

Do Now

Find the axis of symmetry and vertex of the quadratic function algebraically

$$f(x) = \frac{1}{2}x^2 + 5x + 6$$

$$X = \frac{-b}{2a}$$

$$X = \frac{-(5)}{2(\frac{1}{2})}$$

$$X = \frac{-5}{1}$$

$$X = -5$$

AOS

Vertex

$$(-5, -6\frac{1}{2})$$

$$f(x) = \frac{1}{2}(-5)^2 + 5(-5) + 6$$

$$f(x) = \frac{1}{2}(25) - 25 + 6$$

$$f(x) = \frac{25}{2} - 25 + 6$$

$$f(x) = \frac{-13}{2} = -6\frac{1}{2}$$

Apr 3-8:38 AM

4) Write an equation of a quadratic function whose graph opens upwards and the coordinates of its vertex are (8,7)

$$y = 1(x - 8)^2 + 7$$

$$y = a(x - h)^2 + k$$

\downarrow x-value \downarrow y-value

5) Write an equation of a quadratic function whose graph opens downwards and the coordinates of its vertex are (-5, -1)

$$f(x) = -1000(x + 5)^2 - 1$$

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Converting from Standard Form to Vertex Form

To convert from standard form to vertex form, we need to recall the method of completing the square.

Step 1: Write the equation in the form

$$y = x^2 + bx + \underline{\quad} + c - \underline{\quad}$$

(you may need to factor out a GCF first!)

Step 2: Find $(b \div 2)^2$

Step 3: Place the number from Step 2 in the blanks

Step 4: Factor the trinomial to $(x + \frac{b}{2})^2$

$$y = a(x-h)^2 + k$$

Vertex Form

- 6) Rewrite the following quadratic in vertex form by completing the square, and state the vertex:

$$y = x^2 + 14x + 15$$

$$y = x^2 + 14x + \underline{49} + 15 - \underline{49}$$

$$y = (x+7)^2 - 34$$

$$\text{Vertex } (-7, -34)$$

$$\begin{array}{l} \left(\frac{b}{2}\right)^2 \\ \left(\frac{14}{2}\right)^2 \\ 49 \end{array}$$

Vertex Form

Rewrite the following equation in vertex form by completing the square, and state the vertex:

$$7) f(x) = -x^2 + 12x - 16$$

$$f(x) = -1(x^2 - 12x + 16)$$

$$\left(\frac{b}{2}\right)^2$$
$$\left(\frac{12}{2}\right)^2 = 36$$

$$f(x) = -1(x^2 - 12x + \underline{36} + 16 - \underline{36})$$

$$f(x) = -1(x - 6)^2 - 20$$

Vertex
(6, -20)

Apr 6-12:26 AM