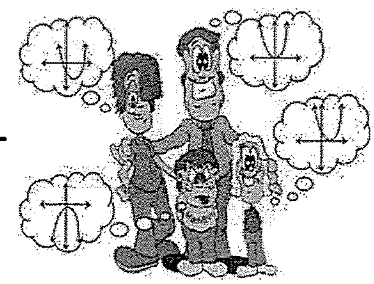
Name: KEY Date:

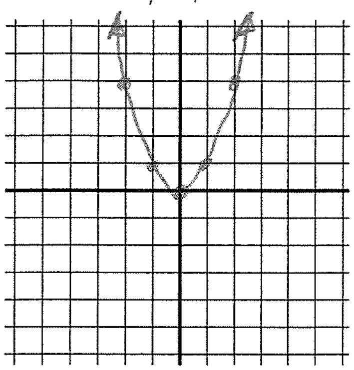
Advanced Algebra II Honors: 1.1 Parent Functions and Transformations



Do Now!! Use a table of values to sketch a graph of each of the following.

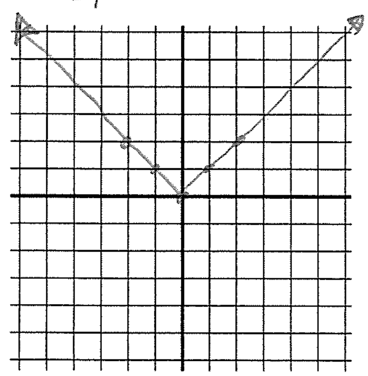
1) $y = x^2$

x	y
-1	1
0	0
1	1
2	4



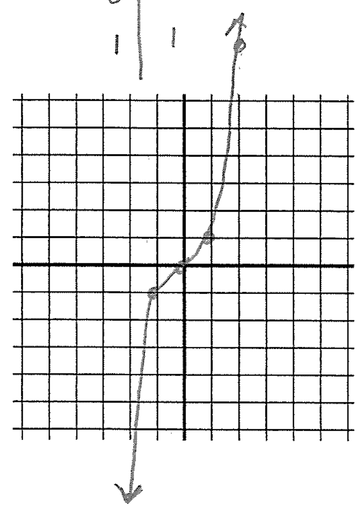
2) $y = |x|$

x	y
-2	2
-1	1
0	0
2	2



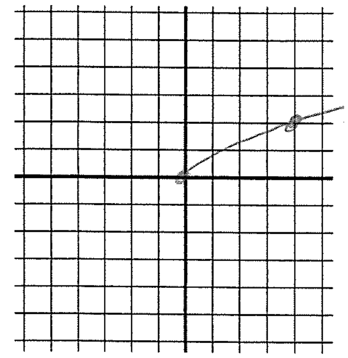
3) $y = x^3$

x	y
-1	-1
0	0
1	1



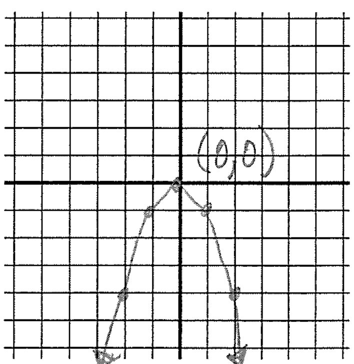
4) $y = \sqrt{x}$

x	y
0	0
4	2
9	3

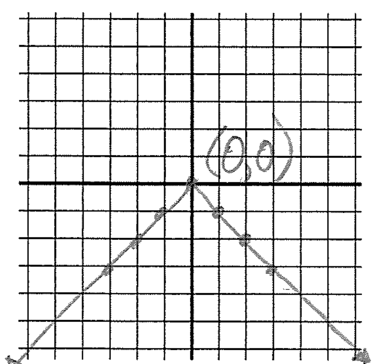


For #5-8, use your calculator to copy a sketch of each graph. Label any key points such as vertices.

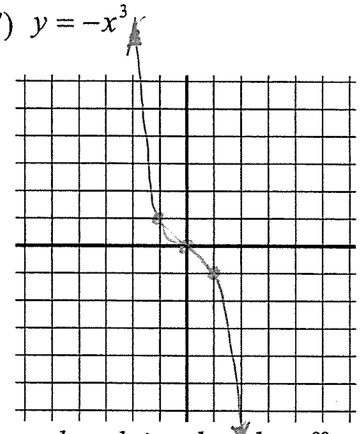
5) $y = -x^2$



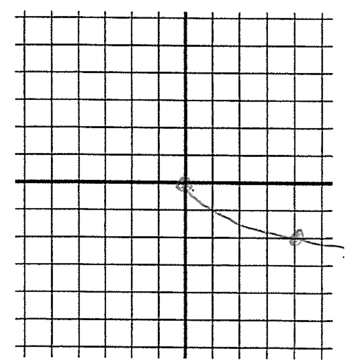
6) $y = -|x|$



7) $y = -x^3$



8) $y = -\sqrt{x}$

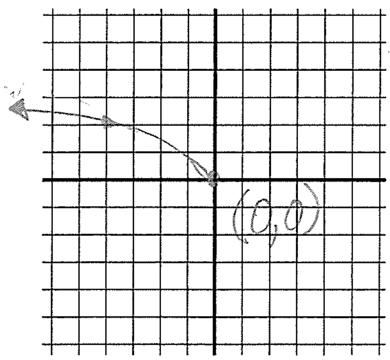


I. Compare these graphs to the graphs you did for the do now and explain what the effect of multiplying a function by -1 has on its graph. ***[-f(x)]***

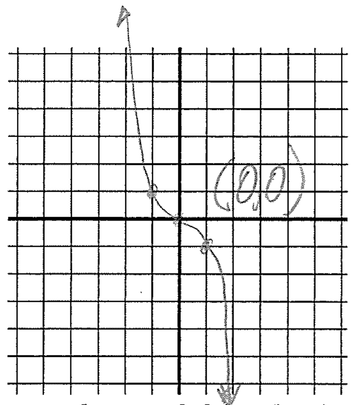
$-f(x)$ is a reflection of the parent graph.
For $y=-x^2$, $y=-|x|$, and $y=-\sqrt{x}$, $-f(x)$ is a reflection about the x-axis. For $y=-x^3$, $-f(x)$ is a reflection about y-axis.

Use your calculator to copy a sketch of each graph. Label any key points such as vertices.

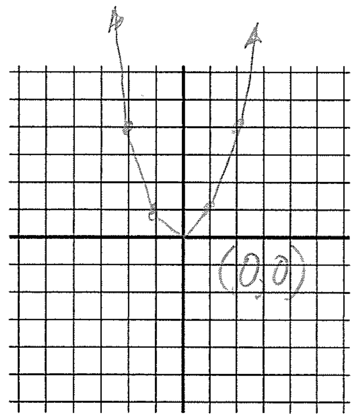
9) $y = \sqrt{-x}$



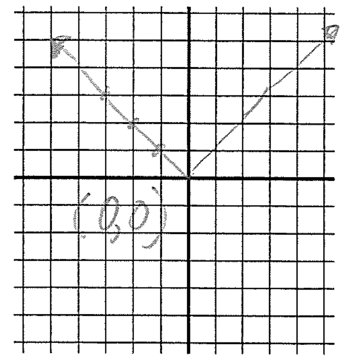
10) $y = (-x)^3$



11) $y = (-x)^2$



12) $y = |-x|$



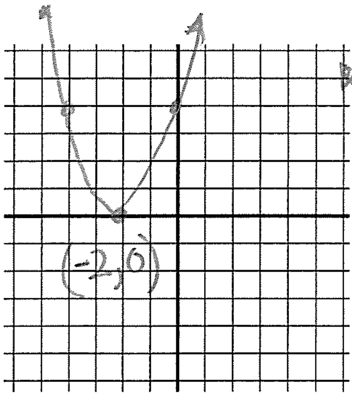
II. Compare these graphs to the graphs you did for the do now and explain what the effect of negating x in a function has on its graph. ***[f(-x)]***

No effect

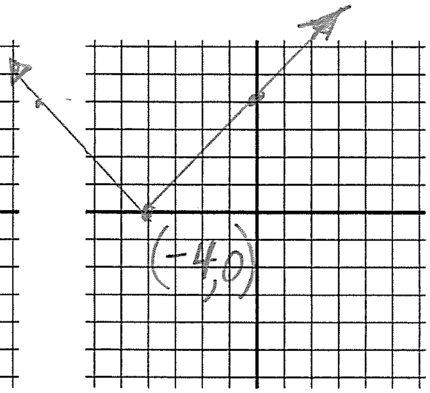
Reflection about y-axis

Use your calculator to copy a sketch of each graph. Label any key points such as vertices.

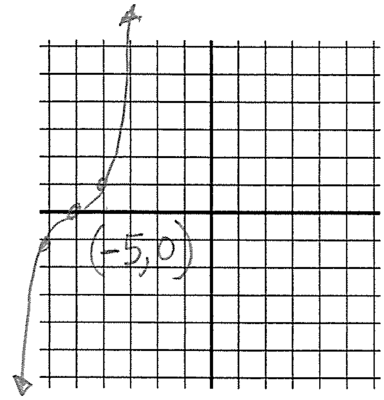
13) $y = (x+2)^2$



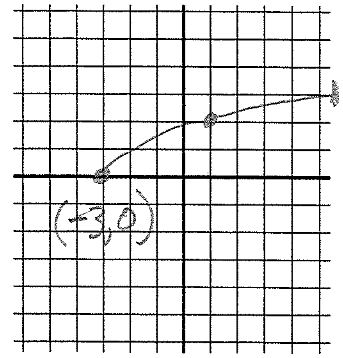
14) $y = |x+4|$



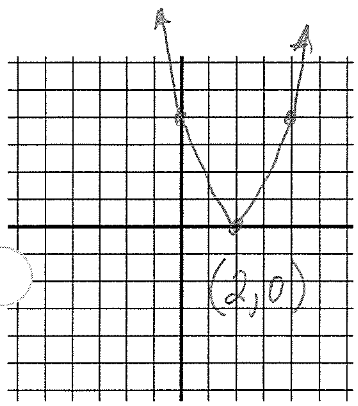
15) $y = (x+5)^3$



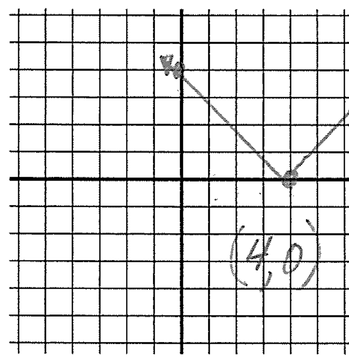
16) $y = \sqrt{x+3}$



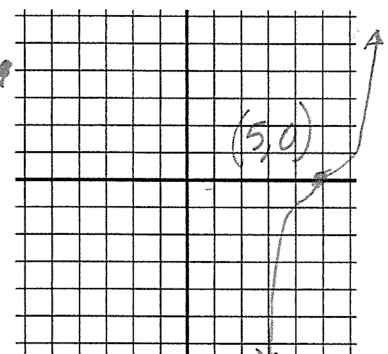
17) $y = (x-2)^2$



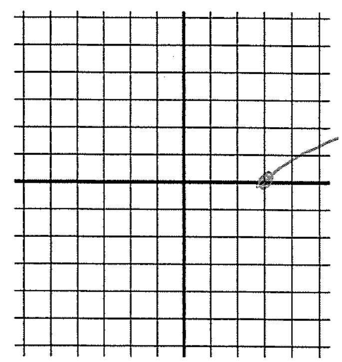
18) $y = |x-4|$



19) $y = (x-5)^3$



20) $y = \sqrt{x-3}$



III. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***f(x + c).***

The effect is a translation.

f(x+c) shifts the parent graph to the left.

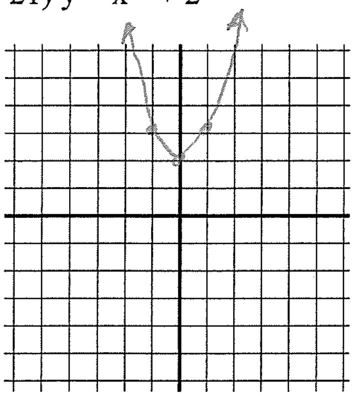
Tip: In order for x+c = 0, x must be negative.

f(x-c) shifts the parent graph to the right.

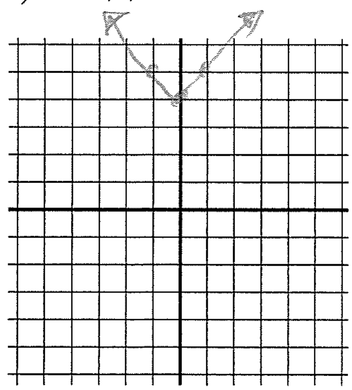
Tip: In order for x-c=0, x must be positive.

Use your calculator to copy a sketch of each graph. Label any key points such as vertices.

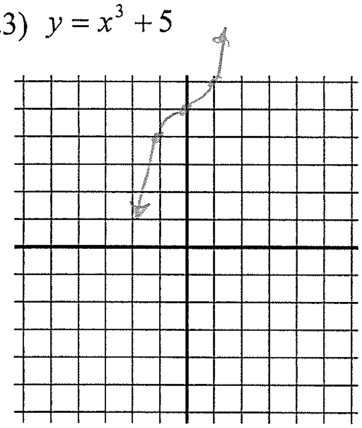
21) $y = x^2 + 2$



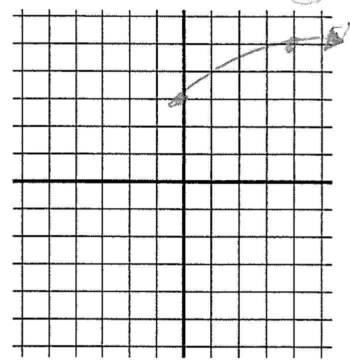
22) $y = |x| + 4$



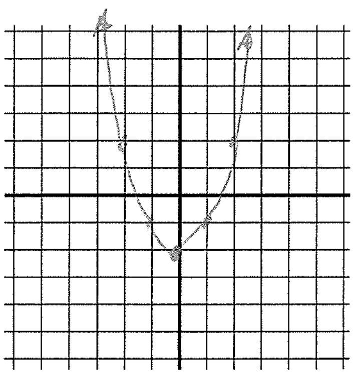
23) $y = x^3 + 5$



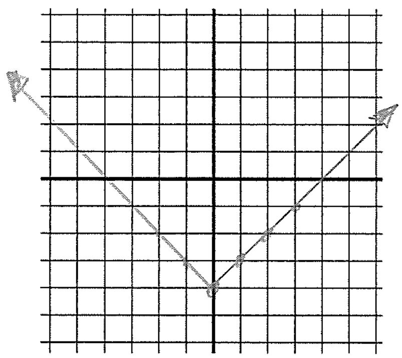
24) $y = \sqrt{x} + 3$



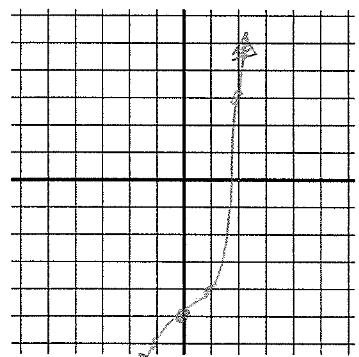
25) $y = x^2 - 2$



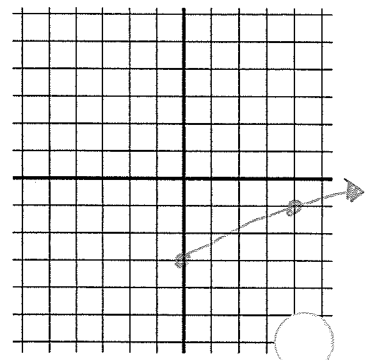
26) $y = |x| - 4$



27) $y = x^3 - 5$



28) $y = \sqrt{x} - 3$



IV. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***f(x) + c.***

The effect is a translation.
f(x) + c shifts the parent graph up c units;
f(x) + c shifts the parent graph down c units.

Fill in the table of values for the given function.

29) $y = x^2$

x	y
-1	1
0	0
1	1
4	16

30) $y = |x|$

x	y
-1	1
0	0
1	1
2	2

31) $y = x^3$

x	y
-1	-1
0	0
1	1
2	8

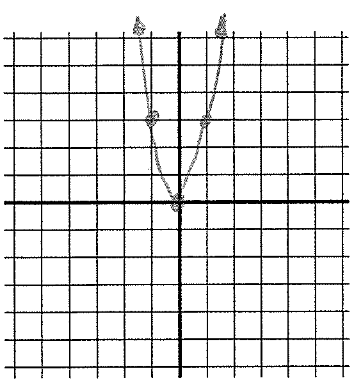
32) $y = \sqrt{x}$

x	y
-1	—
0	0
1	1
4	2

Fill in the table of values for the given function and compare them to the corresponding tables in numbers 29 - 32. Use your calculator to copy a sketch of each graph.

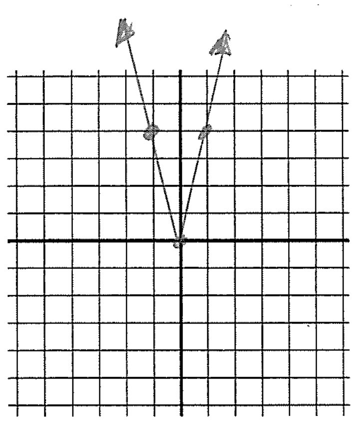
33) $y = 3x^2$

x	y
-1	3
0	0
1	3
2	12



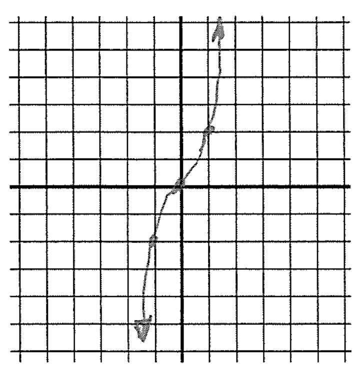
34) $y = 4|x|$

x	y
-1	4
0	0
1	4
2	8



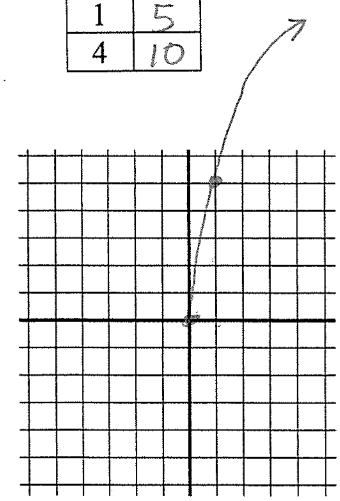
35) $y = 2x^3$

x	y
-1	-2
0	0
1	2
2	16



36) $y = 5\sqrt{x}$

x	y
-1	—
0	0
1	5
4	10



V. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***cf(x) when*** $|c|$ ***> 1.***

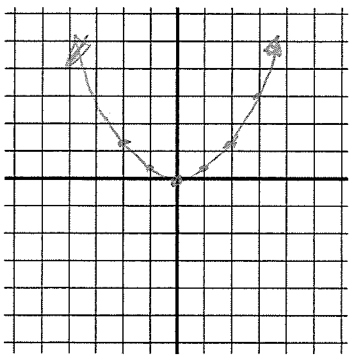
The effect on the parent graph is that it makes the graph narrower; cf(x) when |c|>1 increases the slope of each arm ("c" causes "y" value to increase multiple times)

It pulls the "arms" of the graph towards the y-axis.

Fill in the table of values for the given function and compare them to the corresponding tables in numbers 29 - 32. Use your calculator to copy a sketch of each graph.

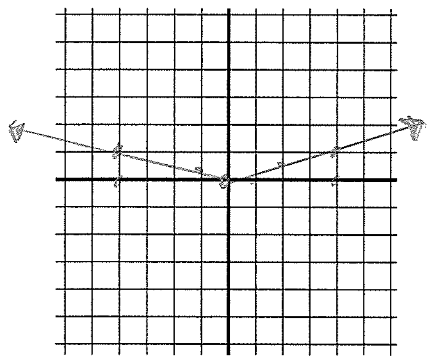
41) $y = \frac{1}{3}x^2$

x	y
-1	1/3
0	0
1	1/3
2	1 1/3



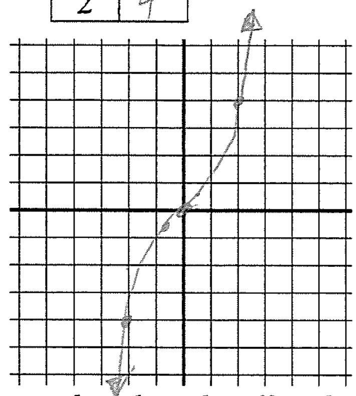
42) $y = \frac{1}{4}|x|$

x	y
-1	1/4
0	0
1	1/4
2	1/2



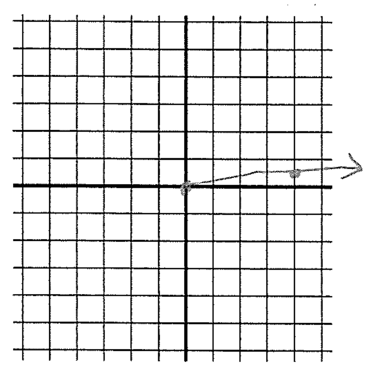
43) $y = \frac{1}{2}x^3$

x	y
-1	-1/2
0	0
1	1/2
2	4



44) $y = \frac{1}{5}\sqrt{x}$

x	y
-1	—
0	0
1	1/5
4	2/5



VI. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***cf(x) when*** $|c| < 1$.

The affect is that it makes the parent graph wider. cf(x) when |c|<1 causes the "y" value to grow much slower than the original function.

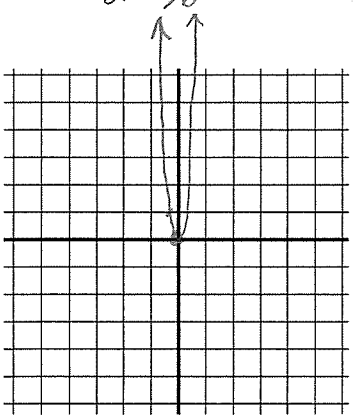
It pulls the graph towards the x-axis.

Fill in the table of values for the given function and compare them to the corresponding tables in numbers 29 - 32. Use your calculator to copy a sketch of each graph.

49) $y = (3x)^2$

y grows faster

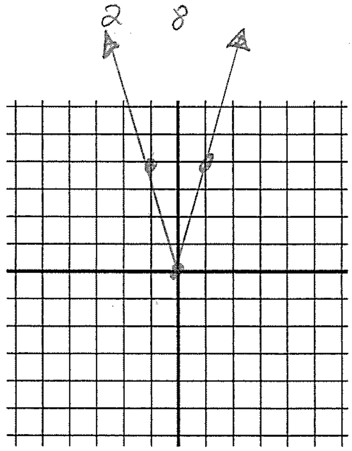
x	y
-1	9
0	0
1/3	1
1	9
2	36



50) $y = |4x|$

same

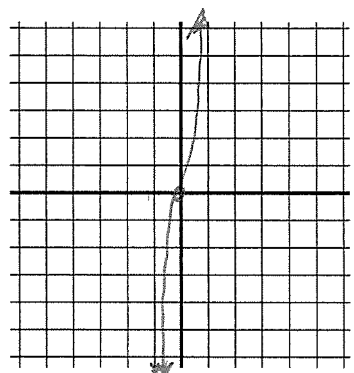
x	y
-1	4
0	0
1/2	2
1	4
2	8



51) $y = (2x)^3$

y grows faster

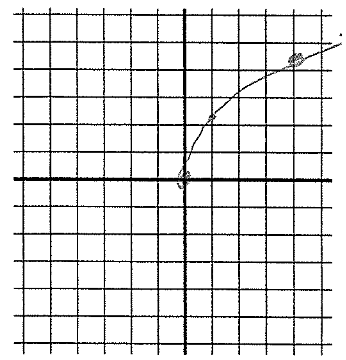
x	y
-1	-8
0	0
1	8
2	64



52) $y = \sqrt{5x}$

y grows slower

x	y
-1	—
0	0
1	2.23
4	4.4



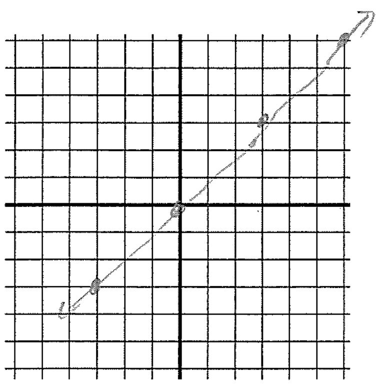
VII. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***f(cx)*** ***when*** $|c| > 1$.

It pulls the "arms" of the graph towards the y-axis.

Fill in the table of values for the given function and compare them to the corresponding tables in numbers 29 - 32. Use your calculator to copy a sketch of each graph.

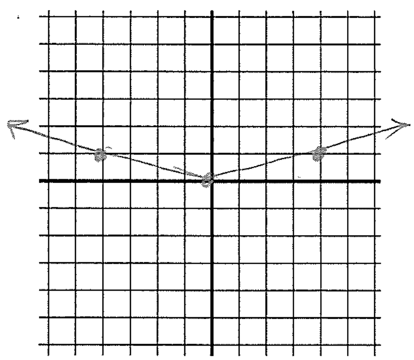
57) $y = (x)$

x	y
-3	-3
0	0
3	3
6	6



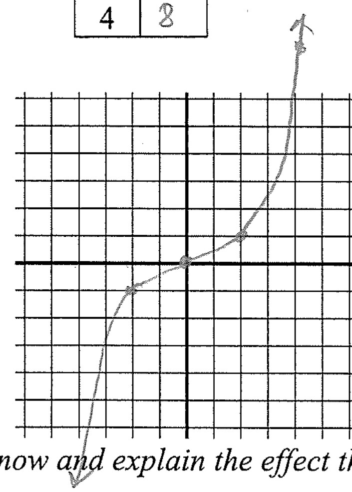
58) $y = \left|\frac{1}{4}x\right|$

x	y
-4	1
0	0
4	1
8	2



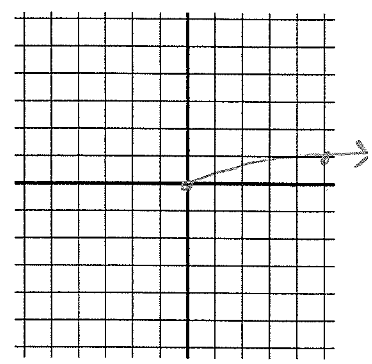
59) $y = \left(\frac{1}{2}x\right)^3$

x	y
-2	-1
0	0
2	1
4	8



60) $y = \sqrt{\frac{1}{5}x}$

x	y
-5	—
0	0
5	1
20	2



VIII. Compare these graphs to the graphs you did for the do now and explain the effect that c has on the graph of f(x) for the following situation: ***f(cx)* when** $|c| < 1$.

It pulls the "arms" of the graph towards the x-axis.