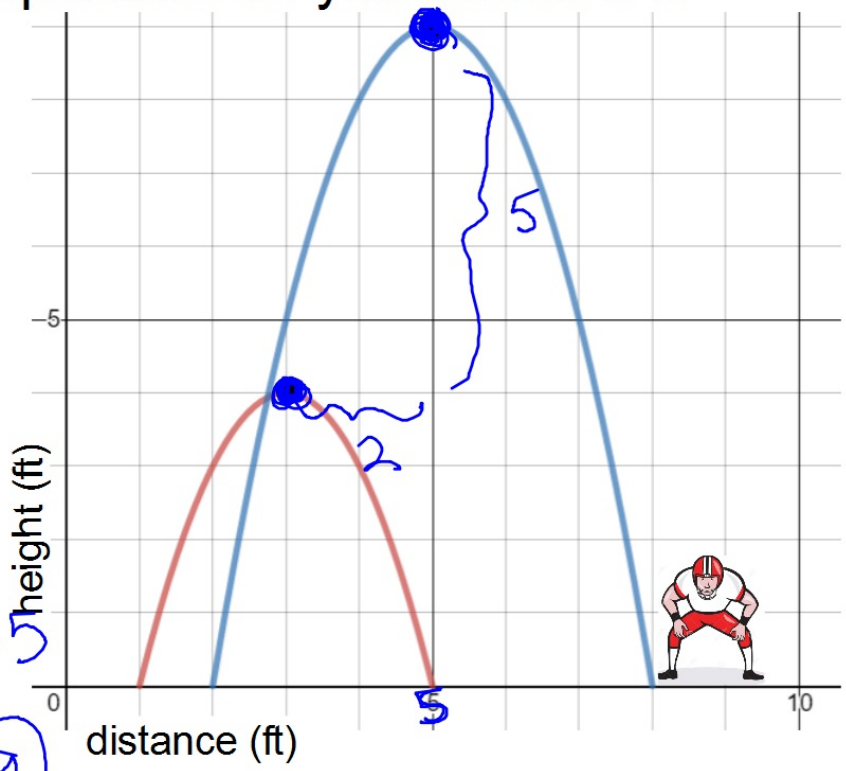
Bellwork: Algebra 1

1. Welcome back, Happy Monday!
2. Write down your work for the week in your planner.
3. You need your Algebra Nation book.
4. Answer the following question on your MONDAY Bellwork:

The red parabola shows the path of a football being thrown to John. The following equation models this parabola:

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

Transform the equation so the football follows the path of the blue parabola and reaches John.



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

$y = -(x-5)^2 + 9$

(5,9)

Section 6 – Topic 7
Transformations of the Dependent Variable of Quadratic Functions

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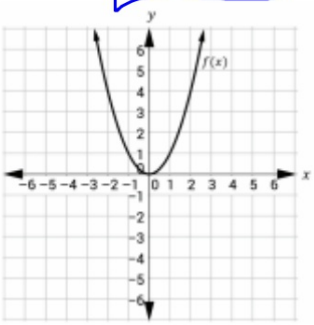
Consider the graph and table for the function $f(x) = x^2$.

parent function

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4



Consider the following transformations on the dependent variable $f(x)$.

y-values

$$g(x) = f(x) + 2$$
$$h(x) = f(x) - 2$$
$$m(x) = 2f(x)$$
$$n(x) = \frac{1}{2}f(x)$$
$$p(x) = -f(x)$$

Why do you think these are called transformations on the dependent variable?

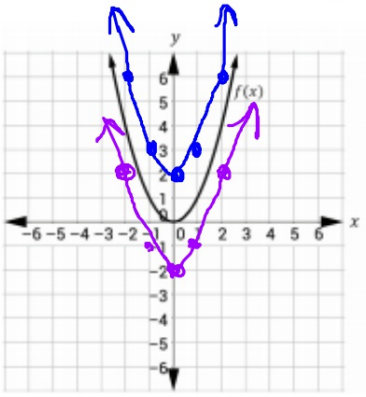
changing the y-values

Let's Practice!

1. Complete the table to explore what happens when we add a constant to $f(x)$.

x	$f(x)$	$g(x) = f(x) + 2$	$h(x) = f(x) - 2$
-2	4	$4+2=6$	2
-1	1	$1+2=3$	-1
0	0	2	-2
1	1	3	-1
2	4	6	2

2. Sketch the graphs of each function on the same coordinate plane with the graph of $f(x)$.

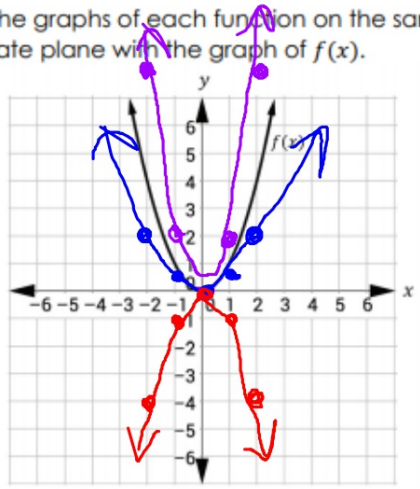


Try It!

3. Complete the table to determine what happens when we multiply $f(x)$ by a constant.

x	$f(x)$	$m(x) = 2f(x)$	$n(x) = \frac{1}{2}f(x)$	$p(x) = -f(x)$
-2	4	8	2	-4
-1	1	2	$\frac{1}{2}$	-1
0	0	0	0	0
1	1	2	$\frac{1}{2}$	-1
2	4	8	2	-4

4. Sketch the graphs of each function on the same coordinate plane with the graph of $f(x)$.

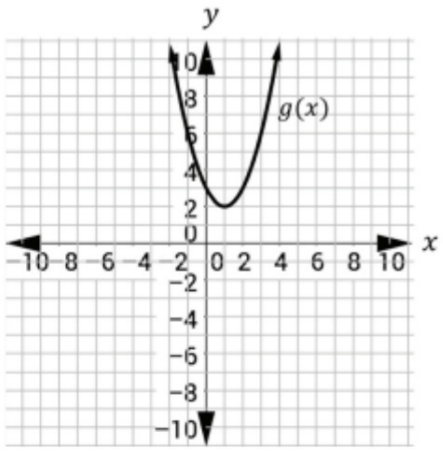


BEAT THE TEST!

1. Given the function $f(x) = x^2 + 3$, identify the effect on the graph of $f(x)$ by replacing $f(x)$ with:

E	$f(x) + k$, where $k > 0$.	**A.** Vertically compressed $f(x)$ by a factor of k.
B	$f(x) + k$, where $k < 0$.	**B.** Shifted $f(x)$ down k units.
D	$kf(x)$, where $k > 1$.	**C.** Reflected $f(x)$ about the x-axis.
A	$kf(x)$, where $0 < k < 1$.	**D.** Vertically stretched $f(x)$ by a factor of k.
C	$kf(x)$, where $k = -1$.	**E.** Shifted $f(x)$ up k units.

2. The graph of $g(x)$ is shown below.

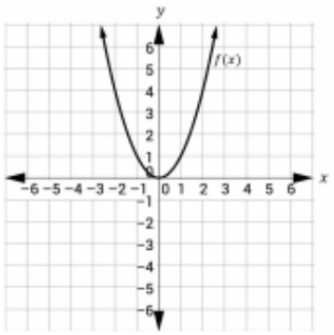


If $f(x) = 3g(x) + 2$, identify three ordered pairs that lie on $f(x)$.

Section 6 – Topic 8
Transformations of the Independent Variable of Quadratic Functions

Consider the graph and table for the function $f(x) = x^2$.

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4



Consider the following transformations on the independent variable x.

inside
opposite

$g(x) = f(x + 2)$ -2
$h(x) = f(x - 2)$ $+2$
$m(x) = f(2x)$ $\div 2$
$n(x) = f\left(\frac{1}{2}x\right)$ $\div \frac{1}{2}$ or $\times 2$

Why do you think these are called transformations on the independent variable?

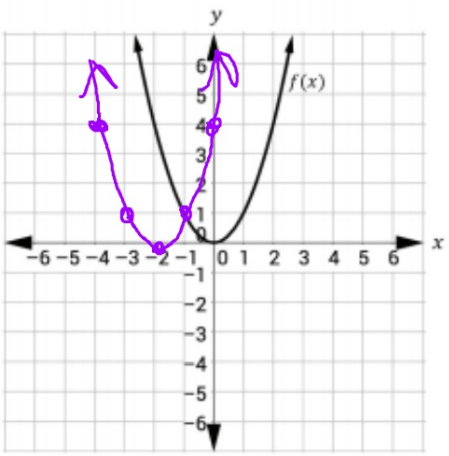
changing the X-values

1. Complete the table to determine what happens when you add a positive constant to x.

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4

x	$g(x) = f(x+2)$	$g(x)$
-4	$g(-4) = f(-4+2) = f(-2)$	4
-3	$g(-3) = f(-3+2) = f(-1)$	1

2. Sketch the graph of $g(x)$ on the same coordinate plane with the graph of $f(x)$.



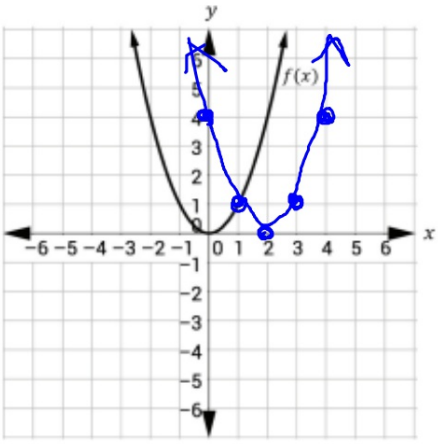
Try It!

3. Complete the table to determine what happens when you add a negative constant to x.

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4

x	$h(x) = f(x-2)$	$h(x)$
0	$h(0) = f(0-2) = f(-2)$	4
1	$h(1) = f(1-2) = f(-1)$	1

4. Sketch the graph of $h(x)$ on the same coordinate plane with the graph of $f(x)$.



Let's Practice!

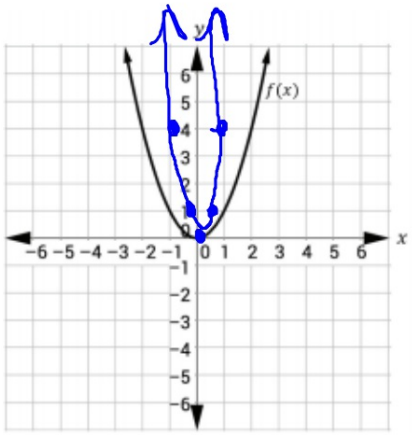
5. Complete the table to determine what happens when you multiply x by a number greater than 1.

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4

x	$m(x) = f(2x)$	$m(x)$
-1	$m(-1) = f(2 \cdot -1) = f(-2)$	4
$-\frac{1}{2}$	$m\left(-\frac{1}{2}\right) = f\left(2 \cdot -\frac{1}{2}\right) = f(-1)$	1
0		0
$\frac{1}{2}$		1
1		4

$2 \cdot f(x)$

6. Sketch the graph of $m(x)$ on the same coordinate plane with the graph of $f(x)$.



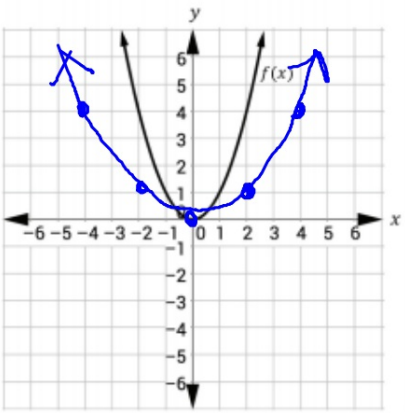
Try It!

7. Complete the table to determine what happens when you multiply x by a constant between 0 and 1.

x	$f(x)$
-2	4
-1	1
0	0
1	1
2	4

x	$n(x) = f\left(\frac{1}{2}x\right)$	$n(x)$
-4	$n(-4) = f\left(\frac{1}{2}\cdot -4\right) = f(-2)$	4
-2	$n(-2) = f\left(\frac{1}{2}\cdot -2\right) = f(-1)$	1
0		0
2		1
4		4

8. Sketch the graph of $n(x)$ on the same coordinate plane with the graph of $f(x)$.



BEAT THE TEST!

1. The table that represents the quadratic function $g(x)$ is shown below.

x	$g(x)$
-6	12
-4	2
1	12
7	90
11	182

$\times \frac{1}{3}$ or $\times 3$

$\frac{1}{3}g(x)$

The function $f(x) = g\left(\frac{1}{3}x\right)$. Complete the following table for $f(x)$.

x	$f(x)$
-18	12
-12	2
3	12
21	90
33	182