Amery recorded the distance and height of a basketball when shooting a free throw.

1. Find the quadratic equation for the relationship of the horizontal distance and the height of the ball. Round to 3 decimal places.

\[ f(x) = -0.118x^2 + 2.112x + 4.215 \]

2. Using this function what is the approximate maximum height of the ball?

13.665 feet

This table shows the population of a city every ten years since 1970.

3. Find the best-fitting quadratic model for the data. Round to 3 decimal places.

\[ y = 1.209x^2 + 13.000x + 504.257 \]

4. Using this model, what will be the estimated population in 2020?

\[ x = 50 \quad 4,176.8 \text{ thousand} \]

5. Which of the following is best modeled by a **quadratic** function?
   A. Relationship between circumference and diameter. \[ C = \pi d \]
   B. Relationship between area of a square and side length. \[ A = x^2 \]
   C. Relationship between diagonal of a square and side length. \[ 2x^2 = \text{diag.}^2 \]
   D. Relationship between volume of a cube and side length. \[ V = s^3 \]

6. If \( y \) is a quadratic function of \( x \), which value completes the table?

<table>
<thead>
<tr>
<th>( x )</th>
<th>-2</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>-8</td>
<td>0</td>
<td>12</td>
<td>28</td>
<td></td>
</tr>
</tbody>
</table>

\[ y = 0.5x^2 + 5x \]
7. The graph of a quadratic function having the form \( f(x) = ax^2 + bx + c \) passes through the points \((0, -8)\), \((3, 10)\), and \((6, 34)\). What is the value of the function when \( x = -3 \)?

A. -32  
B. -26  
C. -20  
D. 10

8. Which is the quadratic equation the best fits the scatterplot?

A. \( f(x) = (x - 3)^2 - 4 \) \((3, -4)\)  
B. \( f(x) = (x + 3)^2 + 4 \) \((-3, 4)\)  
C. \( f(x) = (x - 4)^2 - 3 \) \((4, -3)\)  
D. \( f(x) = (x + 4)^2 + 3 \) \((-4, 3)\)

9. Which is the quadratic equation the best fits the scatterplot?

A. \( f(x) = x^2 - 8x + 22 \)  
B. \( f(x) = -x^2 - 8x - 10 \)  
C. \( f(x) = -x^2 + 8x - 32 \)  
D. \( f(x) = -x^2 + 8x - 10 \)  

Write a quadratic equation that fits each set of points.

10. \((0, -8), (2, 0), \) and \((-3, -5)\)

\[ y = x^2 + 2x - 8 \]

11. \((-1, -16), (2, 5), \) and \((5, 8)\)

\[ y = -x^2 + 8x - 7 \]

12. \((1, 4), (-2, 13), \) and \((0, 3)\)

\[ y = 2x^2 - x + 3 \]

13. 

<table>
<thead>
<tr>
<th>( x )</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>35</td>
<td>22</td>
<td>11</td>
<td>2</td>
<td>-5</td>
</tr>
</tbody>
</table>

\[ y = x^2 - 12x + 22 \]