

Ex 1.3

1)

Sol:-

$$X = \{1, 2, 3, \dots\}$$

$$Y = \{1, 2, 3, \dots\}$$

$$(f) f = 2x \quad \text{Put } y = 1, 2, \dots$$

$$\begin{array}{l|l|l} f(y) = 2(1) & f(y) = 2(2) & f(3) = 2(3) \\ f(1) = 2 & = 4 & = 6 \end{array}$$

$$f = \{(1, 2), (2, 4), (3, 6), \dots\}$$

$$\text{Domain} = \{1, 2, 3, \dots\}, \quad \text{Co-domain} = \{1, 2, 3, 4, \dots\}$$

$$\text{Range} = \{2, 4, 6, 8, \dots\}$$

Yes it is a function.

2)

$$X = \{3, 4, 6, 8\}$$

$$\text{Given } f(x) = x^2 + 1$$

then

$$\begin{array}{l|l|l|l} f(3) = 3^2 + 1 = 10 & f(4) = 4^2 + 1 & f(6) = 6^2 + 1 & f(8) = 8^2 + 1 \\ & = 17 & = 37 & = 65 \end{array}$$

Yes f is a function.

3)

$$\text{Given } f: x \rightarrow x^2 - 5x + 6$$

find

$$\begin{aligned} f(-1) &= (-1)^2 - 5(-1) + 6 \\ &= 1 + 5 + 6 \\ &= 12 \end{aligned}$$

$$\begin{aligned} \text{(ii) } f(2a) &= (2a)^2 - 5(2a) + 6 \\ &= 4a^2 - 10a + 6 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad f(2) &= 2^2 - 5(2) + 6 \\
 &= 4 - 10 + 6 \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad f(x-1) &= (x-1)^2 - 5(x-1) + 6 \\
 &= x^2 - 2x + 1 - 5x + 5 + 6 \\
 &= x^2 - 7x + 12
 \end{aligned}$$

4. from the graph:

$$\text{(i)} \quad \text{a) } f(0) = 9 \quad \text{b) } f(7) = 6 \quad \text{c) } f(2) = 6 \quad \text{d) } f(10) = 0$$

$$\text{(ii)} \quad f(x) = 1 = 9 \cdot 5$$

$$\text{(iii)} \quad \text{Domain} = \{0, 1, 2, 3, \dots, 10\}, \text{Range} = \{0, 1, 2, \dots, 9\}$$

$$\text{(iv)} \quad \text{Image of } 6 \text{ is } 5$$

$$5. \quad f(x) = 2x + 5$$

$$\text{find } \frac{f(x+2) - f(2)}{x}$$

Sol:-

$$\begin{aligned}
 & \underline{f(x) = 2x + 5} \\
 &= \frac{2(x+2) + 5 - \overset{2(2)+5}{f(2)}}{x}
 \end{aligned}$$

$$= \frac{(2x + 4 + 5) - (4 + 5)}{x}$$

$$= \frac{2x + \cancel{4} + \cancel{5} - \cancel{4} - \cancel{5}}{x}$$

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

length of the cuboid: $24 - 2x$

breath of the cuboid: $24 - 2x$

height of the cuboid: $2x$

$$\begin{aligned} \text{volume of cuboid} &= l \times b \times h \quad (a-b)^2 = a^2 - 2ab + b^2 \\ &= (24 - 2x)(24 - 2x)(x) \\ &= (576 - 96x + 4x^2)(x) \\ &= 576x - 96x^2 + 4x^3 \quad [\text{arrange the order}] \\ &= 4x^3 - 96x^2 + 576x \end{aligned}$$

$$f(x^2) = (f(x))^2 \rightarrow (a-b)^2 = a^2 + b^2 - 2ab$$

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

$$3 - 2x^2 = 9 + 4x^2 - 12x$$

$$0 = 9 + 4x^2 - 12x - 3 + 2x^2$$

$$0 = 6x^2 - 12x + 6 \quad [\text{factorize}]$$

$$0 = 6(x^2 - 2x + 1)$$

$$0 = (x^2 - 2x + 1)$$

$$0 = (x - 1)(x - 1)$$

$$\boxed{x = 1}$$

$$\begin{array}{r} 1 \\ \times 1 \\ \hline x \\ \times x \\ \hline -92 \end{array}$$

distance = Speed $\times$ time

$$d = 500xt$$

$$d = 500t$$

(i) The relation is $y = 0.9x + 24.5$
yes, it is a function

$$(ii) a = 0.9 \quad b = 24.5$$

$$(iii) y = 0.9x + 24.5$$

$$0.9 \times 40 + 24.5 = 36 + 24.5 = 60.5 \text{ ft}$$

(iv)

$$53.3 = 0.9x + 24.5$$

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$$53.5 - 24.5 = 0.9x$$

$$28.8 = 0.9x$$

$$\frac{28.8}{0.9} = x$$

$$x = 32 \text{ cm.}$$

length of the cuboid = $24 - 2x$

breadth of the cuboid = $24 - 2x$

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 &= 576x - 96x^2 + 4x^3 \quad [\text{arrange the order}] \\
 &= 4x^3 - 96x^2 + 576x
 \end{aligned}$$

$$f(x^2) = (f(x))^2 \quad (a-b)^2 = a^2 + b^2 - 2ab$$

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

$$3 - 2x^2 = 9 + 4x^2 - 12x$$

$$0 = 9 + 4x^2 - 12x - 3 + 2x^2$$

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$$0 = 6(x^2 - 2x + 1)$$

$$0 = (x^2 - 2x + 1)$$

$$0 = (x - 1)(x - 1)$$

$$\boxed{x = 1}$$

$$\begin{array}{r|l}
 1 & \\
 \hline
 1 & 1 \\
 \hline
 x & x \\
 \hline
 & -2 \\
 \hline
 & 1
 \end{array}$$

9) distance = Speed $\times$ time

$$d = 500xt$$

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