

Foundations of Math 10
Chapter 4 – Relations and Functions Unit Test

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1. Determine the **domain** of the following relations (1 mark each):

a. $(3, 1), (0, 3), (-1, 2), (-1, 4)$ $\{-1, 0, 3\}$

b. $(5, 0), (2, 1), (-5, 10), (0, 7)$ $\{-5, 0, 2, 5\}$

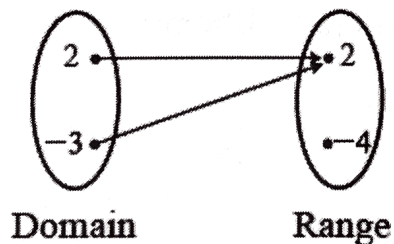
2. Determine the **range** of the following relations (1 mark each):

a. $(-2, 2), (4, -2), (1, 4), (1, -4)$ $\{-4, -2, 2, 4\}$

b. $(-1, 6), (-1, -6), (0, 4), (4, 4)$ $\{-6, 4, 6\}$

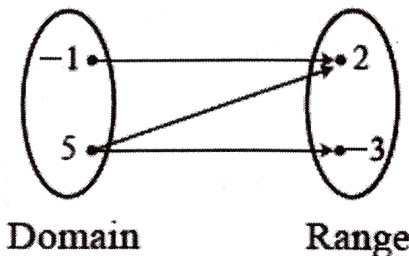
3. Write the mapping diagram in ordered pair notation (1 mark each):

a.



$(2, 2), (-3, 2)$

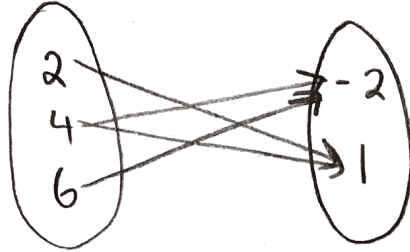
b.



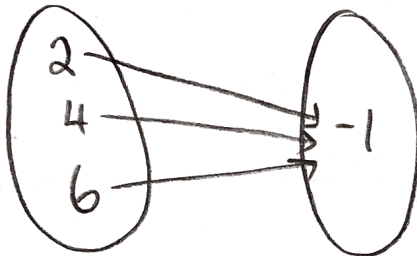
$(-1, 2), (5, 2), (5, -3)$

4. Draw a mapping diagram for the ordered pairs (1 mark each):

1. $(4, 1), (2, 1), (4, -2), (6, -2)$

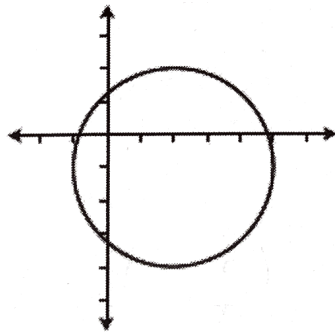


2. $(2, -1), (4, -1), (6, -1), (4, -1)$



5. Determine the **domain** and **range** of the following functions (2 marks each):

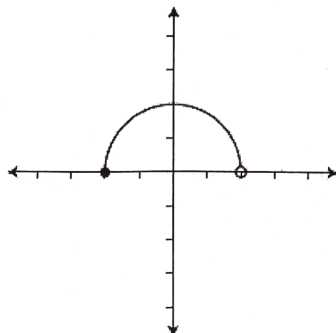
a.



Domain: $-1 \leq x \leq 5$

Range: $-4 \leq y \leq 2$

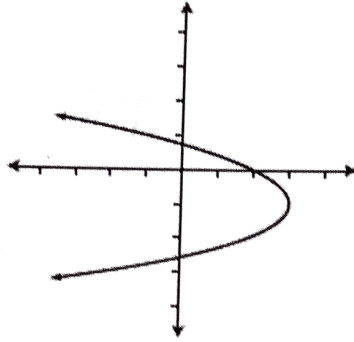
b.



Domain: $-2 \leq x < 2$

Range: $0 \leq y \leq 2$

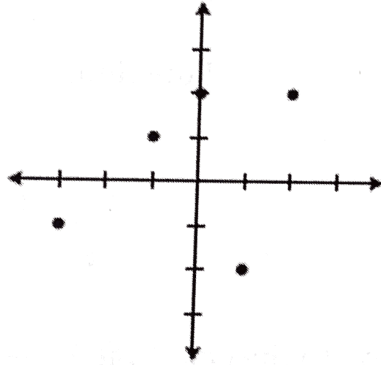
c.



Domain: $x \leq 3$

Range: all real numbers
 $y \in \mathbb{R}$

d.



Domain: $\{-3, -1, 0, 1, 2\}$

Range: $\{-2, -1, 1, 2\}$

6. Are the following **relations** also **functions**? (1 mark each)

a. (Lambrick, Math), (Lambrick, PE), (Lambrick, Art) Y/N

b. $(3, 1)$, $(4, 2)$, $(5, 3)$, $(6, 4)$ Y/N

c. $(4, -2)$, $(1, 1)$, $(4, 2)$, $(1, -1)$ Y/N

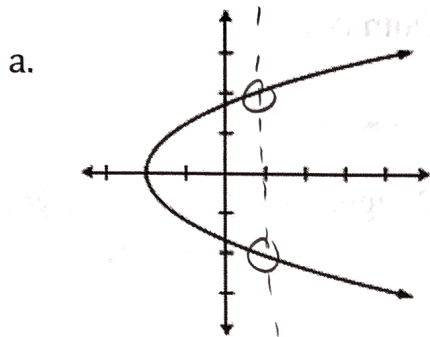
7. Are the following **functions** also **one-to-one** functions? (1 mark each)

a. $(-2, 4)$, $(-1, 1)$, $(1, 1)$, $(2, 4)$ Y/N

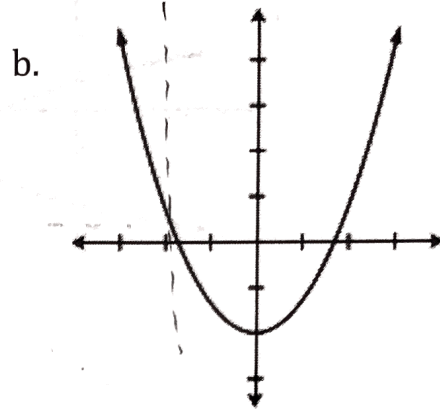
b. $(1, 5)$, $(2, 9)$, $(4, 17)$, $(5, 21)$ Y/N

c. $(-1, 5)$, $(0, 5)$, $(-2, 8)$, $(5, 29)$ Y/N

8. Apply the **vertical line test** to determine if the following relations are functions (1 mark each):



Function: Y N



Function: Y N

9. Is the point $(1, 3)$ a solution to the equation $3x - 2y = -5$?
show your work (2 marks)

$$3(1) - 2(3) = -5$$

$$3 - 6 = -5$$

$$-3 \neq -5$$

No, $(1, 3)$ is not a solution.

10. Graph the following linear equations and determine if it is a function:

a. $2x + 4y = 8$ (3 marks)

$$x = 0$$

$$2(0) + 4y = 8$$

$$\frac{4y}{4} = \frac{8}{4}$$

$$y = 2$$

$$(0, 2)$$

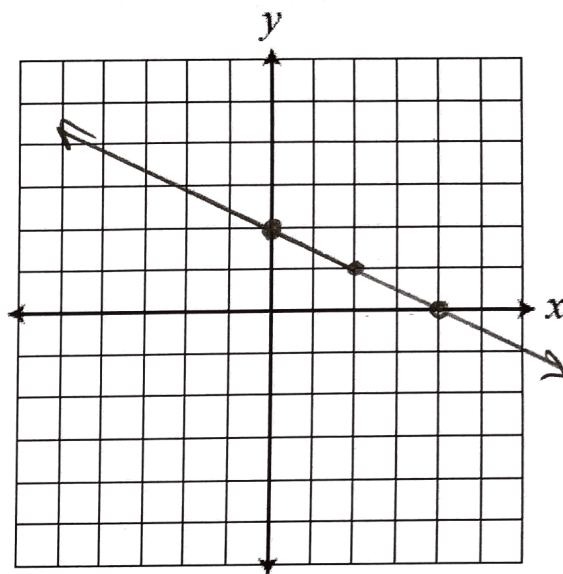
$$y = 0$$

$$2x + 4(0) = 8$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

$$(4, 0)$$



Function: Y/N

$$x = 2$$

$$2(2) + 4y = 8$$

$$4 + 4y = 8$$

$$\frac{4y}{4} = \frac{4}{4}$$

$$y = 1$$

$$(2, 1)$$

b. $y = \frac{1}{2}x - 3$ (3 marks)

$$x = 0$$

$$y = \frac{1}{2}(0) - 3$$

$$y = -3$$

$$(0, -3)$$

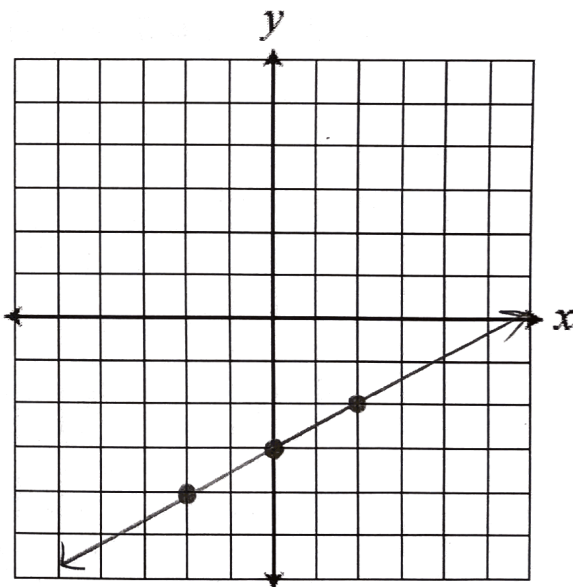
$$x = 2$$

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

$$= 1 - 3$$

$$= -2$$

$$(2, -2)$$



Function: Y/N

$$x = -2$$

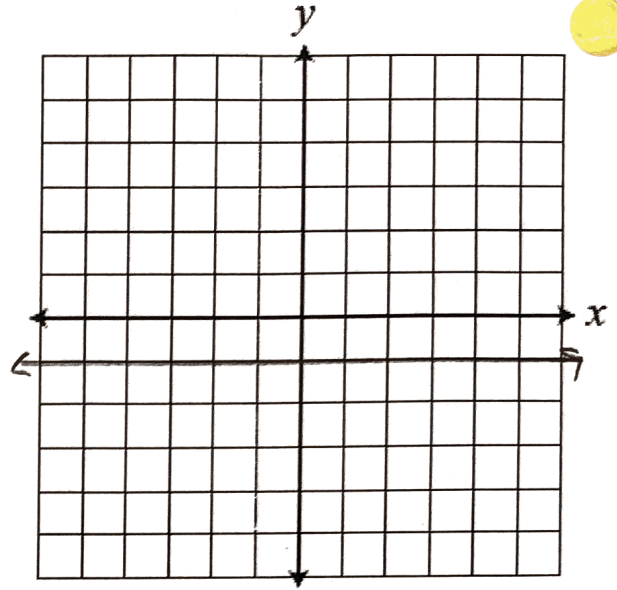
$$y = \frac{1}{2}(-2) - 3$$

$$= -1 - 3$$

$$= -4$$

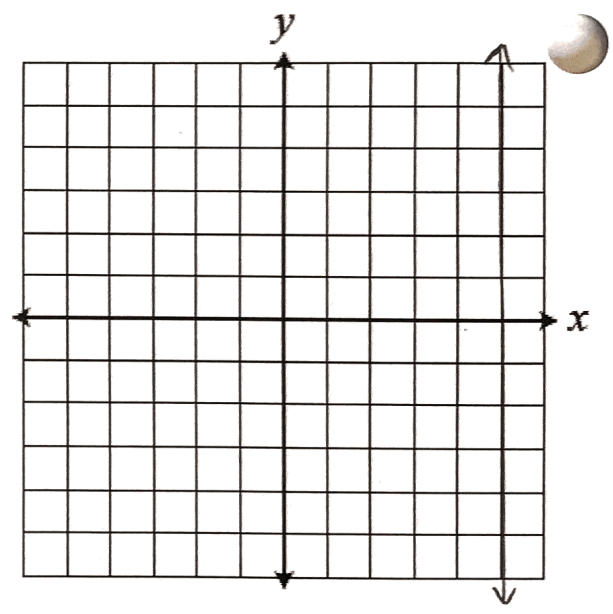
$$(-2, -4)$$

c. $y = -1$ (2 marks)



Function: Y N

d. $x = 5$ (2 marks)



Function: Y N

11. Graph the following **non-linear** equation and determine whether the relation is also a function using the vertical line test (3 marks):

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

x	0	1	-1	2	-2	3	-3		
y	0	$\frac{3}{2}$	$\frac{3}{2}$	6	6	13.5	13.5		

$$\begin{array}{ccccccc} \frac{3}{2}(0)^2 & \frac{3}{2}(1)^2 & \frac{3}{2}(-1)^2 & \frac{3}{2}(2)^2 & \frac{3}{2}(-2)^2 & \frac{3}{2}(3)^2 & \frac{3}{2}(-3)^2 \\ = 0 & = \frac{3}{2} & = \frac{3}{2} & = \frac{3(4)}{2} & = \frac{3(4)}{2} & = \frac{3 \cdot 9}{2} & = \frac{3 \cdot 9}{2} \\ & & & = 6 & = 6 & = 13.5 & = 13.5 \end{array}$$

