

RECAP:

From the last lesson

Describe the transformations that would be applied to obtain the graph of each quadratic:

a) $y = 5x^2 - 4$

- stretched by a factor of 5

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

- moved 4 units left

- moved 2 units down

- translated 4 units down

b) $y = -0.25(x-3)^2 + 6$

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

- Reflected in the x-axis
- moved up 6 units

- Reflected in the x-axis

- Compressed by a factor of 0.25

- moved 3 units right

- moved up 6 units

Lesson # 6: Modeling the vertex form

By the end of this lesson you should be able to:

- write the equation of a parabola in vertex form by using the vertex and one other point

If you know the vertex of the parabola and one other point you can write the equation.

Use the vertex form of the equation:

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

Your vertex is (h, k) .

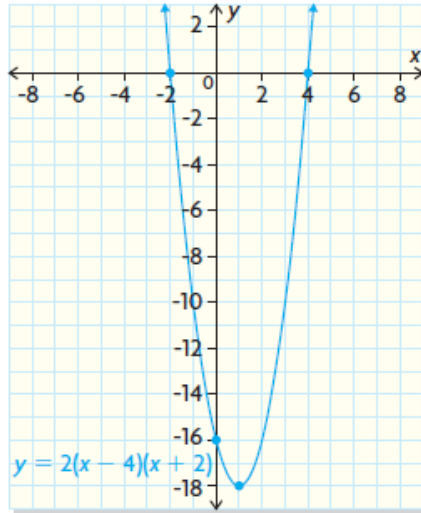
1) Plug it into the equation, making sure to change the sign of your h value

2) Sub in another point to find the value of a

3) Re-write your equation with a

(sub the values of the point in for x and y)

Example 1: Given the parabola below, find the quadratic equation



Vertex form:

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

$$y = a(x - (1))^2 - 18$$

$$-16 = a(0 - 1)^2 - 18$$

$$+18 \quad -16 = a(1) - 18$$

Vertex is: $(1, -18)$
Therefore $h = 1$
 $k = -18$

Another point: $(0, -16)$

$$\frac{2}{1} = \frac{1}{1}a$$

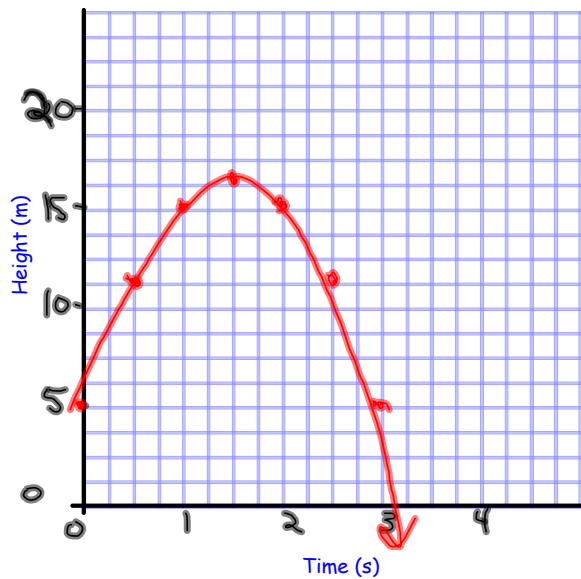
$$\boxed{2 = a}$$

$$\therefore y = 2(x - 1)^2 - 18$$

Example 2: Using a table of values to find the equation

Given the following data table, find the quadratic equation in vertex form.

Time (s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0
Height (m)	5.00	11.25	15.00	16.25	15.00	11.25	5.00



vertex (1.5, 16.25)

$h = 1.5$

$K = 16.25$

Another point
(3, 5)

$$y = a(x - 1.5)^2 + 16.25$$

$$5 = a(3 - 1.5)^2 + 16.25$$

$$5 = a(1.5)^2 + 16.25$$

$$5 - 16.25 = a(2.25) \quad +16.25 - 16.25$$

$$\frac{-11.25}{2.25} = \frac{2.25a}{2.25}$$

$$\boxed{-5 = a}$$

$$\therefore y = -5(x - 1.5)^2 + 16.25$$