

Period: _____

Name: Key

Chapter 4 Assignment – Absolute Value & Reciprocal Functions

/23

Show all of your work.

1) Evaluate (1 mark each)

a) $2|6 - 5(3)|$

$$\begin{aligned} & 2|6 - 15| \\ & 2|-9| \\ & 2(9) \\ & 18 \end{aligned}$$

ANSWER: 18

b) $-2|14 + 4(7 - 10)^3|$

$$\begin{aligned} & -2|14 + 4(-3)^3| = -2|14 + 4(-27)| \\ & = -2|14 - 108| \\ & = -2|-94| \\ & = -2(94) = -188 \end{aligned}$$

ANSWER: -188

2a) Graph $y = -\frac{1}{2}|x + 2| - 3$ (2 marks)

b) State the domain and range (0.5 each)

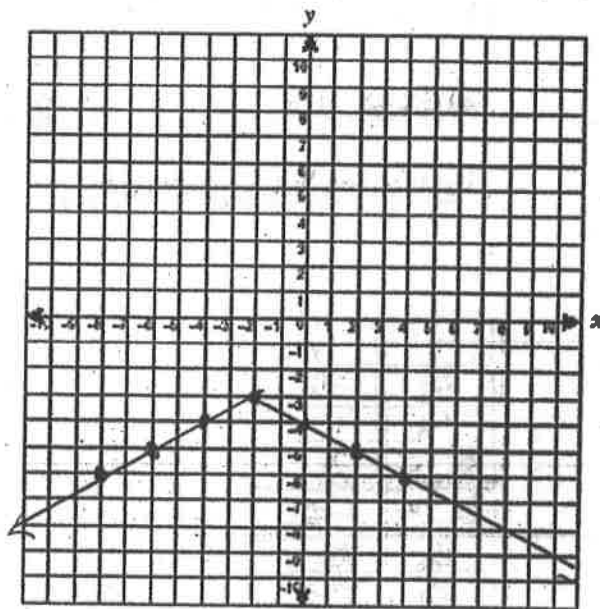
c) Express $y = -\frac{1}{2}|x + 2| - 3$ as a piecewise function (1 mark).

vertex : $(-2, -3)$

$a = -\frac{1}{2} \Rightarrow$ over 1 down $\frac{1}{2}$
 over 2 down 1
 over 4 down 2
 over 6 down 3

Piecewise:

$$\begin{aligned} y &= -\frac{1}{2}(x+2) - 3 & y &= -\frac{1}{2}(-(x+2)) - 3 \\ &= -\frac{1}{2}x - 1 - 3 & &= \frac{1}{2}(-x-2) - 3 \\ &= -\frac{1}{2}x - 4 & &= \frac{1}{2}x + 1 - 3 \\ & & &= \frac{1}{2}x - 2 \end{aligned}$$



c) Piecewise Function

$$y = \begin{cases} -\frac{1}{2}x - 4 & x \geq -2 \\ \frac{1}{2}x - 2 & x < -2 \end{cases}$$

DOMAIN: $x \in \mathbb{R}$
 RANGE: $y \leq -3$

$$y = a|bx + c| + d$$

3a) Graph $y = -|2x - 4| + 3$ (2 marks)

b) State the domain and range (0.5 marks each).

c) Express $y = -|2x - 4| + 3$ as a piecewise function (1 mark).

vertex: $(\frac{-c}{b}, d)$

$(\frac{+4}{2}, 3) = (2, 3)$

x	y
1	1
3	1
0	-1
4	-1

$\rightarrow -|2(1) - 4| + 3 = -|-2| + 3 = 1$

$\rightarrow -|2(3) - 4| + 3 = -|2| + 3 = 1$

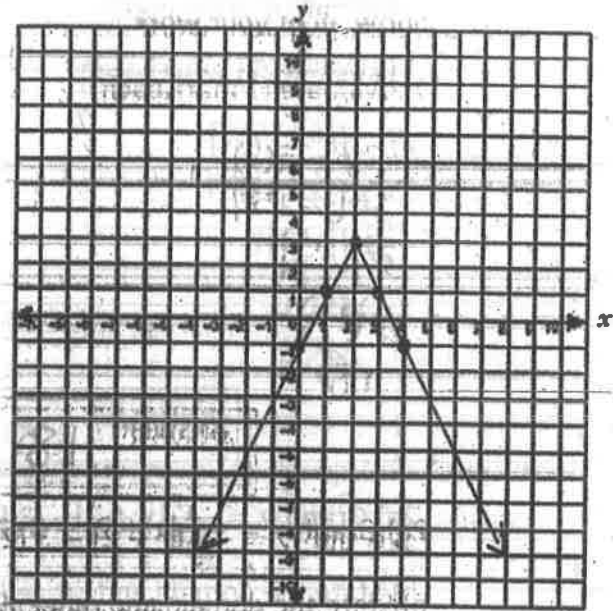
$\rightarrow -|2(0) - 4| + 3 = -|-4| + 3 = -1$

$\rightarrow -|2(4) - 4| + 3 = -|4| + 3 = -1$

piecewise

$y = -(2x - 4) + 3$
 $= -2x + 4 + 3$
 $= -2x + 7$

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



b) DOMAIN:

$x \in \mathbb{R}$

RANGE:

$y \leq 3$

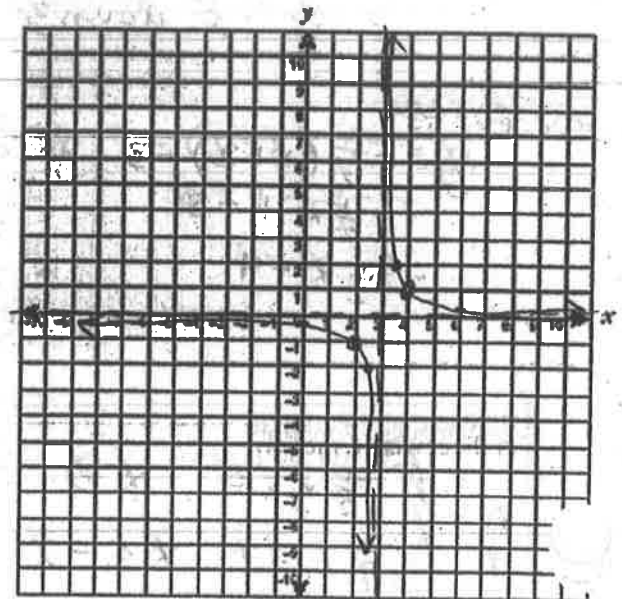
c) Piecewise Function:

$$y = \begin{cases} -2x + 7 & x \geq 2 \\ 2x - 1 & x < 2 \end{cases}$$

4a) Graph $y = \frac{1}{x-3}$ (3 marks).

b) State the horizontal and vertical asymptotes (0.5 marks each).

x	y
2	-1
4	1
3.5	2
2.5	-2
6	1/3
0	-1/3



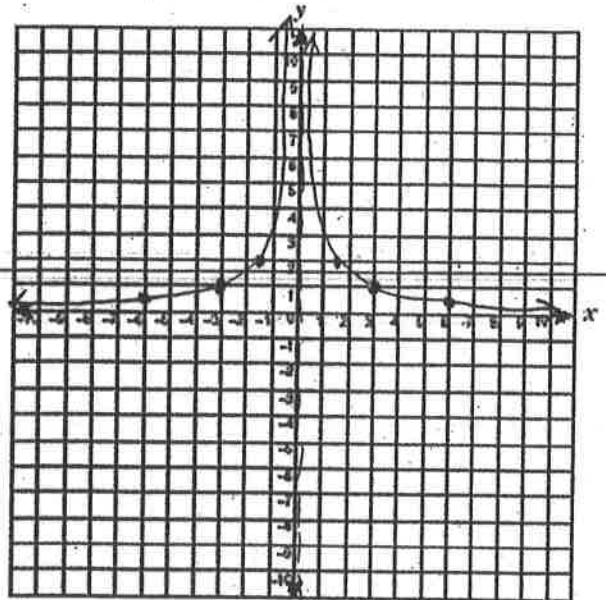
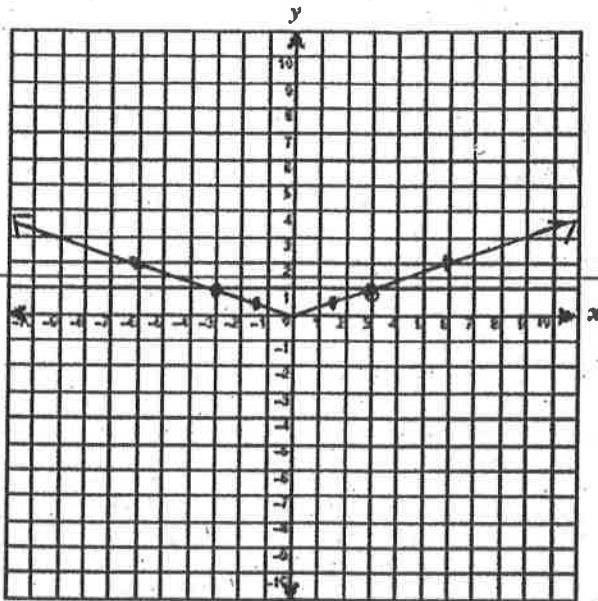
b) Horizontal Asymptotes:

$y = 0$

Vertical Asymptotes:

$x = 3$

6) Draw a graph of the reciprocal function using the original function graph (3 marks):



7) Solve $|1 - x| = 2x - 3$ (3 marks)

$$\textcircled{+} \begin{array}{l} 1 - x = 2x - 3 \\ +3 \quad +x \quad +x \quad +3 \end{array}$$

$$\frac{4}{3} = \frac{3x}{3}$$

$$x = \frac{4}{3}$$

X

$$\textcircled{-} \begin{array}{l} 1 - x = -2x + 3 \\ -1 \quad +2x \quad +2x \quad -1 \end{array}$$

$$x = 2$$

✓

CHECK(S):

$$x = \frac{4}{3}$$

$$|1 - \frac{4}{3}| = 2(\frac{4}{3}) - 3$$

$$|\frac{3}{3} - \frac{4}{3}| = \frac{8}{3} - \frac{9}{3}$$

$$|\frac{-1}{3}| = \frac{-1}{3}$$

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

X

$$x = 2$$

$$|1 - (2)| = 2(2) - 3$$

$$|-1| = 4 - 3$$

$$1 = 1$$

✓

ANSWERS(S):

$$x = 2$$

8) Solve $|x^2 - 5x - 4| - 10 = 0$ (4 marks)

$$|x^2 - 5x - 4| = 10$$

$$\oplus \quad x^2 - 5x - 4 = 10$$

$$-10 \quad -10$$

$$x^2 - 5x - 14 = 0$$

$$(x-7)(x+2) = 0$$

$$x = 7, \quad x = -2$$

$$\checkmark \quad \checkmark$$

$$\ominus \quad x^2 - 5x - 4 = -10$$

$$+10 \quad +10$$

$$x^2 - 5x + 6 = 0$$

$$(x-2)(x-3) = 0$$

$$x = 2, \quad x = 3$$

$$\checkmark \quad \checkmark$$

<p>CHECK(S): $x = 7$</p> $ (7)^2 - 5(7) - 4 - 10 = 0$ $ 49 - 35 - 4 - 10 = 0$ $ 10 - 10 = 0$ $10 - 10 = 0$ $0 = 0$ \checkmark	<p>$x = -2$</p> $ (-2)^2 - 5(-2) - 4 - 10 = 0$ $ 4 + 10 - 4 - 10 = 0$ $ 10 - 10 = 0$ $10 - 10 = 0$ $0 = 0$ \checkmark
<p>$x = 2$</p> $ (2)^2 - 5(2) - 4 - 10 = 0$ $ 4 - 10 - 4 - 10 = 0$ $ -10 - 10 = 0$ $10 - 10 = 0$ $0 = 0$ \checkmark	<p>$x = 3$</p> $ (3)^2 - 5(3) - 4 - 10 = 0$ $ 9 - 15 - 4 - 10 = 0$ $ -6 - 4 - 10 = 0$ $ -10 - 10 = 0$ $10 - 10 = 0$ $0 = 0$ \checkmark

ANSWERS(S):

$$x = \pm 2, 3, 7$$