

Exercise 16.2

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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 ?

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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 .