Exercise 16.2 Page No: 260

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

Solution:

Suppose 21y5 is a multiple of 9.

Therefore according to the divisibility rule of 9, the sum of all the digits should be a multiple of 9.

That is, $2 + 1 + y + 5 = 8 + y$

Therefore, $8 + y$ is a factor 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, the value of y should be 1 only i.e. $8 + y = 8 + 1 = 9$.

2. 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?

Solution:

Since, 31z5 is a multiple of 9.

Therefore according to the divisibility rule of 9, the sum of all the digits should be a multiple of 9.

$3 + 1 + z + 5 = 9 + z$

Therefore, $9 + z$ is a multiple of 9

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

This implies, $9 + 0 = 9$ and $9 + 9 = 18$

Hence 0 and 9 are two possible answers.

3. 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.)

Solution: Let's say, 24x is a multiple of 3.

Then, according to the divisibility rule of 3, the sum of all the digits should be a multiple of 3.

2 + 4 + x = 6 + x

So, 6 + x is a multiple of 3, and 6 + x is one of these numbers: 0, 3, 6, 9, 12, 15, 18 and so on.

Since, x is a digit, the value of x will be either 0 or 3 or 6 or 9, and the sum of the digits can be 6 or 9 or 12 or 15 respectively.

Thus, x can have any of the four different values: 0 or 3 or 6 or 9.

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

Solution: Since 31z5 is a multiple of 3.

Therefore according to the divisibility rule of 3, the sum of all the digits should be a multiple of 3.

That is, 3 + 1 + z + 5 = 9 + z

Therefore, 9 + z is a multiple of 3.

This is possible when the value of 9 + z is any of the values: 0, 3, 6, 9, 12, 15, and so on.

At z = 0, 9 + z = 9 + 0 = 9

At z = 3, 9 + z = 9 + 3 = 12

At z = 6, 9 + z = 9 + 6 = 15

At z = 9, 9 + z = 9 + 9 = 18

The value of 9 + z can be 9 or 12 or 15 or 18.

Hence 0, 3, 6 or 9 are four possible answers for z.