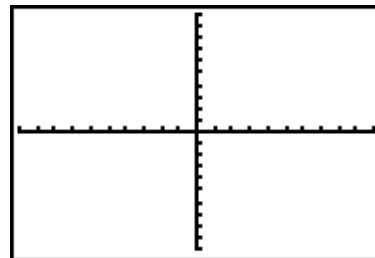


1. Square Function: $f(x) = x^2$

- (a) Graph this function as Y1. Sketch the graph and state the domain and range.



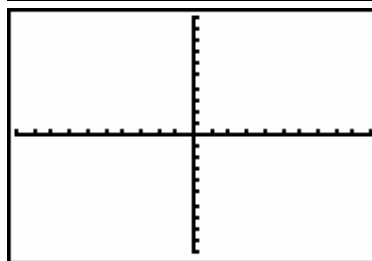
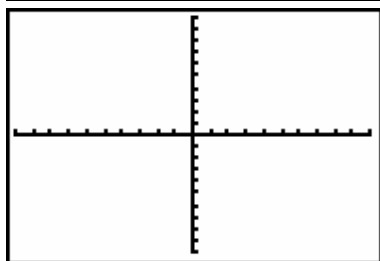
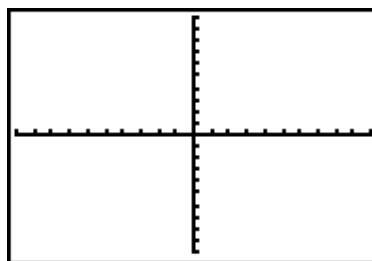
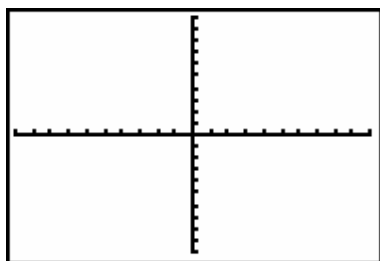
- (b) Each person in your group should graph $Y1 = x^2$ and should choose one of the four functions below to graph also. Sketch the graphs.

$$Y2 = x^2 + 3$$

$$Y4 = x^2 + 1$$

$$Y3 = x^2 - 2$$

$$Y5 = x^2 - 4$$



- (c) Complete the first blank with either up or down and the second blank with the correct number.

The graph of Y2 is the same as Y1 except it has been shifted _____ units.

The graph of Y3 is the same as Y1 except it has been shifted _____ units.

The graph of Y4 is the same as Y1 except it has been shifted _____ units.

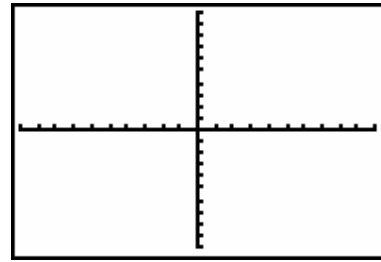
The graph of Y5 is the same as Y1 except it has been shifted _____ units.

Conclusion:

- If c is a positive number, the graph of $f(x) + c$ is the same as the graph of $f(x)$ except that it has been shifted _____ units.
- If c is a positive number, the graph of $f(x) - c$ is the same as the graph of $f(x)$ except that it has been shifted _____ units.

2. Cube Function: $f(x) = x^3$

(a) Graph this function as Y1. Sketch the graph and state the domain and range.



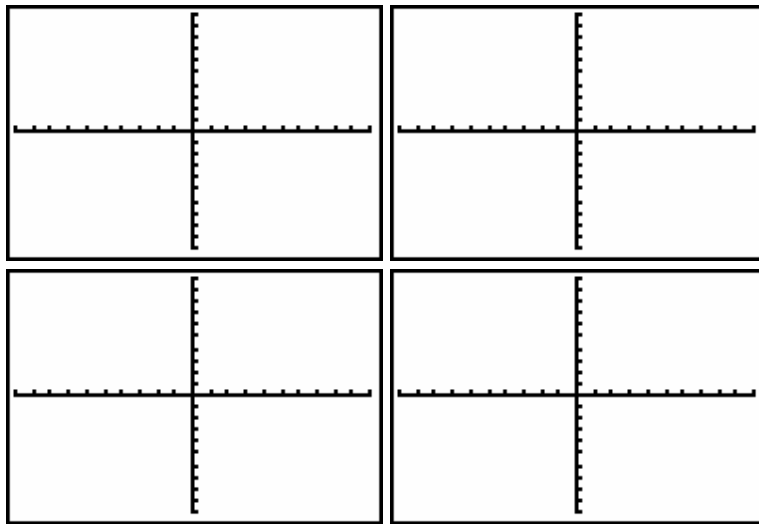
(b) Each person in your group should graph $Y1 = x^3$ and should choose one of the four functions below to graph also. Sketch the graphs.

$$Y2 = (x - 4)^3$$

$$Y4 = (x + 2)^3$$

$$Y3 = (x - 1)^3$$

$$Y5 = (x + 5)^3$$



(c) Complete the first blank with either left or right and the second blank with the correct number.

The graph of Y2 is the same as Y1 except it has been shifted _____ units.

The graph of Y3 is the same as Y1 except it has been shifted _____ units.

The graph of Y4 is the same as Y1 except it has been shifted _____ units.

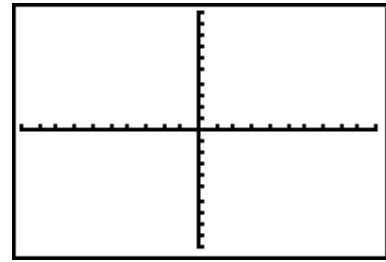
The graph of Y5 is the same as Y1 except it has been shifted _____ units.

Conclusion:

- If c is a positive number, the graph of $f(x + c)$ is the same as the graph of $f(x)$ except that it has been shifted _____ units.
- If c is a positive number, the graph of $f(x - c)$ is the same as the graph of $f(x)$ except that it has been shifted _____ units.

3. Absolute Value Function $f(x) = |x|$.

(a) Graph this function as Y1. Sketch the graph and state the domain and range.



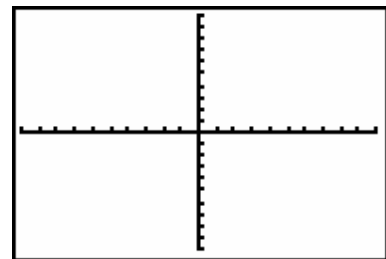
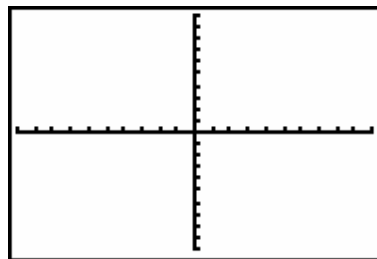
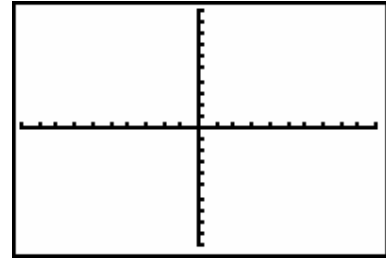
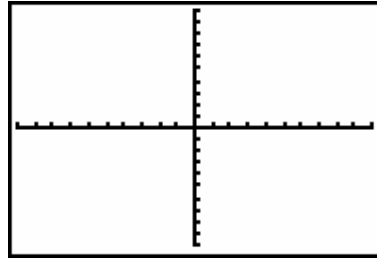
(b) Each person in your group should graph $Y1 = |x|$ and should choose one of the four functions below to graph also. Sketch the graphs.

$$Y2 = 2|x|$$

$$Y4 = 3.4|x|$$

$$Y3 = 0.5|x|$$

$$Y5 = 0.75|x|$$



(c) Complete the first blank with "stretched" (graph is further from the x-axis than Y1) or "compressed" (graph is closer to x-axis than Y1) and the second blank with the correct number.

The graph of Y2 is vertically _____ by a factor of _____ compared to Y1.

The graph of Y3 is vertically _____ by a factor of _____ compared to Y1.

The graph of Y4 is vertically _____ by a factor of _____ compared to Y1.

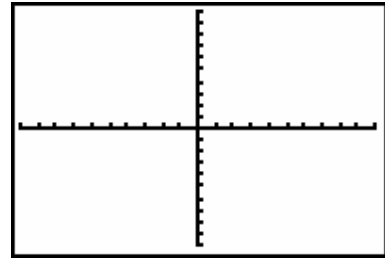
The graph of Y5 is vertically _____ by a factor of _____ compared to Y1.

Conclusion:

- If c is a positive number >1 , the graph of $cf(x)$ is the same as the graph of $f(x)$ except that it has been vertically _____ by a factor of _____ compared to Y1.
- If c is a positive number <1 , the graph of $cf(x)$ is the same as the graph of $f(x)$ except that it has been vertically _____ by a factor of _____ compared to Y1.

OVER →

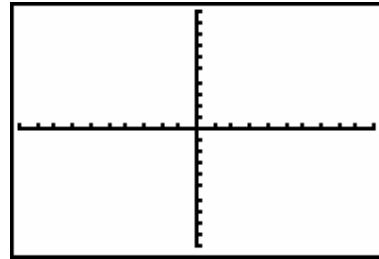
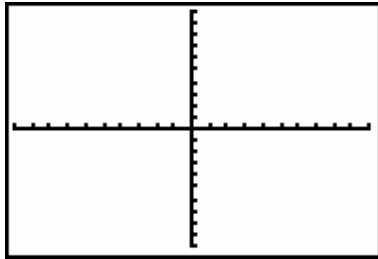
4. Square Root Function $f(x) = \sqrt{x}$
- (a) Graph this function as Y1. Sketch the graph and state the domain and range.



- (b) For each of the following groups of functions, state whether Y2 and Y3 are reflections of Y1 about the x-axis or the y-axis.

$$Y2 = -\sqrt{x}$$

$$Y3 = \sqrt{-x}$$



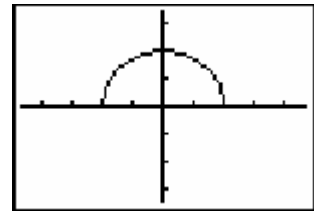
Y2 is a reflection of Y1 about the ____ axis.

Y3 is a reflection of Y1 about the ____ axis.

Conclusion:

- The function $-f(x)$ is a reflection of Y1 about the ____ axis.
- The function $f(-x)$ is a reflection of Y1 about the ____ axis.

5. The graph of a function $y = f(x)$ is shown. Graph each of the following transformations of $f(x)$.



$f(x)+1$ 	$f(x-2)$
$1.5f(x)$ 	$-f(x)$