Panel 1 (top-left)

Graph this transformation of the Parent Quadratic Function using the five main points.

Line of symmetry

$y = -3(x - 4)^2 + 7$

Use transformations of the Parent Function.

$h = 4 \quad K = 7$

Vertex $(4, 7)$

→ 3 times taller & upside down

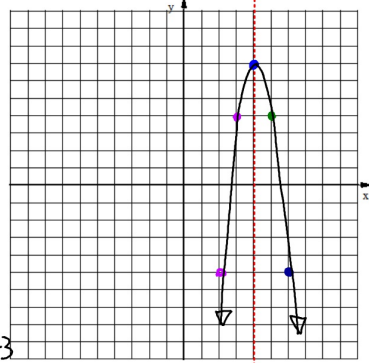1ST PT   parent: $|x-3|$

this function $\frac{1}{1} \downarrow$ -3

2nd PT   parent $\frac{|4 x-3|}{2}$

This function $\frac{2}{}$ -12

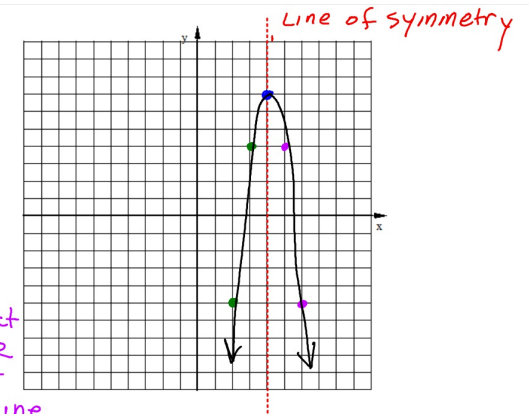{ Reflect these over the line of symmetry }

Panel 2 (top-right)

$y = -3(x - 4)^2 + 7$

Use a table of values

You still need to know where the vertex is! $(4,7)$

pick values 1 & 2 units on either side of the vertex {

X	Y
3	4
2	-5

} Reflect these over the line of symmetry

Line of symmetry

Panel 3 (bottom-left)

Write the equation of this quadratic.
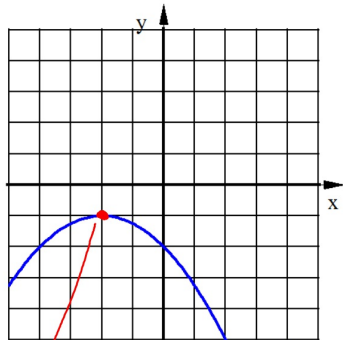
First find the values of h and k.

→ Vertex: $(-2, -1)$

$h = -2$
$K = -1$

$(x-h)^2 + K$

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

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

Panel 4 (bottom-right)

You have this much now:

$y = a(x + 2)^2 - 1$
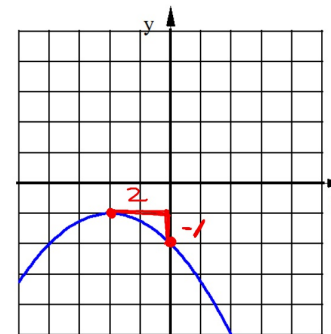
Now find the value of **a**

there are two ways to find the value of **a**

One Method:
Compare this graph to the parent function.

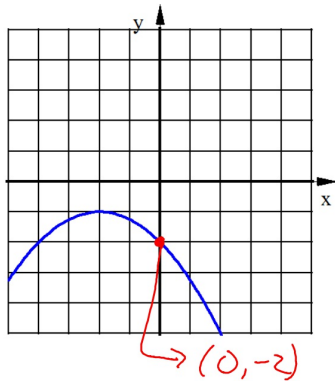$y = -\frac{1}{4}(x + 2)^2 - 1$

first "good" point to the right of the vertex is

$\xrightarrow{2} \downarrow -1$ on the parent

function the point that was 2 right of the vertex was also 4 up

$a = \frac{-1}{4}$

Now
2

Before

Slide 1 (top-left)

You have this much now:

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

$\rightarrow (0, -2)$

Slide 2 (top-right) / "Another method to find a"

Another method to find a

Pick a point on the graph and replace x and y with those values then solve for **a**

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

$$-2 = a(0+2)^2 - 1$$

$$-2 = a \cdot 4 - 1$$
$$+1 \qquad +1$$

$$\frac{-1}{4} = \frac{4a}{4}$$

$$a = -\frac{1}{4}$$

Slide 3 (top-right continued)

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SAS3: Question 1

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- Exploring
- Generalizing Transformations
- page 1

piecewise function

Slide 4 (bottom-left)

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SAS3: Answer questions 2-4

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- Exploring
- Generalizing Transformations
- pages 1&2

Slide 5 (bottom-right)

2. How does the value of **a** affect the graph of the general function rule
$y = af(x - h) + k$?

a>0   graph appears just like the Parent Function

a<0   graph is upside down (x-axis reflection) compared to the Parent Function

Also:

|a|<1   Vertical Shrink - Graph is shorter than Parent Function

|a|>1   Vertical Stretch - Graph is taller than Parent Function

3. How does the value of **h** affect the graph of the general function rule
   y = af(x − h) + k?

   (x − h) means the graph has shifted h units right compared to the Parent Function

   (x + h) means the graph has shifted h units left compared to the Parent Function

4. How does the value of **k** affect the graph of the general function rule
   y = af(x − h) + k?

   +k   graph has shifted k units up compared to the Parent Function

   −k   graph has shifted k units down compared to the Parent Function

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SAS3: Answer question 5

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   • Exploring
   • Generalizing Transformations
   • page 3

5. What values of **a**, **h**, and **k** will transform the graph of
   the parent function rule **f(x)** (the solid red line) so that
   it matches the graph of the new function rule
   af(x − h) + k (the dashed red line)?

   It appears that the original graph
   was shifted to the left and down
   and underwent a vertical shrink.

   a = 0.5 1/2 as tall
   (x+4)   4 units left
   k = -10   10 units down