

Mr. Gallo
Algebra 2

4-2: STANDARD FORM OF A QUADRATIC FUNCTION

Graph: $f(x) = 2x^2 + 8x - 2$

What is the vertex?

$(-2, -10)$

What is the axis of symmetry?

$x = -2$

What is the maximum or minimum value?

-10 is the minimum value

What is the range of the function?

$\{y : y \geq -10\}$

What is the y-intercept of the function?

$(0, -2)$

STANDARD FORM FOR QUADRATICS

- ✗ $f(x) = ax^2 + bx + c, a \neq 0$
+ Shape is a parabola.
- ✗ If $a > 0$; the parabola opens upward.
- ✗ If $a < 0$; the parabola opens downward.
- ✗ The axis of symmetry is the line: $x = -\frac{b}{2a}$
- ✗ The x-coordinate of the vertex is $x = -\frac{b}{2a}$; the y-coordinate is found by substituting the x value.
- ✗ The y-intercept is: $(0, c)$

Graphing: $f(x) = 4x^2 - 16x + 10$

$f(x) = ax^2 + bx + c$

Step 1: → Identify a, b and c .
 $a = 4 \quad b = -16 \quad c = 10$

Step 2: → Sketch the axis of symmetry.

$$x = -\frac{b}{2a} = -\frac{(-16)}{2(4)}$$

$$x = 2$$

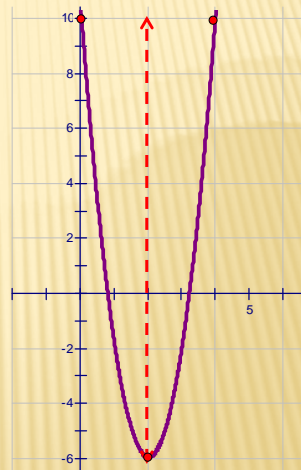
Step 3: → Calculate the vertex. $(2, -6)$

$$x = 2 \quad f(2) = 4(2)^2 - 16(2) + 10$$

$$f(2) = -6$$

Step 4: → Since $c = 10$, the y-intercept is $(0, 10)$

The reflection across $x = 2$ is $(4, 10)$



Convert $f(x) = 2x^2 - 3x + 2$ to Vertex Form

Step 1: → Identify a and b .
 $a = 2$ $b = -3$

Step 2: → Calculate the vertex. $(.75, .875)$

$$x = -\frac{b}{2a} = -\frac{(-3)}{2(2)} \quad f(.75) = 2(.75)^2 - 3(.75) + 2$$

$$x = \frac{3}{4} = .75 \quad f(.75) = .875$$

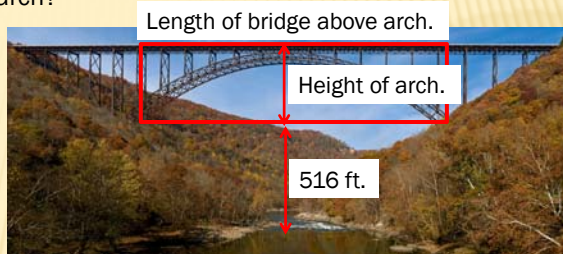
Step 3: → Write in vertex form. $f(x) = a(x-h)^2 + k$

$$f(x) = \square (x - \square)^2 + \square$$

Complete Got It? #3 p. 204

$$y = -(x-2)^2 - 1$$

The New River Gorge Bridge in West Virginia is the world's largest steel single arch bridge. You can model the arch with the function: $y = -.000498x^2 + .847x$, where x and y are in feet. How high above the river is the arch? How long is the section of bridge above the arch?



Calculate the vertex.

$$x = -\frac{b}{2a} = -\frac{.847}{2(-.000498)} \approx 850 \quad y = -.000498(850)^2 + .847(850)$$

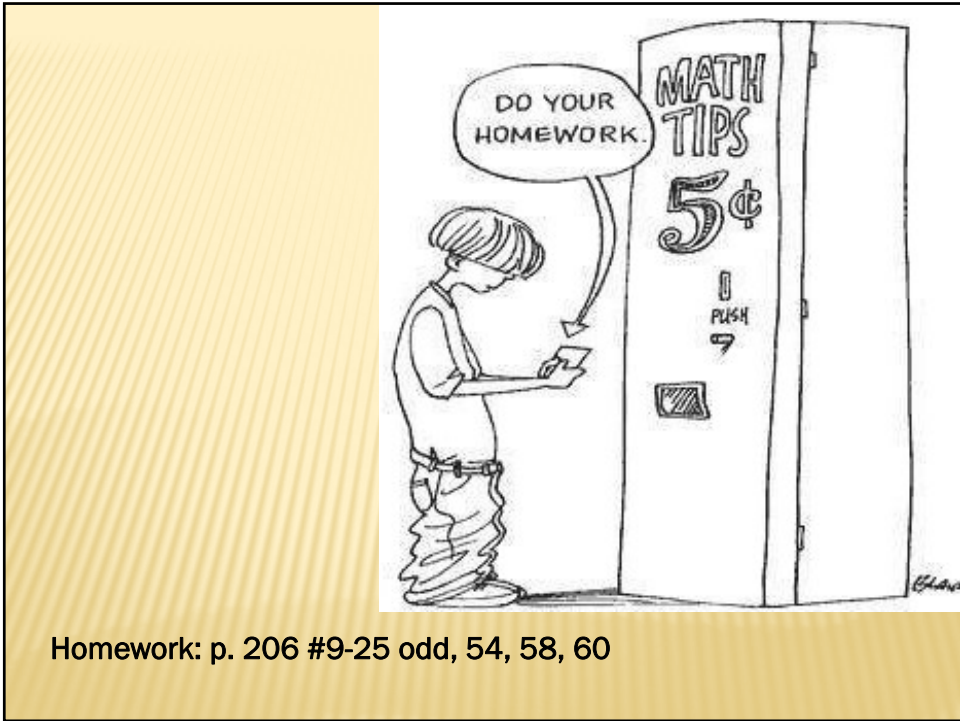
$$y \approx 360 \quad (850, 360)$$

Calculate the height of the arch above the river.

$$360 + 516 = 876 \text{ ft.}$$

Calculate the length of the bridge above the arch.

$$850 + 850 = 1700 \text{ ft.}$$



Homework: p. 206 #9-25 odd, 54, 58, 60