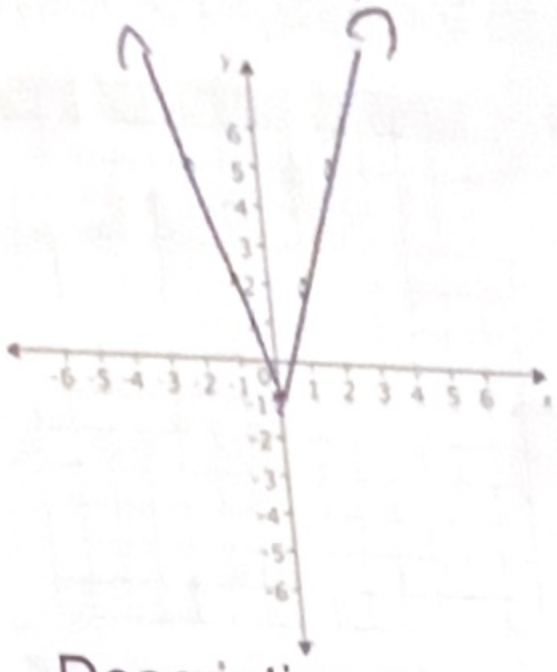
ransformations of Functions

Name: _____

Hour:____ Date: _____

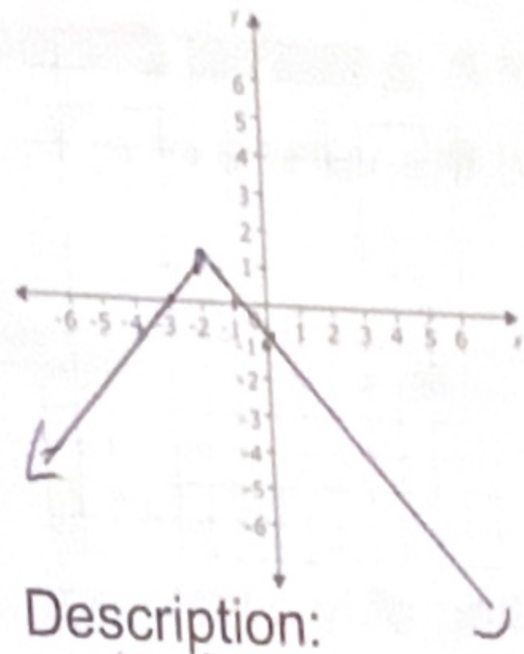
ph the following & describe how they compare to the parent graph $f(x) = |x|$.

a) $g(x) = 3|x| - 1$



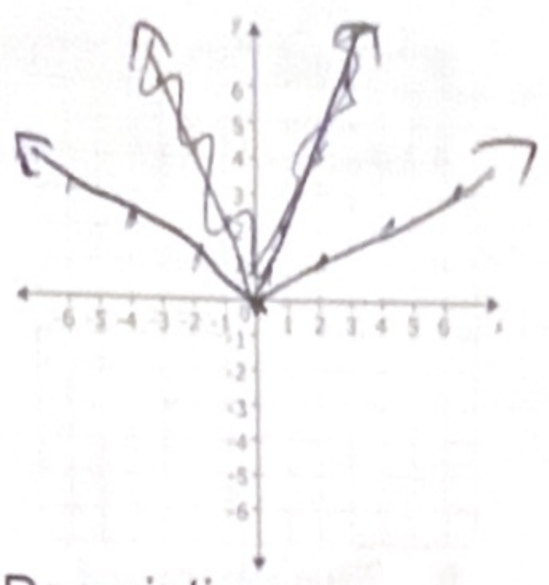
Description:
Vert dilation ; 3
Vert translation down −1
1 down

b) $g(x) = -|x + 2| + 1$



Description:
reflect x
V. translation +1
H. tran −2

c) $g(x) = |2x|$



Description:
Hr
V. dilat by $\frac{1}{2}$

. Describe how each function g(x) compares to its parent graph $f(x) = \sqrt{x}$ without graphing. State the domain and range of g(x).

a) $g(x) = \sqrt{x-1} + 3$

H. tran +1
V. tran +3
D: $[1, \infty)$
R: $[3, \infty)$

$[0, \infty)$
$[0, \infty)$

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

H, refl y
H, tran +2
D: $(-\infty, +2]$
R: $[0, \infty)$

c) $g(x) = 4\sqrt{x} + 5$

V, dil 4
V. tran +5
D: $[0, \infty)$
R: $[5, \infty)$

3. Let g be a function that is a transformation of the function f such that $g(x) = \frac{1}{2}f(x+2) + 5$. Describe the transformations of the function f that result with the function g.

H. tran −2
V. dil $\frac{1}{2}$
V. tran +5

4. Let k be a function that is a transformation of the function h such that $k(x) = 4h\left(\frac{x}{3}\right) - 1$. Describe the transformations of the function h that result with the function k.

H, dil 3
V. dil 4
V. tran −1

5. Let r be a function that is a transformation of the function p such that $r(x) = -3p(4x)$. Describe the transformations of the function p that result with the function r.

~~H. refl $\frac{1}{4}$~~ H. refl $\frac{1}{4}$
V. dil 3
V. refl across x

6. Let n be a function that is a transformation of the function m such that $n(x) = 5$
Describe the transformations of the function m that result with the function n.

H. refl y

V. reflect x

V. tran +5

7. The function k is constructed by applying three transformations to the graph of h in
a horizontal dilation by a factor of 4, a vertical dilation by a factor of $\frac{1}{2}$, and a vertical tra
3 units. If $k(x) = ah(bx) + c$, find the values of a, b, and c.

$\frac{1}{2}\left(\frac{x}{4}\right) + 3$

$a = \frac{1}{2}$ $b = \frac{1}{4}$ $c = 3$

$k(x) = \frac{1}{2}\, h\left(\frac{1}{4}x\right) + 3$

8. The graph of $y = f(x)$, consisting of two line segments and a semicircle, is shown for
$-4 \le x \le 3$. Sketch a graph of h on the same axes where $h(x) = 2f(x + 1)$

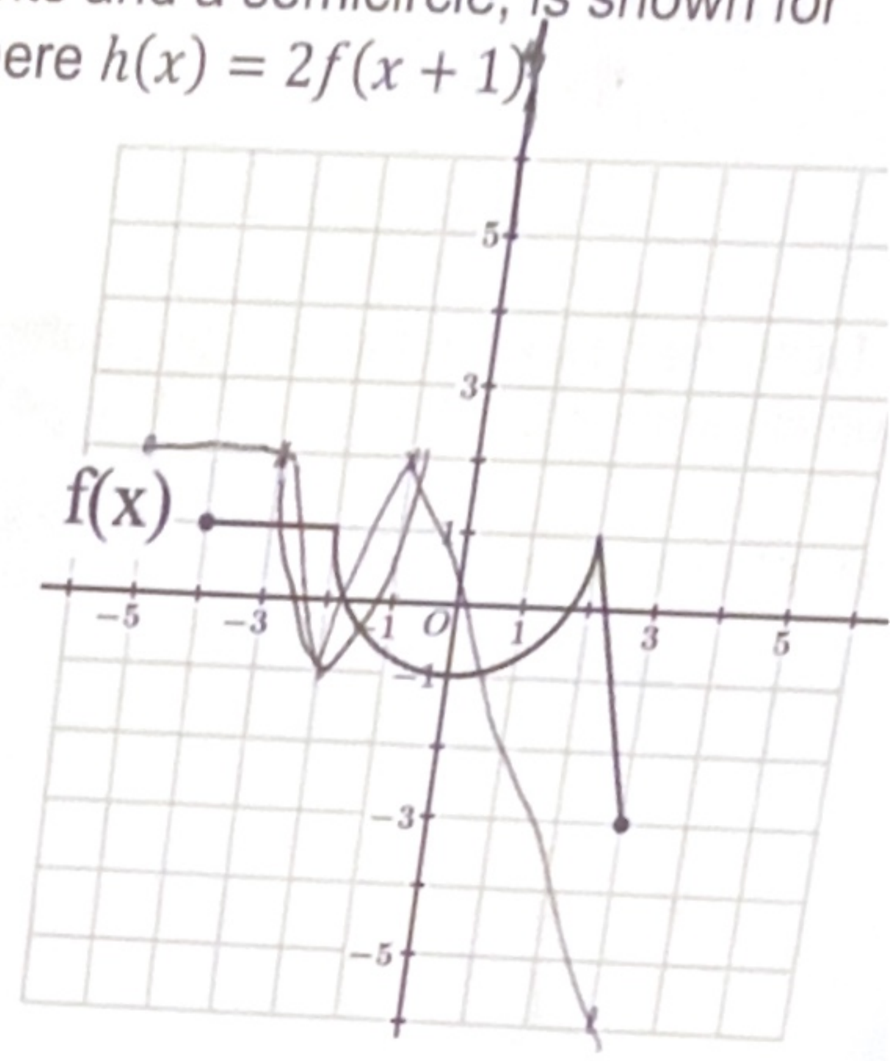
Transformation(s):

H, tran -1

V. dil 2

Graph:

x	
-5	2
-3	2
-1	-2
1	2
3	-6



Domain of f(x):

[-4, 3]

Range of f(x):

[-3, 1]

Domain of g(x):

[-5, 6]

Range of g(x):

[-6, 2]

9. The graph of $y = f(x)$, consisting of two line segments and a semicircle, is shown for
$-4 \le x \le 3$. Sketch a graph of k on the same axes above where $k(x) = -2f(x) + 1$.

Transformation(s):

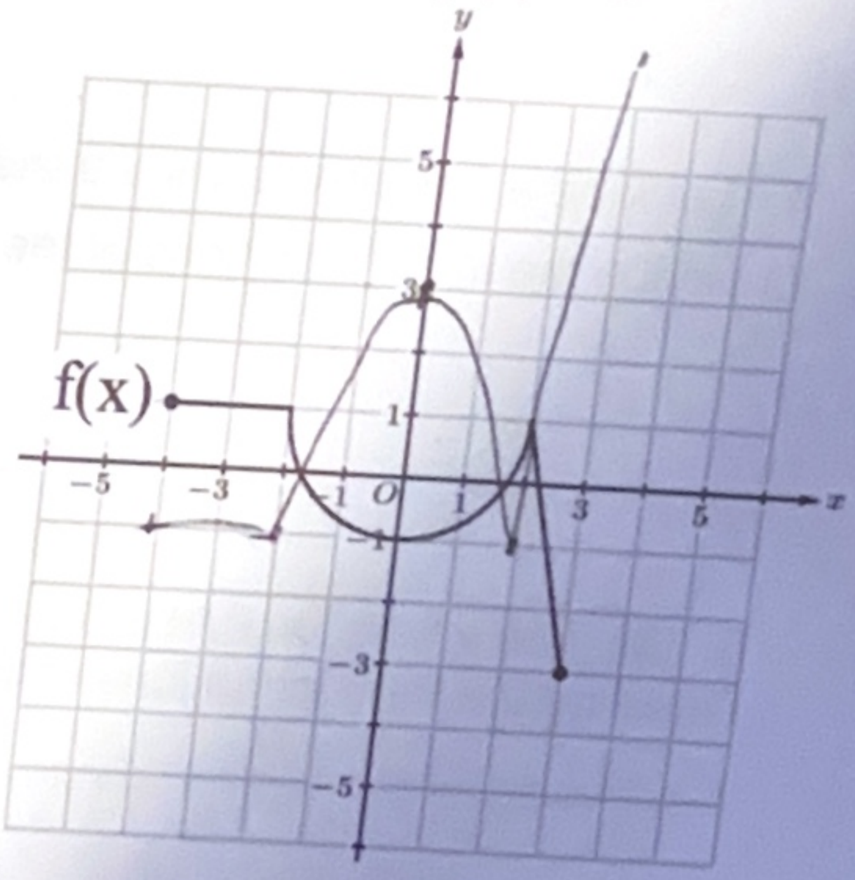
V. refl x

V. dil 2

V. tran +1

Graph:

x	
-4	1
-2	1
0	-1
2	1
3	-3



Domain of f(x):

[-4, 3]

Range of f(x):

[-3, 1]

Domain of g(x):

[-4, 3]

Range of g(x):

[-1, 7]

$-2x + 1$

-1

-1

3

-1

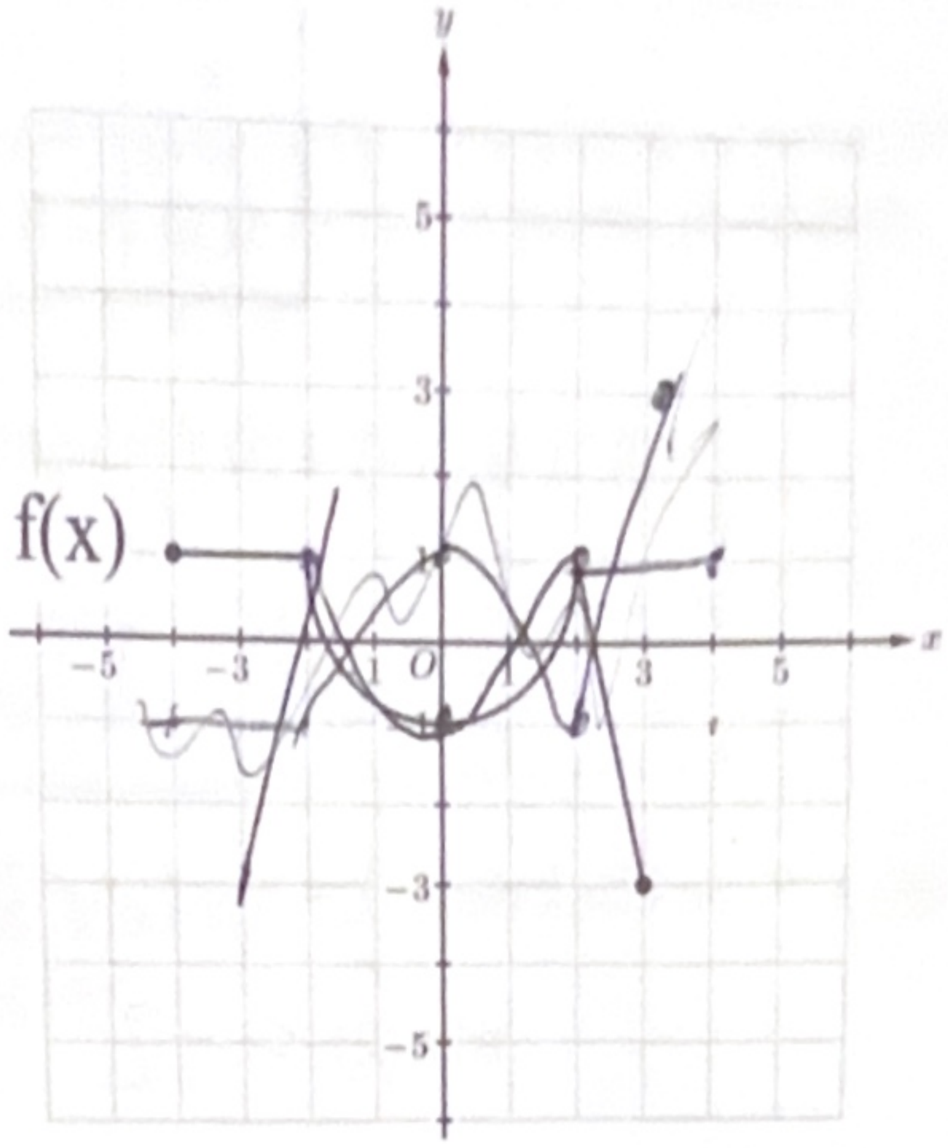
$+1$

graph of $y = f(x)$, consisting of two line segments and a semicircle, is shown for ≤ 3. Sketch a graph of p on the same axes above where $p(x) = f(-x)$.

rmation(s):

H, ref l x

Graph:



n of f(x):

-4,4]

Range of f(x):

[-3, 1]

ain of g(x):

4,3]

Range of g(x):

[-1, 2]

-3,4]

[-3,1]

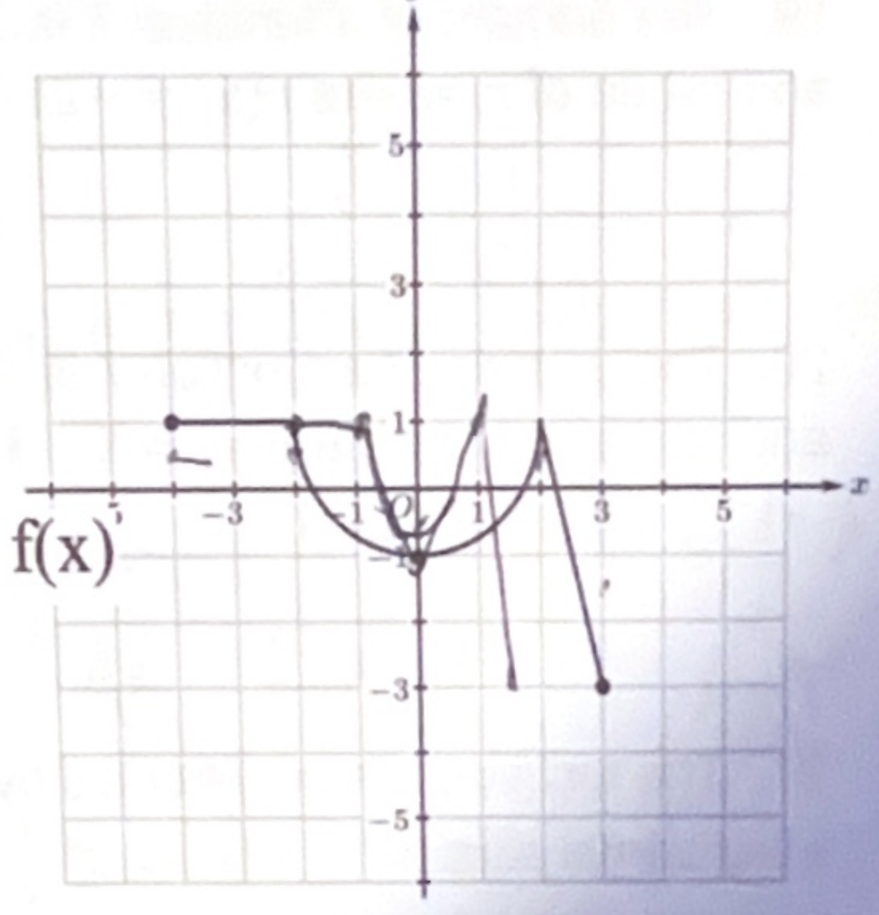
. The graph of $y = f(x)$, consisting of two line segments and a semicircle, is shown for $-4 \leq$ ≤ 3. Sketch a graph of m on the same axes above where $m(x) = f(2x)$.

ransformation(s):

H, dil $\frac{1}{2}$

Graph:

2x | y



Domain of f(x):

[-4, 3]

Range of f(x):

[-3, 1]

Domain of g(x):

[-2, 1.5]

Range of g(x):

[-3, 1]

12. Let k be a function that is a transformation of the function h such that $k(x) = 2h(3x)$. Describe the transformations of the function h that result with the function k.

13. Let f be a function that is a transformation of the function g such that $f(x) = g(x - 2) + 4$. Describe the transformations of the function g that result with the function f.

14. Let p be a function that is a transformation of the function m such that $p(x) = -m\left(\frac{x}{2}\right) - 3$. Describe the transformations of the function m that result with the function p.

15. Let r be a function that is a transformation of the function n such that $r(x) = n(-x) + 1$. Describe the transformations of the function n that result with the function r.

The table below gives values for a function f at selected values of x.

x	-20	-10	-5	0	2	4	6
$f(x)$	8	-3	2	6	-4	-1	9

16. Let $g(x) = 2f\left(\frac{x}{2}\right) - 3$. Find the following values.

a) $g(-10) = 1$ (-5)

b) $g(0) = 9$

17. Let $h(x) = 4 - f(x-2)$. Find the following values.

a) $h(2) = -2$ (0)

b) $h(4) = 8$ (2)

18. The domain of a function h is $-4 \le x \le 7$ and the range of h is $-6 \le y \le 0$. Find the do
and range of g, where $g(x) = 3h(x-2)$.

x+2 -2 D: [-2,9] R: [-18,0]

19. The domain of a function k is $2 \le x \le 14$ and the range of k is $-3 \le y \le 2$. Find the doma
and range of r, where $r(x) = -2k(2x)$.

$\frac{x}{2}$ D: [1,7]

-2y R: [-4,6]

20. The domain of a function f is $-6 \le x \le 4$ and the range of f is $-10 \le y \le 3$. Find the domai
and range of p, where $p(x) = 5 - 3f(2(x+1))$.

$\frac{x}{2}$ -1 -4 1 D: [-4,1]

5-3y 3 -4 R: [-4,3]

21. The function h is constructed by applying three transformations to the graph of f in this order: a horizontal dilation by a factor of $\frac{1}{2}$, a vertical dilation by a factor of 5, and a vertical translation by -7 units. If $h(x) = af(bx) + c$, find the values of a, b, and c.

5(2x)-7

a=5 c=-7 h(x) = 5f(2x)-7

b=2

22. The function k is constructed by applying three transformations to the graph of m in this order: a horizontal dilation by a factor of 3, a vertical dilation by a factor of $\frac{1}{4}$, and a vertical translation by 8 units. If $k(x) = am(bx) + c$, find the values of a, b, and c.

$\frac{1}{4}\left(\frac{1}{3}x\right)+8$

a=$\frac{1}{4}$

b=$\frac{1}{3}$ c=8 $k(x) = \frac{1}{4}f\left(\frac{1}{3}x\right)+8$

23. The function p is constructed by applying three transformations to the graph of g in this order: a horizontal translation by 4 units, a vertical dilation by a factor of 2, and a reflection over the x-axis. If $p(x) = ag(x+c)$, find the values of a and c.

-2(x-4)

a=-2 $p(x) = -2f(x-4)$

c=-4