Day7-MCR3U

Name:______________________________

Date:______________________________

Part 5: Exploring Vertical Stretches: y = a f(x)

A) Quadratic Function: $y = x^2$

Complete the following tables of values and use them to graph and label each function.

x	$y = x^2$
-2	4
-1	1
0	0
1	1
2	4

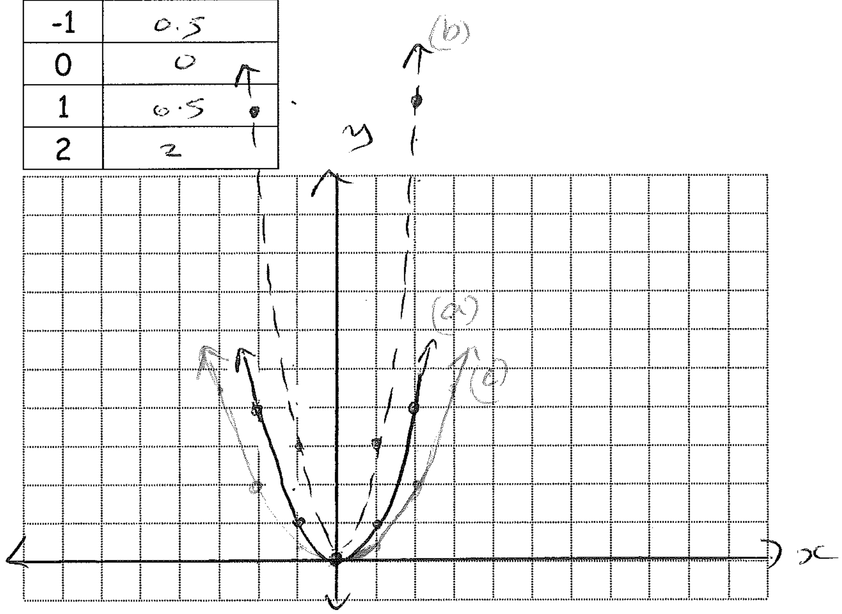
(a)

x	$y = 3x^2$
-2	12
-1	3
0	0
1	3
2	12

(b)

x	$y = \frac{1}{2}x^2$
-2	2
-1	0.5
0	0
1	0.5
2	2

(c)



Compare each function to the first function, $y = x^2$. Notice the similarities and differences of the coordinates of the points.

(b) vertically stretched by a factor of 3 [y x 3]

(c) vertically compressed by a factor of $\frac{1}{2}$ [$y \times \frac{1}{2}$]

B) Square Root Function: $y = \sqrt{x}$

Complete the following tables of values and use them to graph and label each function.

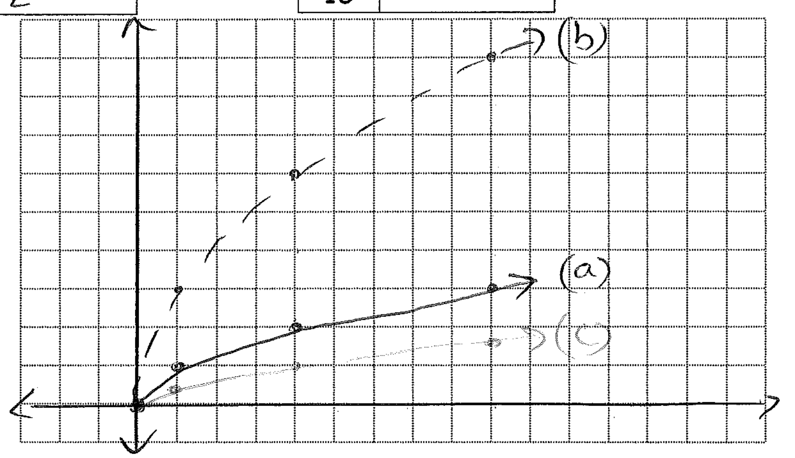
x	$y = \sqrt{x}$
0	0
1	1
4	2
9	3
16	4

(a)

x	$y = 3\sqrt{x}$
0	0
1	3
4	6
9	9
16	12

(b)

x	$y = \frac{1}{2}\sqrt{x}$
0	0
1	0.5
4	1
9	1.5
16	2



Compare each function to the first function, $y = \sqrt{x}$. Notice the similarities and differences of the coordinates of the points.

(b) vertically stretched by a factor of 3 [y x 3]

(c) vertically compressed by a factor of $\frac{1}{2}$ [$y \times \frac{1}{2}$]

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C) Reciprocal Function: $y = \frac{1}{x}$

Complete the following tables of values and use them to graph and label each function.

x	$y = \frac{1}{x}$
-4	-0.25
-1	-1
$-\frac{1}{4}$	-4
$\frac{1}{4}$	4
1	1
4	0.25

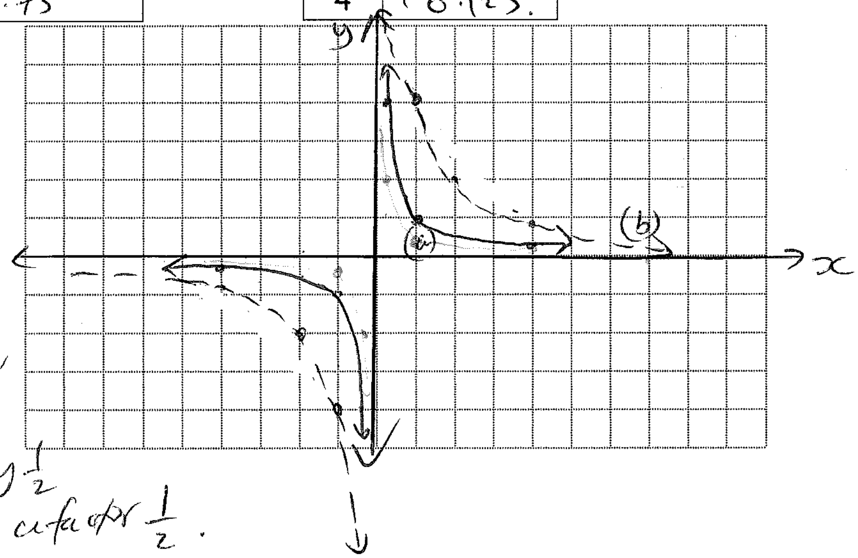
(a)

x	$y = \frac{3}{x}$
-4	-0.75
-1	-3
$-\frac{1}{4}$	-12
$\frac{1}{4}$	12
1	3
4	0.75

(b)

x	$y = \frac{1}{2x}$
-4	-0.125
-1	-0.5
$-\frac{1}{4}$	-2
$\frac{1}{4}$	2
1	+0.5
4	+0.125.

(c)



Compare each function to the first function, $y = \frac{1}{x}$. Notice the similarities and differences of the coordinates of the points.

(b) y-values multiplied by 3
vertically stretched by a factor of 3.

(c) y-values being multiplied by $\frac{1}{2}$
vertically compressed by a factor $\frac{1}{2}$.

SUMMARY

If y = f(x) is transformed to $y = af(x)$, where a is a number, describe the transformation:

1. If a > 1, then the graph will be vertically stretched by a factor of a.
2. If 0 < a < 1, then the graph will be vertically compressed by a factor of a.
3. Any point (x, y) under this transformation becomes (x , ay).

multiply 'y' coordinates by 'a'.

for example

$(1, 3) \to (1, 3a)$

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Part 6: Exploring Horizontal Stretches: y = f(kx)

A) Quadratic Function: $y = x^2$

Complete the following tables of values and use them to graph and label each function.

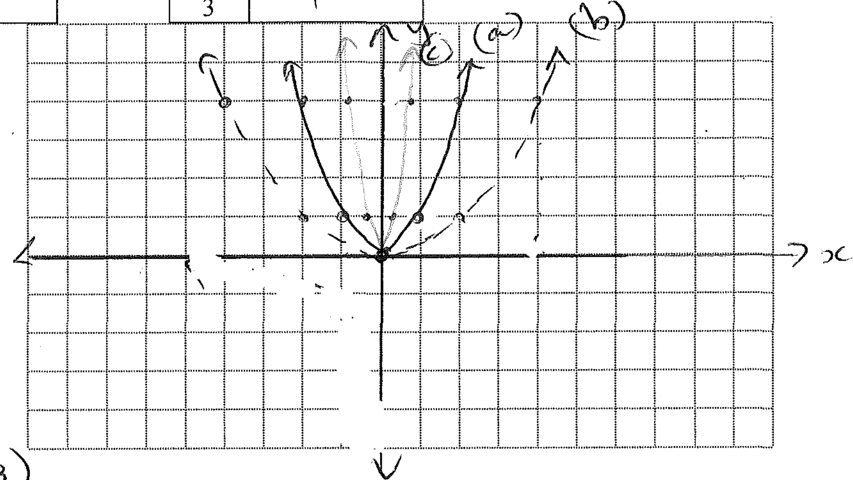
x	$y = x^2$
-2	4
-1	1
0	0
1	1
2	4

(a) ~

x	$y = (\frac{1}{2}x)^2$
-4	4
-2	1
0	0
2	1
4	4

(b) - -

x	$y = (3x)^2$
$-\frac{2}{3}$	4
$-\frac{1}{3}$	1
0	0
$\frac{1}{3}$	1
$\frac{2}{3}$	4



Compare each function to the first function, $y = x^2$. Notice the similarities and differences of the coordinates of the points.

(b) horizontally stretched by a factor of 2 $(x \times 2)$

(c) horizontally compressed by a factor of 1/3 $(x \div 3)$

B) Square Root Function: $y = \sqrt{x}$

Complete the following tables of values and use them to graph and label each function.

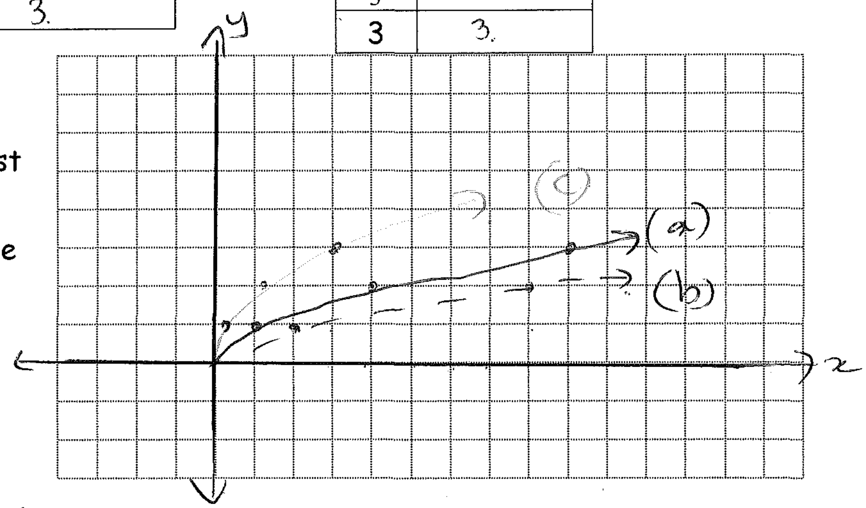
x	$y = \sqrt{x}$
0	0
1	1
4	2
9	3
16	4

(a) ~

x	$y = \sqrt{\frac{x}{2}}$
0	0
2	1
8	2
18	3.

(b) - -

x	$y = \sqrt{3x}$
0	0
$\frac{1}{3}$	1
$\frac{4}{3}$	2
3	3.



Compare each function to the first function, $y = \sqrt{x}$. Notice the similarities and differences of the coordinates of the points.

(b) horizontally stretched by a factor of 2 $(x \times 2)$

(c) horizontally compressed by a factor of 1/3. $[x \div 3]$.

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C) Reciprocal Function: $y = \frac{1}{x}$

Complete the following tables of values and use them to graph and label each function.

x	$y = \frac{1}{x}$
-4	-0.25
-1	-1
$-\frac{1}{4}$	-4
$\frac{1}{4}$	4
1	1
4	0.25

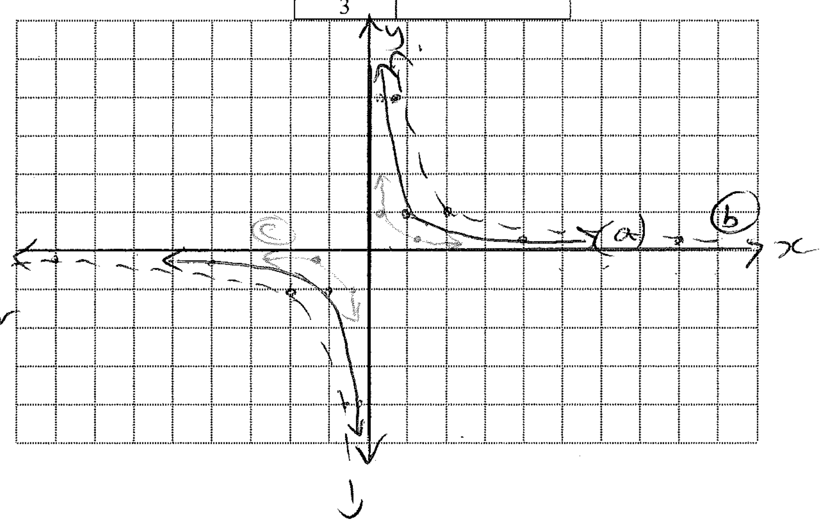
(a)

x	$y = \frac{2}{x}$
-8	-0.25
-2	-1
$-\frac{1}{2}$	-4
$\frac{1}{2}$	4
2	1
8	0.25

(b)

x	$y = \frac{1}{3x}$
$-\frac{4}{3}$	-0.25
$-\frac{1}{3}$	-1
$-\frac{1}{12}$	-4
$\frac{1}{12}$	4
$\frac{1}{3}$	1
$\frac{4}{3}$	0,25

(c)



Compare each function to the first function, $y = \frac{1}{x}$. Notice the similarities and differences of the coordinates of the points.

(a) horizontally stretched by a factor of 2 $(x \times 2)$

(b) horizontally compressed by a factor of 1/3 $(x \div 3)$

SUMMARY

If y = f(x) is transformed to $y = f(kx)$, where k is a number, describe the transformation:

1. If k > 1, then horizontally compressed by a factor of 1/k
2. If 0 < k < 1, then horizontally stretched by a factor of 1/k.
3. Any point (x, y) under this transformation becomes ($\frac{x}{k}$, y).

Homework: p. 58 # 1,2bcd,(4-8)abc