

**Patterns in** **whole number**

A pattern is a sequence of numbers or picture.

We can arrange numbers in elementary shapes consisting of dots.

1. Every number can be arranged as a line.

  

1. Some numbers like 3, 6 and 10 can be arrange as a triangle.



3.  Some numbers like 4, 9 and 16 can be arrange as a square



4. Some numbers like 6, 8 and 10 can be arrange as a rectangle.



Observe the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Line | Triangle | Square | Rectangle |
| 2 | YES | NO | NO | NO |
| 3 | YES | YES | NO | NO |
| 4 | YES | NO | YES | YES |
| 5 | YES | NO | NO | NO |
| 6 | YES | YES | NO | YES |
| 7 | YES | NO | NO | NO |
| 8 | YES | NO | NO | YES |
| 9 | YES | NO | YES | NO |
| 10 | YES | YES | NO | YES |

**Patterns observations:**

1. Multiply 3 by 9, 99, 999, 9999. Study the pattern.

Solution:  3 x 9 = 3 x (10 – 1) = 27

3 x 99 = 3 x (100 – 1) = 297

3 x 999 = 3 x (1000 – 1) = 2997

3 x 9999 = 3 x (10000 – 1) = 29997

1. Observe the following pattern.

   44 x 5 = 44 x 10/2 = 22 x 10 = 220 x 1

   44 x 10 = 44 x 20/2 = 22 x 20 = 220 x 2

   44 x 15 = 44 x 30/2 = 22 x 30 = 220 x 3

   44 x 20 = 44 x 40/2 = 22 x 40 = 220 x 4

***Questions***: Write down the first seven numbers that can be arranged as triangles, e.g. 3, 6, ...

Solution:



Threfore, first 7 numbers which can be arranged as triangles are  3, 6, 10,15, 21, 28, 36,

1. Study the pattern:

    1 × 8 + 1 = 9

   12 × 8 + 2 = 98

   123 × 8 + 3 = 987

1234 × 8 + 4 = 9876

12345 × 8 + 5 = 98765

   Write the next two steps. Can you say how the pattern works?

   (Hint: 12345 = 11111 + 1111 + 111 + 11 + 1).

Solution:

123456 x 8 + 6 = 987648 + 6 = 987654

 1234567 x 8 + 7 = 9876536 + 7 = 9876543

Yes, the pattern works.

123456 = 111111 + 11111 + 1111 + 111 + 11 + 1

123456 x 8 = (111111 + 11111 + 1111 + 111 + 11 + 1) x 8

                    = 111111 x 8 + 11111 x 8 + 1111 x 8 + 111 x 8 + 11 x 8 + 1 x 8

                    = 888888 + 88888 + 8888 + 888 + 88 + 8 = 987648

123456 x 8 + 6 = 987648 + 6 = 987654