Pair of Linear Equations in Two varibles Ex 3.10 Q15

Answer :

Let the actual speed of the train be $x\ km/hr$ and the actual time taken by y hours. Then,

$Distance = Speed \times Time$

Distance covered=$(xy)km \cdots (i)$

If the speed is increased by $10Km/hr$, then time of journey is reduced by 2 hours

when speed is $(x+10)km/hr$, time of journey is $(y-2)hours$

$\therefore$ Distance covered=$(x+10)(y-2)$

$$xy=(x+10)(y-2)$$

$$xy=xy+10y-2x-20$$

$$-2x+10y-20=0$$

$$-2x+3y-12=0$$

When the speed is reduced by $10Km/hr$, then the time of journey is increased by $3hours$ when speed is $(x-10)Km/hr$, time of journey is $(y+3)hours$

$\therefore$ Distance covered=$(x-10)(y+3)$

$$xy=(x-10)(y+3)$$

$$xy=xy-10y+3x-30$$

$$0=-10y+3x-30$$

$$3x-10y-30=0 \cdots (iii)$$

Thus, we obtain the following system of equations:

$$-x+5y-10=0$$

$$3x-10y-30=0$$

By using cross multiplication, we have

$$\frac{x}{5x-30-(-10)\times -10}=\frac{-y}{(-1\times -30)-(3x-10)}=\frac{1}{(-1\times -10)-(3\times 5)}$$

$$\frac{x}{-150-100}=\frac{-y}{30+30}=\frac{1}{10-15}$$

$$\frac{x}{-250}=\frac{-y}{60}=\frac{1}{-5}$$

$$x=\frac{-250}{-5}$$

$$x=50$$

$$y=\frac{-60}{-5}$$

$$y=12$$

Putting the values of x and y in equation (i), we obtain

Distance= $xy\ km$

$$=50\times 12$$

$$=600km$$

Hence, the length of the journey is $\boxed{600\ km}$.

Pair of Linear Equations in Two varibles Ex 3.10 Q16

Answer :

Let x and y be two cars starting from points A and B respectively.
Let the speed of the car X be x km/hr and that of the car Y be y km/hr.
Case I: When two cars move in the same directions:
Suppose two cars meet at point Q, then,
Distance travelled by car X=AQ
Distance travelled by car Y=BQ
It is given that two cars meet in 5 hours.
Distance travelled by car X in 5 hours = $5x$ km AQ= $5x$
Distance travelled by car Y in 5 hours = $5y$ km BQ= $5y$
Clearly AQ-BQ = AB $5x-5y=100$
Both sides divided by 5, we get $x-y=20\cdots(i)$
Case II: When two cars move in opposite direction
Suppose two cars meet at point P, then,
Distance travelled by X car X=AP
Distance travelled by Y car Y=BP
In this case, two cars meet in 1 hour
Therefore,
Distance travelled by car y in1 hours = $1x$ km
Distance travelled by car y in 1 hours = $1y$ km

$$AP+BP=AB$$
$$1x+1y=100$$
$$x+y=100$$
$$x+y=100 \cdots(ii)$$

By solving (i) and (ii) we get,

$$x-y=20$$
$$x+y=100$$
$$2x=120$$
$$x=\frac{120}{2}$$
$$x=60$$

By substituting $x=60$ in equation (ii), we get

$$x+y=100$$
$$60+y=100$$
$$y=100-60$$
$$y=40$$

Hence, speed of car X is $\boxed{60\ km/hr}$, speed of car Y is $\boxed{40\ km/hr}$.

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