What's Going On?

Checking In

Minds on What's my *h* again?

Action! ***Vertex Form:*** $y = \pm a(x - h)^2 + k$

Consolidation Graphing Practice

Learning Goal - I will be able to graph quadratic functions in the form $y = a(x - h)^2 + k$.

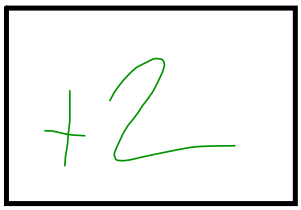
Minds on

What's my *h* again?

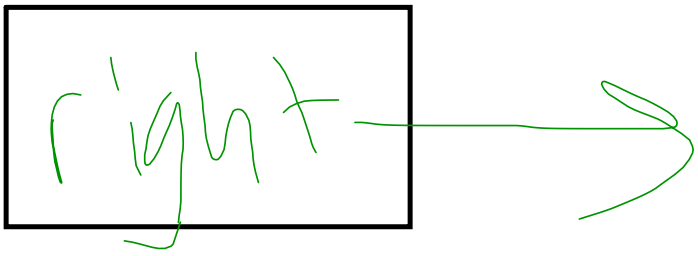
If you were given this equation:

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

What is the value of ***h***?



Has the parabola been moved left or right?



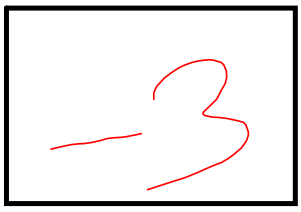
Minds on

What's my *h* again?

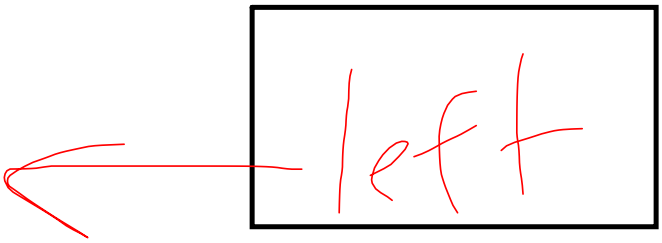
If you were given this equation:

$$y = (x + 3)^2$$

What is the value of ***h***?



Has the parabola been moved left or right?



Action!

Vertex Form Equations

Now that we know what ***a***, ***h*** and ***k*** do, we are ready to put them together and look at equations in the form.

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

This is called the **vertex form equation** of a parabola! You will see why in a moment.

Action!

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

± - if a is positive, parabola opens up ∪. if a is negative, parabola opens down ∩

a - a changes the step pattern. New step pattern is (1, 3, 5, 7) × a

h - moves the parabola left and right. It is the x-value of the vertex.

k - moves the parabola up and down It is the y-value of the vertex

vertex: (h , k)

Action!

Vertex Form Equations

If we were given a vertex form equation

$$y = -2(x - 5)^2 + 4$$

What are the coordinates of the vertex? (5, 4)

The x-coordinate is the ***h*** value!

+5

The y-coordinate is the ***k*** value!

+4

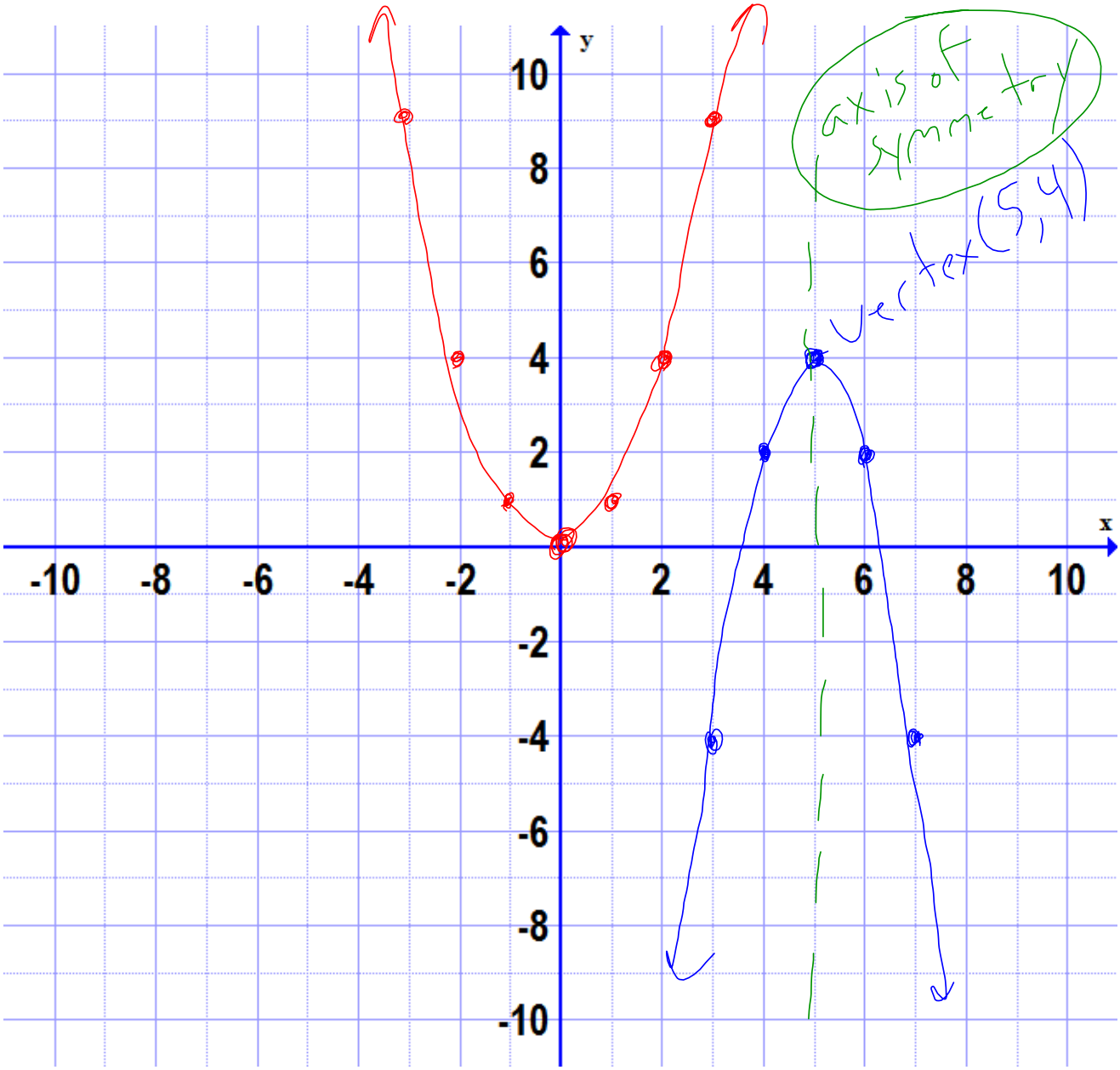
What is the ***new*** step pattern?

It's the old step pattern multiplied by ***a***!

1 3 5 7 → -2 -6 -10

Action!

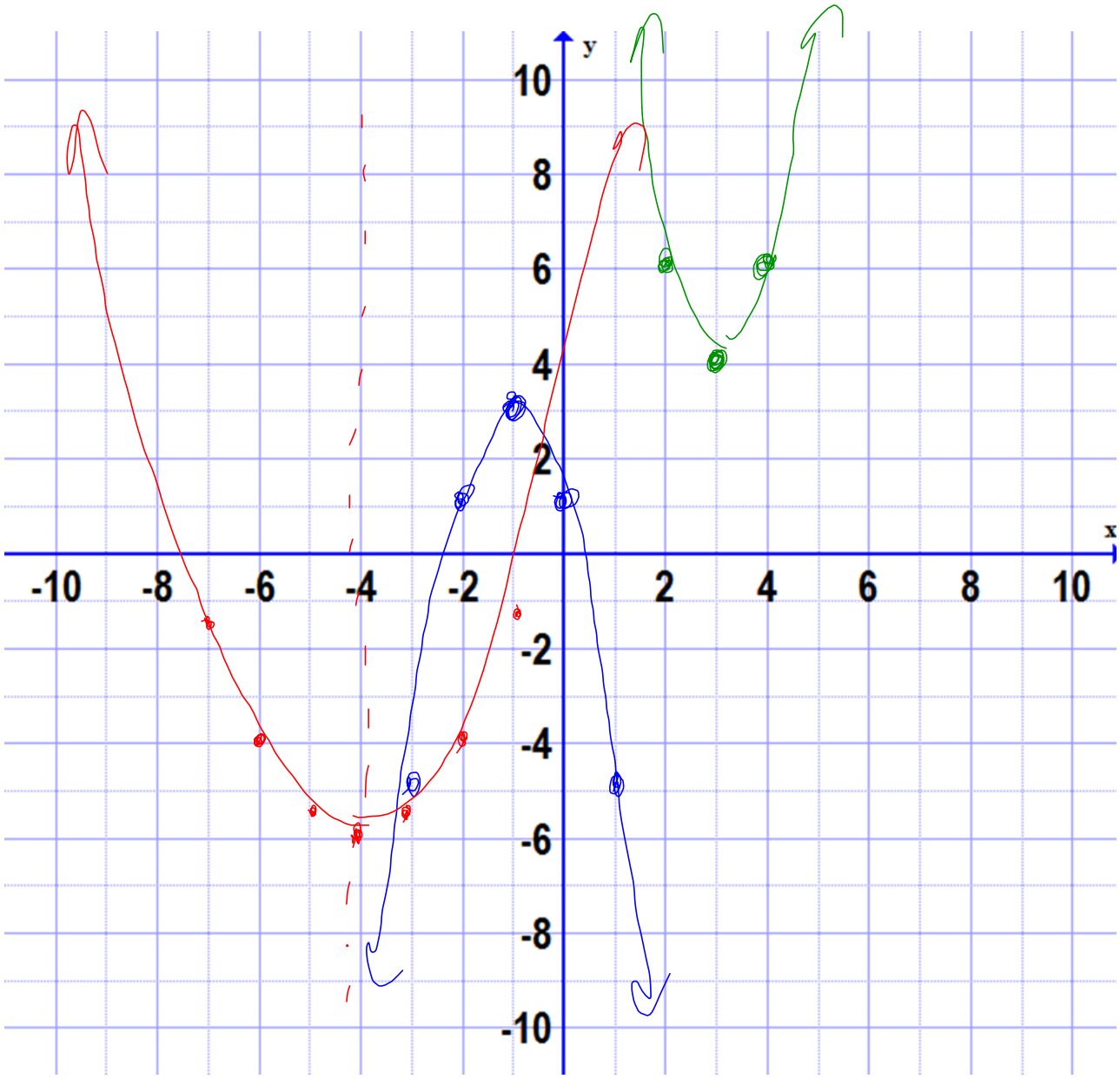
$y = x^2$ and $y = -2(x - 5)^2 + 4$



Consolidation

Graphing $y = a(x - h)^2 + k$ 1 3 5 7

Equation	Vertex	Step Pattern
$y = 2(x - 3)^2 + 4$	(3, 4)	(2, 6, 10)
$y = -2(x + 1)^2 + 3$	(-1, 3)	(-2, -6, -10)
$y = 0.5(x + 4)^2 - 6$	(-4, -6)	(0.5, 1.5, 2.5)



Equations, Vertices and Step Patterns

Equation	Vertex	Step Pattern
$y = 2(x - 3)^2 + 4$	(3, 4)	2, 6, 10, ...
$y = -3(x + 7)^2 + 9$	(-7, 9)	-3, -9, -15
$y = -0.5(x - 10)^2 - 4$	(10, -4)	-0.5, -1.5, -2.5, ...
$y = -2x^2 + 5$	(0, 5)	-2, -6, -10
$y = -4(x + 3)^2$	(-3, 0)	-4, -12, -20
$y = 1(x - 4)^2 - 7$	(4, -7)	1, 3, 5, ...
$y = -(x - 3)^2$ $a = -1$	(3, 0)	-1, -3, -5
$y = -x^2 + 11$ $a = -1$	(0, 11)	-1, -3, -5
$y = -x^2 + 3$	(0, 3)	-1, -3, -5, ...

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

Equation	Vertex	Step Pattern
$y = 2x^2 - 3$	(0, −3)	2, 6, 10, …
$y = -(x + 4)^2 + 4$	(−4, 4)	−1, −3, −5, …
$y = -0.5(x - 5)^2$	(5, 0)	−0.5, −1.5, −2.5