

EXERCISE 5.2

1. Given that the number $\overline{35a64}$ is divisible by 3, where a is a digit, what are the possible values of a ?

Solution:

We know that the given number $\overline{35a64}$ is divisible by 3.

And, if a number is divisible by 3 then sum of digits must be a multiple of 3.

i.e., $3 + 5 + a + 6 + 4 = \text{multiple of } 3$

$a + 18 = 0, 3, 6, 9, 12, 15, \dots$

Here ' a ' is a digit, where, ' a ' can have values between 0 and 9.

$a + 18 = 18$ which gives $a = 0$.

$a + 18 = 21$ which gives $a = 3$.

$a + 18 = 24$ which gives $a = 6$.

$a + 18 = 27$ which gives $a = 9$.

$\therefore a = 0, 3, 6, 9$

2. If x is a digit such that the number $\overline{18x71}$ is divisible by 3, find possible values of x .

Solution:

We know that the given number $\overline{18x71}$ is divisible by 3.

And, if a number is divisible by 3 then sum of digits must be a multiple of 3.

i.e., $1 + 8 + x + 7 + 1 = \text{multiple of } 3$

$x + 17 = 0, 3, 6, 9, 12, 15, \dots$

Here ' x ' is a digit, where, ' x ' can have values between 0 and 9.

$x + 17 = 18$ which gives $x = 1$.

$x + 17 = 21$ which gives $x = 4$.

$x + 17 = 24$ which gives $x = 7$.

$\therefore x = 1, 4, 7$

3. If x is a digit of the number $\overline{66784x}$ such that it is divisible by 9, find possible values of x .

Solution:

We know that the given number $\overline{66784x}$ is divisible by 9.

And, if a number is divisible by 9 then sum of digits must be a multiple of 9.

i.e., $6 + 6 + 7 + 8 + 4 + x = \text{multiple of } 9$

$x + 31 = 0, 9, 18, 27, \dots$

Here ' x ' is a digit, where, ' x ' can have values between 0 and 9.

$x + 31 = 36$ which gives $x = 5$.

$\therefore x = 5$

4. Given that the number $\overline{67y19}$ is divisible by 9, where y is a digit, what are the possible values of y?

Solution:

We know that the given number $\overline{67y19}$ is divisible by 9.

And, if a number is divisible by 9 then sum of digits must be a multiple of 9.

i.e., $6 + 7 + y + 1 + 9 = \text{multiple of } 9$

$y + 23 = 0, 9, 18, 27, \dots$

Here 'y' is a digit, where, 'y' can have values between 0 and 9.

$y + 23 = 27$ which gives $y = 4$.

$\therefore y = 4$

5. If $\overline{3x2}$ is a multiple of 11, where x is a digit, what is the value of x?

Solution:

We know that the given number $\overline{3x2}$ is a multiple of 11.

A number is divisible by 11 if and only if the difference between the sum of odd and even place digits is a multiple of 11.

i.e., Sum of even placed digits – Sum of odd placed digits = 0, 11, 22, ...

$x - (3+2) = 0, 11, 22, \dots$

$x - 5$ is a multiple of 11

$x - 5 = 0$

$\therefore x = 5$

6. If $\overline{98215x2}$ is a number with x as its tens digit such that it is divisible by 4. Find all possible values of x.

Solution:

We know that the given number $\overline{98215x2}$ is divisible by 4.

A number is divisible by 4 only when the number formed by its digits in unit's and ten's place is divisible by 4.

i.e., $x2$ is divisible by 4

Expanding $x2$,

$10x + 2 = \text{multiple of } 4$

Here $x2$ can take values 2, 12, 22, 32, 42, 52, 62, 72, 82, 92

So values 12, 32, 52, 72 and 92 are divisible by 4.

$\therefore x$ can take values 1, 3, 5, 7 and 9

7. If x denotes the digit at hundreds place of the number $\overline{67x19}$ such that the number is divisible by 11. Find all possible values of x.

Solution:

We know that the given number $\overline{67x19}$ is divisible by 11.

A number is divisible by 11 if and only if the difference between the sum of odd and even place digits is a multiple of 11.

i.e., Sum of even placed digits – Sum of odd placed digits = 0, 11, 22...

$$(6 + x + 9) - (7 + 1) = 0, 11, 22 \dots$$

$x + 7$ is a multiple of 11

$$x + 7 = 11$$

$$\therefore x = 4$$

8. Find the remainder when 981547 is divided by 5. Do that without doing actual division.

Solution:

We know that if a number is divided by 5, then remainder is obtained by dividing just the unit place by 5.

i.e., $7 \div 5$ gives 2 as a remainder.

\therefore Remainder will be 2 when 981547 is divided by 5.

9. Find the remainder when 51439786 is divided by 3. Do that without performing actual division.

Solution:

We know that if a number is divided by 3, then remainder is obtained by dividing sum of digits by 3.

Here, sum of digits $(5+1+4+3+9+7+8+6)$ is 43.

i.e., $43 \div 3$ gives 1 as a remainder.

\therefore Remainder will be 1 when 51439786 is divided by 3.

10. Find the remainder, without performing actual division, when 798 is divided by 11.

Solution:

We know that if a number is divided by 11, then remainder is difference between sum of even and odd digit places.

$$\text{i.e., Remainder} = 7 + 8 - 9 = 6$$

\therefore Remainder will be 6 when 798 is divided by 11.

11. Without performing actual division, find the remainder when 928174653 is divided by 11.

Solution:

We know that if a number is divided by 11, then remainder is difference between sum of even and odd digit places.

i.e., Remainder = $9 + 8 + 7 + 6 + 3 - 2 - 1 - 4 - 5 = 33 - 12 = 21$

$\therefore 21 \div 11$ gives 10 as remainder

\therefore Remainder will be 10 when 928174653 is divided by 11.

12. Given an example of a number which is divisible by

(i) 2 but not by 4.

(ii) 3 but not by 6.

(iii) 4 but not by 8.

(iv) Both 4 and 8 but not by 32

Solution:

(i) 2 but not by 4.

Any number which follows the formula of $4n + 2$ is an example of a number divisible by 2 but not by 4.

i.e., 10 where $n = 1$.

(ii) 3 but not by 6.

Any number which follows the formula of $6n + 3$ is an example of a number divisible by 3 but not by 6.

i.e., 15 where $n = 1$.

(iii) 4 but not by 8.

Any number which follows the formula of $8n + 4$ is an example of a number divisible by 4 but not by 8.

i.e., 28 where $n = 1$.

(iv) Both 4 and 8 but not by 32

Any number which follows the formula of $32n + 8$ or $32n + 16$ or $32n + 24$ is an example of a number divisible by both 4 and 8 but not by 32.

i.e., 48 where $n = 1$.

13. Which of the following statements are true?

(i) If a number is divisible by 3, it must be divisible by 9.

(ii) If a number is divisible by 9, it must be divisible by 3.

(iii) If a number is divisible by 4, it must be divisible by 8.

(iv) If a number is divisible by 8, it must be divisible by 4.

(v) A number is divisible by 18, if it is divisible by both 3 and 6.

(vi) If a number is divisible by both 9 and 10, it must be divisible by 90.

(vii) If a number exactly divides the sum of two numbers, it must exactly divide the numbers separately.

(viii) If a number divides three numbers exactly, it must divide their sum exactly.

(ix) If two numbers are co-prime, at least one of them must be a prime number.

(x) The sum of two consecutive odd numbers is always divisible by 4.

Solution:

(i) If a number is divisible by 3, it must be divisible by 9.

False

Because any number which follows the formula $9n + 3$ or $9n + 6$ violates the statement.

For example: 6, 12...

(ii) If a number is divisible by 9, it must be divisible by 3.

True

Because 9 is multiple of 3, any number divisible by 9 is also divisible by 3.

(iii) If a number is divisible by 4, it must be divisible by 8.

False

Because any number which follows the formula $8n + 4$ violates the statement.

For example: 4, 12, 20....

(iv) If a number is divisible by 8, it must be divisible by 4.

True

Because 8 is multiple of 4, any number divisible by 8 is also divisible by 4.

(v) A number is divisible by 18, if it is divisible by both 3 and 6.

False

Because for example 24, this is divisible by both 3 and 6 but not divisible by 18.

(vi) If a number is divisible by both 9 and 10, it must be divisible by 90.

True

Because 90 is the GCD of 9 and 10, any number divisible by both 9 and 10 is also divisible by 90.

(vii) If a number exactly divides the sum of two numbers, it must exactly divide the numbers separately.

False

Because let us consider an example 6 divide 30, but 6 divides none of 13 and 17 as both are prime numbers.

(viii) If a number divides three numbers exactly, it must divide their sum exactly.

True

Because if x , y and z are three numbers, each of x , y and z is divided by a number (say q), then $(x + y + z)$ is also divisible by q .

(ix) If two numbers are co-prime, at least one of them must be a prime number.

False

Because 16 and 21 are co-prime but none of them is prime.

(x) The sum of two consecutive odd numbers is always divisible by 4.

True

Because $3+5=8$ which is divisible by 4.



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