

## Graphing Quadratics NOTES

Date \_\_\_\_\_ Period \_\_\_\_\_

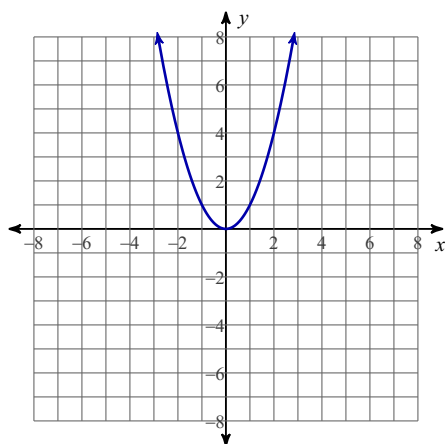
- 1) A PARENT GRAPH is a graph of a relatively simple function that we use to compare to other quadratic function.

Translating: Sliding up or down and/or left or right.

Reflecting: Flipping the graph

Dilating: Stretching(skinny) or Shrink(wider)

Parent Function:  $f(x) = x^2$  We will compare other graphs to this one using different transformations:



- 2) A TRANSFORMATION is a general term for changing a graph in various ways such as translating, reflecting and dilating.

Given  $f(x) = x^2$  is the parent function, then...

$x^2 + a$ : shifts the graph  $a$  units up Ex:  $x^2 + 3$  moves the graph up 3

$x^2 - a$ : shifts the graph  $a$  units down Ex:  $x^2 - 3$  moves the graph 3 units down.

$(x + a)^2$ : moves the graph left  $a$  units. Ex:  $(x + 3)^2$  moves graph 3 units left

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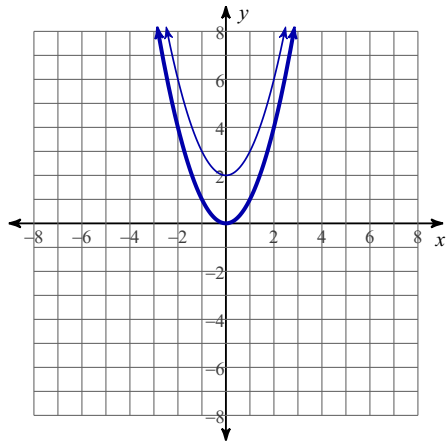
$-x^2$ : flips the graph

$ax^2$ : if  $a > 1$  the graph stretches.  $0 < a < 1$ , graph shrinks (gets wider)

**Graph the following using transformations. Parent function  $f(x) = x^2$  is in bold. Describe the transformation**

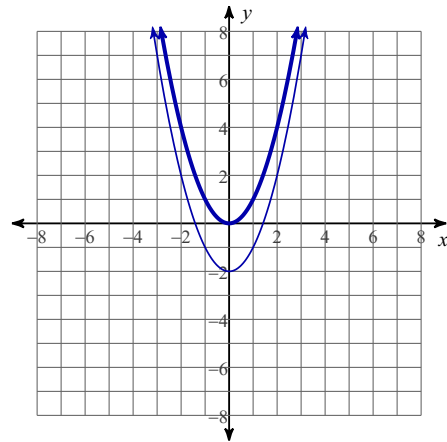
3)  $f(x) = x^2 + 2$

The graph transformed up the y-axis 2 units



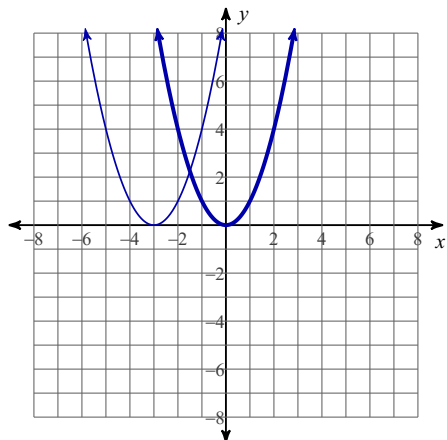
4)  $f(x) = x^2 - 2$

The graph transformed down the y-axis 2 units



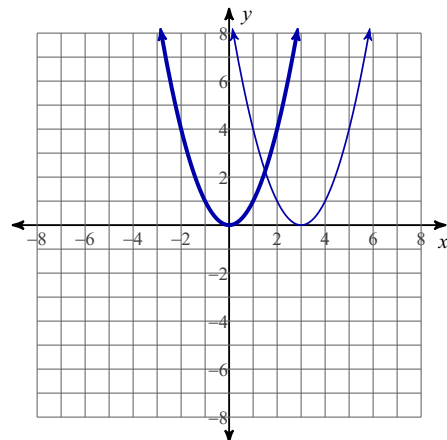
5)  $f(x) = (x + 3)^2$

The graph transformed left across the x-axis 3 units



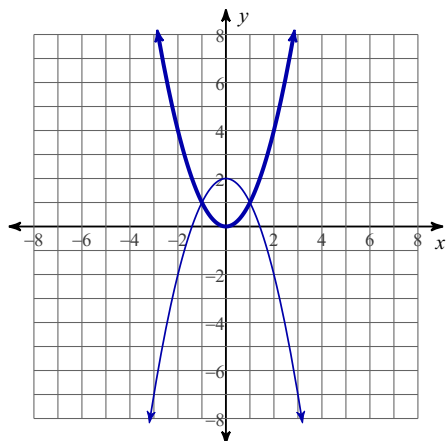
6)  $f(x) = (x - 3)^2$

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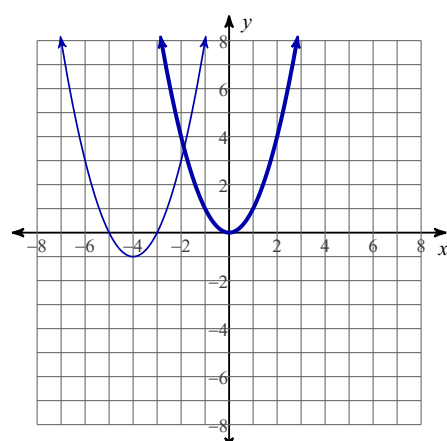
7)  $f(x) = -x^2 + 2$

The graph transformed up the y-axis 2 units then reflected (flipped)

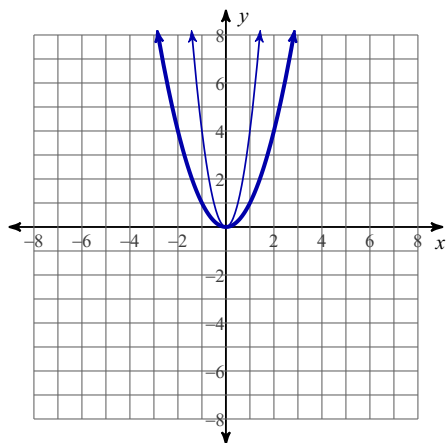


8)  $f(x) = (x + 4)^2 - 1$

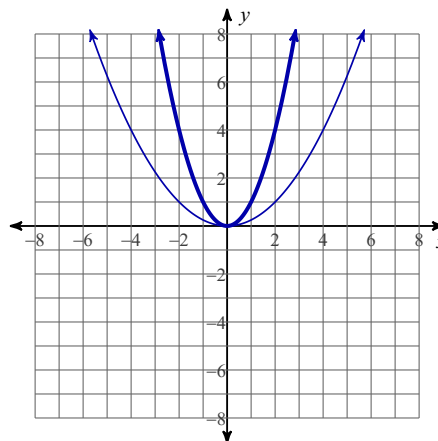
The graph transformed left 4 units across the x-axis and down 1



- 9)  $f(x) = 4x^2$   
The graph stretched (skinny) by a scale factor of 4



- 10)  $f(x) = \frac{1}{4}x^2$   
The graph shrunk (got wider) by a scale factor of  $\frac{1}{4}$



**Without graphing, describe the transformation**

11)  $f(x) = x^2 + 5$

12)  $f(x) = (x - 3)^2 + 4$

13)  $f(x) = 2x^2 - 3$

14)  $f(x) = \frac{1}{3}x^2 + 1$

15)  $f(x) = 5(x + 2)^2 + 7$

16)  $f(x) = -x^2 - 8$

17)  $f(x) = -6(x + 3)^2 - 9$

18)  $f(x) = -\frac{1}{2}(x - 6)^2 + 4$

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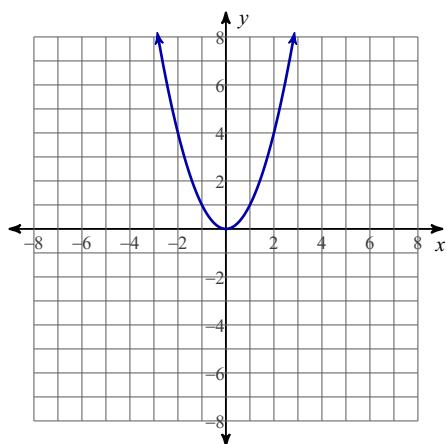
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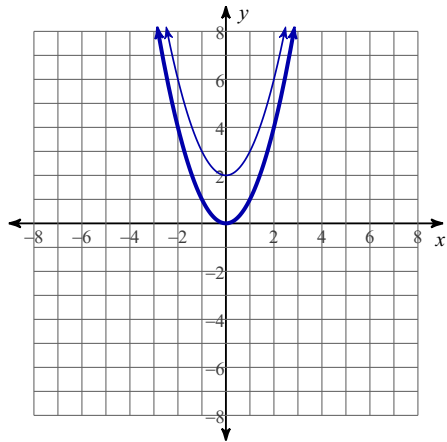
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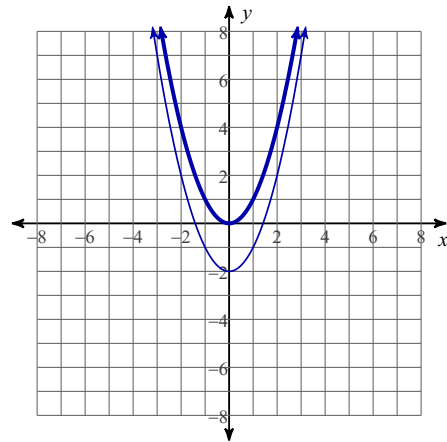
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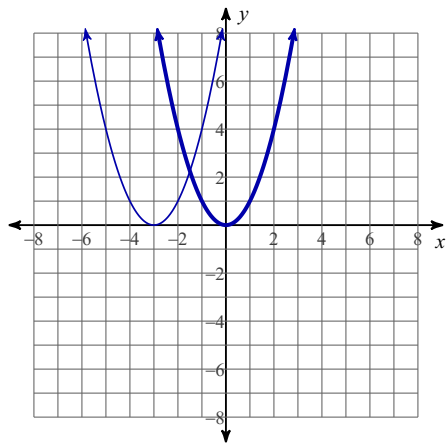
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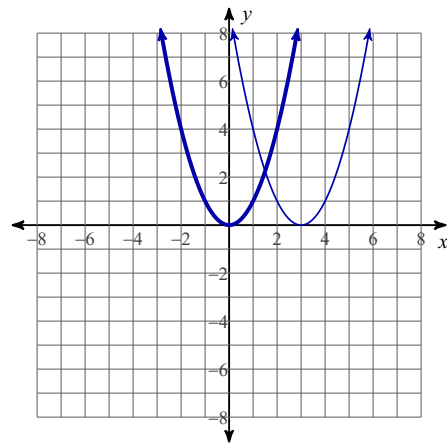
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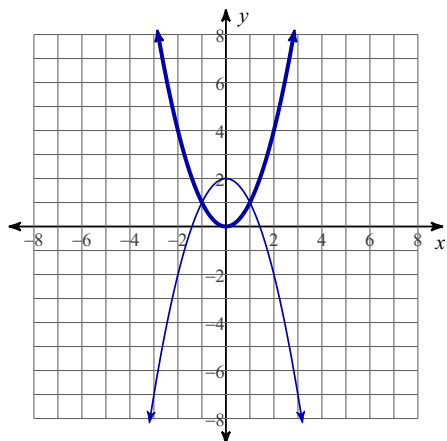
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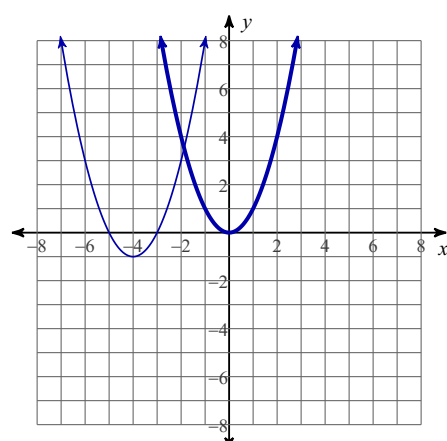
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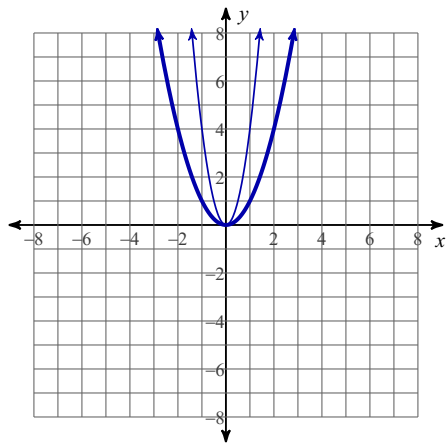
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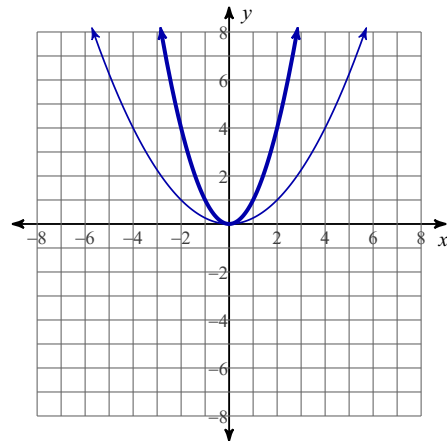
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Transformed up 5 units

13)  $f(x) = 2x^2 - 3$

Stretched by scale factor of 2, moved down 3

15)  $f(x) = 5(x + 2)^2 + 7$

Stretch scale factor of 5, Left 2 units, up 7

17)  $f(x) = -6(x + 3)^2 - 9$

Reflect, Stretch by scale factor of 6, left 3, down 9

12)  $f(x) = (x - 3)^2 + 4$

Moved right 3, up 4

14)  $f(x) = \frac{1}{3}x^2 + 1$  Shrink by scale factor of  $\frac{1}{3}$ , then moved

16)  $f(x) = -x^2 - 8$

Reflect (flip), moved down 8

18)  $f(x) = -\frac{1}{2}(x - 6)^2 + 4$  Reflect, Shrink by scale factor of