

**NUMBER PATTERNS**

- Write the sequence obtained by adding 2 to the multiples of 3 . Is this sequence an arithmetic sequence ?

$$(3 \times 1) + 2 , (3 \times 2) + 2 , (3 \times 3) + 2 , (3 \times 4) + 2 , (3 \times 5) + 2 , . . .$$
$$= 5 , 8 , 11 , 14 , 17 , . . .$$

This sequence is an arithmetic sequence .The algebraic form of the sequence  $= 3n + 2$

- Write the sequence obtained by subtracting 1 from the multiples of 5 .  
Is this sequence an arithmetic sequence ?

$$(5 \times 1) - 1 , (5 \times 2) - 1 , (5 \times 3) - 1 , (5 \times 4) - 1 , (5 \times 5) - 1 , . . .$$
$$= 4 , 9 , 14 , 19 , 24 , . . .$$

This sequence is an arithmetic sequence .The algebraic form of the sequence  $= 5n - 1$

**Arithmetic sequence**

Arithmetic sequences are the sequences obtained by adding a number to the multiples of a number . ( subtracting a number from the multiples of a number )

**NUMBER PATTERN – 1**

Look at the number pattern given below .

1  
2 3  
4 5 6  
7 8 9 10  
.....  
.....

Here the numbers are arranged as first row contains **one number** , second row contains **2 numbers** , third row contains **3 numbers** , fourth row contains **4 numbers** and so on .

The  $n^{\text{th}}$  row will contain  $n$  numbers .

There are  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$  numbers in  $n$  rows in total .

Also ,

Last number in the first row = 1

Last number in the second row = 3 = 1 + 2

Last number in the third row = 6 = 1 + 2 + 3

Last number in the fourth row = 10 = 1 + 2 + 3 + 4

.....

Last number in the  $n^{\text{th}}$  row = 1 + 2 + 3 + \dots + n

Last number in the  $n^{\text{th}}$  row = 1 + 2 + 3 + \dots + n =  $\frac{n(n+1)}{2}$

1
2 3
4 5 6
7 8 9 10
.....
.....
.
.
.
.....
$\frac{n(n+1)}{2}$

**Q. Look at the number pattern given below .**

1

2 3

4 5 6

7 8 9 10

.....

.....

- a) Write the next two more rows of this number pattern ?
- b) How many numbers are there in the 10<sup>th</sup> row ?
- c) What is the last number in the 9<sup>th</sup> row ?
- d) What is the first number in the 10<sup>th</sup> row ?
- e) What is the last number in the 10<sup>th</sup> row ?
- f) What is the sum of the numbers in the 10<sup>th</sup> row ?

**Answer .**

1

2 3

4 5 6

7 8 9 10

.....

.....

.

.

.

.....  $\frac{10 \times 11}{2}$

a) 11 12 13 14 15

16 17 18 19 20 21

b) 10

c) Last number in the 9<sup>th</sup> row =  $\frac{9 \times 10}{2} = 45$

d) First number in the 10<sup>th</sup> row =  $45 + 1 = 46$

e) Last number in the 10<sup>th</sup> row =  $\frac{10 \times 11}{2} = 55$

f) Sum of the numbers in the 10<sup>th</sup> row =  $\frac{10}{2} \times (46 + 55) = 505$

**Another way of finding the answer of the last sub question**

f) Sum of the numbers in the 10<sup>th</sup> row =  $\frac{10}{2} \times (46 + 55) = 505$

$$= 1 + 2 + 3 + \dots + 55 - (1 + 2 + 3 + \dots + 45)$$

$$= \frac{55 \times 56}{2} - \frac{45 \times 46}{2} = 1540 - 1035 = 505$$

**NOTE :**

**Algebraic form of the sequence 6, 10, 14, . . . =  $4n + 2$**

**That is, this sequence is obtained by adding 2 to the multiples of 4**

**$4 \times 1 + 2$ ,  $4 \times 2 + 2$ ,  $4 \times 3 + 2$ ,  $4 \times 4 + 2$ ,  $4 \times 5 + 2$ , . . .**

**That is, adding 2 to four times the terms of the sequence 1, 2, 3, . . . gives the**

**sequence 6, 10, 14, . . .**

**Q. Look at the number pattern given below .**

6

10 14

18 22 26

30 34 38 42

.....

.....

- a) Write the next two more rows of this number pattern ?
- b) How many numbers are there in the 20<sup>th</sup> row ?
- c) What is the last number in the 19<sup>th</sup> row ?
- d) What is the first number in the 20<sup>th</sup> row ?
- e) What is the last number in the 20<sup>th</sup> row ?

**Answer .**

- a) 46 50 54 58 62  
66 70 74 78 82 86

<p>1</p> <p>2 3</p> <p>4 5 6</p> <p>7 8 9 10</p> <p>.....</p> <p>.....</p>	<p>6</p> <p>10 14</p> <p>18 22 26</p> <p>30 34 38 42</p> <p>.....</p> <p>.....</p>
<p>b) 20</p>	<p>20</p>
<p>c) <math>\frac{19 \times 20}{2} = 190</math></p>	<p><math>4 \times 190 + 2 = 760 + 2 = 762</math></p>

$$d) 190 + 1 = 191$$

$$762 + 4 = 766$$

$$e) \frac{20 \times 21}{2} = 210$$

$$4 \times 210 + 2 = 840 + 2 = 842$$

## NUMBER PATTERN – 2

Look at the number pattern given below .

1

2 3 4

5 6 7 8 9

10 11 12 13 14 15 16

.....

.....

Here the numbers are arranged as first row contains **one number** , second row contains **3 numbers** , third row contains **5 numbers** , fourth row contains **7 numbers** and so on .

The  $n^{\text{th}}$  row will contain  $(2n-1)$  numbers .

Also ,

$$\text{Last number in the first row} = 1 = 1^2$$

$$\text{Last number in the second row} = 4 = 2^2$$

$$\text{Last number in the third row} = 9 = 3^2$$

$$\text{Last number in the fourth row} = 16 = 4^2$$

.....

$$\text{Last number in the } n^{\text{th}} \text{ row} = n^2$$

Last number in the  $n^{\text{th}}$  row =  $n^2$

1

2 3 4

5 6 7 8 9

10 11 12 13 14 15 16

.....

.....

.....  $n^2$

**Q. Look at the number pattern given below .**

1

2 3 4

5 6 7 8 9

10 11 12 13 14 15 16

.....

.....

- Write the next two more rows of this number pattern ?
- How many numbers are there in the 10<sup>th</sup> row ?
- What is the last number in the 9<sup>th</sup> row ?
- What is the first number in the 10<sup>th</sup> row ?
- What is the last number in the 10<sup>th</sup> row ?

**Answer .**

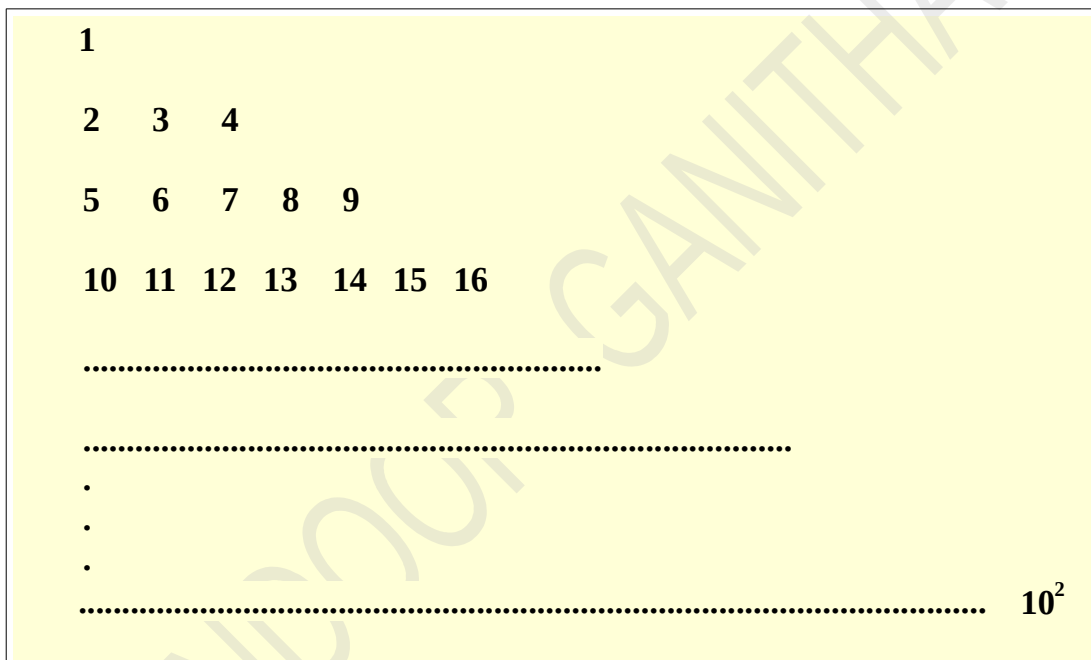
a) 17 18 19 20 21 22 23 24 25  
26 27 28 29 30 31 32 33 34 35 36

b)  $2 \times 10 - 1 = 20 - 1 = 19$

c) Last number in the 9<sup>th</sup> row =  $9^2 = 81$

d) First number in the 10<sup>th</sup> row =  $81 + 1 = 82$

e) Last number in the 10<sup>th</sup> row =  $10^2 = 100$



**Q. Look at the number pattern given below .**

5  
8 11 14  
17 20 23 26 29  
32 35 38 41 44 47 50

.....  
.....



- a) Write the next two more rows of this number pattern ?
- b) How many numbers are there in the 11<sup>th</sup> row ?
- c) What is the last number in the 10<sup>th</sup> row ?
- d) What is the first number in the 11<sup>th</sup> row ?
- e) What is the last number in the 11<sup>th</sup> row ?

**Answer .**

- a) 53 56 59 62 65 68 71 74 77  
80 83 86 89 92 95 98 101 104 107 110

Algebraic form of the arithmetic sequence  $5, 8, 11, \dots = 3n + 2$

1	5
2 3 4	8 11 14
5 6 7 8 9	17 20 23 26 29
.....	.....
.....	.....
b) $(2 \times 11) - 1 = 22 - 1 = 21$	$(2 \times 11) - 1 = 22 - 1 = 21$
c) $10^2 = 100$	$(3 \times 100) + 2 = 300 + 2 = 302$
d) $100 + 1 = 101$	$302 + 3 = 305$
e) $11^2 = 121$	$(3 \times 121) + 2 = 363 + 2 = 365$