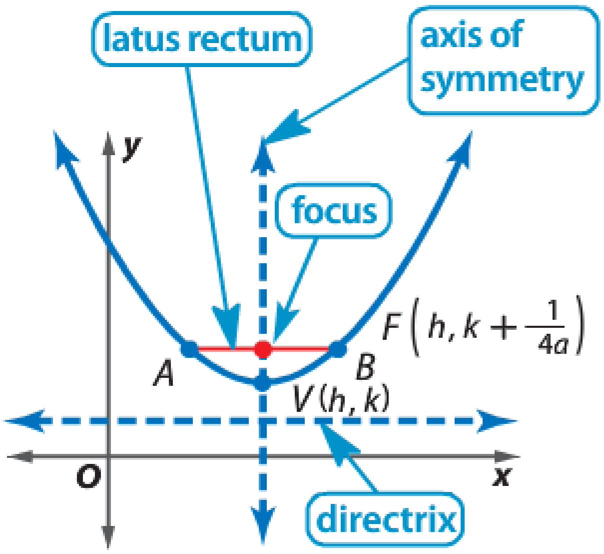
Goals:

- I can write equations of parabolas in standard form.
- I can graph parabolas.

Name: ______________________________

Parabolas | Algebra II
Mr Hartzler

Equations of Parabolas



KeyConcept Equations of Parabolas

Form of Equation	$y = a(x-h)^2 + k$	$x = a(y-k)^2 + h$
Direction of Opening	upward if $a > 0$, downward if $a < 0$	right if $a > 0$, left if $a < 0$
Vertex	(h, k)	(h, k)
Axis of Symmetry	$x = h$	$y = k$
Focus	$\left(h, k+\frac{1}{4a}\right)$	$\left(h+\frac{1}{4a}, k\right)$
Directrix	$y = k - \frac{1}{4a}$	$x = h - \frac{1}{4a}$
Length of Latus Rectum	$\left\lvert\frac{1}{a}\right\rvert$ units	$\left\lvert\frac{1}{a}\right\rvert$ units

Standard form: $\boldsymbol{y = a(x-h)^2 + k}$

General form: $\boldsymbol{y = ax^2 + bx + c}$

Example 1: Analyze the Equation of a Parabola

Write $y = 2x^2 - 12x + 6$ in standard form. Identify the vertex, axis of symmetry, and direction of opening of the parabola.

$y = \quad 2x^2 - 12x + 6$	Original Equation
$2(x^2 - 6x) + 6$	Factor 2 from the x- and x^2- terms.
$2(x^2 - 6x + \square\ ) + 6 - 2(\square)$	Complete the square on the right side.
$2(x^2 - 6x +$ ___$) + 6 - 2($___$)$	The 9 added when you complete the square is multiplied by 2.
$2(x - 3)^2 - 12$	Factor.

The number that goes in the box comes $\left(-\frac{6}{2}\right)^2$. The -6 came from the number next to the x in step 2. Always divide by 2 and always square the number.

a= __________

h= __________

k= __________

The vertex is (______, ______)

The equation of the axis of symmetry is ___________.

The parabola opens _________________.

Formula:	This Example
Focus: $\left(h, k + \frac{1}{4a}\right)$	
Directrix: $y = k - \frac{1}{4a}$	
Length of Latus Rectum: $\left\lvert\frac{1}{a}\right\rvert$ units	

Example 2: Find all pieces of the equation and graph the equation.

$$y + 2x^2 + 32 = -16x - 1$$

Use completing the square to put the equation into STANDARD FORM.

a= __________

h= __________

k= __________

The vertex is (______, ______)

The equation of the axis of symmetry is ___________.

The parabola opens __________________.

Formula:	This Example
Focus: $\left(h, k + \frac{1}{4a}\right)$	
Directrix: $y = k - \frac{1}{4a}$	
Length of Latus Rectum: $\left\lvert\frac{1}{a}\right\rvert$ units	