What's Going On?

Checking In	Reviewing thus far
Minds on	Graphing Vertex Form Equations
Action!	What's my a value? What's my equation?
Consolidation	Cupid's Arrow

Learning Goal - I will be able to determine quadratic equations from graphs.

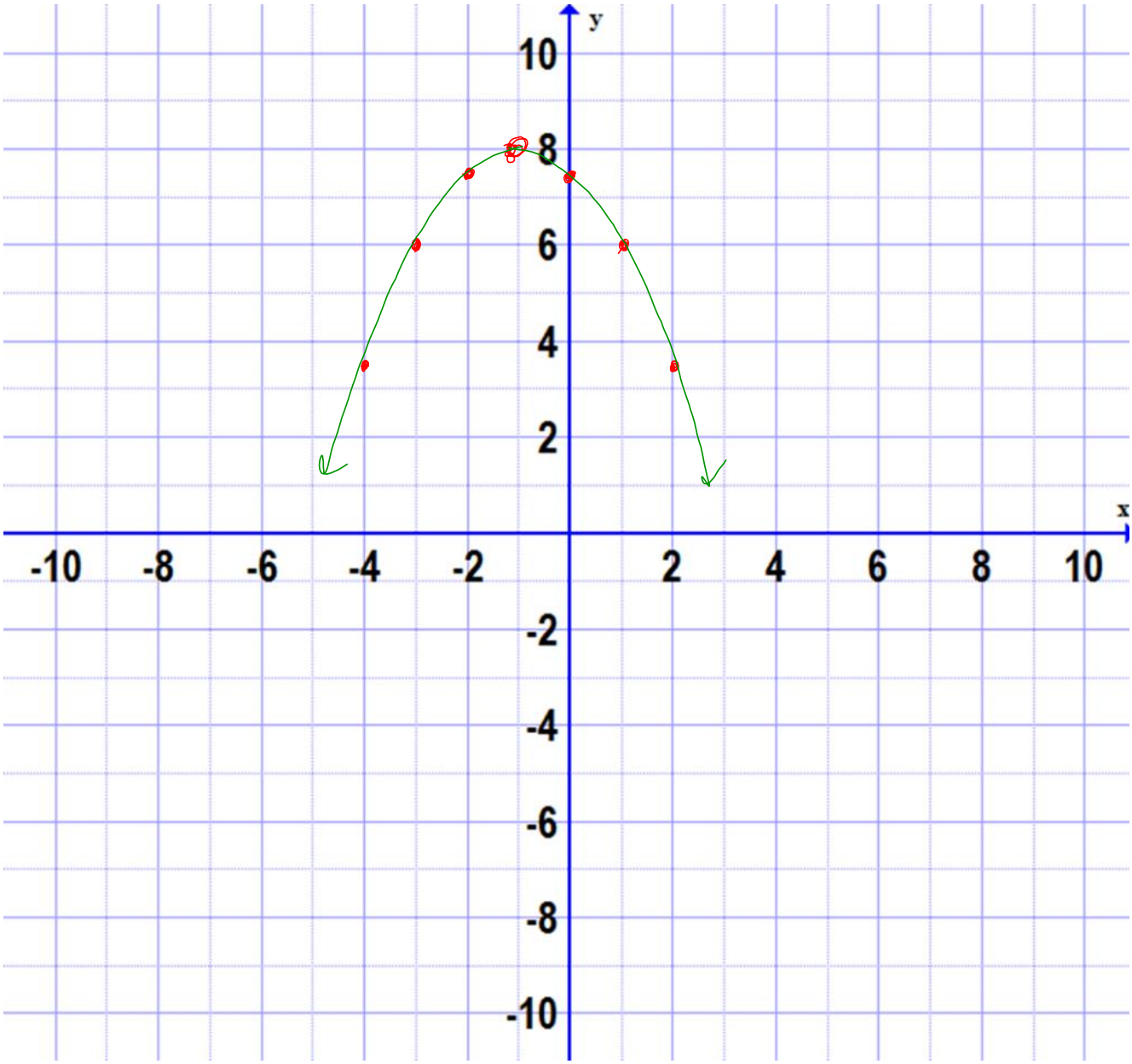
Minds on

Graphing Vertex Form Equations

Identify the key features and graph

$$y = -0.5(x + 1)^2 + 8$$

Vertex	Step Pattern 1 3 5	Direction of Opening
(-1, 8)	-0.5, -1.5, -2.5	down (a is negative step pattern is negative)



Action!

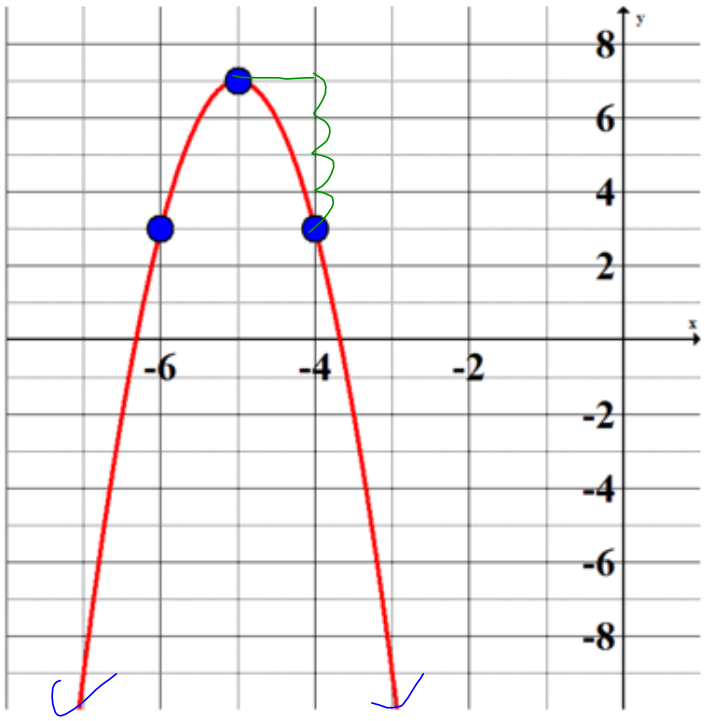
What's my *a* value?

If you were given the graph of a parabola, how would you determine its step pattern?

Action!

1 3 5 7

What's my *equation*?



Vertex?

$(-5, 7)$

Opens up or down?

down!

Step Pattern?

$-4, -12, -20$

Values of a, h, k

$a = -4$

$h = -5$

$k = 7$

Equation

$$y = -4(x+5)^2 + 7$$

Action!

What's my *equation*?

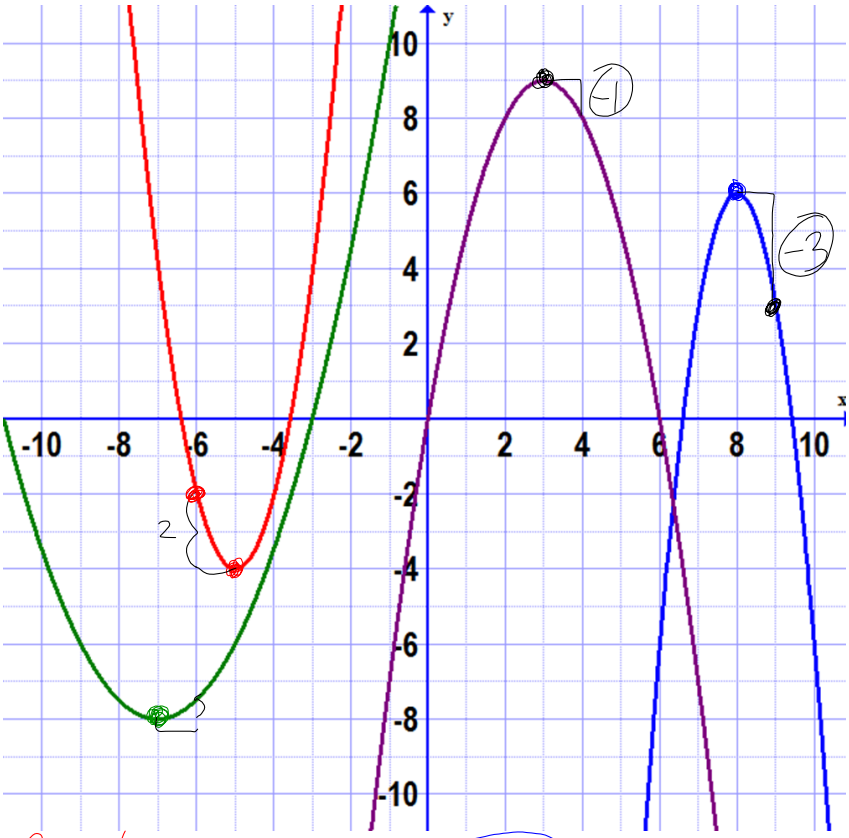
If you are given the graph of a parabola, to write its equation you must determine the coordinates of the vertex and the step pattern by moving over 1 and up or down until you hit the next point.

Then, plug the values of a, h and k into the general form of the vertex form equation.

Action!

What's my *equation*?

Determine the equation of each parabola.



Red: vertex = $(\underset{h}{-5}, \underset{k}{-4})$ $a = 2$

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

Green: vertex = $(-7, -8)$ $a = 0.5$

$y = 0.5(x+7)^2 - 8$

Purple: vertex = $(3, 9)$ $a = -1$

$y = -(x-3)^2 + 9$

Blue: vertex = $(8, 6)$ $a = -3$

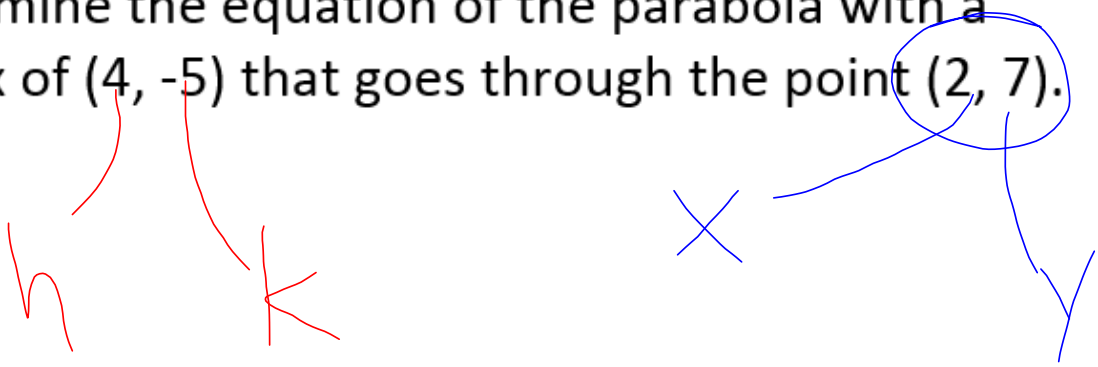
$y = -3(x-8)^2 + 6$

Action!

What's my *equation*?

What if you couldn't move over 1 and find the next point or what if you weren't given a graph at all?

Determine the equation of the parabola with a vertex of (4, -5) that goes through the point (2, 7).



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

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

Action!

What's my *equation*?

To write the vertex form equation of a parabola given the vertex (4, -5) and a point (2, 7):

1. Write the general vertex form equation

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

2. Plug in the coordinates of your vertex (h and k).

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

3. Plug in the coordinates of your point (x and y)

$7 = a(2 - 4)^2 - 5$

4. Solve for a!

$7 = a(2-4)^2 - 5$

$7 = a(-2)^2 - 5$

$7 = a(4) - 5$

$+5 \qquad +5$

$\frac{12}{4} = \frac{a(4)}{4}$

$a = 3$

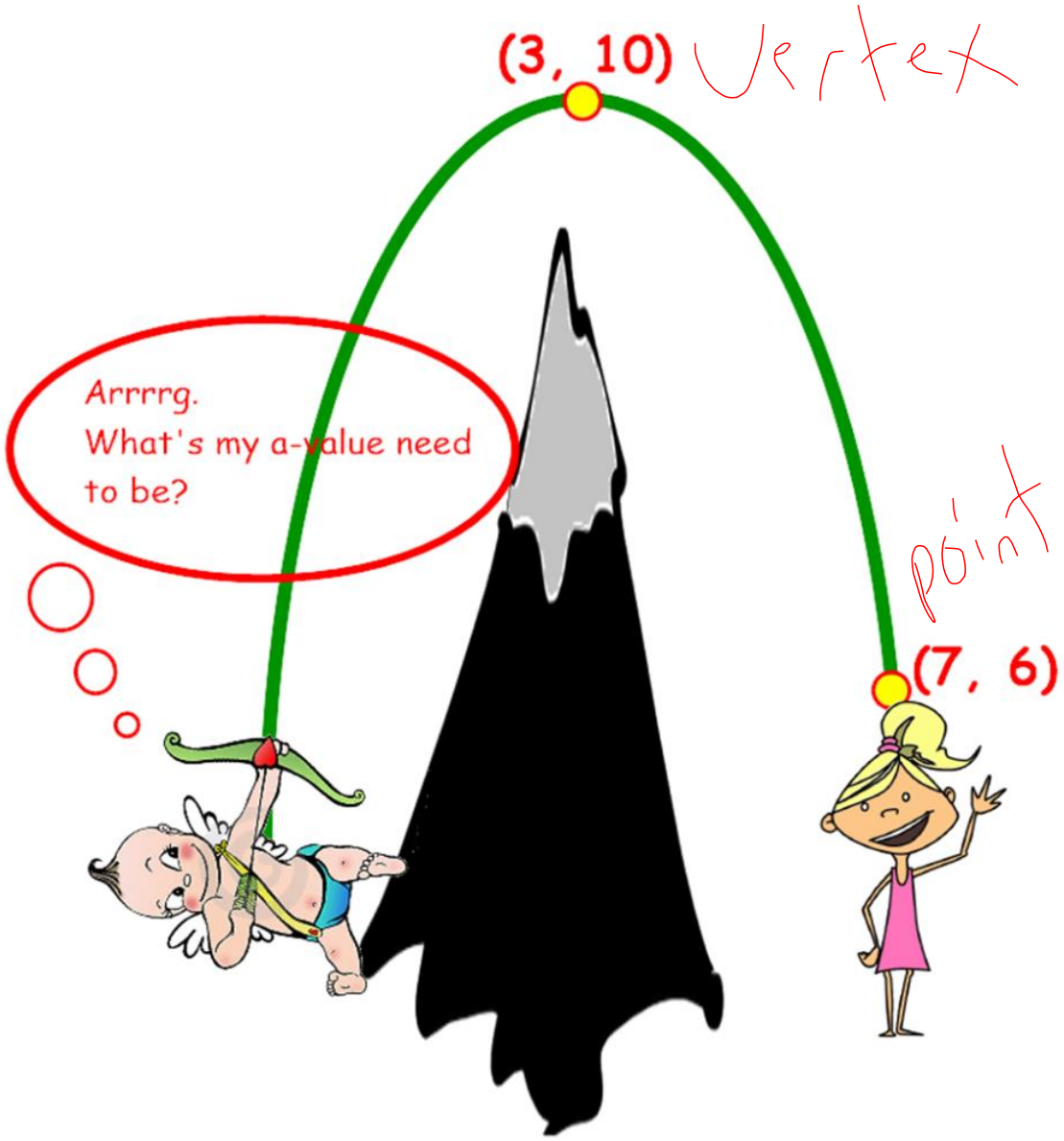
$y = 3(x-4)^2 - 5$

Consolidation

Cupid's Arrow

Cupid is running out of time!
It's 4 days until Valentine's Day and he still hasn't managed to hit one of his targets.

Jenny and Cupid are separated by a mountain.



If Cupid knows the coordinates shown above, what does he need to set his a-value to ensure he hits Jenny with his magical arrow?

vertex = (3, 10) $h=3$ $k=10$

point = (7, 6) $x=7$ $y=6$

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

$$6 = a(7-3)^2 + 10$$

$$6 = a(4)^2 + 10$$

$$6 = a(16) + 10$$

$$-10 \quad -10$$

$$-4 = a(16)$$

$$\frac{}{16} \quad \frac{}{16}$$

$$a = -0.25$$

$$y = -.25(x-3)^2 + 10$$

Vertex = $(-4, 6)$ Point = $(-1, 24)$

$$24 = a(-1+4)^2 + 6$$

$$24 = a(3)^2 + 6$$

$$24 = a(9) + 6$$

$$-6 \qquad -6$$

$$\frac{18}{9} = \frac{a(9)}{9}$$

$$\boxed{a = 2}$$

$$\therefore y = 2(x+4)^2 + 6$$