Honors Algebra 2: Transformations and Forms of Quadratic Functions Quiz

Questions 1 and 2. Multiple Choice. Write the correct answer choice on the line.

1.) Which function below represents a quadratic function?
   a.) $y = 2(x - 4)^2$  
   b.) $x^3 = 8$  
   c.) $y + 2 = -3(x + 5)$  
   d.) $y = 3(x - 4)(x + 2)$

2.) Which function below is the widest compared to the parent graph?
   a.) $y = 5x^2$  
   b.) $y = -7x^2 + 3x$  
   c.) $y = 0.5x^2 - 3x + 8$  
   d.) $y = x^2$

3.) Describe the transformation of $g(x) = -2(x + 1)^2$ as compared to $f(x) = x^2$. 

4.) Write the equation of a parabola (in vertex form) that is shifted 2 units to the right and one unit down as compared to the parent graph.

5.) Convert the function $y = 2x^2 - 4x + 5$ into vertex form.

Graph each equation and answer each question.

6.) $y = x^2 - 4x - 5$
   a.) Does the graph have a maximum or a minimum? ____________
   b.) Vertex: ____________
   c.) Axis of Symmetry Equation: ____________
   d.) Domain: ____________
   e.) Range: ____________
   f.) $y$ - intercept: ____________
7.) \[ y = 2(x + 5)^2 - 2 \]

a.) Does the graph have a maximum or a minimum? 

b.) Vertex: 

c.) Axis of Symmetry Equation: 

d.) Domain: 

e.) Range: 

f.) \( y \) – intercept: 

8.) \[ y = -2(x - 1)(x + 2) \]

a.) Does the graph have a maximum or a minimum? 

b.) Vertex: 

c.) Axis of Symmetry Equation: 

d.) Domain: 

e.) Range: 

f.) \( y \) – intercept: 

g.) Does the graph open up or down? 

9.) A parabola has a vertex of \((2, -1)\) and passes through the point \((4, 0)\). Write the equation of the parabola in vertex form.
Describe transformations from the parent graph of quadratic functions in vertex form.

1.) \( g(x) = -\frac{1}{4}x^2 - 3 \) reflected over x-axis, vertical compression by a factor of \( \frac{1}{4} \), vertical shift down 3

2.) \( f(x) = 2(x + 3)^2 + 2 \) vertical stretch by a factor of 2, horizontal shift left 3, vertical shift up 2

Write quadratic functions in vertex form based on transformation descriptions.

3.) Vertical stretch by a factor of 3, a reflection in the x-axis, and translation 3 units down.
   \[ y = -3x^2 - 3 \]

4.) Vertical compression by a factor of \( \frac{1}{2} \), a translation 2 units up, and translation 1 unit right.
   \[ y = \frac{1}{2}(x-1)^2 + 2 \]

Graph and analyze quadratic functions in vertex form.

5.) \( y = -(x - 1)^2 + 3 \)
   a.) Vertex: \((1, 3)\)
   b.) Axis of symmetry equation: \( x = 1 \)
   c.) Opens up or down? down
   d.) Wider, narrower, or the same width as \( y = x^2 \)? same
   e.) Domain: \((\infty, \infty)\)
   f.) Range: \((-\infty, 3]\)
   g.) \( y \) - intercept: \((0, 2)\)
   h.) Does the graph have a maximum or minimum? maximum

Write quadratic functions in vertex form as quadratic functions in standard form and vice versa.

6.) \( y = -(x + 4)^2 - 10 \) (to standard)
   \[ y = -(x + 4)(x + 4) - 10 \]
   \[ y = -(x^2 + 8x + 16) - 10 \]
   \[ y = -x^2 - 8x - 26 \]

7.) \( y = \frac{1}{2}x^2 - 6x - 24 \) (to vertex)
   \[ \frac{-b}{2a} = \frac{6}{1} = 6 \]
   \[ y = \frac{1}{2} \left( (6)^2 - 6(6) - 24 \right) \]
   \[ y = \frac{1}{2} \left( 36 - 36 - 24 \right) \]
   \[ y = -18 - 36 - 24 \]
   \[ y = -42 \]
   \[ y = \frac{1}{2}(x-6)^2 - 42 \]
Graph and analyze quadratic functions in standard form.

8.) \( y = 2x^2 + 4x + 2 \)

\[ \frac{-b}{2a} = \frac{-4}{4} = -1 \]
\[ y = a(-1)^2 + 4(-1) + 2 = -1 \]
\[ y = 2 \cdot -1 + 2 = 0 \]

a.) Vertex: \((-1, 0)\)

b.) Axis of symmetry equation: \( x = -1 \)

c.) Opens up or down? \( \uparrow \)

d.) Wider, narrower, or the same width as \( y = x^2 \)? \( \text{narrower} \)

e.) Domain: \((-\infty, \infty)\)

f.) Range: \([0, \infty)\)

g.) \( y \) - intercept: \((0, 2)\)

h.) Does the graph have a maximum or minimum? \( \text{minimum} \)

Graph and analyze quadratic functions in intercept form.

9.) \( y = \frac{1}{2}(x - 5)(x + 3) \)

\[ \frac{5-3}{2} = \frac{2}{2} = 1 \]
\[ y = \frac{1}{2}(-4)(4) = -8 \]

a.) Vertex: \((1, -8)\)

b.) Axis of symmetry equation: \( x = 1 \)

c.) Opens up or down? \( \uparrow \)

d.) Wider, narrower, or the same width as \( y = x^2 \)? \( \text{wider} \)

e.) Domain: \((-\infty, \infty)\)

f.) Range: \([-8, \infty)\)

g.) \( y \) - intercept: \((0, -7.5)\)
\[ \frac{1}{2}(-5)(3) = -7.5 \]

h.) Does the graph have a maximum or minimum? \( \text{minimum} \)

i.) \( x \) - intercepts: \((5, 0)\) \((-3, 0)\)

Write equations of quadratic functions in vertex form.

10.) Write the equation of the quadratic function (in vertex form) with a vertex at \((-3, -7)\) that passes through point \((-1, 5)\).

\[
\begin{align*}
5 &= a(-1+3)^2 - 7 \\
5 &= a(2)^2 - 7 \\
5 &= 4a - 7 \\
4a &= 12 \\
a &= 3
\end{align*}
\]

\[
\boxed{y = 3(x + 3)^2 - 7}
\]