C

Multiple Choice

1. Compared to the graph of the base function $f(x) = x^2$, the graph of the function $g(x) = x^2 - 9$ is translated
   A 9 units to the left
   B 9 units to the right
   C 9 units down
   D 9 units up

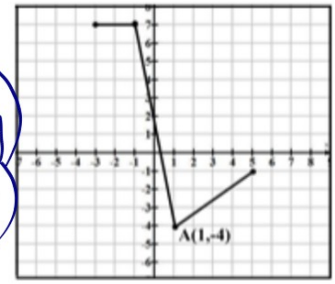
D9.

A

2. Given the graph of $f(x)$ shown below, what are the coordinates of point A if the transformed graph is represented by $y = f(x-2)$?
   A. (3,- 4)
   B. (-1, -4)
   C. (-1, -2)
   D. (3,-6)

$(x,y) \to (x+2, y)$

$(1,-4)$ $(3,-4)$



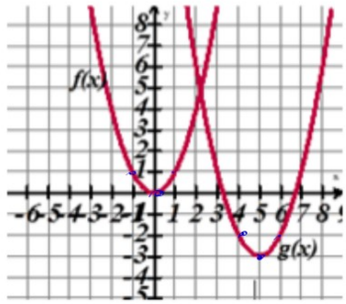
A

3. What is the equation of the transformed function, $g(x)$, after the transformations are applied to the graph of the base function $f(x) = x^2$,
   A. $g(x) = (x-5)^2 - 3$
   B. $g(x) = (x+3)^2 + 5$
   C. $g(x) = (x+3)^3 - 5$
   D. $g(x) = (x-5)^2 + 3$

VR – HR –
VS – HS –
→ VT -3 HT +5

x	y
-1	1
0	0
1	1

4	-2
5	-3
6	-2



V H V

$y = af(b(x-h)) + k$ ← up or Down

VS=a HS=1/b h or k

if a is - there is a VR (about the x-axis)

if b is negative there is a HR (about the y-axis)

A

4. The function $y = -f(x)$ represents a transformation of $f(x)$ that can best be described as

A a reflection in the x-axis
B a reflection in the x-axis and the y-axis
C a reflection in the y-axis
D a reflection in the line $y = x$

B

5. When a function is reflected in the y-axis, the coordinates of point (x, y) become

A $(x, -y)$
B $(-x, y)$
C $(-x, -y)$
D (x, y)

omit

6. What are the coordinates of the invariant point(s) when the function $y = |x| - 2$ is reflected in the y-axis?

A $(2, -2)$
B $(-2, 0)$ and $(2, 0)$
C $(0, -2)$
D $(0, 2)$

C

7. Which choice best describes the combination of transformations that must be applied to the graph of $y = f(x)$ to obtain the graph of $y = f(2x - 4)$?

A. a horizontal stretch by a factor of 2 and a horizontal translation of 2 units to the left

B. a horizontal stretch by a factor of $\frac{1}{2}$ and a horizontal translation of 4 units to the right

C. a horizontal stretch by a factor of $\frac{1}{2}$ and a horizontal translation of 2 units to the right

D. a horizontal stretch by a factor of -2 and a horizontal translation of 2 units to the right

$y = f(2(x-2))$

VR - HR -
VS HS x 1/2
VT HT R 2

A **8.** Which the following functions is the correct inverse for the function $f(x) = -\frac{9}{2}x + 6$?

A $f^{-1}(x) = -\frac{2}{9}x + \frac{4}{3}$

B $f^{-1}(x) = \frac{9}{2}x + \frac{4}{3}$

C $f^{-1}(x) = -\frac{2}{9}x - \frac{4}{3}$

D $f^{-1}(x) = \frac{9}{2}x - \frac{4}{3}$

$y = -\frac{9}{2}x + 6$

$x = -\frac{9}{2}y + 6$

$x - 6 = -\frac{9}{2}y$

$2x - 12 = -9y$

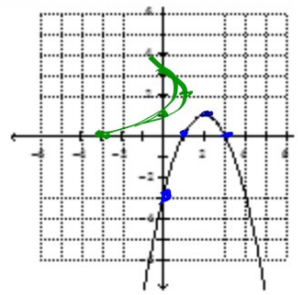
$\frac{2x}{-9} - \frac{12}{-9} = y$

$-\frac{2}{9}x + \frac{12}{9} = y$

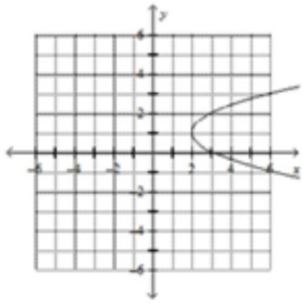
$-\frac{2}{9}x + \frac{4}{3} = y$

D

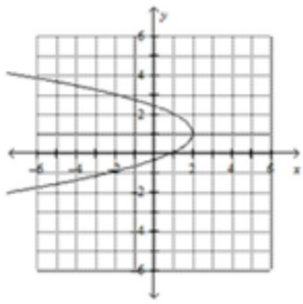
6 Which graph represents the inverse of the graph shown?



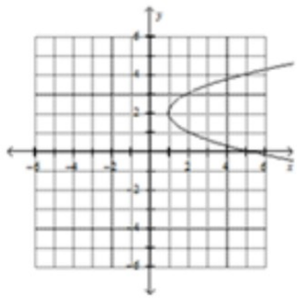
A



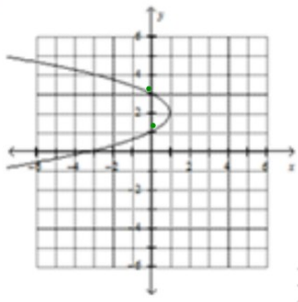
B

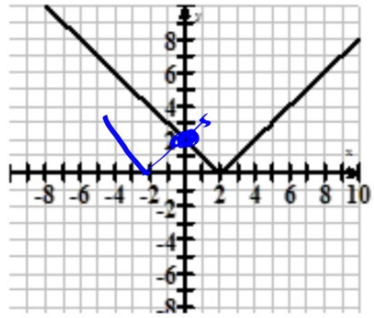


C



D





D

9. What are the coordinates of the invariant point(s) when the function $y = |x| - 2$ is horizontally reflected?

A (2, –2)
B (–2, 0) and (2, 0)
C (0, –2)
D (0, 2)

VR x
V S x
V T x

HR
H S x
H T x

(x, y) → (–x, y)

x	y
–1	3
0	2
1	1
2	0
3	1

x	y
1	3
0	2
–1	1
–2	0
–3	1

1. Suppose (-10,3) is the point of the graph of f(x), for each of the following state the mapping rule and name the image point

	Mapping Rule	Image Point (-10,3)
a. $y=-5f(x+9)+9$	$(x,y)\to(x-9,-5y+9)$	$(-19,-6)$
b. $y=f(-2(x+7))-3$	$(x,y)\to(-\frac{1}{2}x-7,y-3)$	$(-2,0)$
c. $y=\frac{1}{3}f(x)-8$	$(x,y)\to(x,\frac{1}{3}y-8)$	$(-10,-7)$
d. $y=-f(5x+15)-4$ $-f(5(x+3))-4$	$(x,y)\to(\frac{1}{5}x-3,-y-4)$	$(-5,-7)$
e. $y=f(\frac{1}{4}(x-2))+9$	$(x,y)\to(4x+2,y+9)$	$(-38,12)$

Name: _____

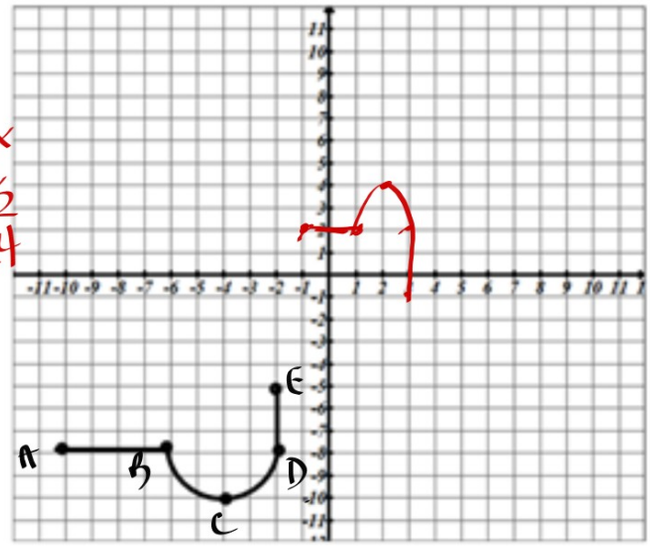
2. Given the graph of f(x), sketch the graph of the following functions, and state the domain and range for each:

$h(x) = -f(2(x-4))-6$ eq'n VR✓ HR× VS× HS½ VT6 HT4

$(x,y) \rightarrow (\frac{1}{2}x+4, -y-6)$

x	y
-10	-8
-6	-8
-4	-10
-2	-8
-2	-5

x	y
-1	2
1	2
2	4
3	2
3	-1



Domain $f(x)$ $-10 \le x \le -2$

Range $f(x)$ $-10 \le y \le -5$

x

Domain $h(x)$ $-1 \le x \le 3$

Range $h(x)$ $-1 \le y \le 4$

y

3. Given f(x) describe the equation of g(x) as

VR ✓ HR X

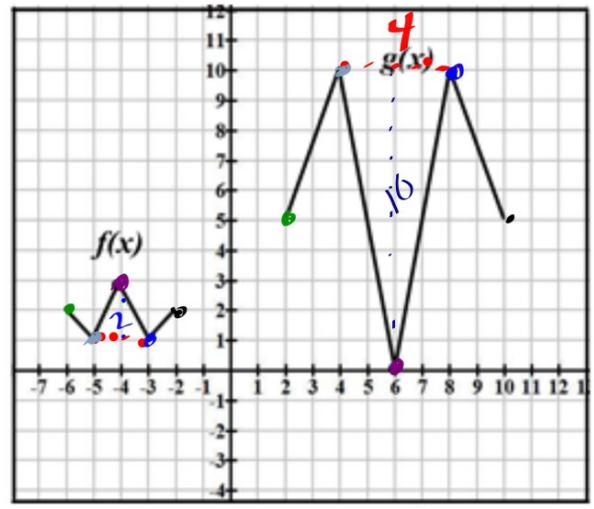
VS x 5 HS x 2

VT up 15 HT R 14

$(x,y) \to (2x+14, -5y+15)$

x	y
-6	2
-5	1
-4	3
-3	1
-2	2

x	y
2	5
4	10
6	0
8	10
10	5



$y = -5f\left(\frac{1}{2}(x-14)\right)+15$

Given f(x) describe the equation of g(x) as

VR ✓ HR ✓

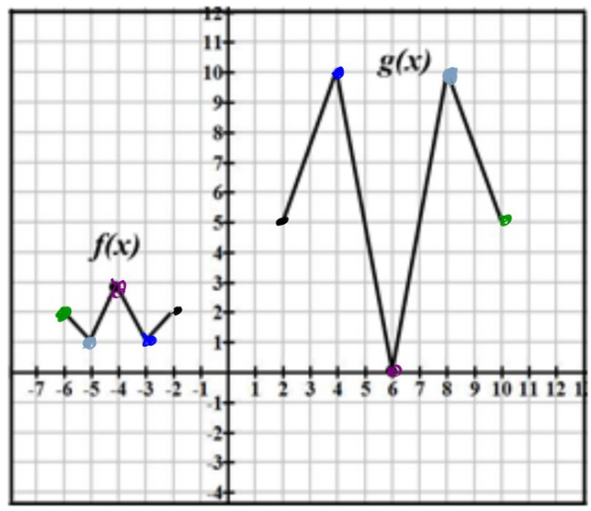
VS x 5 HS x 2

VT HT

$(x,y) \to (-2x-2, -5y+15)$

x	y
-6	2
-5	1
-4	3
-3	1
-2	2

x	y
10	5
8	10
6	0
4	10
2	5



$y = -5f\left(-\frac{1}{2}(x+2)\right)+15$

4. Write the equation of the following functions, given the transformations stated.

a. $y = f(x)$ is vertically stretched by a factor of 4, reflected in the y-axis, translated 3 units to the left and translated 1 units downwards.

VR HR ✓
VS ×4 HS
VT 1 down HT 3 left

$(x,y) \to (-x-3, 4y-1)$ * don't need

guide $\Rightarrow$ $y = 4f(-(x+3)) - 1$

b. $y = f(x)$ is horizontally stretched by a factor of $\frac{1}{6}$, reflected in both the x-axis and the y-axis, translated 2 units up.

VR ✓ HR ✓
VS HS × 1/6
VT 2up HT

$y = -f(-6(x)) + 2$

$y = -f(-6x) + 2$

5. For each function $f(x)$, determine $f^{-1}(x)$,

a) $f(x) = \frac{2}{3}x - 8$ (15,2)

$y = \frac{2}{3}x - 8$

$x = \frac{2}{3}y - 8$

$x - 8 = \frac{2}{3}y$

$3x - 24 = 2y$

$\frac{3}{2}x - \frac{2y}{2} = y$

$y = \frac{3}{2}x - 12$

$3x = 2y - 24$

$3x + 24 = 2y$

$\frac{3x + 24}{2} = y$

$x = 2$ (2,19)

b) $f(x) = 3(x-2)^2 + 7$

$y = 3(x-2)^2 + 7$

Inv $x = 3(y-2)^2 + 7$

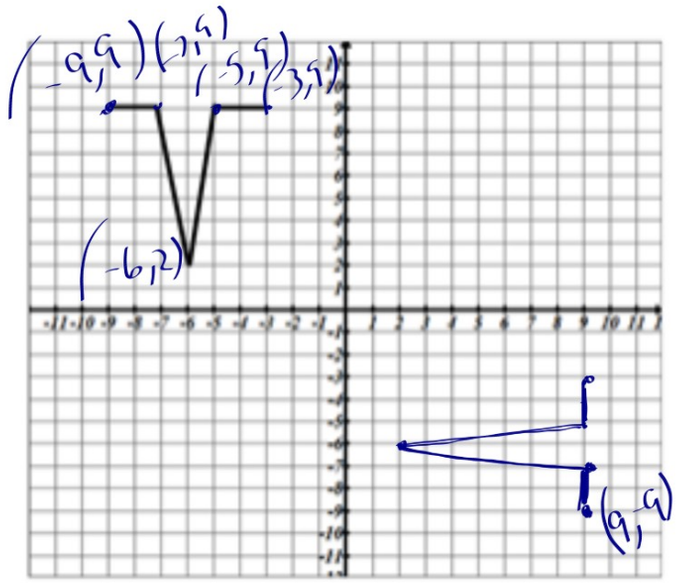
$\frac{x-7}{3} = \frac{3(y-2)^2}{3}$

$\frac{x-7}{3} = (y-2)^2$

$\sqrt{\frac{x-7}{3}} = y - 2$

$\sqrt{\frac{x-7}{3}} + 2 = y$

6. Given the graph of $f(x)$, sketch the graph of $f^{-1}(x)$ the following functions, and state the domain and range for each:



Domain f(x) $-9 \le x \le -3$

Range f(x) $2 \le y \le 9$

Domain $f^{-1}(x)$ $2 \le x \le 9$

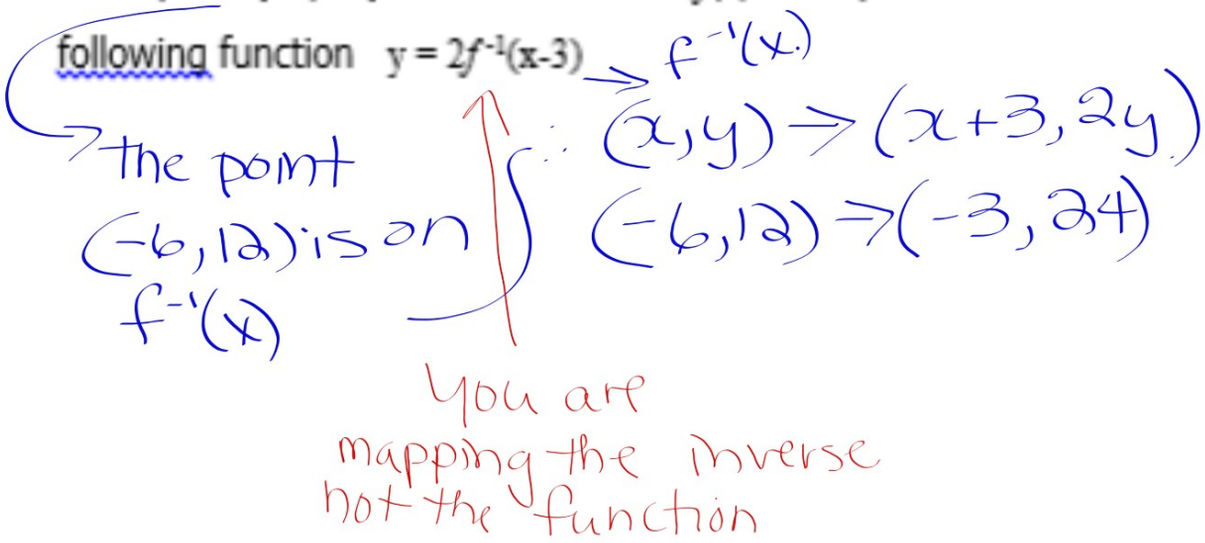
Range $f^{-1}(x)$ $-9 \le y \le -3$

7. If the point (12, -6) is on the function $f(x)$ what point must be on the following function $y = 2f^{-1}(x-3)$

$f(x)$ $f^{-1}(x)$ map $(x,y) \to (x+3, 2y)$

$(12,-6)$ $(-6,12)$ $(-6,12) \to (-3,24)$

7. If the point (12, -6) is on the function $f(x)$ what point must be on the following function $y = 2f^{-1}(x-3)$



8. Given the function $y = \frac{2}{5}x + 6$, determine the equation of the inverse and determine, if any, invariant points.

$y = \frac{2}{5}x + 6$

INV.

$x = \frac{2}{5}y + 6$

$5x = 2y + 30$

$5x - 30 = 2y$

$\frac{5x-30}{2} = y$ OR $\frac{5x}{2} - 15 = y$

Inverse

Invariant Point

$\frac{2}{5}x + 6 = \frac{5}{2}x - 15$

$4x + 60 = 25x - 150$

$4x - 25x = -150 - 60$

$-21x = -210$

$x = 10$

check:

$y = \frac{2}{5}(10) + 6$

$y = 10$

$\frac{5(10)-30}{2} = y$

$y = 10$

(10, 10)

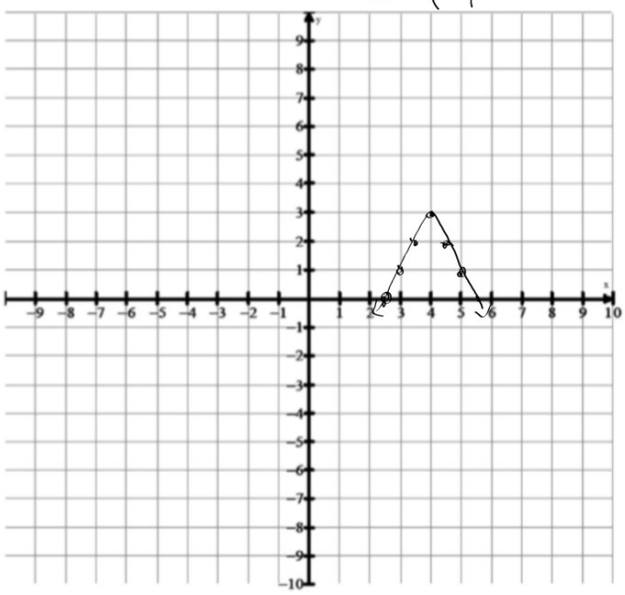
9. Given the function $f(x) = |x|$, sketch:

a. $g(x) = -|f(2(x-4)| + 3$

$y = |x|$ $(x, y) \rightarrow \left(\frac{1}{2}x + 4, -y + 3\right)$

x	y
-3	3
-2	2
-1	1
0	0
1	1
2	2

x	y
$5/2$	0
3	1
$7/2$	2
4	3
$9/2$	2
5	1



b. $f^{-1}(x)$

x	y
3	-3
2	-2
1	-1
0	0
1	1
2	2

