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.

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

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.

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

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.

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

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.

$$\begin{array}{r} 4\ 5 \\ +\ 9\ 8 \\ \hline 1\,4\ 3 \\ \hline \end{array}$$

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.

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

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 × 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 × 5 = 75. Thus, A = 5 is also not possible.

If we take A = 6, then 16 × 6 = 96. Therefore, A should be 6.

The multiplication is as follows.

$$\begin{array}{r} 1\,6 \\ \times\quad 6 \\ \hline 9\,6 \\ \hline \end{array}$$

Hence, the value of A is 6.

Q4 :

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

$$\begin{array}{rcc} & A & B \\ + & 3 & 7 \\ \hline & 6 & A \\ \hline \end{array}$$

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.

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

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.

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

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 × 5 = 15

1 will be a carry for the next step.

We have, 3 × 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 × A = CA

That is, the one's digit of 3 × 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.

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

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.

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

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 × 5 = 5 × 5 = 25

2 will be a carry for the next step.

We have, 5 × A + 2 = CA, which is possible for A = 2 or 7

The multiplication is as follows.

$$\begin{array}{r} 25 \\ \times\ 5 \\ \hline 125 \\ \hline \end{array} \quad \begin{array}{r} 75 \\ \times\ 5 \\ \hline 375 \\ \hline \end{array}$$

If B = 0,

B × 5 = B ⇒ 0 × 5 = 0

There will not be any carry in this step.

In the next step, 5 × 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.

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

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.

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

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 × 6 = 12 and 1 will be a carry for the next step.

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

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

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

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

6A + 4 = BB = 88 ⇒ 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 × 6 = 24 and 2 will be a carry for the next step.

6A + 2 = BB = 44 ⇒ 6A = 42 and hence, A = 7

The multiplication is as follows.

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

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.

$$\begin{array}{r} A\ 1 \\ +\ 1\ B \\ \hline B\ 0 \\ \hline \end{array}$$

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.

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

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.

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

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.

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

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.

$$\begin{array}{r} 1\ 2\ A \\ +\ 6\ A\ B \\ \hline A\ 0\ 9 \\ \hline \end{array}$$

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.

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

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

Exercise 16.2 : Solutions of Questions on Page Number : 260

Q1 :

If 21*y*5 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 21*y*5 = 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 31*z*5 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 31*z*5 = 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 24*x* is a multiple of 3, where *x* is a digit, what is the value of *x*?

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

Sum of digits of 24*x* = 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 31*z*5 is a multiple of 3, where *z* is a digit, what might be the values of *z*?

Answer :

Since 31*z*5 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.