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Standard Form of Quadratic Functions

4.2

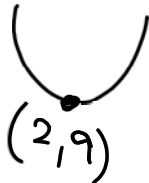
Warm-up

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Write the following Quadratic Functions.

Find the missing information

1) $y = 3(x - 2)^2 + 9$

Opens up Max / MinAxis of symmetry: $x = 2$ Vertex: $(2, 9)$ Domain: $(-\infty, +\infty)$ Range: $[9, +\infty)$ 

2) $y = -2(x + 4)^2 - 8$

Opens down Max / MinAxis of symmetry: $x = -4$ Vertex: $(-4, -8)$ Domain: $(-\infty, +\infty)$ Range: $(-\infty, -8]$ 

Learning Targets

4.2 Standard Form of a Quadratic Function

a. I can graph quadratic functions written in standard form (axis of symmetry, vertex, y-intercept).

b. Given an equation in standard form, I can identify the key information: vertex, axis of symmetry, maximum or minimum value, domain and range, increasing/decreasing intervals and end behavior.

c. I can interpret and calculate the vertex in a real-world application.

Standard Form

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$$y = \pm ax^2 + bx + c$$

Draw the **Axis of Symmetry** as a dashed vertical line. It can be found by the formula:



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

opposite sign

The **Vertex** is found by plugging the x found above into the Quadratic equation

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Find the information for the given Quadratic

1.) $y = 2x^2 + 10x - 4$

a=2 b=10

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

Opens: UP min.

Axis of Symmetry: $x = -2.5$

Vertex: $(-2.5, -16.5)$

Domain: $(-\infty, +\infty)$

Range: $[-16.5, +\infty)$

$$x = \frac{-10}{2(2)}$$

$$x = -2.5$$

$$y = 2(-2.5)^2 + 10(-2.5) - 4$$

$$y = -16.5$$

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Find the information for the given Quadratic

2.) $y = -x^2 + 6x - 2$

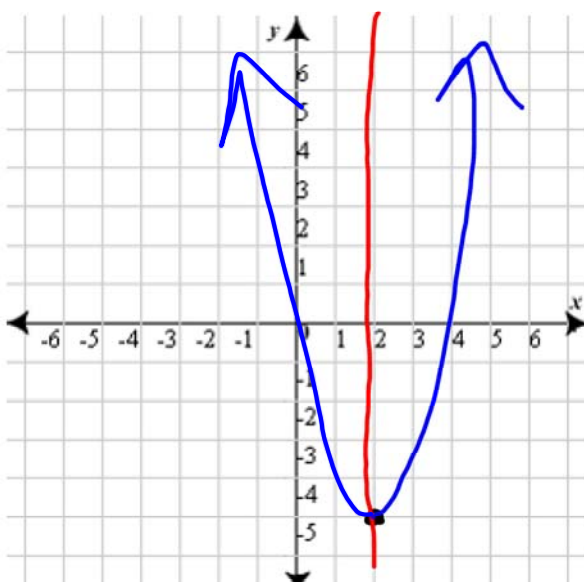
Opens: down max.Axis of Symmetry: $x = 3$

$$x = \frac{-b}{2(-1)}$$

Vertex: $(3, 7)$ Domain: $(-\infty, +\infty)$ Range: $(-\infty, 7]$

$$y = -3^2 + 6(3) - 2$$
$$y = 7$$

3.) $y = 2x^2 - 8x + 3$

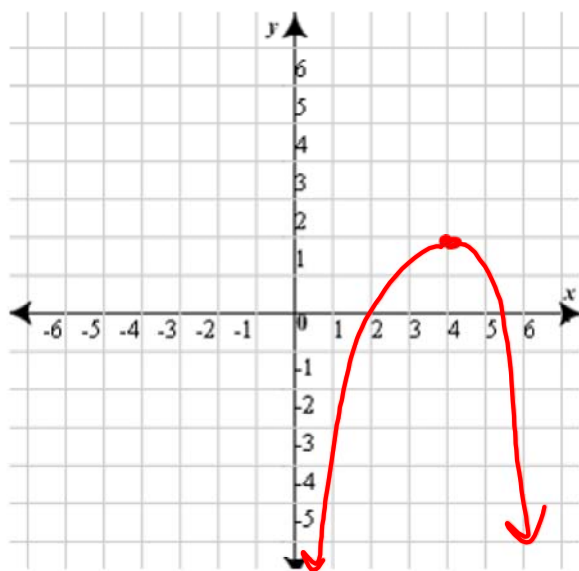


$$y = 2(2)^2 - 8(2) + 3$$

Opens: UPAxis of Symmetry: $x = 2$ Vertex: $(2, -5)$ Maximum/ Minimum (circle one)Domain: $(-\infty, +\infty)$ Range: $[-5, +\infty)$

$$x = \frac{-b}{2a}$$
$$x = \frac{-(-8)}{2(2)} = \frac{8}{4}$$

4.) $y = -\frac{1}{2}x^2 + 4x - 6$

Opens: downAxis of Symmetry: $x = 4$ Vertex: $(4, 2)$ Maximum Minimum (circle one)Domain: $(-\infty, +\infty)$ Range: $(-\infty, 2]$

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

$$x = \frac{-4}{2(-\frac{1}{2})} = \frac{-4}{-1}$$

$$y = -\frac{1}{2}(\quad)^2 + 4(\quad) - 6$$

Practice time!