Quadratic Functions Quiz

Score: ____ out of 42

Part One: Multiple Choice (2 points each.)

Identify the choice that best completes the statement or answers the question.

1. Tell whether the graph of the quadratic function \( y = -x^2 + 10x + 1 \) opens upward or downward. Explain.
   - 1) Because \( a > 0 \), the parabola opens downward.
   - 2) Because \( a < 0 \), the parabola opens downward.
   - 3) Because \( a < 0 \), the parabola opens upward.
   - 4) Because \( a > 0 \), the parabola opens upward.

2. Identify the vertex of the parabola. Then give the minimum or maximum value of the function.
   - 1) The vertex is \((3, 6)\), and the minimum is 6.
   - 2) The vertex is \((3, 6)\), and the maximum is 6.
   - 3) The vertex is \((3, 6)\), and the maximum is 3.
   - 4) The vertex is \((3, 6)\), and the minimum is 3.

3. Find the roots of the quadratic function \( f(x) = 2x^2 - 6x - 8 \) from the graph.
   - 1) 1.5
   - 2) 4 and -1
   - 3) -8
   - 4) 2 and -8
4. Find the axis of symmetry of the parabola.

1) \( y = -1 \) 
2) \( x = -1 \) 
3) \( y = 0 \) 
4) \( x = 0 \)

5. Find the axis of symmetry of the graph of \( y = 3x^2 + 6x + 4 \).

1) \( y = -1 \) 
2) \( x = -1 \) 
3) \( x = 1 \) 
4) \( y = 1 \)

6. Find the vertex of the parabola \( y = -2x^2 - 12x - 16 \).

1) \((-3, 2)\) 
2) \((2, -3)\) 
3) \((-2, 0)\) and \((-4, 0)\) 
4) \((3, -70)\)
7. Graph \( y = -x^2 - 4x - 3 \).

8. Order the functions from narrowest graph to widest graph.

\[
\begin{align*}
  f(x) &= -\frac{1}{3} x^2, \quad g(x) = -2x^2, \quad h(x) = x^2 \\
  1) \quad h(x) &= x^2, \quad f(x) = -\frac{1}{3} x^2, \quad g(x) = -2x^2 \\
  2) \quad f(x) &= -\frac{1}{3} x^2, \quad h(x) = x^2, \quad g(x) = -2x^2 \\
  3) \quad g(x) &= -2x^2, \quad h(x) = x^2, \quad f(x) = -\frac{1}{3} x^2 \\
  4) \quad g(x) &= -2x^2, \quad f(x) = -\frac{1}{3} x^2, \quad h(x) = x^2
\end{align*}
\]
9. Compare the graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) with the graph of \( f(x) = x^2 \).

1) The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) is narrower than the graph of \( f(x) = x^2 \). The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) opens downward, and the graph of \( f(x) = x^2 \) opens upward. The axis of symmetry is the same. The vertex of \( f(x) = x^2 \) is \((0, 0)\). The vertex of \( g(x) = -\frac{1}{2}x^2 - 2 \) is translated down 2 units to \((0, -2)\).

2) The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) is wider than the graph of \( f(x) = x^2 \). The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) opens downward, and the graph of \( f(x) = x^2 \) opens upward. The axis of symmetry is the same. The vertex of \( f(x) = x^2 \) is \((0, 0)\). The vertex of \( g(x) = -\frac{1}{2}x^2 - 2 \) is translated up 2 units to \((0, 2)\).

3) The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) is wider than the graph of \( f(x) = x^2 \). The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) opens upward, and the graph of \( f(x) = x^2 \) opens upward. The axis of symmetry is the same. The vertex of \( f(x) = x^2 \) is \((0, 0)\). The vertex of \( g(x) = -\frac{1}{2}x^2 - 2 \) is translated down 2 units to \((0, -2)\).

4) The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) is wider than the graph of \( f(x) = x^2 \). The graph of \( g(x) = -\frac{1}{2}x^2 - 2 \) opens downward, and the graph of \( f(x) = x^2 \) opens upward. The axis of symmetry is the same. The vertex of \( f(x) = x^2 \) is \((0, 0)\). The vertex of \( g(x) = -\frac{1}{2}x^2 - 2 \) is translated down 2 units to \((0, -2)\).

10. Which ordered pair is in the solution set of the
    system of equations \( y = -x + 1 \) and \( y = x^2 + 5x + 6 \)?

1) \((-5, -1)\)
2) \((-5, 6)\)
3) \((5, -4)\)
4) \((5, 2)\)

11. How many solutions does this system of
    equations have?
    \[ y = -2x^2 \]
    \[ y = x + 4 \]

[A] two      [B] none   [C] three
[D] one      [E] infinitely many
Part TWO: (4 points each.)

Find the vertex and the axis of symmetry of each parabola Algebraically.

12) \( y = x^2 + 6x + 2 \)

13) \( y = 3x^2 + 12x - 12 \)
Part Three: (6 points each.)

14. a) Graph the Quadratic Function: \( y = x^2 - 6x + 8 \)

   b) Write an equation for the axis of symmetry: _____________

   c) Complete the chart

   d) What are the roots? ___________ and ___________

   e) Graph the equation.
15. On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

\[ y = -x^2 + 6x - 3 \]

\[ x + y = 7 \]

Solutions: _____________________________________