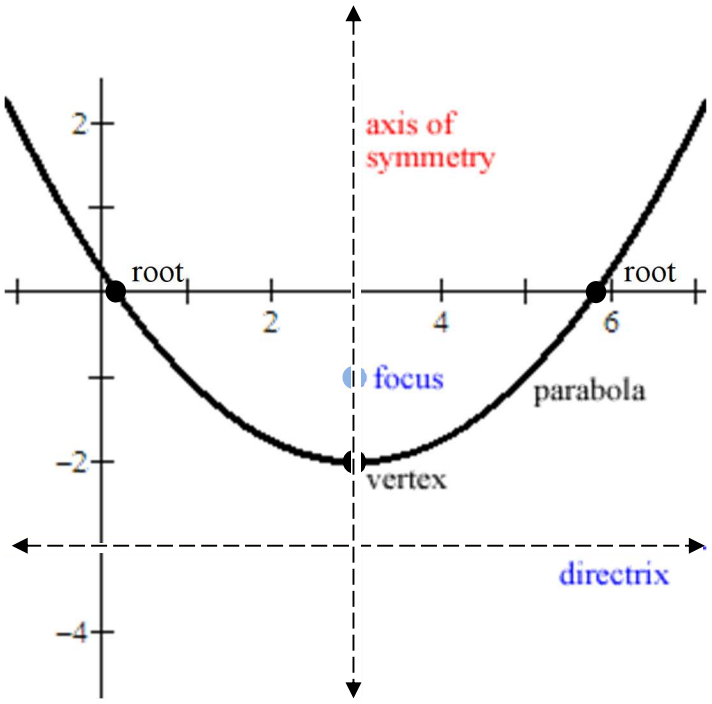
Equations of Parabolas



a tells you which way it opens:

+a = opens up, -a = open down

Root form $y = a(x - r_1)(x - r_2)$

The x-coordinate of the vertex is halfway between the roots.

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

To find the:

Vertex	(h, k)
Axis of symmetry	x = h
Y-intercept	Put 0 in for x. Solve for y.
Symmetric point	(2h, y-intercept)

Standard form $y = ax^2 + bx + c$

To find the:

Y-intercept	c
Vertex	($\frac{-b}{2a}$, solve for y)
Axis of symmetry	x = $\frac{-b}{2a}$
Symmetric point	($\frac{-b}{a}$, y-intercept)
X-intercepts (roots)	$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ or factor it, if possible

Lesson 5-2 Homework
Equations of Parabolas

Show your calculations for each problem.

Root Form
For each parabola:

a. Factor the equation.
b. Set y equal to zero, and solve for both x's.
c. Calculate the value halfway between your x's. This is the x-coordinate of the vertex.
d. Plug the previous answer in the equation to solve for y. This is the y-coordinate of the vertex.
e. Plot the two roots and the vertex on graph paper and draw a smooth parabola through the points.

1. $y = x^2 + 2x - 8$
2. $y = x^2 - 4x$
3. $y = -1x^2 - 2x + 15$

Vertex Form
For each parabola:

a. Find the vertex, axis of symmetry, Y-intercept, and symmetric point
b. Accurately graph the parabola on graph paper.

4. $y + 2 = 3(x - 1)^2$
5. $y + 5 = {}^1/_4 (x + 4)^2$
6. $y - 2 = (x - 5)^2$
7. $y - 4 = -2(x - 1)^2$

Lesson 5-3 Practice

Equations of Parabolas

$y = ax^2 + bx + c$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For each parabola:

a. Use the shortcut ($x_{vertex} = \frac{-b}{2a}$) to find the vertex.

b. Use the quadratic formula to find the roots.

c. Find the y-intercept. Find the symmetric point.

d. Graph the parabola using these 5 points.

1. $y = x^2 - 2x - 3$
2. $y = 2x^2 - 4x - 6$
3. $y = -3x^2 - 6x + 9$
4. $y = 4x^2 + 10x + 4$