Pair of Linear Equations in Two varibles 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

$$10y+x=4(x+y)$$
$$\Rightarrow 10y+x=4x+4y$$
$$\Rightarrow 4x+4y-10y-x=0$$
$$\Rightarrow 3x-6y=0$$
$$\Rightarrow 3(x-2y)=0$$
$$\Rightarrow x-2y=0$$
$$\Rightarrow x=2y$$

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

$$x=2y,$$
$$10y+x=2xy$$

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

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

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 varibles 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

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

So, we have the systems of equations

$$xy=20,$$
$$x-y=1$$

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

$$(1+y)y = 20$$
$$\Rightarrow y + y^2 = 20$$
$$\Rightarrow y^2 + y - 20 = 0$$
$$\Rightarrow y^2 + 5y - 4y - 20 = 0$$
$$\Rightarrow y(y+5) - 4(y+5) = 0$$
$$\Rightarrow (y+5)(y-4) = 0$$

$\Rightarrow y = -5$ 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.

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