

**01** The force (in newtons) required to produce acceleration (in metres/sec<sup>2</sup>) in a body of constant mass (in kg) is directly proportional to the acceleration. Express the above statement as a linear equation in two variables and draw its graph by taking the constant mass equal to 2 kg. Read from the graph the force required when acceleration is 2 m/sec<sup>2</sup>.

Let  $m$  t/s<sup>2</sup> be the acceleration produced in a body of mass  $m$  kg by applying ' $y$ ' newtons of force. Then the equation representing the given statement can be written as  $y = mx$

$$\therefore y = 2x$$

[ $\therefore$  force = mass  $\times$  acceleration]

**02** The work done by a body on application of a constant force is directly proportional to the distance travelled by the body in a straight line. Express this in the form of a linear equation in two variables and draw its graph by taking the constant force as 3 units. Read from the graph, the work done when the distance travelled is 2 units.

If  $x = 2 \Rightarrow y = 4$  i.e., acceleration is '2' then force = 4

Suppose ' $x$ ' is the distance and ' $y$ ' is work done

$\therefore$  According to the problem the equation is  $y = 3x$

[ $\therefore$  work done = force  $\times$  distance]

If  $x = 2$  then  $y = 6$ . i.e., work done

**03**

The taxi fare in a city is charged as per the rates stated below.

Rate for the first kilometer of journey is Rs. 5 and the rate for the subsequent distance covered is Rs. 4 per km. Taking distance covered as  $x$  km and total fare as Rs.  $y$ . Write the linear equation in variables  $x$  and  $y$  to express the above statement. Draw the graph for the linear equation.

$$\begin{aligned} y &= \text{Rs. } 4(x - 1) + \text{Rs. } 5 \\ &= \text{Rs. } 4x - \text{Rs. } 4 + \text{Rs. } 5 \\ y &= 4x + 1 \end{aligned}$$

**04**

A straight line passes through the points  $(2, 4)$  and  $(5, -2)$ . Taking  $1 \text{ cm} = 1 \text{ unit}$ ; mark these points on a graph paper and draw the straight line through these points. If points  $(m, -4)$  and  $(3, n)$  lie on the line drawn; find the values of  $m$  and  $n$ .

$$\begin{aligned} \text{Equation of the line is } 2x + y &= 8 \\ \text{If } (m, -4) \text{ lies on } 2x + y &= 8 \\ 2m - 4 &= 8 \\ 2m &= 12 \Rightarrow m = 6 \\ \therefore (6, -4) &\text{ is the required point} \\ \text{If } (3, n) \text{ lies on } 2x + y &= 8 \\ 6 + n &= 8 \Rightarrow n = 2 \\ \therefore (3, 2) &\text{ is the required point} \end{aligned}$$

**05** Draw the graph (straight line) given by equation  $x - 3y = 18$ . If the straight line drawn passes through the points  $(m, -5)$  and  $(6, n)$ ; find the values of  $m$  and  $n$ .

Draw the graph of  $x - 3y = 18$

given  $(m, -5)$  lies on  $x - 3y = 18 \Rightarrow m = 3$

given  $(6, n)$  lies on  $x - 3y = 18 \Rightarrow n = -4$

**06** Use the table given below to draw the graph.

$x$	-5	-1	3	$b$	13
$y$	-2	$a$	2	5	7

From your graph, find the values of ' $a$ ' and ' $b$ '.

Name of this graph is  $x = 2y - 1$

If  $x = -1$  &  $y = a$  substitute in  $x = 2y - 1$  equation

$$-1 = 2a - 1 \Rightarrow 2a = 0 \Rightarrow a = 0$$

solution set =  $(-1, 0)$

If  $x = b$  &  $y = 5$  is the solution of  $x = 2y - 1$

$$\therefore b = 2(5) - 1 = 9$$

$$\Rightarrow b = 9$$

**07**

In a factory, the cost of manufacturing  $x$ -articles is Rs.  $(20 + 2x)$  and the selling price of  $x$  articles is Rs.  $(2.5x)$ . On the same graph paper, with the same axis, draw two graphs, first for the cost of manufacturing against no. of articles and the second for the selling price against no. of articles.

Take 2 cm = 10 articles on one axis and 2 cm = Rs 20 on the other axis. Provide for  $x$  upto 80. Use your graph to determine.

- (i) No. of articles to be manufactured and sold to reach breakeven point (no profit and no loss situation).
- (ii) The profit made when 60 articles are manufactured and sold.

CP equation is  $y = 20 + 2x$  and

SP equation is  $y = 2.5x$

- (i) Break even point means  $SP = CP$

$$\Rightarrow 2.5x = 20 + 2x$$

$$0.5x = 20$$

$$x = 40$$

If he manufactures & sells '40' articles then he reaches break even point.

- (ii) CP of 60 articles =  $20 + 2(60) = \text{Rs. } 140$

$$\text{SP of 60 articles} = 2.5(60) = \text{Rs. } 150$$

$$\text{Profit} = \text{Rs. } 150 - \text{Rs. } 140 = \text{Rs. } 10$$