EXERCISE 3.3 PAGE NO: 57

1. Using divisibility tests, determine which of the following numbers are divisible by 2; by 3; by 4; by 5; by 6; by 8; by 9; by 10; by 11 (say, yes or no):

Numbers	Divisible by								
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990	.....	.....	.....	.....	.....	.....	.....	.....	.....
1586	.....	.....	.....	.....	.....	.....	.....	.....	.....
275	.....	.....	.....	.....	.....	.....	.....	.....	.....
6686	.....	.....	.....	.....	.....	.....	.....	.....	.....
639210	.....	.....	.....	.....	.....	.....	.....	.....	.....
429714	.....	.....	.....	.....	.....	.....	.....	.....	.....
2856	.....	.....	.....	.....	.....	.....	.....	.....	.....
3060	.....	.....	.....	.....	.....	.....	.....	.....	.....
406839	.....	.....	.....	.....	.....	.....	.....	.....	.....

Solutions:

Numbers	Divisible by								
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
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
6686	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

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
Solutions:
(a) 572
72 are the last two digits. Since, 72 is divisible by 4. Hence, 572 is also divisible by 4
572 are the last three digits. Since, 572 is not divisible by 8. Hence, 572 is not divisible by 8
(b) 726352
52 are the last two digits. Since, 52 is divisible by 4. Hence, 726352 is divisible by 4
352 are the last three digits. Since 352 is divisible by 8. Hence, 726352 is divisible by 8
(c) 5500
Since, last two digits are 00. Hence 5500 is divisible by 4
500 are the last three digits. Since, 500 is not divisible by 8. Hence, 5500 is not divisible by 8
(d) 6000
Since, last two digits are 00. Hence 6000 is divisible by 4
Since, last three digits are 000. Hence, 6000 is divisible by 8
(e) 12159
59 are the last two digits. Since, 59 is not divisible by 4. Hence, 12159 is not divisible by 4
159 are the last three digits. Since, 159 is not divisible by 8. Hence, 12159 is not divisible by 8
(f) 14560
60 are the last two digits. Since 60 is divisible by 4. Hence, 14560 is divisible by 4
560 are the last three digits. Since, 560 is divisible by 8. Hence, 14560 is divisible by 8
(g) 21084
84 are the last two digits. Since, 84 is divisible by 4. Hence, 21084 is divisible by 4
084 are the last three digits. Since, 084 is not divisible by 8. Hence, 21084 is not divisible by 8
(h) 31795072
72 are the last two digits. Since, 72 is divisible by 4. Hence, 31795072 is divisible by 4
072 are the last three digits. Since, 072 is divisible by 8. Hence, 31795072 is divisible by 8
(i) 1700
Since, the last two digits are 00. Hence, 1700 is divisible by 4
700 are the last three digits. Since, 700 is not divisible by 8. Hence, 1700 is not divisible by 8
(j) 2150
50 are the last two digits. Since, 50 is not divisible by 4. Hence, 2150 is not divisible by 4
150 are the last three digits. Since, 150 is not divisible by 8. Hence, 2150 is not divisible by 8

3. Using divisibility tests, determine which of 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
Solutions:
(a) 297144

Since, last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(b) 1258

Since, last digit of the number is 8. Hence, the number is divisible by 2

By adding all the digits of the number, we get 16 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(c) 4335

Since, last digit of the number is 5 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(d) 61233

Since, the last digit of the number is 3 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(e) 901352

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 20 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(f) 438750

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(g) 1790184

Since, the last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 30 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(h) 12583

Since, the last digit of the number is 3. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 19 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(i) 639210

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 21 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(j) 17852

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 23 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

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

Solutions:

(a) 5445

Sum of the digits at odd places = 5 + 4

= 9

Sum of the digits at even places = 4 + 5

= 9

Difference = 9 – 9 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 5445 is divisible by 11

(b) 10824

Sum of digits at odd places = 4 + 8 + 1

= 13

Sum of digits at even places = 2 + 0

= 2

Difference = 13 – 2 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 10824 is divisible by 11

(c) 7138965

Sum of digits at odd places = 5 + 9 + 3 + 7 = 24

Sum of digits at even places = 6 + 8 + 1 = 15

Difference = 24 – 15 = 9

Since, the difference between sum of digits at odd places and sum of digits at even places is 9 which is not divisible by 11. Hence, 7138965 is not divisible by 11

(d) 70169308

Sum of digits at odd places = 8 + 3 + 6 + 0

= 17

Sum of digits at even places = 0 + 9 + 1 + 7

= 17

Difference = 17 – 17 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 70169308 is divisible by 11

(e) 10000001

Sum of digits at odd places = 1

Sum of digits at even places = 1

Difference = 1 – 1 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 10000001 is divisible by 11

(f) 901153

Sum of digits at odd places = 3 + 1 + 0

= 4

Sum of digits at even places = 5 + 1 + 9

= 15

Difference = 15 – 4 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 901153 is divisible by 11

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

Solutions:

(a) __ 6724

Sum of the given digits = 19

Sum of its digit should be divisible by 3 to make the number divisible by 3

Since, 21 is the smallest multiple of 3 which comes after 19

So, smallest number = 21 – 19

= 2

Now 2 + 3 + 3 = 8

But 2 + 3 + 3 + 3 = 11

Now, if we put 8, sum of digits will be 27 which is divisible by 3

Therefore the number will be divisible by 3

Hence, the largest number is 8

(b) 4765 __ 2

Sum of the given digits = 24

Sum of its digits should be divisible by 3 to make the number divisible by 3

Since, 24 is already divisible by 3. Hence, the smallest number that can be replaced is 0

Now, 0 + 3 = 3

3 + 3 = 6

3 + 3 + 3 = 9

3 + 3 + 3 + 3 = 12

If we put 9, sum of its digits becomes 33. Since, 33 is divisible by 3.

Therefore the number will be divisible by 3

Hence, the largest number is 9

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
Solutions:
(a) 92 __ 389
Let 'a' be placed here
Sum of its digits at odd places = 9 + 3 + 2
= 14
Sum of its digits at even places = 8 + a + 9
= 17 + a
Difference = 17 + a – 14
= 3 + a
The difference should be 0 or a multiple of 11, then the number is divisible by 11
If 3 + a = 0
a = -3
But it cannot be a negative
Taking a closest multiple of 11 which is near to 3
It is 11 which is near to 3
Now, 3 + a = 11
a = 11 – 3
a = 8
Therefore the required digit is 8
(b) 8 __ 9484
Let 'a' be placed here
Sum of its digits at odd places = 4 + 4 + a
= 8 + a
Sum of its digits at even places = 8 + 9 + 8
= 25
Difference = 25 – (8 + a)
= 17 – a
The difference should be 0 or a multiple of 11, then the number is divisible by 11
If 17 – a = 0
a = 17 (which is not possible)
Now, take a multiple of 11.
Let's take 11
17 – a = 11
a = 17 – 11
a = 6
Therefore the required digit is 6