



### Pair of Linear Equations in Two variables Ex 3.10 Q15

**Answer :**

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

$\text{Distance} = \text{Speed} \times \text{Time}$

Distance covered =  $(xy) \text{ km} \dots (i)$

If the speed is increased by  $10 \text{ km/hr}$ , then time of journey is reduced by 2 hours

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

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

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

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

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

$$-2x + 10y - 20 = 0 \dots (ii)$$

When the speed is reduced by  $10 \text{ km/hr}$ , then the time of journey is increased by 3 hours when

speed is  $(x-10) \text{ km/hr}$ , time of journey is  $(y+3) \text{ hours}$

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

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

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

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

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

Thus, we obtain the following system of equations:

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

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

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 =  $xy \text{ km}$

$$= 50 \times 12$$

$$= 600 \text{ km}$$

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

### Pair of Linear Equations in Two variables 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  $x - y = 20 \dots (i)$

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 in 1 hours =  $1x$  km

Distance travelled by car y in 1 hours =  $1y$  km

$$AP + BP = AB$$

$$1x + 1y = 100$$

$$x + y = 100$$

$$x + y = 100$$

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

\*\*\*\*\* END \*\*\*\*\*