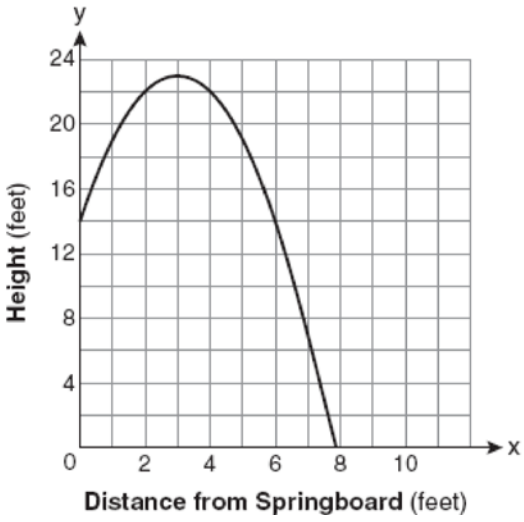
F.IF.B.4: Graphing Quadratic Functions 2

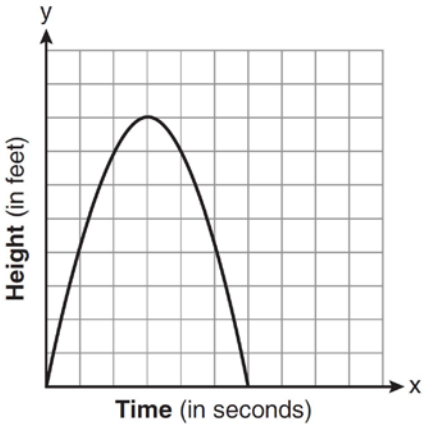
1 A swim team member performs a dive from a 14-foot-high springboard. The parabola below shows the path of her dive.



Which equation represents the axis of symmetry?

1) $x = 3$
2) $y = 3$
3) $x = 23$
4) $y = 23$

2 The graph below represents the parabolic path of a ball kicked by a young child. What are the vertex and the axis of symmetry for the parabola?



1) vertex: (3,8); axis of symmetry: $x = 3$
2) vertex: (3,8); axis of symmetry: $y = 3$
3) vertex: (8,3); axis of symmetry: $x = 3$
4) vertex: (8,3); axis of symmetry: $y = 3$

3 The height, y, of a ball tossed into the air can be represented by the equation $y = -x^2 + 10x + 3$, where x is the elapsed time. What is the equation of the axis of symmetry of this parabola?

1) $y = 5$
2) $y = -5$
3) $x = 5$
4) $x = -5$

4 A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball t seconds after it is thrown is given by the formula $h(t) = 54t - 12t^2$. How many seconds after the ball is thrown will it return to the ground?

1) 9.2
2) 6
3) 4.5
4) 4

5 A model rocket is launched from ground level. Its height, h meters above the ground, is a function of time t seconds after launch and is given by the equation $h = -4.9t^2 + 68.6t$. What would be the maximum height, to the nearest meter, attained by the model?
1) 243
2) 242
3) 241
4) 240

6 An archer shoots an arrow into the air such that its height at any time, t, is given by the function $h(t) = -16t^2 + kt + 3$. If the maximum height of the arrow occurs at time $t = 4$, what is the value of k?
1) 128
2) 64
3) 8
4) 4

7 The height of a swimmer's dive off a 10-foot platform into a diving pool is modeled by the equation $y = 2x^2 - 12x + 10$, where x represents the number of seconds since the swimmer left the diving board and y represents the number of feet above or below the water's surface. What is the farthest depth below the water's surface that the swimmer will reach?
1) 6 feet
2) 8 feet
3) 10 feet
4) 12 feet

8 The height of an object, $h(t)$, is determined by the formula $h(t) = -16t^2 + 256t$, where t is time, in seconds. Will the object reach a maximum or a minimum? Explain or show your reasoning.

9 Vanessa throws a tennis ball in the air. The function $h(t) = -16t^2 + 45t + 7$ represents the distance, in feet, that the ball is from the ground at any time t. At what time, to the *nearest tenth of a second,* is the ball at its maximum height?

10 The height, h, in feet, a ball will reach when thrown in the air is a function of time, t, in seconds, given by the equation $h(t) = -16t^2 + 30t + 6$. Find, to the *nearest tenth*, the maximum height, in feet, the ball will reach.

11 When a current, I, flows through a given electrical circuit, the power, W, of the circuit can be determined by the formula $W = 120I - 12I^2$. What amount of current, I, supplies the maximum power, W?

12 The equation $W = 120I - 12I^2$ represents the power (W), in watts, of a 120-volt circuit having a resistance of 12 ohms when a current (I) is flowing through the circuit. What is the maximum power, in watts, that can be delivered in this circuit?

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Answer Section

1 ANS: 1 REF: 080813ia

2 ANS: 1 REF: 081405ia

3 ANS: 3

$x = \frac{-b}{2a} = \frac{-10}{2(-1)} = 5.$

REF: 081018ia

4 ANS: 3

$54t - 12t^2 = 0$

$6t(9 - 2t) = 0$

$6t = 0 \;\; 9 - 2t = 0$

$t = 0 \;\; t = \frac{9}{2}$

REF: 080112b

5 ANS: 4

$x = \frac{-68.6}{2(-4.9)} = \frac{-(8)}{2(2)} = 7$

$y = -4.9(7)^2 + 68.6(7) = 240.1$

REF: fall9915b

6 ANS: 1

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

$4 = \frac{-(k)}{2(-16)}$

$k = 128$

REF: 060101b

7 ANS: 2

$x = \frac{-b}{2a} = \frac{-(-12)}{2(2)} = 3$

$y = 2(3)^2 - 12(3) + 10 = -8$

REF: 010907b

8 ANS:
Maximum, because $a < 0$ the parabola representing the relationship between the object's height and time is cupped downward and therefore has a maximum.

REF: 010322b

9 ANS:

1.4. $t = \dfrac{-b}{2a} = \dfrac{-(45)}{2(-16)} = \dfrac{45}{32} \approx 1.4$

REF: 060321b

10 ANS:

20.1. $t = \dfrac{-b}{2a} = \dfrac{-(30)}{2(-16)} = \dfrac{15}{16}$

$h = -16\left(\dfrac{15}{16}\right)^2 + 30\left(\dfrac{15}{16}\right) + 6 = \dfrac{321}{16} \approx 20.1$

REF: 080321b

11 ANS:

5. $I = \dfrac{-b}{2a} = \dfrac{-(120)}{2(-12)} = 5$

REF: 010424b

12 ANS:

300. $I = \dfrac{-b}{2a} = \dfrac{-(120)}{2(-12)} = 5$

$W = 120(5) - 12(5)^2 = 300$

REF: 060225b