Name: Key Period: _____

PC 1-Review(2)

1) Find and fully simplify the difference quotient for the function g below. $\frac{g(x+h)-g(x)}{h}$, $h \neq 0$

$$g(x) = -3x + 4$$

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

$$= \frac{-3x - 3h + 4 + 3x - 4}{h}$$

$$= \frac{-3h}{h}$$

$$= -3$$

2) Find and fully simplify the difference quotient for the function f below. $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$

$$f(x) = x^2 - 9x$$

$$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)^2 - 9(x+h) - (x^2 - 9x)}{h}$$

$$= \frac{\cancel{x^2} + 2xh + h^2 - \cancel{9x} - 9h - \cancel{x^2} + \cancel{9x}}{h}$$

$$= \frac{2xh + h^2 - 9h}{h}$$

$$= \frac{\cancel{h}(2x + h - 9)}{\cancel{h}}$$

$$= 2x + h - 9$$

3) Point $A(20, -4)$ is on the graph of $y = f(x)$. Determine the location of point A' after the transformation shown. Describe the transformation steps in detail.

a) $f((x + 4)) - 3$

(20,-4) → Subtract 4 from x → (16,-4)

(16,-4) → Subtract 3 from y → $\boxed{(16,-7)}$

(20,-4) becomes (16,-7) after the transformation

b) $-2f(4x)$

(20,-4) → Multiply y by -2 → (20,8)

(20,8) → Divide x by 4 → $\boxed{(5,8)}$

(20,-4) becomes (5,8) after the transformation

4) Point $A(-9,25)$ is on the graph of $y = f(x)$. Determine the location of point A' after the transformation shown. Describe the transformation steps in detail.

a) $\frac{1}{5}f(-3(x - 7)) + 11$

(-9,25) → Multiply y by $\frac{1}{5}$ → (-9,5)

(-9,5) → Divide x by -3 → (3,5)

(3,5) → Add 7 to x → (10,5)

(10,5) → Add 11 to y → $\boxed{(10,16)}$

(-9,25) becomes (10,16) after the transformation

b) $5f\left(\frac{1}{3}(x + 2)\right) - 8$

(-9,25) → Multiply y by 5 → (-9,125)

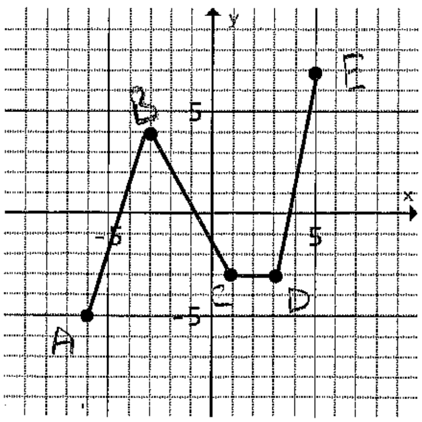
(-9,125) → Multiply x by 3 → (-27,125)

(-27,125) → Subtract 2 from x → (-29,125)

(-29,125) → Subtract 8 from y → $\boxed{(-29,117)}$

(-9,25) becomes (-29,117) after the transformation

$h(x)$ is shown below

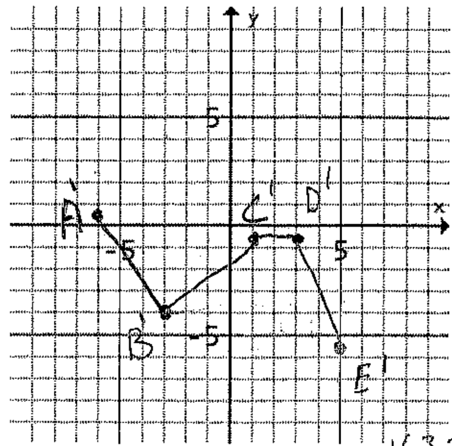


A(-6, -5)
D(3, -3)
B(-3, 4)
E(5, 7)
C(1, -3)

5) a) *Write the coordinate rule for the transformation:* $-\frac{1}{2}h(x) - 2$

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

b) Graph it.

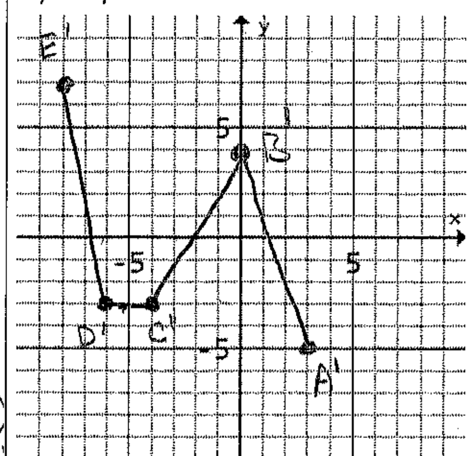


A'(-6, 0.5) B'(-3, -4) C'(1, -0.5) D'(3, -0.5) E'(5, -5.5)

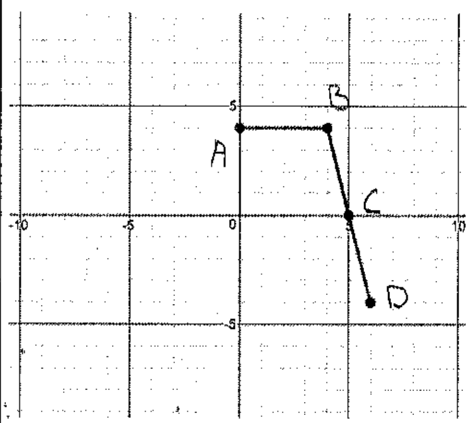
6) a) *Write the coordinate rule f… transformation:*
$h(-(x + 3))$

$(x, y) \rightarrow (-x - 3, y)$

b) *Graph it.*



$f(x)$ is shown below

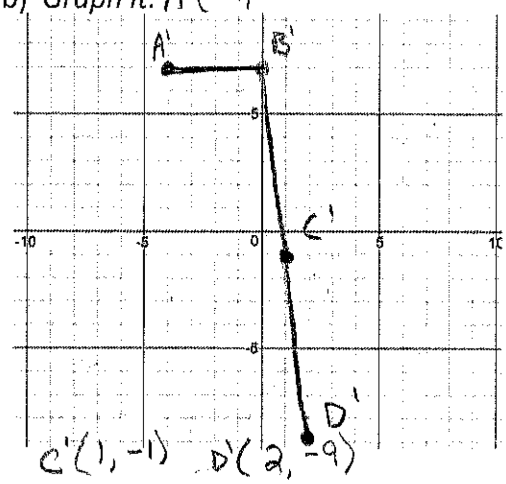


A(0, 4)
B(4, 4)
C(5, 0)
D(6, -4)

7) a) *Write the coordinate rule for the transformation:* $2f(x + 4) - 1$

$(x, y) \rightarrow (x - 4, 2y - 1)$

b) *Graph it.* A'(-4, 7) B'(0, 7)



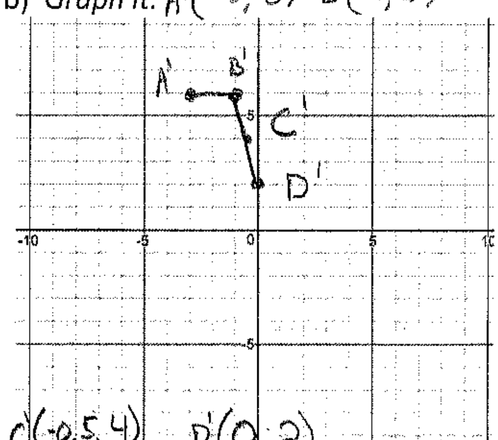
C'(1, -1) D'(2, -9)

8) a) *Write the coordinate rule for the transformation:*

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

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

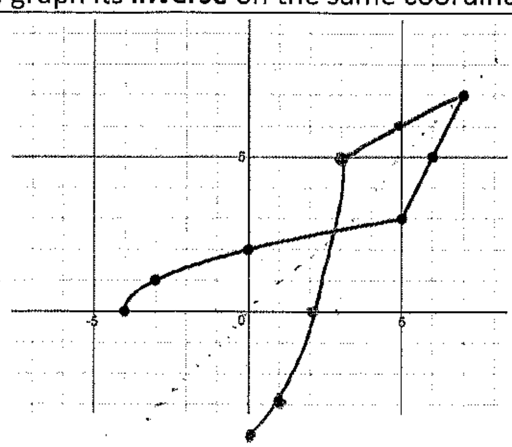
b) *Graph it.* A'(-3, 6) B'(-1, 6)



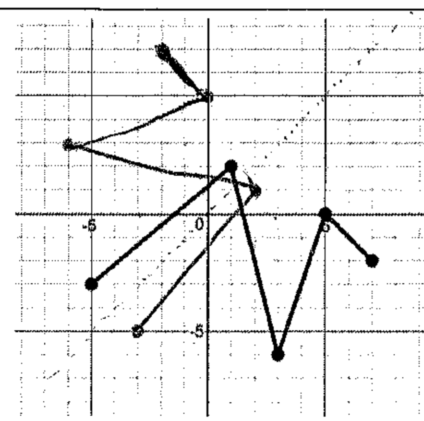
C'(-0.5, 4) D'(0, 2)

Given the graph, graph its **inverse** on the same coordinate plane.

(-4, 0)	(0, -4)
(-3, 1)	(1, -3)
(0, 2)	(2, 0)
(5, 3)	(3, 5)
(6, 5)	(5, 6)
(7, 7)	



(-5, -3)	(-3, -5)
(1, 2)	(2, 1)
(3, -6)	(-6, 3)
(5, 0)	(0, 5)
(7, -2)	(-2, 7)



...et $n(x) = \frac{4x-7}{8x+2}$ Algebraically determine $n^{-1}(x)$.

$$y = \frac{4x-7}{8x+2}$$

$$x = \frac{4y-7}{8y+2}$$

$$(8y+2)x = \frac{4y-7}{\cancel{8y+2}}(\cancel{8y+2})$$

$$8xy + 2x = 4y - 7$$
$$-4y \quad -2x \quad -4y \quad -2x$$

$$8xy - 4y = -7 - 2x$$

$$8xy - 4y = -7 - 2x$$

$$\frac{y(8x-4)}{8x-4} = \frac{-7-2x}{8x-4}$$

$$y = \frac{-7-2x}{8x-4}$$

$$n^{-1}(x) = \frac{-7-2x}{8x-4}$$

Domain of n:	Domain of $n^{-1}(x)$
$D: \{x \mid x \neq -1/4\}$	$D: \{x \mid x \neq \frac{1}{2}\}$
Range of n:	Range of $n^{-1}(x)$
$R: \{y \mid y \neq \frac{1}{2}\}$	$R: \{y \mid y \neq -1/4\}$

7) Verify the inverse of $n(x) = \frac{4x-7}{8x+2}$ by showing that $n(n^{-1}(x)) = x$. Showing work is a major portion of this problem.

$$n(x) = \frac{4x-7}{8x+2}$$

$$n(n^{-1}(x)) = \frac{4(n^{-1}(x)) - 7}{8(n^{-1}(x)) + 2}$$

$$= \frac{4\left(\frac{-7-2x}{8x-4}\right) - 7}{8\left(\frac{-7-2x}{8x-4}\right) + 2}$$

$$= \frac{\frac{4(-7-2x)}{8x-4} - 7}{\frac{8(-7-2x)}{8x-4} + 2}$$

$$= \frac{\frac{-28-8x}{8x-4} - 7}{\frac{-56-16x}{8x-4} + 2}$$

$$= \frac{\frac{-28-8x}{8x-4} - \frac{7(8x-4)}{(8x-4)}}{\frac{-56-16x}{8x-4} + \frac{2(8x-4)}{8x-4}} =$$

$$= \frac{\frac{-28-8x}{8x-4} - \frac{56x-28}{8x-4}}{\frac{-56-16x}{8x-4} + \frac{16x-8}{8x-4}}$$

$$= \frac{\frac{\cancel{-28}-8x-56x+\cancel{28}}{8x-4}}{\frac{-56\cancel{-16x}\cancel{+16x}-8}{8x-4}} = \frac{\frac{-64x}{8x-4}}{\frac{-64}{8x-4}}$$

$$= \frac{-64x}{\cancel{8x-4}} \cdot \frac{\cancel{8x-4}}{-64} = \frac{-64x}{-64} = x$$

7) Let $f(x) = x + 4$ and $g(x) = 3x^2 + 7x - 20$, find each of the following. Simplify all answers.

a) $(f - g)(11)$

$= f(11) - g(11)$

$= 11 + 4 - (3(11)^2 + 7(11) - 20)$

$= 15 - (420)$

$= -405$

b) $(fg)(x)$

$= f(x) \cdot g(x)$

	$3x^2$	$7x$	-20
4	$12x^2$	$28x$	-80
x	$3x^3$	$7x^2$	$-20x$

$= 3x^3 + 19x^2 + 8x - 80$

d) $(f \circ g)(-2)$

$= f(g(-2))$

$f(x) = x + 4$

$f(g(-2)) = (g(-2)) + 4$

$= (3(-2)^2 + 7(-2) - 20) + 4$

$= -18$

e) $(g \circ f)(x)$

$= g(f(x))$

$g(x) = 3x^2 + 7x - 20$

$g(f(x)) = 3(f(x))^2 + 7(f(x)) - 20$

$= 3(x+4)^2 + 7(x+4) - 20$

$= 3x^2 + 31x + 56$

f) $f + g$

$= x + 4 + 3x^2 + 7x - 20$

$= 3x^2 + 8x - 16$

g) $\frac{f}{g}(3)$

$= \frac{f(3)}{g(3)} = \frac{3+4}{3(3)^2 + 7(3) - 20} = \frac{7}{28}$

$= \frac{1}{4}$

8) Fill in the table below, then answer the questions using the table.

x	-5	-3	0	1	7
$f(x)$	10	2	-5	7	-3
$g(x)$	1	12	-3	-2	8
$f^{-1}(x)$	0	7	Undefined	Undefined	1

a) $f(-3) = 2$

d) $f^{-1}(-3) = 7$

g) $f^{-1}(f(-5)) = -5$

b) $g(f(7)) = 12$

e) $f(g(0)) = 2$

h) $g^{-1}(f(7)) = 0$

c) $g^{-1}(-3) = 0$

f) $g(f(-5)) =$ Undefined

i) $f(f(0)) = 10$