

15. Patterns



Tai : How nice ! The dots for your *rangoli* are all at equal distances from each other. Do you see the maths hidden in these dots ?

Surekha : Maths in the dots? I did not see that.

Shabnam : I know what you mean, Tai. The dots are arranged in the form of a **square**.

Tai : You're absolutely right! Now tell me, how many dots are there ?

Surekha : 4 dots in each row, and 4 rows. Therefore, there are $4 \times 4 = 16$ dots.

Tai : Good ! This means we can arrange 16 dots in a square. Which other numbers of dots can we arrange in a square ?

Shabnam : To make a square, each horizontal and vertical row needs to have an equal number of dots.

Surekha : That means $2 \times 2 = 4$; $3 \times 3 = 9$; if we take a number obtained by multiplying another number by itself, we can put the dots in a square arrangement.

Tai : Exactly ! 4, 9, 16, 25 or 36 are the numbers of dots that we can put in a square arrangement. These numbers are called **square numbers**. Is 100 a square number ?

Surekha : Ten tens are 100. This means that 100 is a square number.

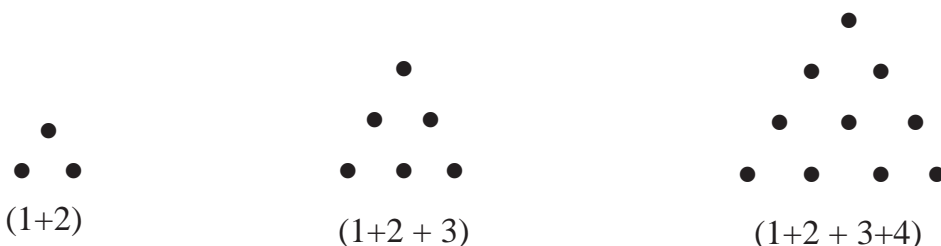
Tai : Correct ! And 40 ?

Shabnam : Let me think. $6 \times 6 = 36$; $7 \times 7 = 49$ and 40 comes between 36 and 49. This means that there is no number that can be multiplied by itself to make 40. Therefore, 40 is not a square number.

Tai : Let me tell you one more fun thing about numbers. First, add numbers from 1 to 6 like this : $1 + 2$; $1 + 2 + 3$.

Surekha : $1 + 2 = 3$, $1 + 2 + 3 = 6$, $1 + 2 + 3 + 4 = 10$,
 $1 + 2 + 3 + 4 + 5 = 15$, $1 + 2 + 3 + 4 + 5 + 6 = 21$.

Tai : Let me draw dots equal to the numbers 3, 6, 10, 15 and 21 like this :



Shabnam : I've got it, Tai ! These arrangements of dots form triangles.

Tai : Right ! And, can you see anything special about the triangles ?

Surekha : All three sides of the triangles are equal.

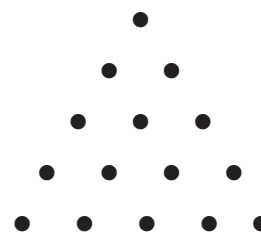
Tai : Right, again ! Now tell me, can we draw 15 dots in such an arrangement ?

Shabnam : Yes, Tai. I can make a *rangoli* of 15 dots shaped like a triangle with equal sides.

Tai : Ok ! Now make one with 21 dots.

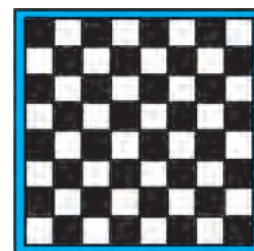
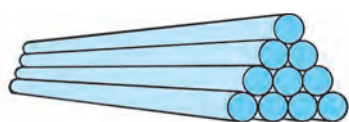
Surekha : We just have to add 6 dots to the arrangement !

Tai : So, aren't numbers like 3, 6, 10, 15 and 21 fun ?
What will you call such numbers ?



Shabnam : **Triangular numbers!**

Tai : Correct. These numbers are actually called triangular numbers. We can find square and triangular numbers all around us. For example, in stacked bowls or on a chess board and so on.



Problem Set 53

- Find the square numbers from the list given below.
5, 9, 12, 16, 50, 60, 64, 72, 80, 81
- Which are the triangular numbers in the given list ?
3, 6, 8, 9, 12, 15, 16, 20, 21, 42
- Name a number which is square as well as triangular.
- If 4 is the first square number, which is the tenth one ?
- If 3 is the first triangular number, which is the tenth one ?

Think about it.

- (1) How will you decide if a given number is a square number ?
- (2) How will you decide if a given number is a triangular number ?
- (3) How many square numbers do you think there are ?
- (4) How many triangular numbers do you think there are ?

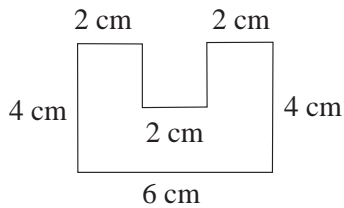
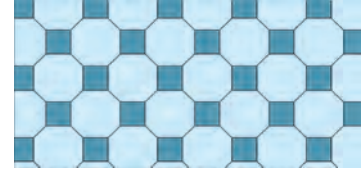
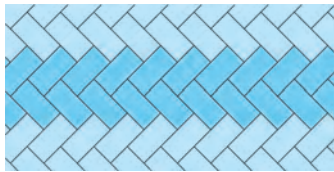
Activity

Make a collection of pictures in which you can see square or triangular numbers.



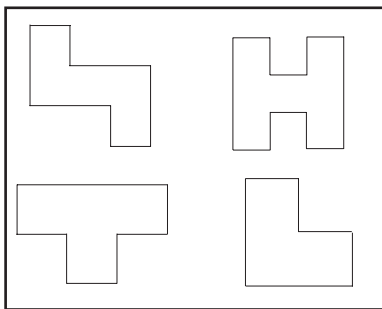
❑ Patterns in floor tiles

The tiles in each picture below form a specific pattern. Observe that there is no gap or open ground between two tiles.



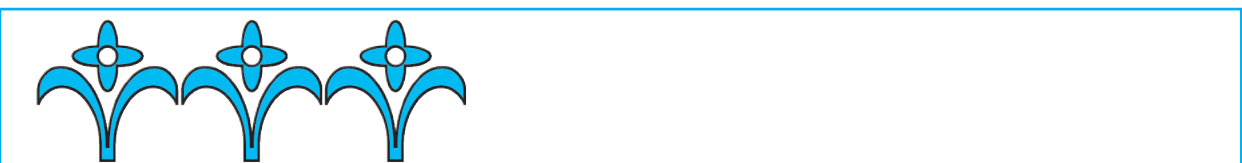
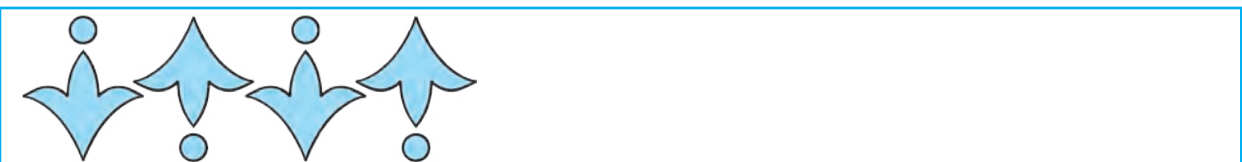
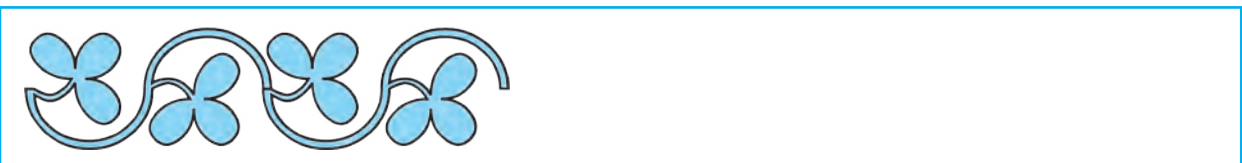
❖ On a large piece of card sheet, draw several shapes like the one shown alongside. Colour half of them. Cut them all out and separate them.

One pattern made of these shapes is shown alongside. Make some other patterns of your own.



❖ Cut out many pieces of each of the shapes shown alongside. Join them in a pattern like floor tiles.

❖ Note the pattern and complete the design.



❖ Make your own shapes and use them to make patterns for *sari* and *shawl* borders, etc.