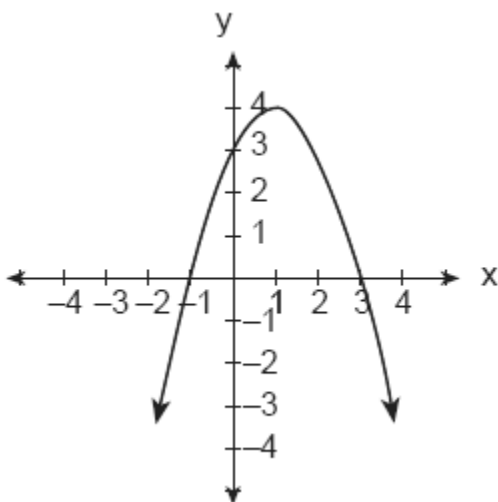
3. 080508a, P.I. A.A.8

The height of a golf ball hit into the air is modeled by the equation $h = -16t^2 + 48t$, where h represents the height, in feet, and t represents the number of seconds that have passed since the ball was hit. What is the height of the ball after 2 seconds?

- [A] 32 ft [B] 16 ft [C] 80 ft [D] 64 ft

4. 080017a, P.I. A.G.4

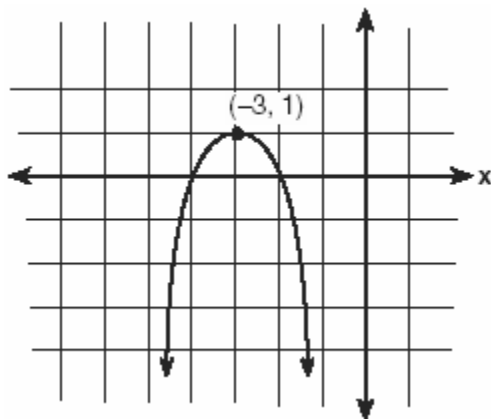
Which is an equation of the parabola shown in the accompanying diagram?



- [A] $y = x^2 - 2x + 3$ [B] $y = -x^2 - 2x + 3$
[C] $y = x^2 + 2x + 3$ [D] $y = -x^2 + 2x + 3$

5. 010303b, P.I. A.G.4

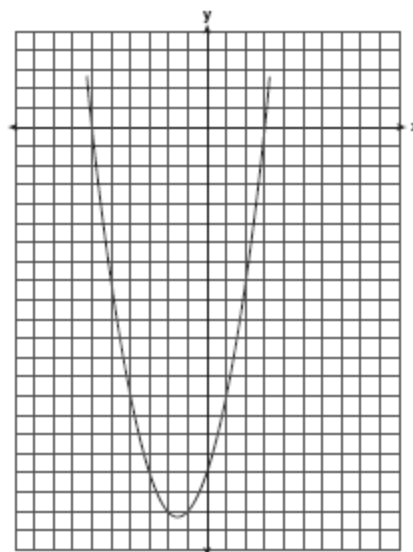
Which equation represents the parabola shown in the accompanying graph?



- [A] $f(x) = (x+1)^2 - 3$
[B] $f(x) = -(x+3)^2 + 1$
[C] $f(x) = -(x-3)^2 - 3$
[D] $f(x) = -(x-3)^2 + 1$

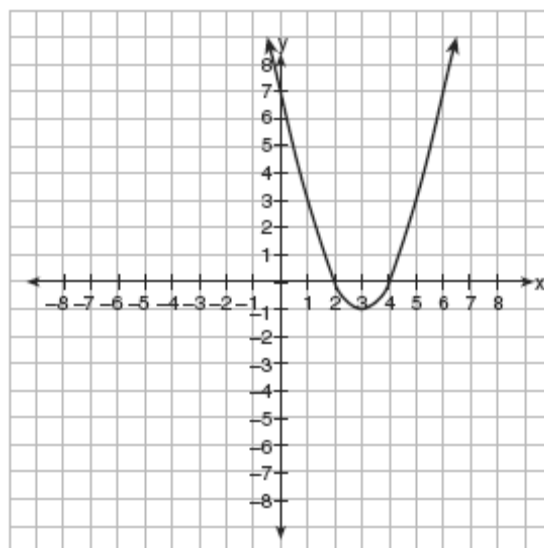
6. 010328a, P.I. A.G.4

The graph of a quadratic equation is shown in the accompanying diagram. The scale on the axes is a unit scale. Write an equation of this graph in standard form.



7. 010606b, P.I. A.G.10

Which is an equation of the line of symmetry for the parabola in the accompanying diagram?



- [A] $x = 3$ [B] $x = 2$
[C] $x = 4$ [D] $y = 3$

8. 060514b, P.I. A.A.41

For which quadratic equation is the axis of symmetry $x = 3$?

[A] $y = x^2 + x + 3$ [B] $y = x^2 + 6x + 3$

[C] $y = -x^2 + 6x + 2$ [D] $y = -x^2 + 3x + 5$

9. 060611b, P.I. A.A.41

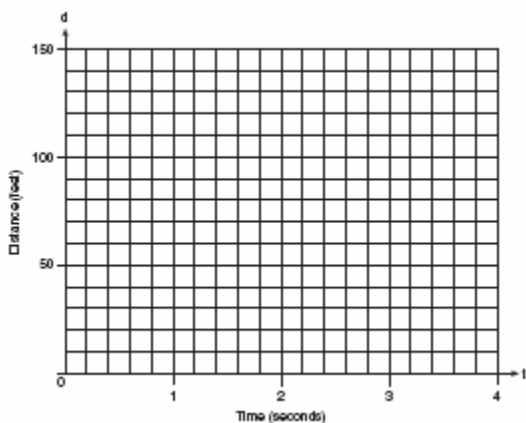
The graph of $y = (x - 3)^2$ is shifted left 4 units and down 2 units. What is the axis of symmetry of the transformed graph?

[A] $x = -2$ [B] $x = 7$

[C] $x = -1$ [D] $x = 1$

10. 080234a, P.I. A.A.27

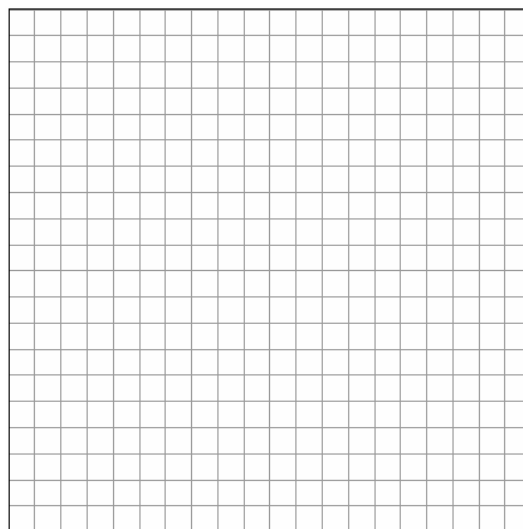
Greg is in a car at the top of a roller-coaster ride. The distance, d , of the car from the ground as the car descends is determined by the equation $d = 144 - 16t^2$, where t is the number of seconds it takes the car to travel down to each point on the ride. How many seconds will it take Greg to reach the ground?



11. 010431b, P.I. A2.A.7

An acorn falls from the branch of a tree to the ground 25 feet below. The distance, S , the acorn is from the ground as it falls is represented by the equation

$S(t) = -16t^2 + 25$, where t represents time, in seconds. Sketch a graph of this situation on the accompanying grid. Calculate, to the nearest hundredth of a second, the time the acorn will take to reach the ground.

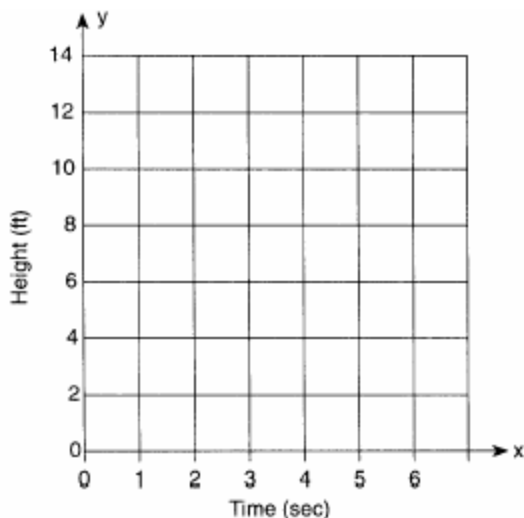


**MINIMUM AND MAXIMUM OF
QUADRATICS**

12. 010031a, P.I. A.G.4

Amy tossed a ball in the air in such a way that the path of the ball was modeled by the equation $y = -x^2 + 6x$. In the equation, y represents the height of the ball in feet and x is the time in seconds.

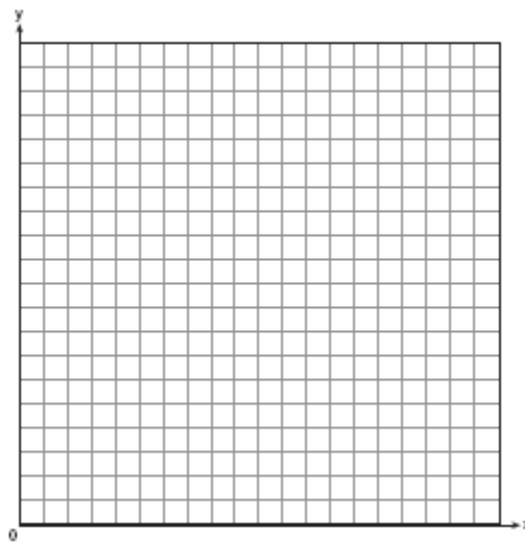
a Graph $y = -x^2 + 6x$ for $0 \leq x \leq 6$ on the grid provided below.



b At what time, x , is the ball at its highest point?

13. 060333a, P.I. A.G.4

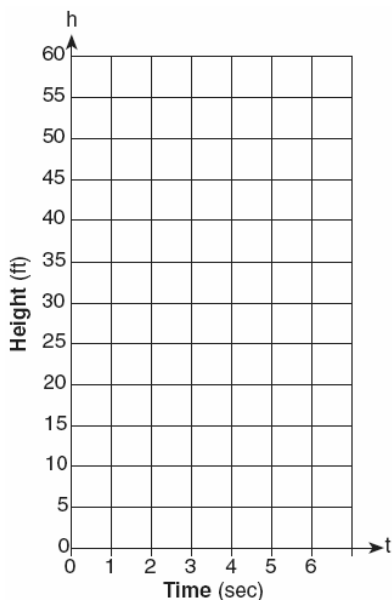
An architect is designing a museum entranceway in the shape of a parabolic arch represented by the equation $y = -x^2 + 20x$, where $0 \leq x \leq 20$ and all dimensions are expressed in feet. On the accompanying set of axes, sketch a graph of the arch and determine its maximum height, in feet.



14. 010439a, P.I. A.G.4

Tom throws a ball into the air. The ball travels on a parabolic path represented by the equation $h = -8t^2 + 40t$, where h is the height, in feet, and t is the time, in seconds.

a On the accompanying set of axes, graph the equation from $t = 0$ to $t = 5$ seconds, including all integral values of t from 0 to 5.

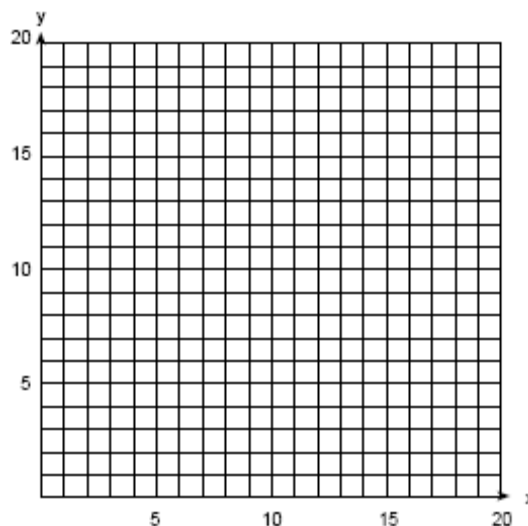


b What is the value of t at which h has its greatest value?

15. 089933a, P.I. A.G.4

An arch is built so that it is 6 feet wide at the base. Its shape can be represented by a parabola with the equation $y = -2x^2 + 12x$, where y is the height of the arch.

a Graph the parabola from $x = 0$ to $x = 6$ on the grid below.



b Determine the maximum height, y , of the arch.

CHAPTER 7-4

SQUARE ROOTS

16. 010001a, P.I. 7.N.18

The expression $\sqrt{93}$ is a number between

- [A] 8 and 9 [B] 3 and 9
[C] 46 and 47 [D] 9 and 10

17. 010703a, P.I. 7.N.18

Which point on the accompanying number line best represents the position of $\sqrt{5}$?



- [A] B [B] A [C] C [D] D

18. 060706a

The expression $\sqrt{54-b}$ is equivalent to a positive integer when b is equal to

- [A] 16 [B] -10 [C] 54 [D] 4

19. 060502a, P.I. 7.A.6

The amount of time, t , in seconds, it takes an object to fall a distance, d , in meters, is

expressed by the formula $t = \sqrt{\frac{d}{4.9}}$.

Approximately how long will it take an object to fall 75 meters?

- [A] 3.9 sec [B] 0.26 sec
[C] 2.34 sec [D] 7.7 sec

CHAPTER 7-5

SOLVING QUADRATICS

20. 010215a, P.I. A.A.27

What is the solution set of the equation

$$3x^2 = 48?$$

- [A] {2,8} [B] {4,4}
[C] {-2,-8} [D] {4,-4}

21. 010808a, P.I. A.A.27

A solution of the equation $\frac{x^2}{4} = 9$ is

- [A] 12 [B] 3 [C] $\frac{3}{2}$ [D] 6

22. 080733a, P.I. A.A.27

What is the positive solution of the equation

$$4x^2 - 36 = 0?$$

[1] A

[2] A

[3] A

[4] D

[5] B

[3] $y = x^2 + 3x - 18$, and appropriate work leading from the roots to the equation is shown.

[2] Appropriate work is shown, but one computational error is made.

or [2] $x^2 + 3x - 18 = 0$, but appropriate work is shown.

or [2] Only the correct factors $(x + 6)$ and $(x - 3)$ are shown.

[1] Appropriate work is shown, but more than one computational error is made.

or [1] Only the roots -6 and 3 are shown, such as $x = -6$, $x = 3$.

or [1] $y = x^2 + 3x - 18$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.

[7] A

[8] C

[9] C

[4] 3 , and an appropriate algebraic or graphic solution is shown.

[3] The equation is graphed correctly, but the time to reach the ground is not identified.

or [3] Appropriate work is shown for an algebraic solution, but either no solution is found or the negative root is not rejected.

or [3] An appropriate algebraic solution is shown, but one computational error is made.

[2] The equation is graphed incorrectly, but an appropriate time to reach the ground is identified.

or [2] The equation is factored incorrectly, but an appropriate solution is found.

[1] 3 , but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[10] incorrect procedure.

[4] A correct graph is sketched and 1.25, and appropriate work is shown.

[3] A correct graph is sketched, but one computational or rounding error is made in determining the time.

or [3] Appropriate work is shown, but one error is made in sketching the graph, such as the axes are not labeled or are labeled incorrectly, but the time is determined correctly.

or [3] A correct graph is sketched and appropriate work is shown to calculate the time, but the negative root is not rejected.

[2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct graph is sketched, but no further correct work is shown.

or [2] Appropriate work is shown to calculate the time, but no graph or an incorrect graph is sketched.

[1] Appropriate work is shown to calculate the time, but one computational or rounding error is made, and no graph or an incorrect graph is sketched.

or [1] Appropriate work is shown to calculate the time, but the negative root is not rejected, and no graph or an incorrect graph is sketched.

or [1] 1.25, but no graph or an incorrect graph is sketched, and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[11] incorrect procedure.

a [3] A parabola is correctly graphed through (0,0), (1,5), (2,8), (3,9), (4,8), (5,5), and (6,0).

[2] The correct table of values is shown but is not graphed through the entire domain.

or [2] The correct points are graphed but as a broken line graph not a curve.

or [2] At least three values are correctly calculated and graphed.

[1] At least two of the values are correctly calculated, and the student tried to graph all points.

b [1] 3

or [1] The correct time, x , for an incorrect graph in part a is found.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[12] obviously incorrect procedure.

- [4] 100 and a correct parabolic arch is drawn, and appropriate work is shown, such as a table of values for the parabola or correctly labeled points.
- [3] 100 and a correct parabolic arch is drawn, but no table of values or labeled points are shown.
- or [3] 100 and a correct parabolic arch is drawn, and appropriate work is shown, but no scale or an incorrect scale is shown.
- or [3] A correct parabolic arch is drawn, but the maximum height is missing or is incorrect.
- [2] An incorrect parabolic arch is drawn, but an appropriate maximum height is found.
- or [2] A correct height is determined algebraically, but a parabolic arch is not drawn.
- or [2] 100 and an appropriate parabolic arch is drawn, but it is not drawn between $0 \leq x \leq 20$.
- [1] A correct parabolic arch is drawn, but no work is shown, such as a table of values or correctly labeled points, and the maximum height is missing or is incorrect.
- or [1] 100, but no work is shown and no parabolic arch is drawn.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [13] _____

- a [3] A parabola with points graphed at (0,0), (1,32), (2,48), (3,48), (4,32), and (5,0) is shown. [Points do not have to be labeled on the graph for full credit.]
- [2] Appropriate work is shown, such as a table of values, but one graphing error is made.
- or [2] The correct points are graphed, but the parabola is drawn incorrectly, such as connecting (2,48) and (3,48) as a line segment or not connecting the points at all.
- or [2] At least four correct values are found, and the parabola is graphed appropriately.
- or [2] A correct table of values is shown for all values from 0 to 5, but no graph is drawn.
- [1] Two or three correct values are found, and the parabola is graphed appropriately.
- or [1] A correct table of values is shown for an incorrectly transcribed equation, such as $h = 8t^2 + 40t$, but no graph is drawn.
- b [1] 2.5 is found algebraically or identified from a table or from the graph of the parabola.
- or [1] An appropriate value of t is found, based on an incorrect graph.
- or [1] $2 < t < 3$ is given as the range of values based on the line segment drawn in part a.
- a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [14] _____

a [3] A parabola is correctly graphed through (0,0), (1,10), (2,16), (3,18), (4,16), (5,10), and (6,0).

[2] A correct table of values is shown, but not all the points are graphed correctly.

or [2] The correct points are graphed but as a broken-line graph, not a curve.

or [2] At least four values are calculated correctly and graphed.

[1] The student has at least two of the values calculated correctly and has tried to graph all the points.

[0] Fewer than two values are calculated correctly.

b [1] A maximum height of 18 is found.

or [1] Correct y is found for an incorrect graph in part a.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[15] obviously incorrect procedure.

[16] D

[17] C

[18] B

[19] A

[20] D

[21] D

[2] 3, and appropriate work is shown, such as factoring or trial and error with at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as not rejecting the negative root.

or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [1] 3, but no work or fewer than three trials and appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[22] incorrect procedure.
