Secondary Math 2 [redacted] Name Key

Unit 6 Quadratic Modeling Review

Date _____ Period ____

Write each quadratic in intercept form and list the x intercepts.

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

$y = -(x+3)(x+1)$

x-int: $(-3,0)$, $(-1,0)$

2) $y = -3x^2 + 6x + 1$

x-int: $(-0.15, 0)$, $(2.15, 0)$

$y = -3(x+0.15)(x-2.15)$

3) $y = 2x^2 + 12x + 16$

$y = 2(x+4)(x+2)$

x-int: $(-4,0)$, $(-2,0)$

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

$y = 2x(x+2)$

x-int: $(0,0)$, $(-2,0)$

5) $y = -3(x-1)^2 + 2$

$y = -3x(x-2)$

x-int: $(0,0)$, $(2,0)$

6) $y = (x+4)^2 - 2$

x-int: $(-5.41, 0)$, $(-2.56, 0)$

$y = (x+5.41)(x+2.56)$

Write each quadratic in vertex form and identify the vertex.

7) $y = 2x^2 - 16x + 31$

Vertex: $(4, -1)$

$y = 2(x-4)^2 - 1$

8) $y = -x^2 + 2x + 1$

Vertex: $(1, 2)$

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

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

Vertex: $(1, 2)$

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

10) $y = 4(x - 6)(x + 1)$

$y = 4(x-2.5)^2 - 49$

Vertex: $(2.5, -49)$

11) $y = -(x + 12)(x + 8)$

Vertex: $(-10, 4)$

$y = -(x+10)^2 + 4$

12) $y = -2x(x - 9)$

Vertex: $(4.5, 40.5)$

$y = -2(x-4.5)^2 + 40.5$

Write the quadratic equation for the following.

13) x - intercepts of $(0, 0)$ and $(2, 0)$ and passes through the point $(-2, 6)$.

$y = \frac{3}{4}x(x-2)$

14) x - intercepts of $(7, 0)$ and $(-3, 0)$ and passes through the point $(0, 1)$.

$y = -\frac{1}{21}(x-7)(x+3)$

15) x - intercepts of $(7, 0)$ and $(3, 0)$ and passes through the point $(-2, 4)$

$y = -\frac{2}{9}(x+4)(x-6)$

16) Vertex: (1,-2) and passes through the point (0,16)

$y = -\frac{4}{9}(x-2)^2 + 10$

17) Vertex: (2,10) and passes through the point (-1,6)

$y = -\frac{4}{9}(x-2)^2 + 10$

18) Vertex: (2,-5) and passes through the origin.

$y = -\frac{5}{4}(x-2)^2 + 5$

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Sketch each scenario, determine what part of the quadratic graph is each question asking for, then answer each question.

19) The scariest swing swings between two cliffs that are 1300 feet above the Colorado River. It takes 30 seconds to swing from one side to the other. When a person reaches the lowest part of the arc, they are 1200 feet above the river.

a. What is the y-intercept in this situation?

$(0, 1300)$

b. What is the vertex in this situation?

$(15, 1200)$

c. Write an equation that could model this function.

$y = \frac{4}{9}(x-15)^2 + 1200$

20) The cables of a suspension bridge create a parabola. The towers are 500 feet apart and 90 feet tall. The cable touches the road halfway between the towers. What is the equation of the line that would model this curve?

$y = \frac{9}{6250}(x-250)^2$

21) Paul is kicking a field goal. The ball lands 36 yards away. The maxium height of the ball is 23 yards. Goal posts are typically $\frac{10}{3}$ yards tall.

a) How far away from Paul is the ball when it reaches its maximum height?

18 yards

b) How high is the ball when it is 23 yards away from Paul?

21.23 yards

c) If the goal post is located at the position in part b, will Paul make a field goal? Why or why not?

Yes, the goal post is only $\frac{10}{3}$ yards tall, so the ball clears the goal post by 17.89 yards

d) Give the domain and range for the path of the ball.

D: $[0, 36]$ R: $[0, 23]$

22) A diver is standing on a platform 28 feet above the pool. His jump from the pool can be represented by the equation: $h = -16t^2 + 6t + 28$, where h is their height above the water, and t is the time.

a) When will the diver reach his maximum height?

0.19 seconds

b) What is his maximum height?

28.56 feet

c) How high will he be at 0.5 seconds? At 1 seconds?

27 feet, 18 feet

d) How long will it take him to splash into the water?

1.52 seconds

e) Give the domain and range for his time above the water.

D: $[0, 1.52]$ R: $[0, 28.56]$

23) A baseball is being thrown from the top of a hill to a friend at the bottom of the hill. The equation that models the curve the ball takes can be expressed by: $h = -6.6t^2 + 21.4t + 63.4$. Use this information to answer the following questions.

a) What is the starting height of the baseball?

63.4 feet

b) When will the ball reach its maximum height?

1.62 seconds

c) What is the maximum height the ball will reach?

80.75 feet

d) When will the ball hit the ground?

5.12 seconds

24) The path of an arrow shot in the air can be modeled by the function: $h = -22t^2 + 135t$, where h is the height, in feet, of the arrow above the ground t seconds after it is released.

a) What is the maximum height the arrow reaches?

207.10 feet

b) After how many seconds dose it reach that height?

3.07 seconds

c) How high will the arrow be at 2 seconds? At 5.3 seconds?

182 feet, 97.52 feet

d) At what time will the arrow land on the ground?

6.13 seconds

e) Determine the domain and range of the arrow.

D: $[0, 6.13]$ R: $[0, 207.10]$