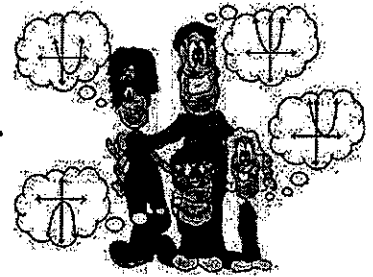


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Date: _____

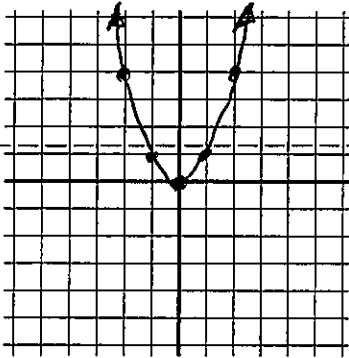
Advanced Algebra II Honors: 1.1 Parent Functions and Transformations



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

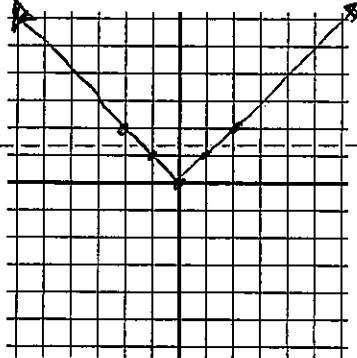
1) $y = x^2$

X	Y
-1	1
0	0
1	1
2	4



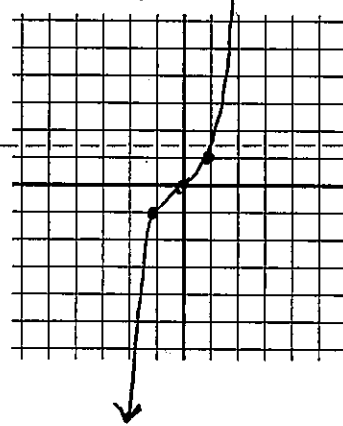
2) $y = |x|$

X	Y
-2	2
-1	1
0	0
2	2



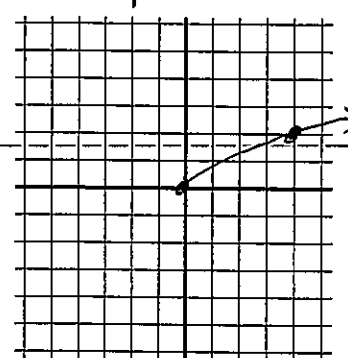
3) $y = x^3$

X	Y
-1	-1
0	0
1	1



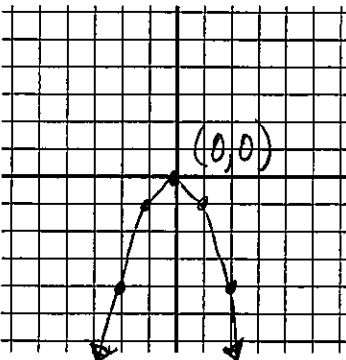
4) $y = \sqrt{x}$

X	Y
0	0
4	2
9	3

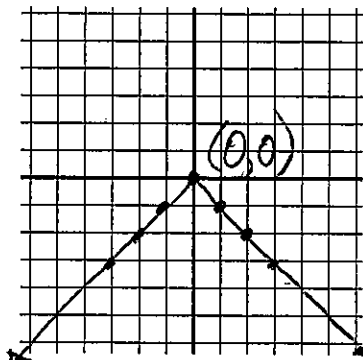


For #5-8, use your calculator to copy a sketch of each graph. Label any key points such as vertices.

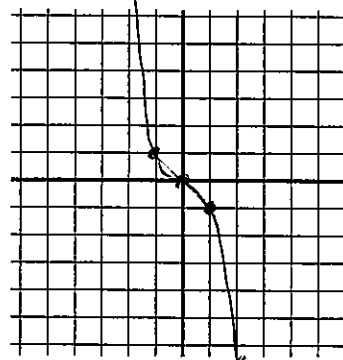
5) $y = -x^2$



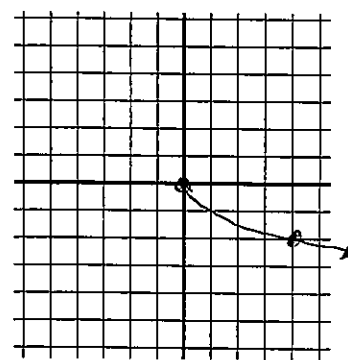
6) $y = -|x|$



7) $y = -x^3$



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



1. 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.

$+f(x)$ is a reflection about the x -axis.

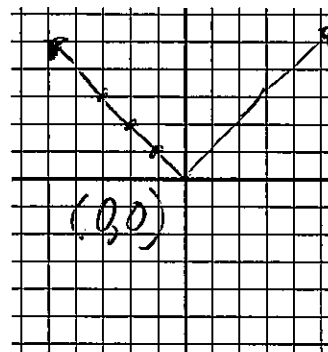
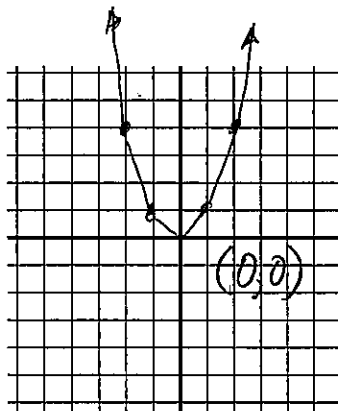
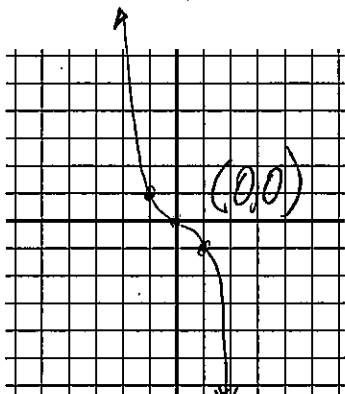
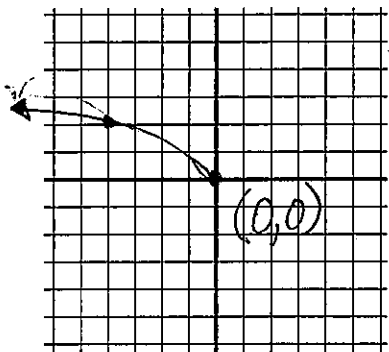
Use your calculator to copy a sketch of each graph. Label any key points such as vertices.

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

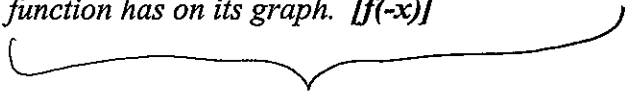
10) $y = (-x)^3$

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. [$f(-x)$]



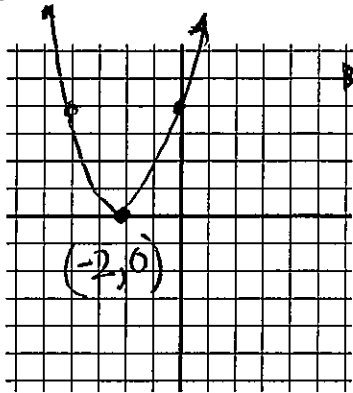
Reflection about y -axis

Think about your parent graph \rightarrow Now you are using negative x values.

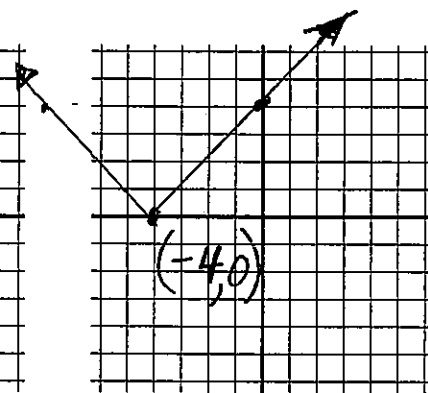


Use your calculator to copy a sketch of each graph. Label any key points such as vertices.

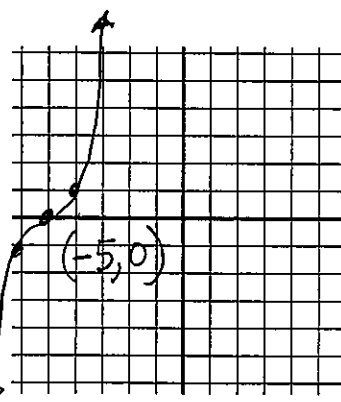
3) $y = (x+2)^2$



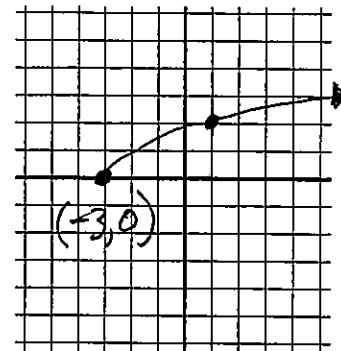
14) $y = |x+4|$



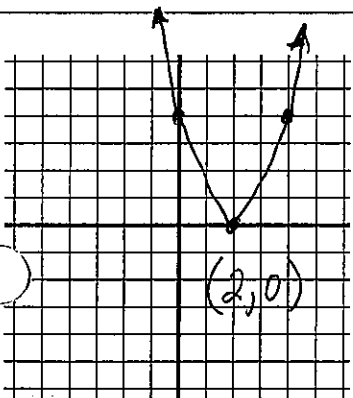
15) $y = (x+5)^3$



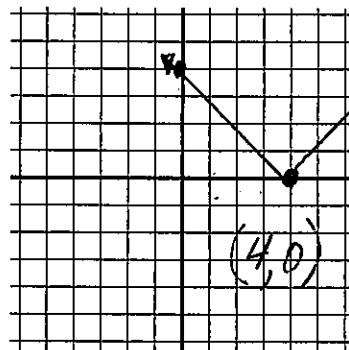
16) $y = \sqrt{x+3}$



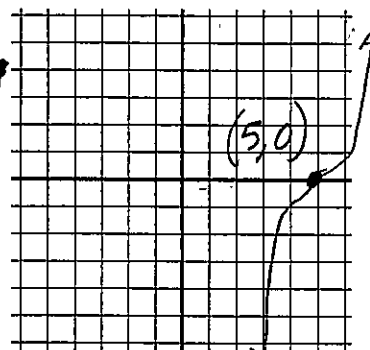
17) $y = (x-2)^2$



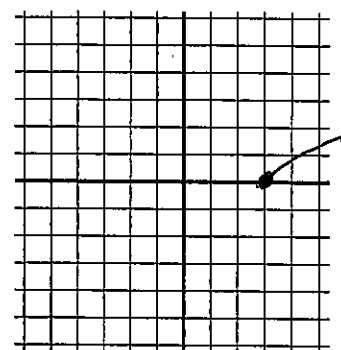
18) $y = |x-4|$



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 along the x -axis.

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

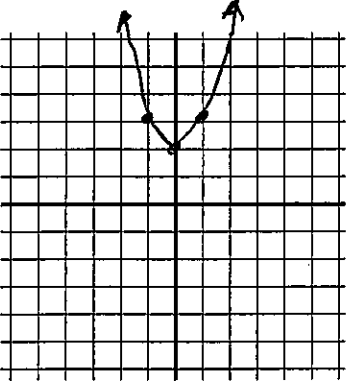
Tip: In order for $x+c=0$, x must be negative, meaning move left.

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

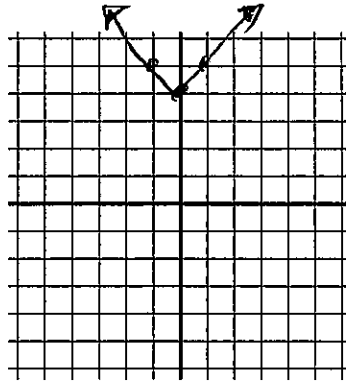
Tip: In order for $x-c=0$, x must be positive, meaning move right.

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

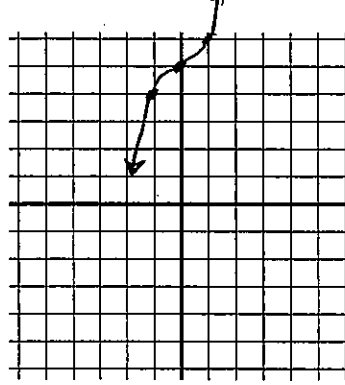
21) $y = x^2 + 2$



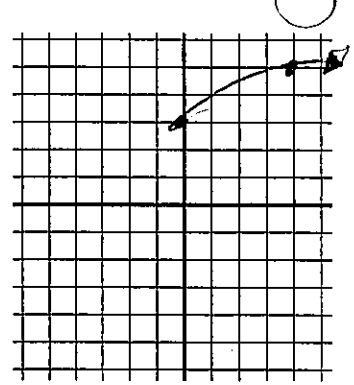
22) $y = |x| + 4$



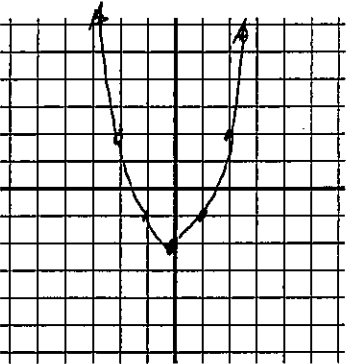
23) $y = x^3 + 5$



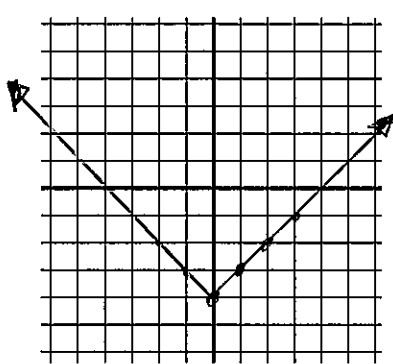
24) $y = \sqrt{x} + 3$



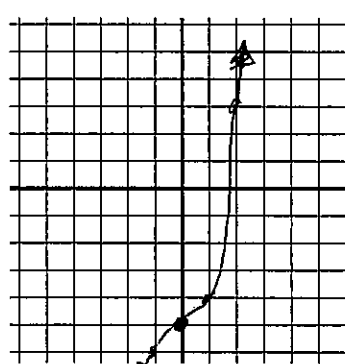
25) $y = x^2 - 2$



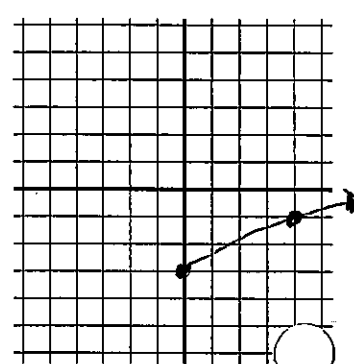
26) $y = |x| - 4$



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 along the y-axis (\updownarrow)
 $f(x) + c$ 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

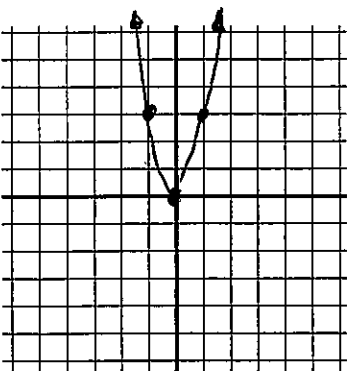
32) $y = \sqrt{x}$

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.

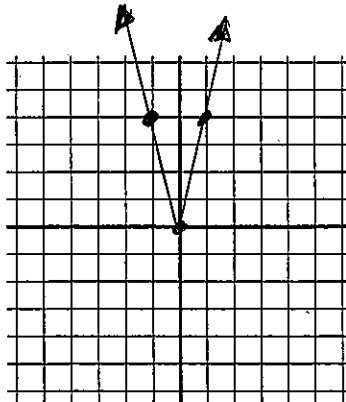
33) $y = 3x^2$

x	y
-1	3
0	0
1	3
2	12



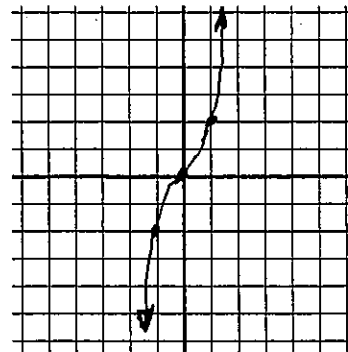
34) $y = 4|x|$

x	y
-1	4
0	0
1	4
2	8



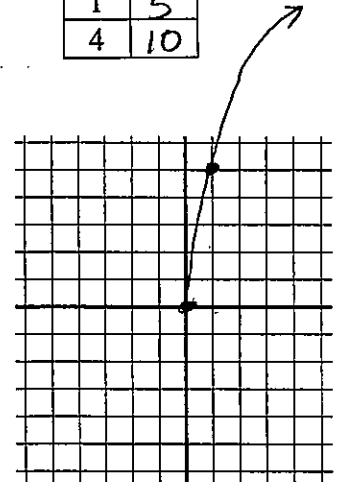
35) $y = 2x^3$

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 $|c| > 1$. (C makes y values \uparrow multiple times)

A VERTICAL STRETCH

The effect on the parent graph is that it makes the

graph narrower;

How? Look at $cf(x)$ as "y" multiplied by "c".

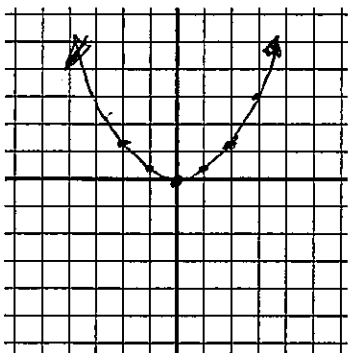
Since $|c| > 1$, y increases.

If y increases, the graph is stretched up/down.

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.

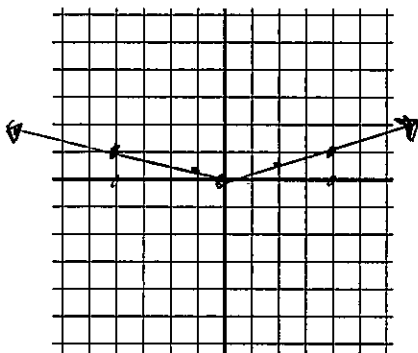
41) $y = \frac{1}{3}x^2$

x	y
-1	$\frac{1}{3}$
0	0
1	$\frac{1}{3}$
2	$\frac{4}{3}$



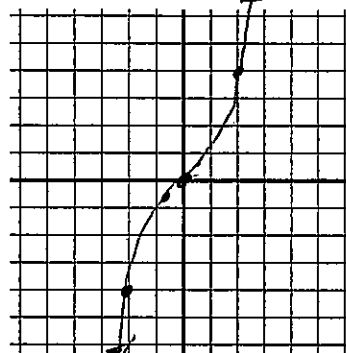
42) $y = \frac{1}{4}|x|$

x	y
-1	$\frac{1}{4}$
0	0
1	$\frac{1}{4}$
2	$\frac{1}{2}$



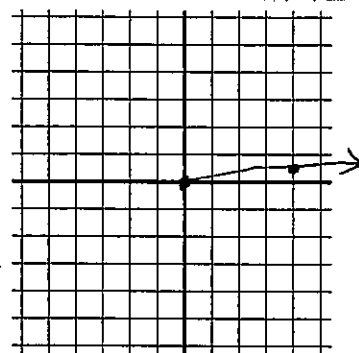
43) $y = \frac{1}{2}x^3$

x	y
-1	$-\frac{1}{2}$
0	0
1	$\frac{1}{2}$
2	4



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

x	y
-1	-
0	0
1	$\frac{1}{5}$
4	$\frac{2}{5}$



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 $|c| < 1$. (c is a fraction of y values)

A VERTICAL SHRINK

The effect is that it makes the parent graph wider.
 $cf(x)$: when $|c| < 1$, " c " multiplied with " y " causes y to decrease. For example:

if $c = \frac{1}{2}$,

4	$\frac{1}{2} \cdot 4$
1	$\rightarrow \frac{1}{2}$
2	$\rightarrow 1$
3	$\rightarrow 1\frac{1}{2}$

This results in the graph being compressed.

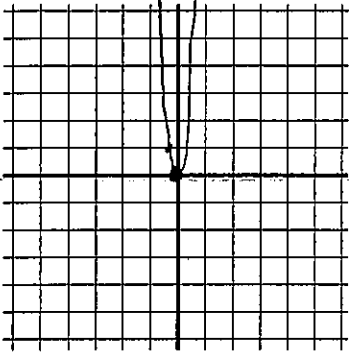
Fill in the table of values for the given function and compare them to the corresponding tables in numbers 29 - 32. Use your calculator to copy a sketch of each graph.

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

y grows faster

x	y
-1	9
0	0
$\frac{1}{3}$	1
1	9

2 36

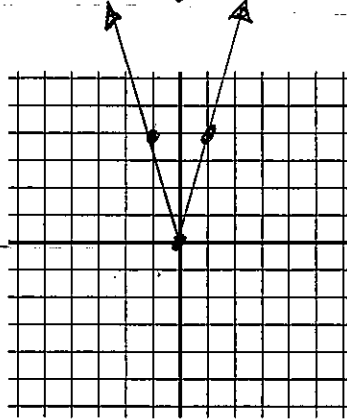


50) $y = |4x|$

same

x	y
-1	4
0	0
$\frac{1}{2}$	2
1	4

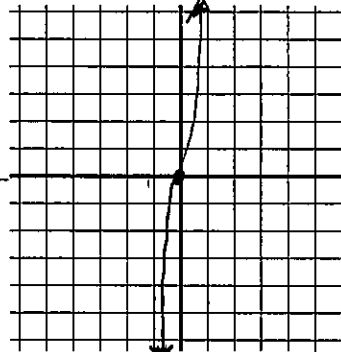
2 8



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

y grows faster

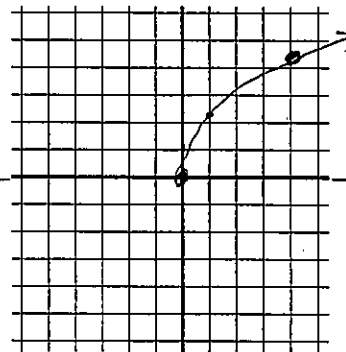
x	y
-1	-8
0	0
1	8
2	64



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

$f(cx)$ for the following situation: $f(cx)$ when $|c| > 1$.

Horizontal situations are counter-intuitive.

A HORIZONTAL SHRINK

For $f(cx)$: if $|c| > 1$, it causes x to decrease; therefore compress horizontally, like pushing in an accordion.

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

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

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

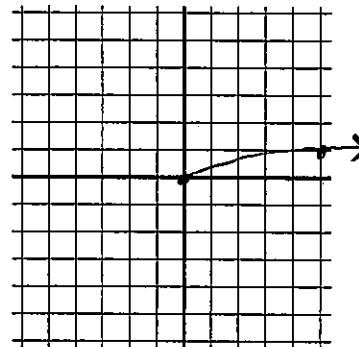
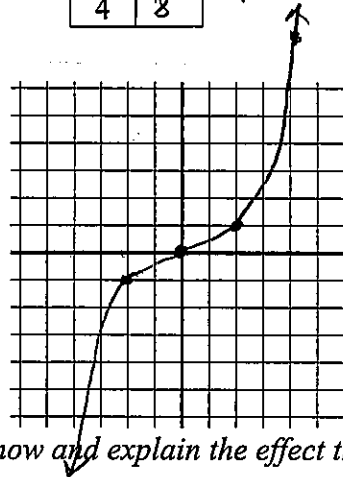
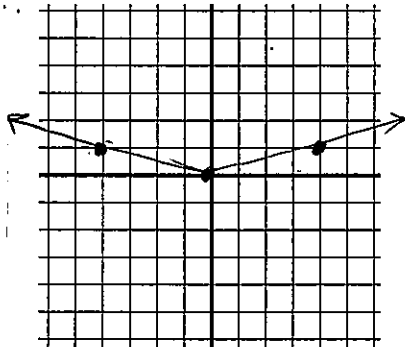
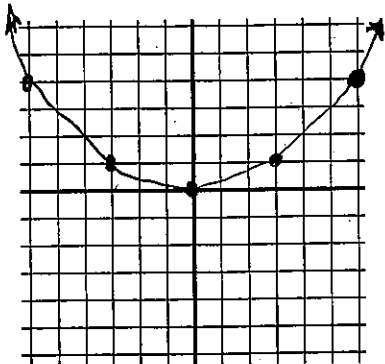
48
~~50~~ $y = \sqrt{\frac{1}{5}x}$

x	y
-3	1
0	0
3	1
6	4

x	y
-4	1
0	0
4	1
8	2

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

x	y
-5	1
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 $|c| < 1$.

Again, counter-intuitive, causes x to increase.

A HORIZONTAL STRETCH