Pair of Linear Equations in Two varibles Ex 3.7 Q7

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 two digits of the number are differing by 3. Thus, we have $x-y=\pm 3$

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

The sum of the numbers obtained by interchanging the digits and the original number is 99. Thus, we have

$$(10x+y)+(10y+x)=99$$
$$\Rightarrow 10x+y+10y+x=99$$
$$\Rightarrow 11x+11y=99$$
$$\Rightarrow 11(x+y)=99$$
$$\Rightarrow x+y=\frac{99}{11}$$
$$\Rightarrow x+y=9$$

So, we have two systems of simultaneous equations

$$x-y=3,$$
$$x+y=9$$
$$x-y=-3,$$
$$x+y=9$$

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

(i) First, we solve the system

$$x-y=3,$$
$$x+y=9$$

Adding the two equations, we have

$$(x-y)+(x+y)=3+9$$
$$\Rightarrow x-y+x+y=12$$
$$\Rightarrow 2x=12$$
$$\Rightarrow x=\frac{12}{2}$$
$$\Rightarrow x=6$$

Substituting the value of x in the first equation, we have

$$6-y=3$$
$$\Rightarrow y=6-3$$
$$\Rightarrow y=3$$

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

(ii) Now, we solve the system

$$x-y=-3,$$
$$x+y=9$$

Adding the two equations, we have

$$(x-y)+(x+y)=-3+9$$
$$\Rightarrow x-y+x+y=6$$
$$\Rightarrow 2x=6$$

$$\Rightarrow x = \frac{6}{2}$$

$$\Rightarrow x = 3$$

Substituting the value of x in the first equation, we have

$$3 - y = -3$$

$$\Rightarrow y = 3 + 3$$

$$\Rightarrow y = 6$$

Hence, the number is $10 \times 6 + 3 = \boxed{63}$.

Note that there are two such numbers.

Pair of Linear Equations in Two varibles Ex 3.7 Q8

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

$$10y + x = 4(x + y)$$

$$\Rightarrow 10y + x = 4x + 4y$$

$$\Rightarrow 4x + 4y - 10y - x = 0$$

$$\Rightarrow 3x - 6y = 0$$

$$\Rightarrow 3(x - 2y) = 0$$

$$\Rightarrow x - 2y = 0$$

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

If 18 is added to the number, the digits are reversed. Thus, we have

$$(10y + x) + 18 = 10x + y$$

$$\Rightarrow 10x + y - 10y - x = 18$$

$$\Rightarrow 9x - 9y = 18$$

$$\Rightarrow 9(x - y) = 18$$

$$\Rightarrow x - y = \frac{18}{9}$$

$$\Rightarrow x - y = 2$$

So, we have the systems of equations

$$x - 2y = 0,$$

$$x - y = 2$$

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

Subtracting the first equation from the second, we have

$$(x - y) - (x - 2y) = 2 - 0$$

$$\Rightarrow x - y - x + 2y = 2$$

$$\Rightarrow y = 2$$

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

$$x - 2 \times 2 = 0$$

$$\Rightarrow x - 4 = 0$$

$$\Rightarrow x = 4$$

Hence, the number is $10 \times 2 + 4 = \boxed{24}$.

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