Checkered Plate Activity!

1 a) Graph the inverse of: $y = -(2x-8)^2 + 2$

$y = -(2(x-4))^2 + 2$ ← Factor

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

Basic

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

→

Image

x	y
2.5	-7
3	-2
3.5	1
4	2
4.5	1
5	-2
5.5	-7

→

Inverse

x	y
-7	2.5
-2	3
1	3.5
2	4
1	4.5
-2	5
-7	5.5

b) The point (4, -5) is on the graph of $f(x)$. Determine the coordinates of the image point on the graph

$$y = 2f(-x+4) + 6$$

$y = 2f(-(x-4)) + 6$ ← FACTOR

$(x, y) \longrightarrow (-x + 4, 2y + 6)$

x	y
4	-5

→

0	-4

∴ image point is (0, -4)

2 a) Given $y = \left|\frac{1}{2}x+1\right| - 3$, describe the transformations in words, State the mapping notation and determine the table of values of the image.

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

Words

HS ×2
left 2
down 3

$(x, y) \longrightarrow (2x-2, y-3)$

Basic $y = |x|$

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

$\longrightarrow$

Image

x	y
-8	0
-6	-1
-4	-2
-2	-3
0	-2
2	-1
4	0

b) Basic Function is $y = |x|$

Transformations: HS ×1/4
reflection y-axis
left 4
down 1

State equation of image function and sketch the graph.

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

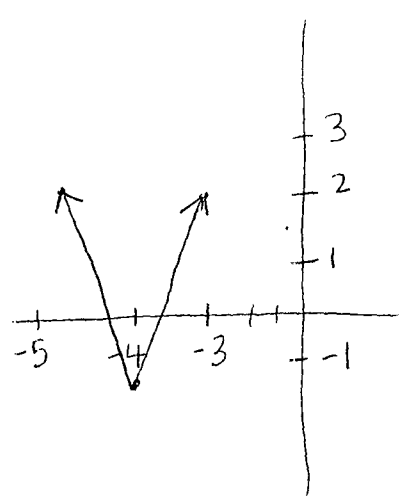
Basic

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

$\longrightarrow$

Image

x	y
-13/4	2
-7/2	1
-15/4	0
-4	-1
-17/4	0
-9/2	1
-19/4	2



3a) The point $(2,3)$ is on the graph of $g(x)$. Determine the coordinates of the image point on the graph

$$y = 3\,g(2x-6) - 1$$

$$y = 3g(2(x-3)) - 1 \longleftarrow \text{FACTOR}$$

$$(x, y) \longrightarrow \left(\tfrac{1}{2}x + 3,\ 3y - 1\right)$$

x	y
2	3

$\longrightarrow$

x	y
4	8

b) $f(x) = 3x^2 + 2x - 1$ $\quad g(x) = 5x - 4$ $\quad h(x) = \dfrac{2}{3-x}$

$$h(-5) = \frac{2}{3-(-5)} = \frac{2}{8} = \frac{1}{4}$$

$$g(f(x)) = 5(3x^2 + 2x - 1) - 4$$
$$= 15x^2 + 10x - 5 - 4$$
$$= 15x^2 + 10x - 9$$

$$h^{-1}(x) \Rightarrow y = \frac{2}{3-x}$$

$\boxed{\text{INV}}$ $x = \dfrac{2}{3-y}$

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

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

$$\boxed{h^{-1}(x) = 3 - \frac{2}{x}}$$

$$f(h^{-1}(1)) = f(1)$$
$$= 3(1)^2 + 2(1) - 1$$
$$= 3 + 2 - 1$$
$$= 4$$

aside

$$h^{-1}(1) = 3 - \frac{2}{1} = 3 - 2 = 1$$

$$-3f(-2) + 4g(-3) = -3(7) + 4(-19)$$
$$= -21 - 76$$
$$= -97$$

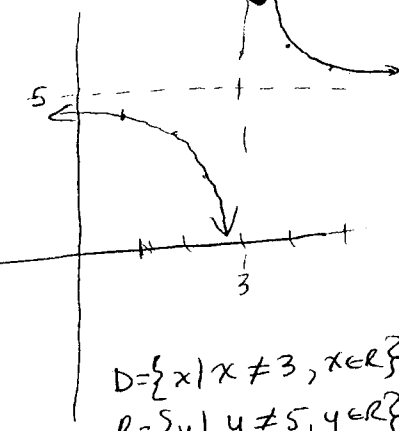
4 a) $y = \frac{1}{x-3} + 5$ Determine the domain & range

$(x, y) \rightarrow (x+3, y+5)$

x	y
-2	-0.5
-1	-1
-0.5	-2
0.5	2
1	1
2	0.5

x	y
1	4.5
2	4
2.5	3
3.5	7
4	6
5	5.5

WILL FIX GG



$D = \{x \mid x \neq 3, x \in R\}$
$R = \{y \mid y \neq 5, y \in R\}$

b) Graph the inverse of $y = -(2x+8)^2 + 2$

$y = -(2(x+4))^2 + 2$ FACTOR

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

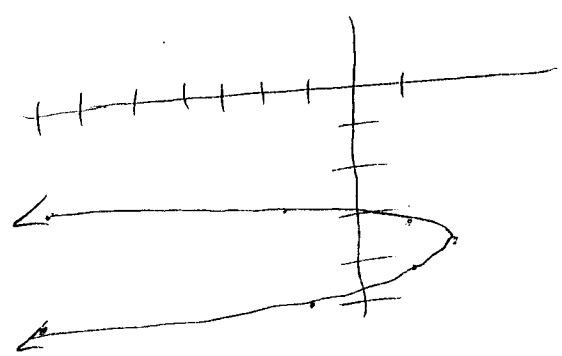
x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

IMAGE

x	y
-5.5	-7
-5	-2
-4.5	1
-4	2
-3.5	1
-3	-2
-2.5	-7

INVERSE

x	y
-7	-5.5
-2	-5
1	-4.5
2	-4
1	-3.5
-2	-3
-7	-2.5



5. a) Basic function is $y = x^3$

Transformations: VS $\times 2$
reflection x-axis
right 3
up 1

State the equation of the image & graph it.

$$y = -2(x-3)^3 + 1$$

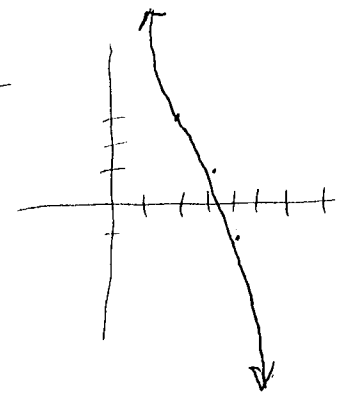
$y = x^3$
Basic

x	y
-3	-27
-2	-8
-1	-1
0	0
1	1
2	8
3	27

$(x, y) \longrightarrow (x+3, -2y+1)$

Image

x	y
0	55
1	17
2	3
3	1
4	-1
5	-15
6	-53



b) Given $f(x) = \dfrac{2}{-x-1} + 4$, describe the transformations in words, state the mapping notation and determine the table of values of the image.

FACTOR $y = \dfrac{2}{-(x+1)} + 4$ OR $y = 2\left(\dfrac{1}{-(x+1)}\right) + 4$

WORDS
VS $\times 2$
reflection y-axis
left 1
up 4

$(x, y) \longrightarrow (-x-1, 2y+4)$

x	y
-2	-0.5
-1	-1
-0.5	-2
0.5	2
1	1

x	y
1	3
0	2
-0.5	0
-1.5	8
-2	6

6a) Determine the domain & range of:

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

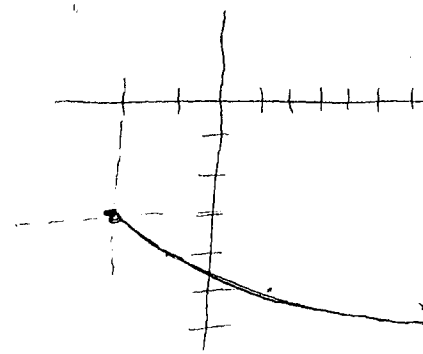
$(x, y) \longrightarrow (x-2, -y-3)$

$y=\sqrt{x}$ BASIC

x	y
0	0
1	1
4	2
9	3

IMAGE

x	y
-2	-3
-1	-4
2	-5
7	-6



$D = \{x \mid x \geq -2, x \in R\}$

$R = \{y \mid y \leq -3, y \in R\}$

b) Given $f(x) = -\sqrt{-2x-6}$, describe the transformations in words, state the mapping notation and determine the table of values of the image.

FACTOR $y = -\sqrt{-2(x+3)}$

$(x, y) \longrightarrow (-\frac{1}{2}x - 3, -y)$

$y=\sqrt{x}$ BASIC

x	y
0	0
1	1
4	2
9	3

IMAGE

x	y
-3	0
-3.5	-1
-5	-2
-7.5	-3

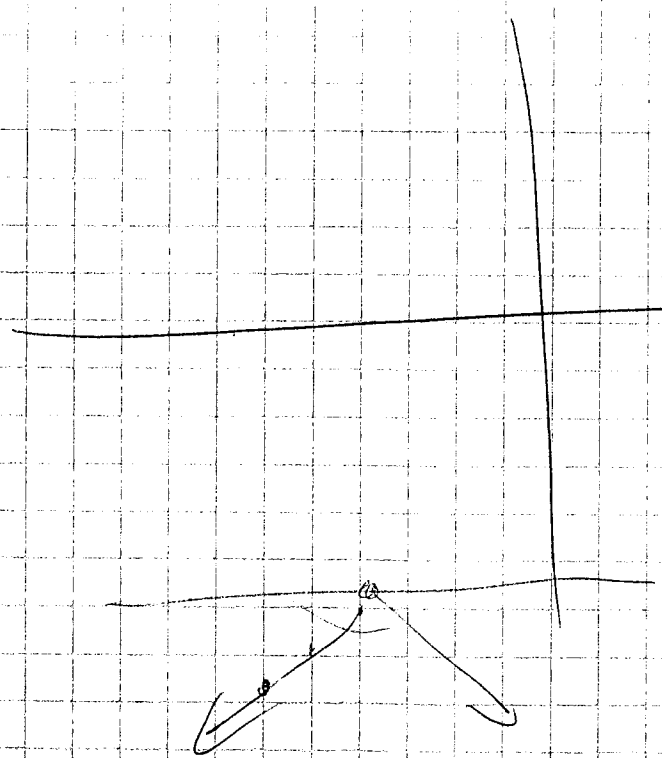
(1) $y = -|2(x+4)| - 3$

$(x, y) \longrightarrow \left(\frac{1}{2}x - 4,\ -y - 3\right)$

-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3

$\longrightarrow$

-5.5	-6
-5	-5
-4.5	-4
-4	-3
-3.5	-4
-3	-5
-2.5	-6



$D = \{x \mid x \in \mathbb{R}\}$

$R = \{y \mid y \leq -3, y \in \mathbb{R}\}$