

# SOL HW 3.1

December 18, 2017 9:41 PM

Name: \_\_\_\_\_

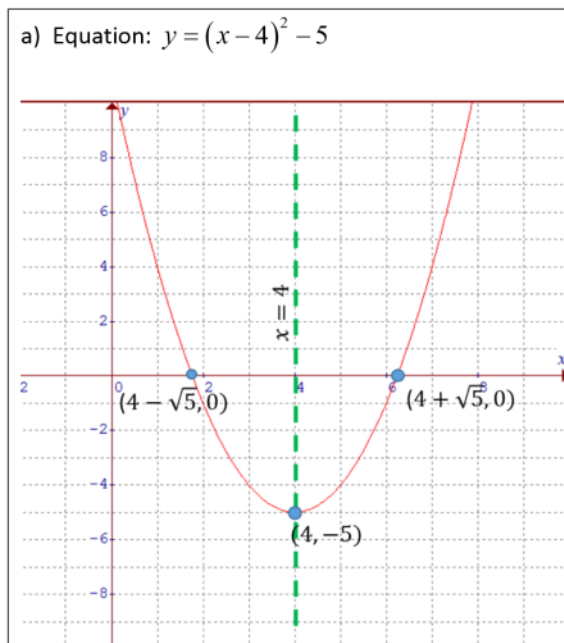
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## Pre-Calculus 11 HW 3.1 Quadratic Functions in Standard Form $y = a(x - p)^2 + q$

1. Indicate the values of "a", "p", "q" and the coordinates of the vertex in each equation:

<p>a) <math>y = 3(x - 4)^2 + 8</math></p> <p><math>a = 3 \quad p = 4 \quad q = 8</math></p> <p>Vertex: (4,8)</p>	<p>b) <math>y = 2(x + 6)^2 - 13</math></p> <p><math>a = 2 \quad p = -6 \quad q = -13</math></p> <p>Vertex: (-6,-13)</p>	<p>c) <math>y = -4x^2 + 10</math></p> <p><math>a = -4 \quad p = 0 \quad q = 10</math></p> <p>Vertex: (0,10)</p>
<p>d) <math>y = 21 - (x - 1)^2</math></p> <p><math>y = -(x - 1)^2 + 21</math></p> <p><math>a = -1 \quad p = 1 \quad q = 21</math></p> <p>Vertex: (1,21)</p>	<p>e) <math>y = 4(x - 20)^2 + 11</math></p> <p><math>a = 4 \quad p = 20 \quad q = 11</math></p> <p>Vertex: (20,11)</p>	<p>f) <math>y = (-3x)^2 + 2</math></p> <p><math>y = 9(x)^2 + 2</math></p> <p><math>a = 9 \quad p = 0 \quad q = 2</math></p> <p>Vertex: (0,2)</p>

2. Graph each of the following quadratic functions and label the following: Equation of the Axis of Symmetry, Coordinates of the Vertex, and location of the X and Y-intercepts. Do **NOT** use a graphing calculator:



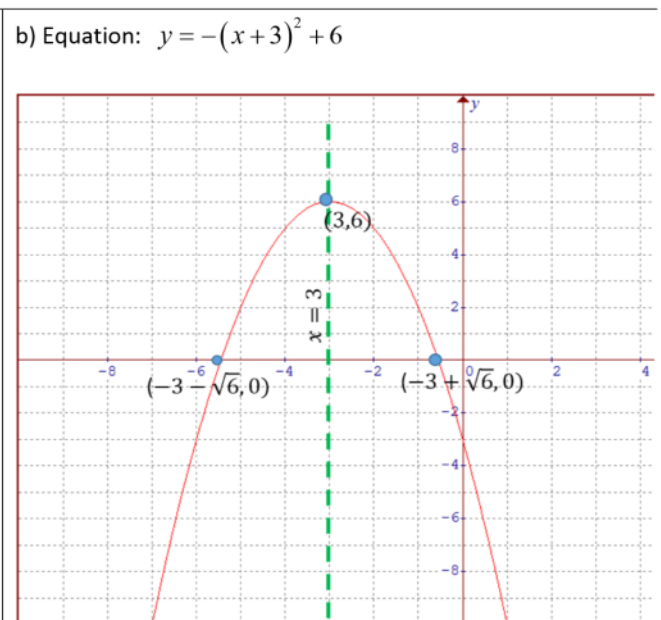
X-intercepts

$$0 = (x - 4)^2 - 5$$

$$5 = (x - 4)^2 \quad (4 + \sqrt{5}, 0) \& (4 - \sqrt{5}, 0)$$

$$\pm\sqrt{5} = x - 4$$

$$4 \pm \sqrt{5} = x$$



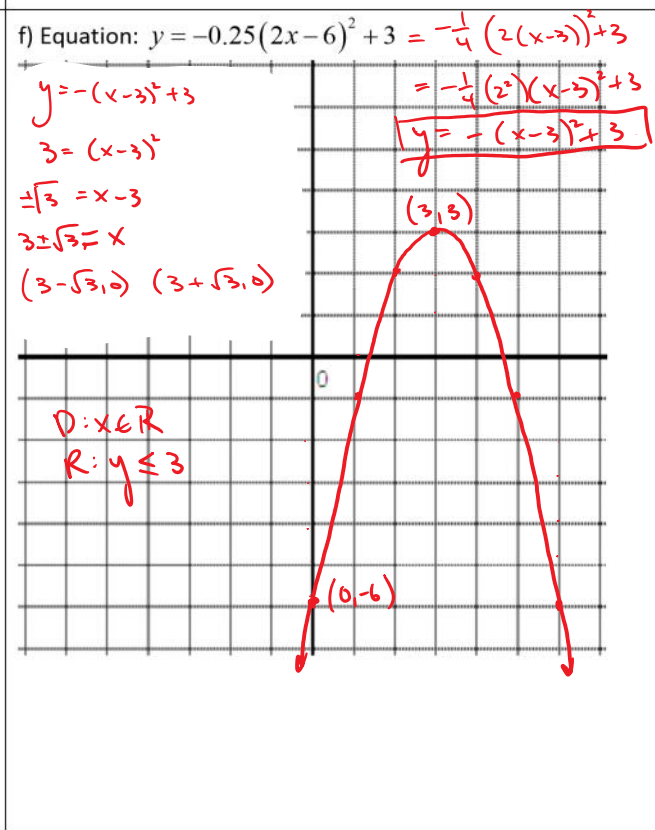
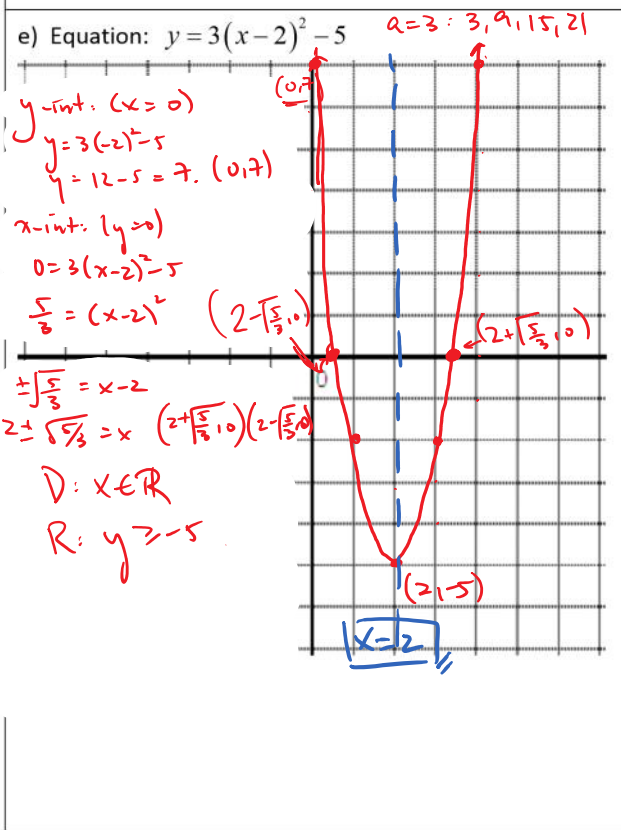
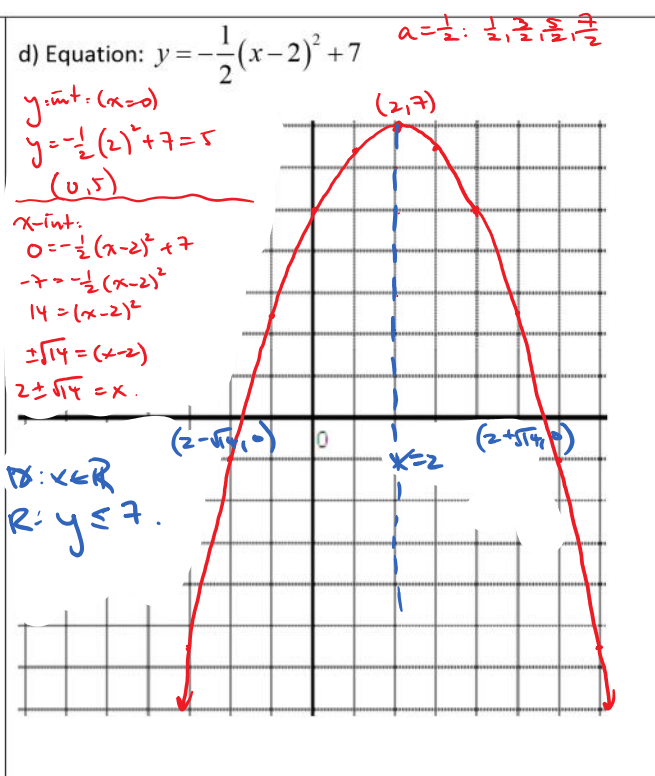
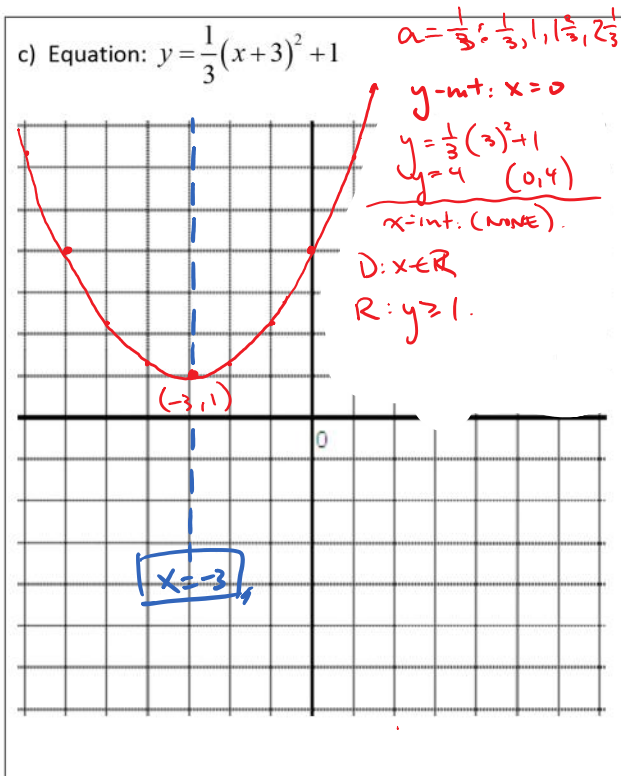
$$0 = -(x + 3)^2 + 6$$

$$-6 = -(x + 3)^2$$

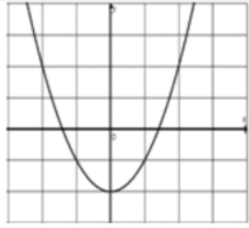
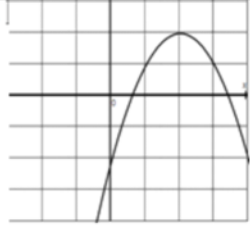
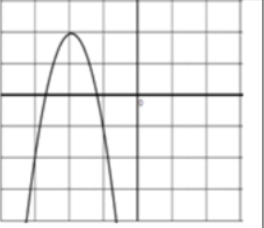
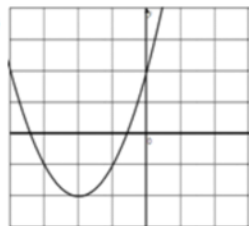
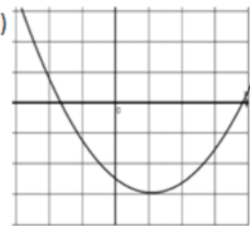
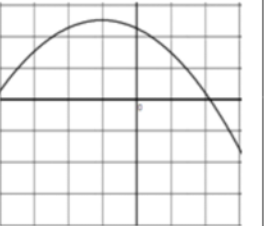
$$6 = (x + 3)^2 \quad (-3 - \sqrt{6}, 0) \& (-3 + \sqrt{6}, 0)$$

$$\pm\sqrt{6} = x + 3$$

$$-3 \pm \sqrt{6} = x$$



3. If each parabola is in the form of  $y = a(x - p)^2 + q$ , then which graph best describes each equation:

<p>i) <math>a &lt; -1, p &lt; 0, q &gt; 0</math>            Opens down – “a” is negative, shift left and up, and goes down fast b/c “a” is less than -1.            Graph “C”</p>	<p>a) </p>	<p>b) </p>	<p>c) </p>
<p>ii) <math>0 &lt; a &lt; 1, p &gt; 0, q &lt; 0</math>            Opens up, but slowly, Shift right and down            Graph “E”</p>	<p>d) </p>	<p>e) </p>	<p>f) </p>
<p>iii) <math>a &gt; 0, p = 0, q &lt; 0</math>            Opens up, centered on the Y-axis, and shifted down. Graph A</p>			
<p>iv)  <math>0 &gt; a &gt; -1, p &lt; 0, q &gt; 0</math>            Opens down but slowly because “a” is between 0 and -1. Shift left and up            Graph F</p>			

4. What does it mean when two parabola functions are congruent?

It means that the value of “a” for both graphs are equal. They increase by the same amount.

5. The parabola  $y = x^2$  is shifted 4 units to the right, 3 units down, and then flipped upside down over its vertex.

What is the equation of the parabola now in APQ form?

Since the graph will be upside down, the value of “a” will be negative.

The vertex is 4 right ( $p=4$ ) and 3 down ( $q=-3$ )

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

6. The parabola  $y = x^2 - 2x + 4$  is moved ‘p’ units to the right and ‘q’ units down. The x-intercepts of the resulting parabola are 3 and 5. What are the values of “p” and “q”?

Start off by factoring the original equation and changing it to vertex form. Then find out how much shifting that needs to be done to get the x-intercepts that you want.