Name _____ Date _____

Quadratic Functions in Context Unit Review

Directions: Each question uses a quadratic model of a real situation, says what its variables stand for with units, and gives the domain where it applies. Answer using the model only inside that domain.

1. A ball is thrown upward from the roof of a building. The model $h = -16t^2 + 64t + 80$ gives its height h, in feet above the ground, t seconds after it is thrown, from the moment it is thrown until it lands. What height does the model give at the moment the ball is thrown?

A. 64 feet B. 80 feet C. 0 feet D. 144 feet

2. The model $h = -16t^2 + 64t + 80$ gives the height h, in feet above the ground, of a ball t seconds after it is thrown upward from a roof, from the moment it is thrown until it lands. How many seconds after it is thrown does the ball land?

_____ seconds

3. A ball's height is $h = -16t^2 + 64t + 80$ feet above the ground, t seconds after it is thrown upward from a roof, from the throw until it lands. What is the ball's greatest height, and when does it reach it?

A. 140 feet, 2.5 seconds after it is thrown
B. 80 feet, at the moment it is thrown
C. 144 feet, 2 seconds after it is thrown
D. 2 feet, 144 seconds after it is thrown

4. Thrown upward from a roof, a ball has height $h = -16t^2 + 64t + 80$ feet above the ground, t seconds after it is thrown, until it lands. The model gives $h = 80$ when $t = 4$. What does this mean?

A. The ball's greatest height is 80 feet.
B. The ball lands 4 seconds after it is thrown.
C. Eighty seconds after it is thrown, the ball is 4 feet above the ground.
D. Four seconds after it is thrown, the ball is 80 feet above the ground.

5. A club's profit from selling T-shirts is modeled by $P = -5(x - 4)(x - 16)$, where P is the profit in dollars and x is the price of one shirt in dollars, for prices from \$0 to \$20. What do the zeros $x = 4$ and $x = 16$ mean?

A. At a price of \$4 or \$16, the model gives a profit of \$0.
B. The profit is \$4 at a price of \$16.
C. The greatest profit is \$16, at a price of \$4.
D. The club sells 4 shirts or 16 shirts.

6. For the T-shirt profit model $P = -5(x - 4)(x - 16)$, with the price x in dollars from \$0 to \$20 and the profit P in dollars, which interval gives all the prices where the model shows a positive profit?

A. Prices from \$16 to \$20
B. Prices between \$4 and \$16
C. Prices from \$0 to \$20
D. Prices from \$0 to \$4

7. A club's T-shirt profit is modeled by $P = -5(x - 4)(x - 16)$, where P is the profit in dollars and x is the shirt price in dollars, for prices from \$0 to \$20. What is the greatest profit the model gives?

_____ dollars

8. The number of people waiting in line at a food truck is modeled by $N = -2(t - 1)(t - 9)$, where t is the number of hours after 10 a.m., for $1 \le t \le 9$. Which interval gives all the times when the model shows the line getting longer?

A. From $t = 1$ to $t = 9$ B. From $t = 1$ to $t = 5$ C. From $t = 0$ to $t = 5$ D. From $t = 5$ to $t = 9$

A Water Balloon

Use the table and its model for these questions.

Heights of a water balloon launched upward from a balcony, from the model $h = -16t^2 + 32t + 48$, every half second from launch until it lands

Time t (seconds)	Height h (feet)
0	48

Time t (seconds)	Height h (feet)
0.5	60
1	64
1.5	60
2	48
2.5	28
3	0

9. The table shows heights from the model $h = -16t^2 + 32t + 48$ for a water balloon, from launch until it lands. Which interval gives all the times when the balloon's height is decreasing?

A. From $t = 0$ to $t = 1$ B. From $t = 0$ to $t = 3$ C. From $t = 1$ to $t = 3$ D. From $t = 2$ to $t = 3$

10. The table shows heights from the model $h = -16t^2 + 32t + 48$ for a water balloon, from launch until it lands. At what time t after launch, other than $t = 0$, does the model give the same height as at launch?

_____ seconds

11. The model $h = -16t^2 + 32t + 48$ for the water balloon also gives $h = 0$ at $t = -1$. Why does that not describe the balloon?

A. Because -1 is not a solution of $-16t^2 + 32t + 48 = 0$.

B. Because a height can never be 0.

C. Because $t = -1$ is before the launch, outside the model's domain from launch to landing.

D. Because the balloon lands at $t = -1$.

12. Water from a fountain follows the model $h = -0.5x^2 + 4x$, where h is the height of the water in feet and x is the horizontal distance from the nozzle in feet, from the nozzle until the water lands at ground level. How far from the nozzle does the water land?

A. 16 feet B. 4 feet C. 8 feet D. 0 feet

13. Water from a fountain follows the model $h = -0.5x^2 + 4x$, where h is the height in feet and x is the horizontal distance from the nozzle in feet, for $0 \le x \le 8$. Which statements are true for the model? Select the three true statements.

☐ A. The height increases from $x = 0$ to $x = 4$.

☐ B. The water is at the same height at $x = 2$ and at $x = 6$.

☐ C. The water is highest, 8 feet up, at $x = 4$.

☐ D. At its highest point the water is 4 feet up.

☐ E. The water is highest at $x = 8$.