

Exercise 16.1 : Solutions of Questions on Page Number : 255

Q1 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} 3 \ A \\ + 2 \ 5 \\ \hline B \ 2 \end{array}$$

Answer :

The addition of A and 5 is giving 2 i.e., a number whose ones digit is 2. This is possible only when digit A is 7. In that case, the addition of A (7) and 5 will give 12 and thus, 1 will be the carry for the next step. In the next step,

$$1 + 3 + 2 = 6$$

Therefore, the addition is as follows.

$$\begin{array}{r} 3 \ 7 \\ + 2 \ 5 \\ \hline 6 \ 2 \end{array}$$

Clearly, B is 6.

Hence, A and B are 7 and 6 respectively.

Q2 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} 4 \ A \\ + 9 \ 8 \\ \hline C \ B \ 3 \end{array}$$

Answer :

The addition of A and 8 is giving 3 i.e., a number whose ones digit is 3. This is possible only when digit A is 5. In that case, the addition of A and 8 will give 13 and thus, 1 will be the carry for the next step. In the next step,

$$1 + 4 + 9 = 14$$

Therefore, the addition is as follows.

$$\begin{array}{r} 45 \\ + 98 \\ \hline 143 \end{array}$$

Clearly, B and C are 4 and 1 respectively.

Hence, A, B, and C are 5, 4, and 1 respectively.

Q3 :

Find the value of the letter in the following and give reasons for the steps involved.

$$\begin{array}{r} 1A \\ \times A \\ \hline 9A \end{array}$$

Answer :

The multiplication of A with A itself gives a number whose ones digit is A again. This happens only when  $A = 1, 5$ , or  $6$ .

If  $A = 1$ , then the multiplication will be  $11 \times 1 = 11$ . However, here the tens digit is given as 9. Therefore,  $A = 1$  is not possible. Similarly, if  $A = 5$ , then the multiplication will be  $15 \times 5 = 75$ . Thus,  $A = 5$  is also not possible.

If we take  $A = 6$ , then  $16 \times 6 = 96$ . Therefore, A should be 6.

The multiplication is as follows.

$$\begin{array}{r} 16 \\ \times 6 \\ \hline 96 \end{array}$$

Hence, the value of A is 6.

Q4 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} A \quad B \\ + 3 \quad 7 \\ \hline 6 \quad A \end{array}$$

Answer :

The addition of A and 3 is giving 6. There can be two cases.

(1) First step is not producing a carry

In that case, A comes to be 3 as  $3 + 3 = 6$ . Considering the first step in which the addition of B and 7 is giving A (i.e., 3), B should be a number such that the units digit of this addition comes to be 3. It is possible only when  $B = 6$ . In this case,  $A = 6 + 7 = 13$ . However, A is a single digit number. Hence, it is not possible.

(2) First step is producing a carry

In that case, A comes to be 2 as  $1 + 2 + 3 = 6$ . Considering the first step in which the addition of B and 7 is giving A (i.e., 2), B should be a number such that the units digit of this addition comes to be 2. It is possible only when  $B = 5$  and  $5 + 7 = 12$ .

$$\begin{array}{r} 2 \quad 5 \\ + 3 \quad 7 \\ \hline 6 \quad 2 \end{array}$$

Hence, the values of A and B are 2 and 5 respectively.

Q5 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} \text{A B} \\ \times 3 \\ \hline \text{C A B} \end{array}$$

Answer :

The multiplication of 3 and B gives a number whose ones digit is B again.

Hence, B must be 0 or 5.

Let B is 5.

Multiplication of first step =  $3 \times 5 = 15$

1 will be a carry for the next step.

We have,  $3 \times A + 1 = CA$

This is not possible for any value of A.

Hence, B must be 0 only. If B = 0, then there will be no carry for the next step.

We should obtain,  $3 \times A = CA$

That is, the one's digit of  $3 \times A$  should be A. This is possible when A = 5 or 0.

However, A cannot be 0 as AB is a two-digit number.

Therefore, A must be 5 only. The multiplication is as follows.

$$\begin{array}{r} 50 \\ \times 3 \\ \hline 150 \end{array}$$

Hence, the values of A, B, and C are 5, 0, and 1 respectively.

Q6 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} \text{A B} \\ \times 5 \\ \hline \text{C A B} \end{array}$$

Answer :

The multiplication of B and 5 is giving a number whose ones digit is B again. This is possible when  $B = 5$  or  $B = 0$  only.

In case of  $B = 5$ , the product,  $B \times 5 = 5 \times 5 = 25$

2 will be a carry for the next step.

We have,  $5 \times A + 2 = CA$ , which is possible for  $A = 2$  or  $7$

The multiplication is as follows.

$$\begin{array}{r|l} \begin{array}{r} 25 \\ \times 5 \\ \hline 125 \end{array} & \begin{array}{r} 75 \\ \times 5 \\ \hline 375 \end{array} \end{array}$$

If  $B = 0$ ,

$$B \times 5 = B \Rightarrow 0 \times 5 = 0$$

There will not be any carry in this step.

In the next step,  $5 \times A = CA$

It can happen only when  $A = 5$  or  $A = 0$

However, A cannot be 0 as AB is a two-digit number.

Hence, A can be 5 only. The multiplication is as follows.

$$\begin{array}{r} 50 \\ \times 5 \\ \hline 250 \end{array}$$

Hence, there are 3 possible values of A, B, and C.

(i) 5, 0, and 2 respectively

(ii) 2, 5, and 1 respectively

(iii) 7, 5, and 3 respectively

Q7 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} A\ B \\ \times 6 \\ \hline B\ B\ B \end{array}$$

Answer :

The multiplication of 6 and B gives a number whose one's digit is B again.

It is possible only when  $B = 0, 2, 4, 6,$  or  $8$

If  $B = 0$ , then the product will be 0. Therefore, this value of B is not possible.

If  $B = 2$ , then  $B \times 6 = 12$  and 1 will be a carry for the next step.

$6A + 1 = BB = 22 \Rightarrow 6A = 21$  and hence, any integer value of A is not possible.

If  $B = 6$ , then  $B \times 6 = 36$  and 3 will be a carry for the next step.

$6A + 3 = BB = 66 \Rightarrow 6A = 63$  and hence, any integer value of A is not possible.

If  $B = 8$ , then  $B \times 6 = 48$  and 4 will be a carry for the next step.

$6A + 4 = BB = 88 \Rightarrow 6A = 84$  and hence,  $A = 14$ . However,  $A$  is a single digit number. Therefore, this value of  $A$  is not possible.

If  $B = 4$ , then  $B \times 6 = 24$  and 2 will be a carry for the next step.

$6A + 2 = BB = 44 \Rightarrow 6A = 42$  and hence,  $A = 7$  The

multiplication is as follows.

$$\begin{array}{r} 74 \\ \times 6 \\ \hline 444 \end{array}$$

Hence, the values of  $A$  and  $B$  are 7 and 4 respectively.

Q8 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} A1 \\ + 1B \\ \hline B0 \end{array}$$

Answer :

The addition of 1 and  $B$  is giving 0 i.e., a number whose ones digits is 0. This is possible only when digit  $B$  is 9. In that case, the addition of 1 and  $B$  will give 10 and thus, 1 will be the carry for the next step. In the next step,

$$1 + A + 1 = B$$

Clearly,  $A$  is 7 as  $1 + 7 + 1 = 9 = B$

Therefore, the addition is as follows.

$$\begin{array}{r}
 7 \ 1 \\
 + 1 \ 9 \\
 \hline
 9 \ 0
 \end{array}$$

Hence, the values of A and B are 7 and 9 respectively.

Q9 :

Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r}
 2 \ A \ B \\
 + A \ B \ 1 \\
 \hline
 B \ 1 \ 8
 \end{array}$$

Answer :

The addition of B and 1 is giving 8 i.e., a number whose ones digits is 8. This is possible only when digit B is 7. In that case, the addition of B and 1 will give 8. In the next step,  $A + B = 1$

Clearly, A is 4.

$4 + 7 = 11$  and 1 will be a carry for the next step. In the next step,

$$1 + 2 + A = B$$

$$1 + 2 + 4 = 7$$

Therefore, the addition is as follows.

$$\begin{array}{r}
 2 \ 4 \ 7 \\
 + 4 \ 7 \ 1 \\
 \hline
 7 \ 1 \ 8
 \end{array}$$

Hence, the values of A and B are 4 and 7 respectively.

Q10 :



Find the values of the letters in the following and give reasons for the steps involved.

$$\begin{array}{r} 12A \\ + 6AB \\ \hline A09 \end{array}$$

Answer :

The addition of A and B is giving 9 i.e., a number whose ones digits is 9. The sum can be 9 only as the sum of two single digit numbers cannot be 19. Therefore, there will not be any carry in this step.

In the next step,  $2 + A = 0$

It is possible only when  $A = 8$

$2 + 8 = 10$  and 1 will be the carry for the next step.

$$1 + 1 + 6 = A$$

Clearly, A is 8. We know that the addition of A and B is giving 9. As A is 8, therefore, B is 1.

Therefore, the addition is as follows.

$$\begin{array}{r} 128 \\ + 681 \\ \hline 809 \end{array}$$

Hence, the values of A and B are 8 and 1 respectively.

#### Exercise 16.2 : Solutions of Questions on Page Number : 260

Q1 :

If  $21y5$  is a multiple of 9, where y is a digit, what is the value of y?

Answer :

If a number is a multiple of 9, then the sum of its digits will be divisible by 9.

Sum of digits of  $21y5 = 2 + 1 + y + 5 = 8 + y$

Hence,  $8 + y$  should be a multiple of 9.

This is possible when  $8 + y$  is any one of these numbers 0, 9, 18, 27, and so on ...

However, since  $y$  is a single digit number, this sum can be 9 only. Therefore,  $y$  should be 1 only.

Q2 :

If  $31z5$  is a multiple of 9, where  $z$  is a digit, what is the value of  $z$ ?

You will find that there are two answers for the last problem. Why is this so?

Answer :

If a number is a multiple of 9, then the sum of its digits will be divisible by 9.

Sum of digits of  $31z5 = 3 + 1 + z + 5 = 9 + z$

Hence,  $9 + z$  should be a multiple of 9.

This is possible when  $9 + z$  is any one of these numbers 0, 9, 18, 27, and so on ...

However, since  $z$  is a single digit number, this sum can be either 9 or 18. Therefore,  $z$  should be either 0 or 9.

Q3 :

If  $24x$  is a multiple of 3, where  $x$  is a digit, what is the value of  $x$ ?

(Since  $24x$  is a multiple of 3, its sum of digits  $6 + x$  is a multiple of 3; so  $6 + x$  is one of these numbers: 0, 3, 6, 9, 12, 15, 18.... But since  $x$  is a digit, it can only be that  $6 + x = 6$  or  $9$  or  $12$  or  $15$ . Therefore,  $x = 0$  or  $3$  or  $6$  or  $9$ . Thus,  $x$  can have any of four different values)

Answer :

Since  $24x$  is a multiple of 3, the sum of its digits is a multiple of 3.

Sum of digits of  $24x = 2 + 4 + x = 6 + x$

Hence,  $6 + x$  is a multiple of 3.

This is possible when  $6 + x$  is any one of these numbers 0, 3, 6, 9, and so on ...

Since  $x$  is a single digit number, the sum of the digits can be 6 or 9 or 12 or 15 and thus, the value of  $x$  comes to 0 or 3 or 6 or 9 respectively.

Thus,  $x$  can have its value as any of the four different values 0, 3, 6, or 9.

Q4 :

If  $31z5$  is a multiple of 3, where  $z$  is a digit, what might be the values of  $z$ ?

Answer :

Since  $31z5$  is a multiple of 3, the sum of its digits will be a multiple of 3.

That is,  $3 + 1 + z + 5 = 9 + z$  is a multiple of 3.

This is possible when  $9 + z$  is any one of 0, 3, 6, 9, 12, 15, 18, and so on ...

Since  $z$  is a single digit number, the value of  $9 + z$  can only be 9 or 12 or 15 or 18 and thus, the value of  $x$  comes to 0 or 3 or 6 or 9 respectively.

Thus,  $z$  can have its value as any one of the four different values 0, 3, 6, or 9.