

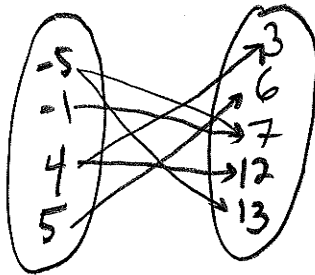
1. A relation is defined by the following points: $\{(-5,7), (4,3), (5,6), (-1,7), (4,12), (-5,13)\}$

(10 marks)

(a) Draw a mapping diagram for this relation.

(b) State the range of this relation.

(3M)



$R = \{3, 6, 7, 12, 13\}$

(2M)

(c) Find the value of y when x = 5.

$y = 6$

(1M)

(d) Mr. S. decides that this relation is NOT a function. He explains that the reason for his decision is that the output value of 7 results from two different input values of -1 and -5.

i. Is Mr. S. correct in his statement? Explain your reasoning.

(2M)

Yes, this is not a function because the x values of 4 and -5 each produce 2 outputs

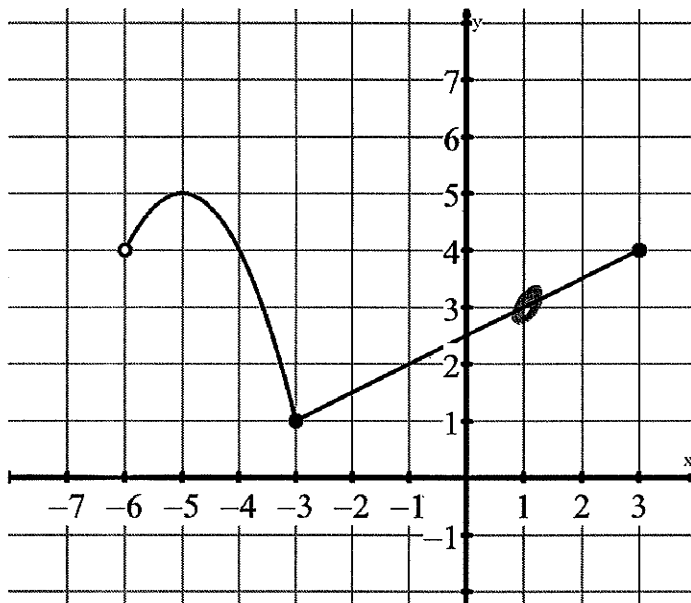
ii. Is Mr. S. correct in his reasoning? Explain your reasoning.

(2M)

NO, because what distinguishes a function from a non function is not an output arising from multiple inputs but rather a single input producing multiple outputs

2. The graph of the function $y = H(x)$ is given. Use the graph to answer the following questions:

(10 marks)



(a) Find $y = H(-1)$

(2M)

2

(b) Write the domain of $y = H(x)$ and use PROPER NOTATION when giving your answer.

$D = \{x \in \mathbb{R} \mid -6 < x \leq 3\}$ (3M)

(c) For what value(s) of x is $H(x) = 5$?

(2M)

$x = -5$

(d) For what value(s) of x is $H(x) = 4$?

$x = -4$ or $x = 3$ (2M)

(e) Ms. A. is going to add a new POINT to the graph of this function so that the resulting relation will no longer be a function. Explain where she can add a point.

(2M)

any part with an x value in our domain i.e. $(-3, 2)$

(f) Show on the graph your understanding of the mathematical statement $H(1) = 3$.

(1M)

Draw a point at $(1, 3)$

3. A linear function has the equation $f(x) = 12 - 4x$. The following questions all relate to this linear function. You are being asked to show/explain any work or reasoning in your solutions that leads to your final answers.

(8 marks)

- (a) If the domain of $f(x) = 12 - 4x$ was $\{-2, -1, 0, 1\}$, determine the range.

(3M)

$$f(-2) = 12 - 4(-2) = 20$$

$$f(-1) = 12 - 4(-1) = 16$$

$$f(0) = 12 - 4(0) = 12$$

$$f(1) = 12 - 4(1) = 8$$

$$R: \{8, 12, 16, 20\}$$

- (b) Graph this function on the grid below, given your results from Q3(a)

(2M)

graph
should show
4 points,
but not a line

- (c) If $f(x) = 12 - 4x$ and $f(B) = 28$, determine the value of B .

(3M)

$$28 = 12 - 4x$$

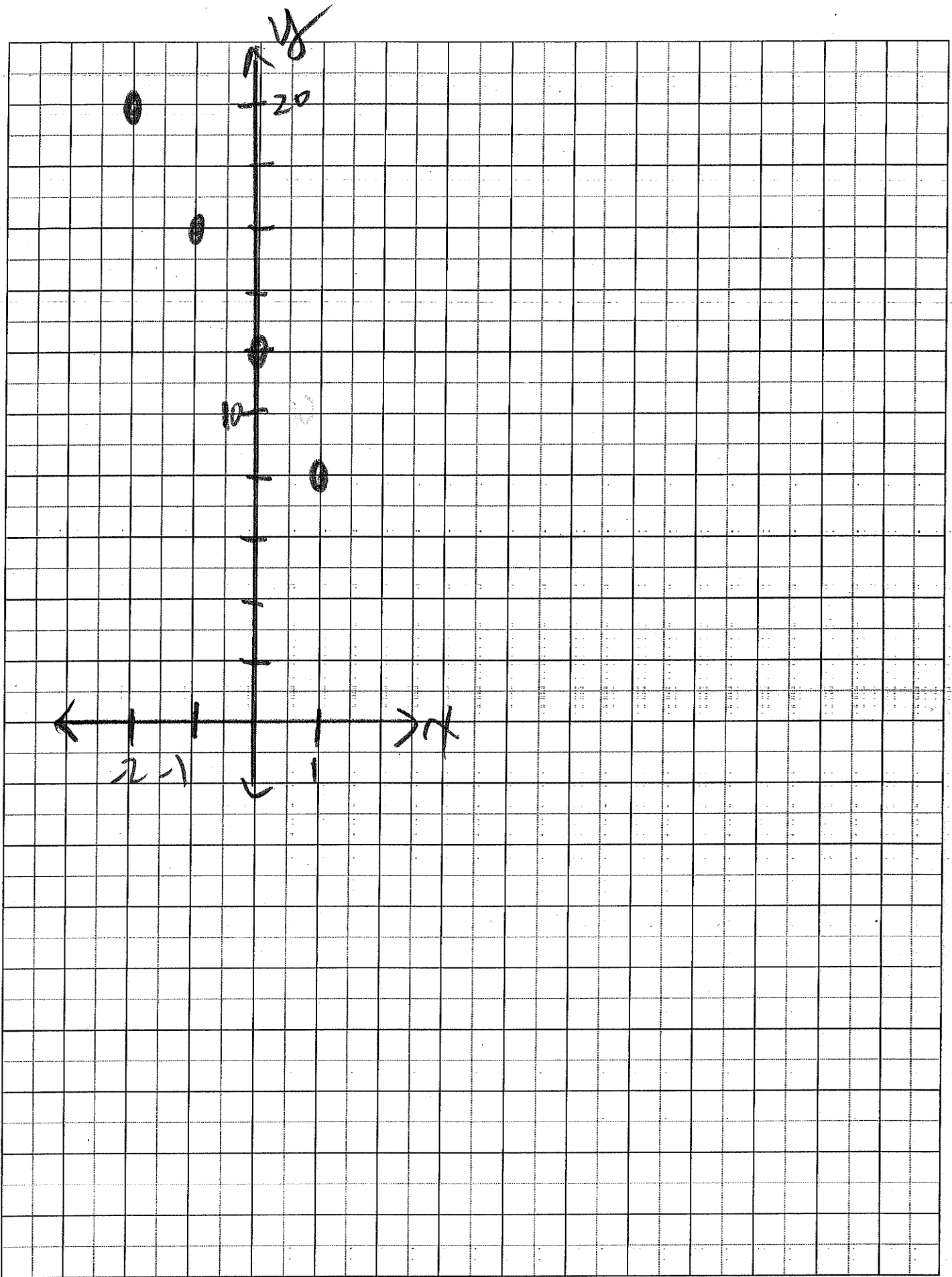
$$4x = 12 - 28$$

$$4x = -16$$

$$x = -4$$

$$\therefore B = -4$$

check $f(-4) = 12 - 4(-4)$
 $= 12 + 16$
 $= 28$



4. An airplane is flying at an altitude of 1570 meters. It starts to go down at a rate of 50 meters every minute. NOTE: You are being asked to show/explain any work or reasoning in your solutions that leads to your final answers.

(7 marks)

(a) From its starting height of 1570 meters, how long does it take for the plane to reach the ground. Show/explain your reasoning.

(b) Recall that the domain refers to the independent variable. What would be the independent variable in this plane problem?

(2M)

50 $\frac{m}{min}$ · time = 1570

∴ time = $\frac{1570 m}{50 m/min}$
= 31.4 min
= 31 min 24 sec

(1M)

time (as the height depends upon the time)

(c) What would be a reasonable DOMAIN for this relation? Explain your thinking.

(d) What would be a reasonable RANGE for this relation? Explain your thinking.

(2M)

{t ∈ ℝ | 0 ≤ t ≤ 31.4}
probably 0 → 31.4 min
because after 31.4 min the plane has landed.

{H ∈ ℝ | 0 ≤ H ≤ 1570} (2M)

because the plane's altitude changed from 1570 m to 0 m.

