



### Pair of Linear Equations in Two variables Ex 3.7 Q11

**Answer :**

Let the digits at units and tens place of the given number be  $x$  and  $y$  respectively. Thus, the number is  $10y + x$ .

The number is 4 times the sum of the two digits. Thus, we have

$$\begin{aligned} 10y + x &= 4(x + y) \\ \Rightarrow 10y + x &= 4x + 4y \\ \Rightarrow 4x + 4y - 10y - x &= 0 \\ \Rightarrow 3x - 6y &= 0 \\ \Rightarrow 3(x - 2y) &= 0 \\ \Rightarrow x - 2y &= 0 \\ \Rightarrow x &= 2y \end{aligned}$$

After interchanging the digits, the number becomes  $10x + y$ .

The number is twice the product of the digits. Thus, we have  $10y + x = 2xy$

So, we have the systems of equations

$$\begin{aligned} x &= 2y, \\ 10y + x &= 2xy \end{aligned}$$

Here  $x$  and  $y$  are unknowns. We have to solve the above systems of equations for  $x$  and  $y$ .

Substituting  $x = 2y$  in the second equation, we get

$$\begin{aligned} 10y + 2y &= 2 \times 2y \times y \\ \Rightarrow 12y &= 4y^2 \\ \Rightarrow 4y^2 - 12y &= 0 \\ \Rightarrow 4y(y - 3) &= 0 \\ \Rightarrow y(y - 3) &= 0 \\ \Rightarrow y &= 0 \text{ Or } y = 3 \end{aligned}$$

Substituting the value of  $y$  in the first equation, we have

$y$	0	3
$x$	0	6

Hence, the number is  $10 \times 3 + 6 = \boxed{36}$ .

Note that the first pair of solution does not give a two digit number.

### Pair of Linear Equations in Two variables Ex 3.7 Q12

**Answer :**

Let the digits at units and tens place of the given number be  $x$  and  $y$  respectively. Thus, the number is  $10y + x$ .

The product of the two digits of the number is 20. Thus, we have  $xy = 20$

After interchanging the digits, the number becomes  $10x + y$ .

If 9 is added to the number, the digits interchange their places. Thus, we have

$$\begin{aligned} (10y + x) + 9 &= 10x + y \\ \Rightarrow 10y + x + 9 &= 10x + y \\ \Rightarrow 10x + y - 10y - x &= 9 \\ \Rightarrow 9x - 9y &= 9 \\ \Rightarrow 9(x - y) &= 9 \\ \Rightarrow x - y &= \frac{9}{9} \\ \Rightarrow x - y &= 1 \end{aligned}$$

So, we have the systems of equations

$$\begin{aligned} xy &= 20, \\ x - y &= 1 \end{aligned}$$

Here  $x$  and  $y$  are unknowns. We have to solve the above systems of equations for  $x$  and  $y$ .

Substituting  $x = 1 + y$  from the second equation to the first equation, we get

$$(1 + y)y = 20$$

$$\Rightarrow y + y^2 = 20$$

$$\Rightarrow y^2 + y - 20 = 0$$

$$\Rightarrow y^2 + 5y - 4y - 20 = 0$$

$$\Rightarrow y(y + 5) - 4(y + 5) = 0$$

$$\Rightarrow (y + 5)(y - 4) = 0$$

$$\Rightarrow y = -5 \text{ Or } y = 4$$

Substituting the value of  $y$  in the second equation, we have

$y$	-5	4
$x$	-4	5

Hence, the number is  $10 \times 4 + 5 = \boxed{45}$ .

Note that in the first pair of solution the values of  $x$  and  $y$  are both negative. But, the digits of the number can't be negative. So, we must remove this pair.

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