

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

MCR3U

ensen

SOLUTIONS

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 by a factor of 2
- horizontal compression by a factor of  $\frac{1}{3}$
- shift right 1 unit

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

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

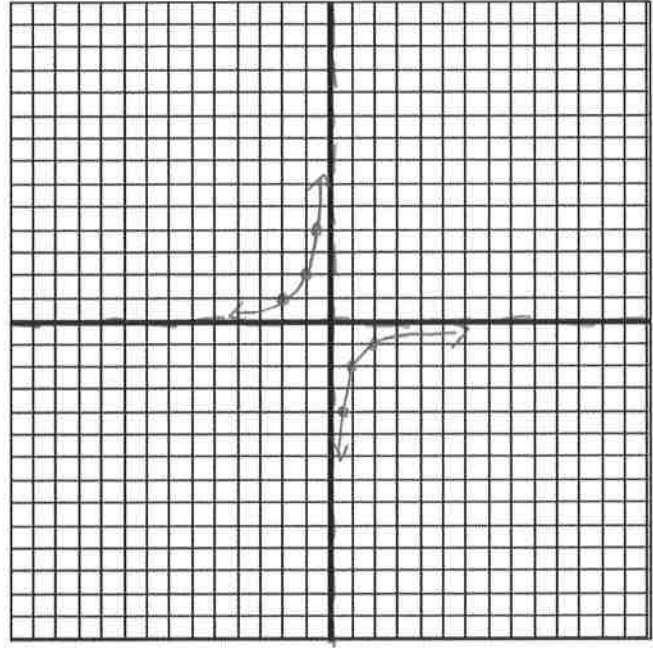
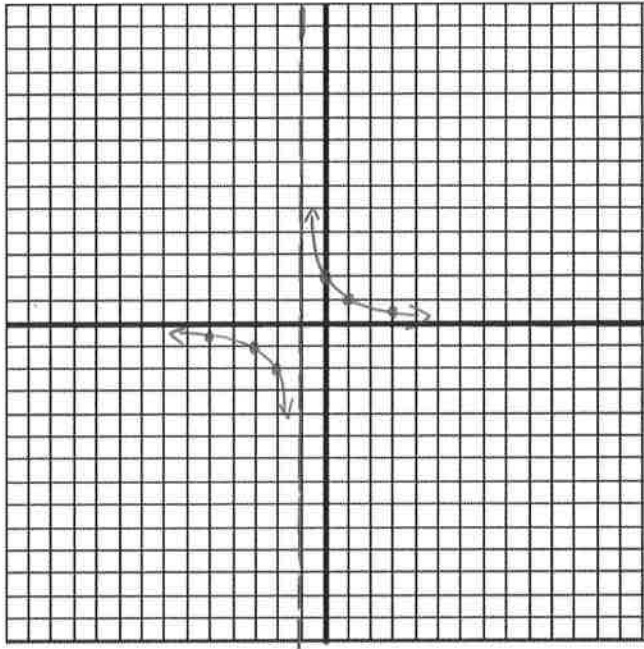
c)  $g(x) = \frac{1}{\frac{1}{2}(x+1)} - 0.5$

- horizontal stretch by a factor of 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 factor 2 ( $2x$ )
- shift left 1 unit ( $x-1$ )

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

$f(x)$	$g(x)$
$x$	$y$
$(-2, -0.5)$	$(-5, -0.5)$
$(-1, -1)$	$(-3, -1)$
$(-0.5, -2)$	$(-2, -2)$
$(0.5, 2)$	$(0, 2)$
$(1, 1)$	$(1, 1)$
$(2, 0.5)$	$(3, 0.5)$

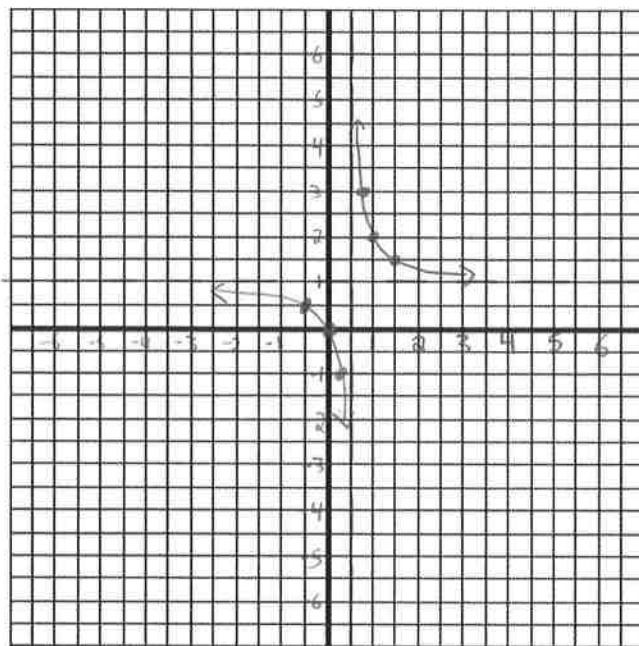
$f(x)$	$g(x)$
$x$	$2y$
$(-2, -0.5)$	$(2, -1)$
$(-1, -1)$	$(1, -2)$
$(-0.5, -2)$	$(0.5, -4)$
$(0.5, 2)$	$(-0.5, 4)$
$(1, 1)$	$(-1, 2)$
$(2, 0.5)$	$(-2, 1)$

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

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

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

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



$f(x)$

- $(-2, -0.5)$
- $(-1, -1)$
- $(-0.5, -2)$
- $(0.5, 2)$
- $(1, 1)$
- $(2, 0.5)$

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

$a = -1$

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

$d = -4$

$c = -1$

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

