Panel 1

Graphs of Quadratic Equations:

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

The graph of this equation is:
- a Parabola
- Vertex at (h,k)
- Opens up if a > 0
- Opens down if a < 0
- a is the Vertical Stretch/Shrink Factor

$|a| > 1$

$0 < |a| < 1$

There is NO slope for Parabolas!

Panel 2

Describe all the transformations of $y=x^2$ each equation represents.

$$y = -\frac{1}{3}(x-8)^2 + 1$$

- Opens down
- $\frac{1}{3}$ as tall
- 8 RT } Vertex (8,1)
- 1 up

Panel 3

Write the equation of this transformation of $y = x^2$.

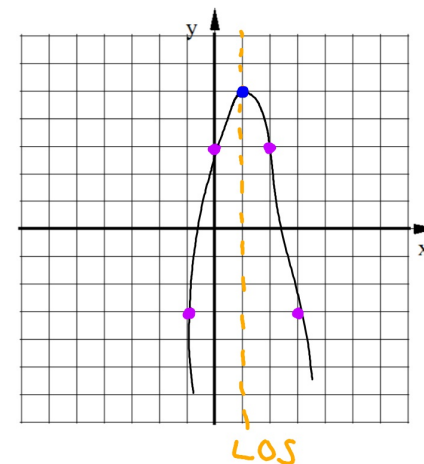Translated 9 units up, 3 units right, four times taller, opens down.

$$y = -4(x-3)^2 + 9$$

Panel 4

Graph with at least 5 points.

$$y = -2(x-1)^2 + 5$$

1 Right   5 up

Vertical Vertex (1,5)
Stretch factor & opens down

parent 1ST PT	this graph
1 , -2	-2
1	

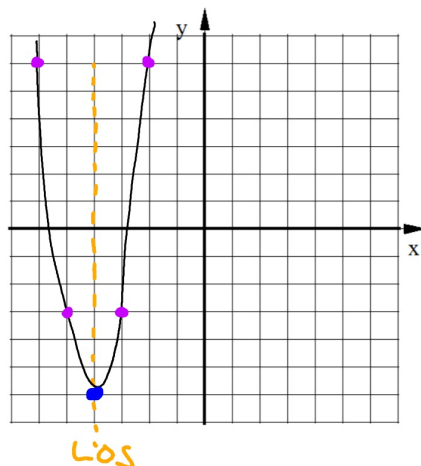| parent 2nd PT	this graph
4 , -2	-8
2	2

LOS

Graph with at least 5 points.

$y = 3(x+4)^2 - 6$

4 Left   6 down

Vert stretch factor

Vertex $(-4, -6)$

parent 1ST PT   this graph

$\downarrow_1 |1 \times 3 \rightarrow \downarrow_1 |3$

parent 2nd PT   this graph

$\downarrow_2 |4 \times 3 \rightarrow \downarrow_2 |12$

LOS

Write the equation of this graph.

1st method:

- Use vertex to fill in h and k

Vertex $(1, 8)$
         ↑   ↑
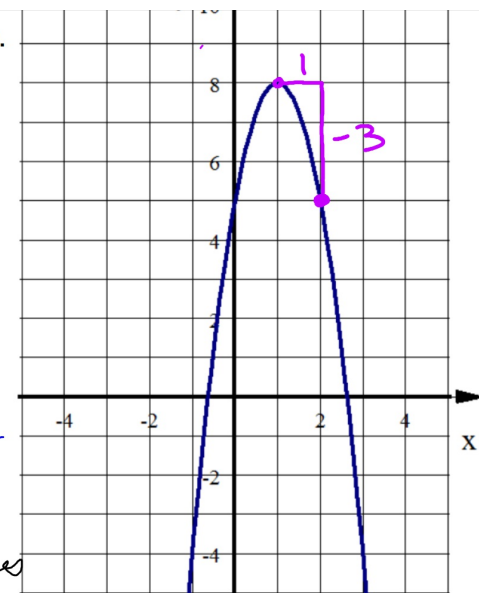   h   k

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

- Use the 1st "good" pt to find a.

this graph   Parent func

$\downarrow_1 \overline{|-3}$ $\downarrow_1 \overline{|1}$

this graph is 3 times taller & opens down

$a = -3$

EQ: $y = -3(x-1)^2 + 8$

Write the equation of this graph.

2nd method:

- Use vertex to fill in h and k

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

- After using the Vertex, find any other point on the parabola and replace and x and y with those coordinates. Then solve for a

$(1, 8)$
 ↑   ↑
 h   k

"1 Right 8 up"

The point $(0, 5)$ is on the graph. Replace x with 0 and y with 5. Then solve for a.
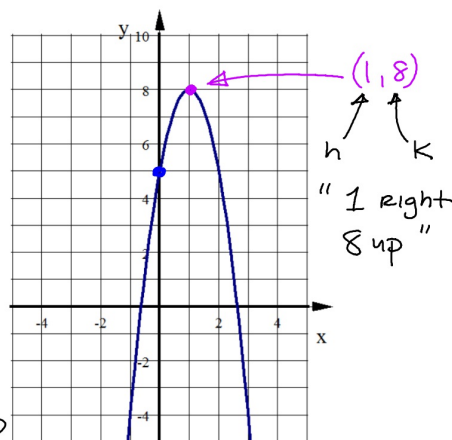
$5 = a(0-1)^2 + 8$

$5 = a(-1)^2 + 8$

$5 = a + 8$

$a = -3$

EQ: $y = -3(x-1)^2 + 8$

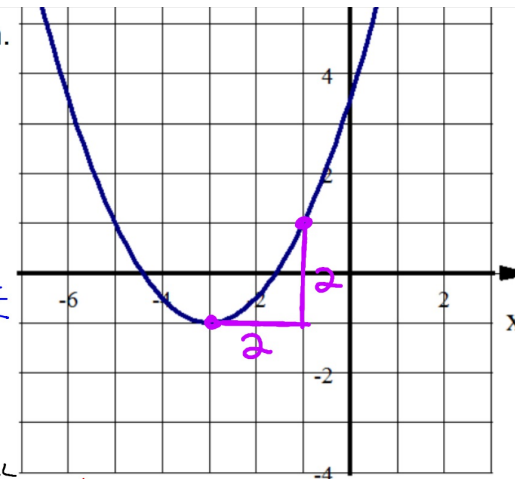## Write the equation of this graph.

The vertex is $(-3, -1)$
                  ↑   ↑
                  h   k
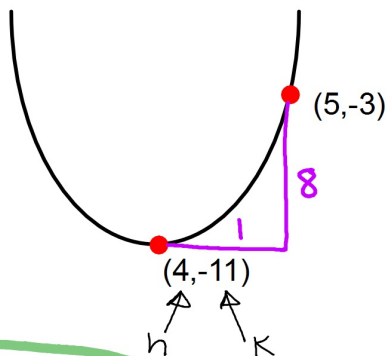
$y = a(x+3)^2 - 1$

THIS GRAPH   Parent Func

$\downarrow_2 \overline{|2} = $ $\downarrow_2 \overline{|4} = $

THIS GRAPH IS HALF AS TALL Therefore $a = \frac{1}{2}$
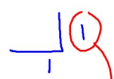
EQ: $y = \frac{1}{2}(x+3)^2 - 1$

Write the equation of this graph.

(5,-3)

8

1

(4,-11)

h   K
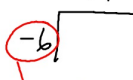
EQ: $y = 8(x-4)^2 - 11$

This graph

$\frac{}{1}\sqrt{8}$

parent func

$\frac{}{1}|1$

this graph is
8 times taller,
$a = 8$

Write the equation of this graph.

h   K

(-5,9)

-1

-6

(-6,3)
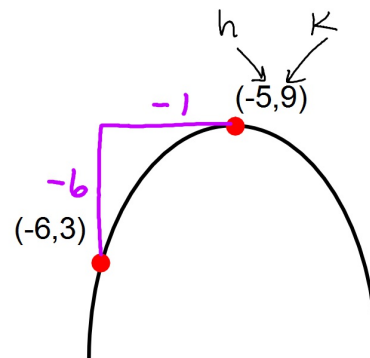
EQ: $y = -6(x+5)^2 + 9$

This graph $-6\sqrt{}^{-1}$

parent func $1|_{-1}$

this graph is
6 times taller but
opens down.
$a = -6$