Transformations of $\frac{1}{x}$ - Worksheet

SOLUTIONS

MCR3U

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Key points of $y = \frac{1}{x}$

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

1) State the transformations to the parent function $f(x) = \frac{1}{x}$ in the order that you would do them.

a) $g(x) = \frac{2}{3(x-1)}$

- vertical stretch bafo 2
- horizontal compression bafo $\frac{1}{3}$
- shift right 1 unit

b) $g(x) = \frac{-1}{x+2} - 1$

- vertical reflection
- shift left 2 units
- shift down 1 unit

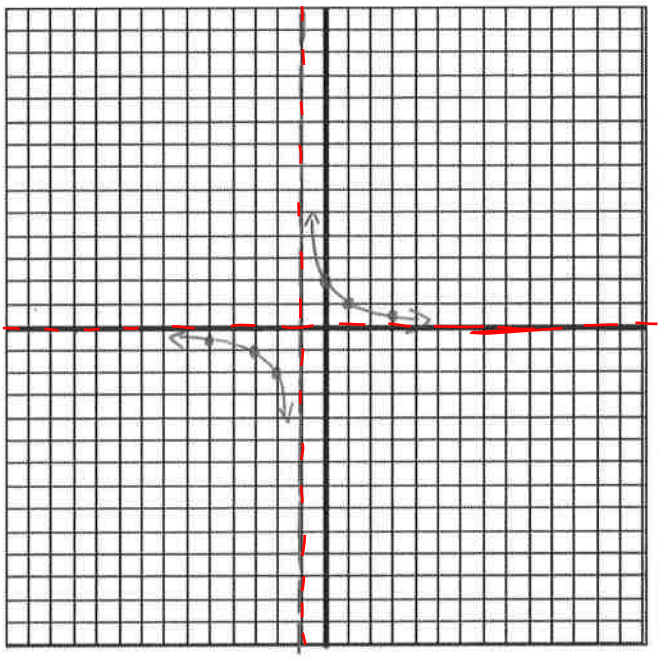
c) $g(x) = \frac{1}{\frac{1}{2}(x+1)} - 0.5$

- horizontal stretch bafo 2
- shift left 1 unit
- shift down 0.5 units

2) Describe the transformations to the parent function $f(x) = \frac{1}{x}$ in order, make a table of values of image points, write the equation of the transformed function and graph it.

a) $g(x) = f[\frac{1}{2}(x+1)]$

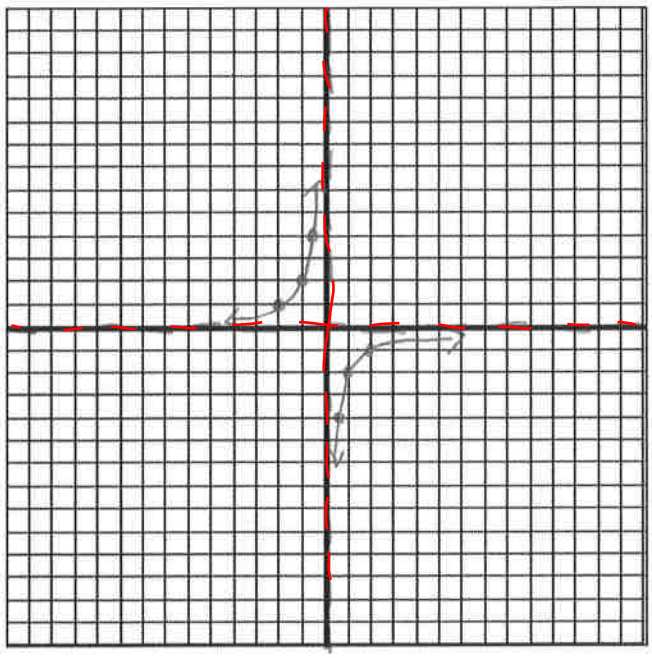
b) $g(x) = 2f(-x)$



- horizontal stretch bafo 2 $(2x)$
- shift left 1 unit $(x+1)$

$f(x)$	$g(x)$ $2x-1$	y
$(-2, -0.5)$	-5	-0.5
$(-1, -1)$	-3	-1
$(-0.5, -2)$	-2	-2
$(0, \text{und})$	-1	und.
$(0.5, 2)$	0	2
$(1, 1)$	1	1
$(2, 0.5)$	3	0.5

$$g(x) = \frac{1}{\frac{1}{2}(x+1)}$$



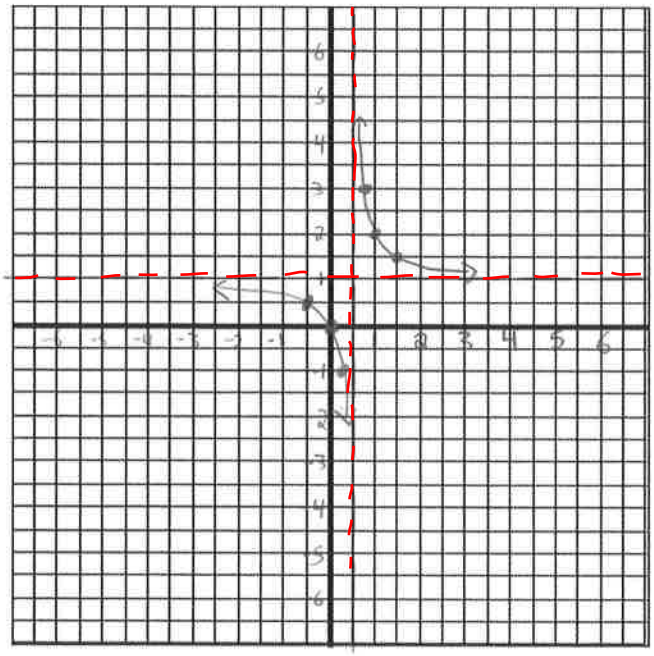
- vertical stretch bafo 2 $(2y)$
- horizontal reflection $(-x)$

$f(x)$	$g(x)$ $-x$	$2y$
$(-2, -0.5)$	2	-1
$(-1, -1)$	1	-2
$(-0.5, -2)$	0.5	-4
$(0, \text{und})$	0	und
$(0.5, 2)$	-0.5	4
$(1, 1)$	-1	2
$(2, 0.5)$	-2	1

$$g(x) = \frac{2}{-x}$$

c) $g(x) = -f[-2(x - 0.5)] + 1$

- vertical reflection $(-y)$
- horizontal reflection $(-x)$
- horizontal compression by a $\frac{1}{2}$ $\left(\frac{x}{\frac{1}{2}}\right)$
- shift right 0.5 units $(x-0.5)$
- shift up 1 unit $(y+1)$



f(x)

(-2, -0.5)
(-1, -1)
(-0.5, -2)
(0, und.)
(0.5, 2)
(1, 1)
(2, 0.5)

$\frac{x}{\frac{1}{2}} + 0.5$	$-y+1$
1.5	1.5
1	2
0.75	3
0.5	und.
0.25	-1
0	0
-0.5	0.5

3) Use the description to write the transformed function, *g(x)*.

a) The parent function, $f(x) = \frac{1}{x}$, is compressed vertically by a factor of $\frac{1}{3}$ and then translated (shifted) 3 units left.

$a = \frac{1}{3}$

$d = -3$

$g(x) = \frac{\frac{1}{3}}{x+3}$ OR $\frac{1}{3(x+3)}$

b) The parent function, $f(x) = \frac{1}{x}$, is reflected over the x-axis, stretch horizontally by a factor of 3 and then translated 1 unit left and 4 units down.

$a = -1$

$k = \frac{1}{3}$

$d = -1$

$c = -4$

$g(x) = \frac{-1}{\frac{1}{3}(x+1)} - 4$ OR $\frac{-3}{x+1} - 4$