Pair of Linear Equations in Two varibles Ex 3.10 Q5

Answer :

Let the speed of Ajeet and Amit be *x Km/hr* respectively. Then,

Time taken by Ajeet to cover $30Km = \frac{30}{x}hrs$

Time taken by Amit to cover $30Km = \frac{30}{y}hrs$

By the given conditions, we have

$$\frac{30}{x} - \frac{30}{y} = 2 \cdots (i)$$

If Ajeet doubles his speed, then speed of Ajeet is $2xKm/hr$

Time taken by Ajeet to cover $30Km = \frac{30}{2x}hrs$

Time taken by Amit to cover $30Km = \frac{30}{y}hrs$

According to the given condition, we have

$$-15x + \frac{30}{y} = 1 \quad ...(ii)$$

Putting $\frac{1}{x} = u$ and $\frac{1}{y} = v$, in equation (i) and (ii), we get

$$30u - 30v = 2 \cdots (iii)$$

$$-15u + 30v = 1 \cdots (iv)$$

Adding equations (iii) and (iv), we get

$$\begin{array}{r} 30u \cancel{-30v} = 2 \\ -15u \cancel{+30v} = 1 \\ \hline 15u = 3 \end{array}$$

$$u = \frac{15}{3}$$

$$u = \frac{1}{5}$$

Putting $u = \frac{1}{5}$ in equation (iii), we get

$$30u - 30v = 2$$

$$30 \times \frac{1}{5} - 30v = 2$$

$$6 - 30v = 2$$

$$-30v = 2 - 6$$

$$-30v = -4$$

$$v = \frac{\cancel{-4}}{\cancel{-30}}$$

$$v = \frac{2}{15}$$

Now, $u = \frac{1}{5}$

$$\frac{1}{x}=\frac{1}{5}$$

$$x=5$$

and $y=\frac{2}{15}$

$$\frac{1}{y}=\frac{2}{15}$$

$$y=\frac{15}{2}$$

$$y=7.5$$

Hence, the speed of Ajeet is $\boxed{5\ km/hr}$

The speed of Amit is $\boxed{7.5\ km/hr}$

Pair of Linear Equations in Two varibles Ex 3.10 Q6

Answer :

Let the actual speed of the train be *x Km/hr* and the actual time taken by y hours. Then,

Distance covered= $speed \times dis\tan ce$

$= x \times y$

$= xy \cdots (i)$

If the speed is increased by $\frac{1}{2}\ Km/hr$, then time of journey is reduced by 1 hour i.e., when speed is $\left(x+\frac{1}{2}\right) km/hr$, time of journey is $(y-1) hours$

$\therefore$ Distance covered= xy km

$-2x+y-1=0$ *...(ii)*

When the speed is reduced by $1Km/hr$, then the time of journey is increased by $3hours$ i.e., when speed is $(x-1) Km/hr$, time of journey is $(y+3) hours$

$\therefore$ Distance covered = xy

$xy=(x-1)(y+3)$

$xy=(x-1)(y+3)$

$xy=xy-1y+3x-3$

$\cancel{xy}=\cancel{xy}+3x-1y-3$

$3x-1y-3=0 \cdots (iii)$

Thus we obtain the following equations

$-2x+1y-1=0$

$3x-1y-3=0$

By using elimination method, we have

$$\begin{array}{r} -2x+1y-1=0 \\ 3x-1y-3=0 \\ \hline 1x-4=0 \end{array}$$

$$x=4$$

Putting the value $x=4$ in equation (iii) we get

$$3x-1y-3=0$$
$$3\times 4-1y-3=0$$
$$12-1y-3=0$$
$$12-3-1y=0$$
$$9-1y=0$$
$$-1y=-9$$
$$\frac{-1y}{-1}=\frac{-9}{-1}$$
$$y=9$$

Putting the value of x and y in equations (i) we get

Distance covered $=xy$

$$=4\times 9$$
$$=36km$$

Hence, the distance is $\boxed{36\ km}$.

The speed of walking is $\boxed{4\ km/hr}$.

********** END **********