CHAPTER – 3

Playing with Numbers

EXERCISE – 3.3

Q. 1 Using divisibility tests, determine which of the following numbers are divisible by 2; by 3; by 5; by6; by 8; by 9; by 10; by 11 (say, yes or no):

Number	Divisible by								
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990									
1586									
275									
6689									
639210									
429714									
2856									
3060									
406839									

Answer:

In this question, we have to divide the numbers by the given numbers to see whether it is divisible or not.
To check this, we follow the divisibility rules:

(i) For divisible by 2: Any number that has 0,2,4,6, or 8 in its one's place is divisible by 2.

(ii) For divisible by 3: If the sum of all the digits of the number is multiple of 3, then it is divisible by 3.

(iii) For divisible by 4: Any number whose last two digits (i.e. one's and ten's place digits) are divisible by 4 then, the number is divisible by 4.

(iv) For divisible by 5: Any number that has 0 or 5 in its one's place is divisible by 5.

(v) For divisible by 6: If a number a divisible by both 2 and 3, then it is divisible by 6.

(vi) For divisible by 8: Any number whose last three digits are divisible by 8 then, the number is divisible by 8.

(vii) For divisible by 9: If the sum of all the digits of the number is multiple of 9, then it is divisible by 9.

(viii) For divisible by 10: Any number that has 0 in its one's place is divisible by 10.

For example-

990

= 990 ÷ 2 = 495 so yes it is divisible.

$= 990 \div 3 = 330$ so yes,

$= 990 \div 4 = 247.5$ which is not completely divisible so no its not divisible by 4,

$= 990 \div 5 = 198$ yes

$= 990 \div 6 = 165$ yes

$= 990 \div 8 = 123.75$ (N0)

$= 990 \div 9 = 110$ yes

$= 990 \div 10 = 99$ yes

$= 990 \div 11 = 90$ yes

Number	Divisible by								
	2	3	4	5	6	8	9	10	11
990	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
1586	Yes	No	No	No	No	No	No	No	No
275	No	No	No	Yes	No	No	No	No	Yes
6689	Yes	No	No	No	No	No	No	No	No
639210	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
429714	Yes	Yes	No	No	Yes	No	Yes	No	No
2856	Yes	Yes	Yes	No	Yes	Yes	No	No	No
3060	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
406839	No	Yes	No	No	No	No	No	No	No

Q. 2

Using divisibility tests, determine which of the following numbers are divisible by 4; by 8;

(a) 572
(b) 726352
(c) 5500
(d) 6000
(e) 12159
(f) 14560
(g) 21084
(h) 31795072
(i) 1700
(j) 2150

Answer:

a. 572
As per the divisibility rule for 4: if the last two digits of a whole number are divisible by 4, then the entire number is divisible by 4.
The last two digits of the given number are 72, since 72 is divisible by 4, the number is also divisible by 4.
According to the rule of divisibility for 8: if the last three digit of a whole number are divisible by 8, then the entire number is divisible by 8.
The last three digits are 572, as 572 is not divisible by 8, the given number is also not divisible by 8.

b. 726352

According to the rule of divisibility for 4 the last two digits of the given number are 52, since 52 is divisible by 4, the given number is also divisible by 4.

According to the rule of divisibility for 8 the last three digits are 352, as 352 is divisible by 8, the given number is also divisible by 8.

c. (5500

According to the rule of divisibility for 4 the last two digits of the given number are 00, the number is divisible by 4.

According to the rule of divisibility for 8, the last three digits are 500, as 500 is not divisible by 8, the given number is also not divisible by 8.

d. 6000

According to the rule of divisibility for 4 the last two digits of the given number are 00, the number is divisible by 4.

According to the rule of divisibility for 4 the last three digits are 000, the given number is divisible by 8.

e. 12159

According to the rule of divisibility for 4 the last two digits of the given number are 59, since 59 is not divisible by 4, the number is also not divisible by 4. According to the rule of divisibility for 8 the last three digits are 159, as 159 is not divisible by 8, the given number is also not divisible by 8.

f. 14560

According to the rule of divisibility for 4 the last two digits of the given number are 60, since 60 is divisible by 4, the number is also divisible by 4. According to the rule of divisibility for 8 the last three digits are 560, as 560 is divisible by 8, the given number is also divisible by 8.

g. 21084

According to the rule of divisibility for 4 the last two digits of the given number are 84, since 84 is divisible by 4, the number is also divisible by 4. According to the rule of divisibility for 8 the last three digits are 084, as 084 is not divisible by 8, the given number is also not divisible by 8.

h. 31795072

According to the rule of divisibility for 4 the last two digits of the given number are 72, since 72 is divisible by 4, the number is also divisible by 4.

According to the rule of divisibility for 8 the last three digits are 072, as 072 is divisible by 8, the given number is also divisible by 8.

i. 1700

According to the rule of divisibility for 4 the last two digits of the given number are 00, the number is also divisible by 4.

According to the rule of divisibility for 8 the last three digits are 700, as 700 is not divisible by 8, the given number is also not divisible by 8.

j. 2150

According to the rule of divisibility for 4 the last two digits of the given number are 50, since 50 is not divisible by 4, the number is also not divisible by 4.

According to the rule of divisibility for 8 the last three digits are 150, as 150 is not divisible by 8, the given number is also not divisible by 8.

Q. 3

Using divisibility tests, determine which of the following numbers are divisible by 6:

(a) 297144

(b) 1258

(c) 4335
(d) 61233
(e) 901352
(f) 438750
(g) 1790184
(h) 12583
(i) 639210
(j) 17852

Answer:

The prime factors of 6 are 2 and 3. So for the number to be divisible by 6, it must also be divisible by 2 and 3. Therefore, we need to check whether the number is divisible by 2 and then the sum of the digits should also be divisible by 3.

a. 297144
Since the last digit of the number is 4, it is divisible by 2, so, the given number is divisible by 2.
On adding all the digits of the number, the sum obtained is 27 since 27 is divisible by 3, the given number is also divisible by 3.
As per the divisibility rule of 6 the number is divisible by both 2 and 3, so, it is divisible by 6.

b. 1258
Since the last digit of the number is 8, it is divisible by 2, so, the given number is divisible by 2.

On adding all the digits of the number, the sum obtained is 16 since 16 is not divisible by 3, the given number is also not divisible by 3.
As per the divisibility rule of 6 the number should be divisible by 2 and 3 but the given number is not divisible by both 2 and 3, so, it’s not divisible by 6.

c. 4335
Since the last digit of the number is 5, it is not divisible by 2, so, the given number is not divisible by 2
On adding all the digits of the number, the sum obtained is 15 since 15 is divisible by 3, the given number is also divisible by 3.
As per the divisibility rule of 6 the number should be divisible by both 2 and 3 the number but the given number is not divisible by both 2 and 3, so, it is not divisible by 6.

d. 61233
Since the last digit of the number is 3, it is not divisible by 2, so, the given number is not divisible by 2
On adding all the digits of the number, the sum obtained is 15 since 15 is divisible by 3, the given number is also divisible by 3.
As per the divisibility rule of 6 the number should be divisible by both 2 and 3 but the given number is not divisible by both 2 and 3, so, it is not divisible by 6.

e. 901352

Since the last digit of the number is 2, it is divisible by 2, so, the given number is divisible by 2

On adding all the digits of the number, the sum obtained is 20 since 20 is not divisible by 3, the given number is also not divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 and 3 but the given number is not divisible by both 2 and 3, so, it is not divisible by 6.

f. 438750

Since the last digit of the number is 0, it is divisible by 2, so, the given number is divisible by 2

On adding all the digits of the number, the sum obtained is 27 since 27 is divisible by 3, the given number is also divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 and 3, the given number is divisible by both 2 and 3, so, it is divisible by 6.

g. 1790184

Since the last digit of the number is 4, it is divisible by 2, so, the given number is divisible by 2

On adding all the digit's number, the sum obtained is 30 since 30 is divisible by 3, the given number is also divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 and 3 and the given number is divisible by both 2 and 3, so, it is divisible by 6.

h. 12583

Since the last digit of the number is 3, it is divisible by 2, so, the given number is not divisible by 2

On adding all the digits' number, the sum obtained is 19 since 19 is not divisible by 3, the given number is also not divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 and 3 but the given number is not divisible by both 2 and 3, so, it is not divisible by 6.

i. 639210

Since the last digit of the number is 0, it is divisible by 2, so, the given number is divisible by 2

On adding all the digits number, the sum obtained is 21 since 21 is divisible by 3, the given number is also divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 & 3 and the given number is divisible by both 2 and 3, so, it is divisible by 6.

j. 17852

Since the last digit of the number is 2, it is divisible by 2, so, the given number is divisible by 2

On adding all the digits number, the sum obtained is 23, since 23 is not divisible by 3, the given number is also not divisible by 3.

As per the divisibility rule of 6 the number should be divisible by both 2 and 3 but the given number is not divisible by both 2 and 3, so, it is not divisible by 6.

Q. 4

Using divisibility tests, determine which of the following numbers are divisible by 11:

(a) 5445
(b) 10824
(c) 7138965
(d) 70169308
(e) 10000001
(f) 901153

Answer:

Divisibility rule of 11 says that if the difference, of the sum of the digits at odd place and the sum of the digits at even place in the given number, is divisible by 11 then the number is also divisible by 11.

a. 5445
Calculate the sum of the digits at odd places = 5 + 4 = 9
Calculate the sum of the digits at even places = 4 + 5 = 9
Difference = 9 - 9 = 0
As per the divisibility rule of 11 the difference between the sum of the digits at odd places and the

sum of the digits at even places is 0, hence, 5445 is divisible by 11.

b. 10824

Calculate the sum of the digits at odd places = 4+ 8 + 1 = 13

Calculate the sum of the digits at even places = 2 + 0 = 2

Difference = 13 - 2 = 11

As per the divisibility rule of 11 the difference between the sum of the digits at good places and the sum of the digits at even places is 11, which is divisible by 11, therefore 10824 is divisible by 11.

c. 7138965

Calculate the sum of the digits at odd places = 5 + 9 + 3 + 7 = 24

Calculate the sum of the digits at even places = 6 + 8 + 1 = 15

Difference = 24 - 15 = 9

As the difference between the sum of the digits at old places and the sum of the digits at even places is 9, which is not divisible by 11, therefore, given number is also not divisible by 11.

d. 70169308

Calculate the sum of the digits at odd places = 8 + 3 + 6 + 0 = 17

Calculate the sum of the digits at even places = 0 + 9 + 1 + 7 = 17

Difference = 17 – 17 = 0

As per the divisibility rule of 11 the difference between the sum of the digits at odd places and the sum of the digits at even places is 0, hence, 70169308 is divisible by 11.

e. 10000001

Calculate the sum of the digits at odd places = 1

Calculate the sum of the digits at even places = 1

Difference = 1 – 1 = 0

As per the divisibility rule of 11 the difference between the sum of the digits at odd places and the sum of the digits at even places is 0, hence, 10000001 is divisible by 11.

f. 901153

Calculate the sum of the digits at odd places = 3 + 1 + 0 = 4

Calculate the sum of the digits at even places = 5 + 1 + 9 = 15

Difference = 15 – 4 = 11

As per the divisibility rule of 11 the difference between the sum of the digits at odd places and the sum of the digits at even places is 11, which is divible by 11, therefore, 901153 is divisible by 11.

Q. 5

Write the smallest digit and the greatest digit in the blank space of each of the following numbers so that the number formed is divisible by 3:

(a) ………… 6724

(b) 4765 ………2

Answer:

a. ____6724

Add the remaining digits = 6+7+2+4 = 19

To make the number divisible by 3, the sum of its digits should be divisible by 3.

The smallest multiplier of 3 which comes after 19 is 21.

Therefore, smallest number = 21 – 19 = 2

if we add 8 then the digit is divisible by 3 (19 + 8 = 27)8 is the largest digit 26724 = 8 + 6 + 7 + 2 + 4 = 36

Therefore, the largest number is 8.

b. 4765____2

Add the remaining digits = 4 + 7 + 6 + 5 + 2 = 24

To make the number divisible by 3, the sum of its digits should be divisible by 3. As we can see 24 is already divisible by 3,

the smallest number that can be placed here is 0.

if we add 9 then the digit is divisible by 3 (2 + 9 = 33) 9 is the largest digit 4765 ____2 = 4 + 7 + 6 + 5 + 9 + 2 = 33

Therefore, the largest number is 9.

Q. 6

Write a digit in the blank space of each of the following numbers so that the number formed is divisible by 11:

(a) 92 ……389 (b) 8 ……9484

Answer:

a. Let suppose missing digit = x
Calculate the sum of the digits at odd places = 9 + 3 + 2 = 14
Calculate the sum of the digits at even places = 8+ x + 9 = 17 + x
Difference = 17 + x – 14 = 3 + x
For a number to be divisible by 11, this difference should be 0 or a multiplier of 11.
If 3 + x = 0, then
x = -3
But the number cannot be negative.
The closest multiplier of 11, which is near to 3 is taken. This is 11 itself.
3 + x = 11
x = 8
Therefore, the required digit is 8.

b. Let suppose missing digit = x
Calculate the sum of the digits at odd places = 4 + 4 + x = 8 + x

Calculate the sum of the digits at even places = 8 + 9 + 8 = 25

Difference = 25 – (8 + x) = 17 – x

For a number to be divisible by 11, this difference should be 0 or a multiplier of 11.

If 17 - x = 0, then

x = 17

But this is not possible.

The closest multiplier of 11 is taken, taking 11 itself we get,

17 - x = 11

x = 6

Therefore, the required digit is 6.