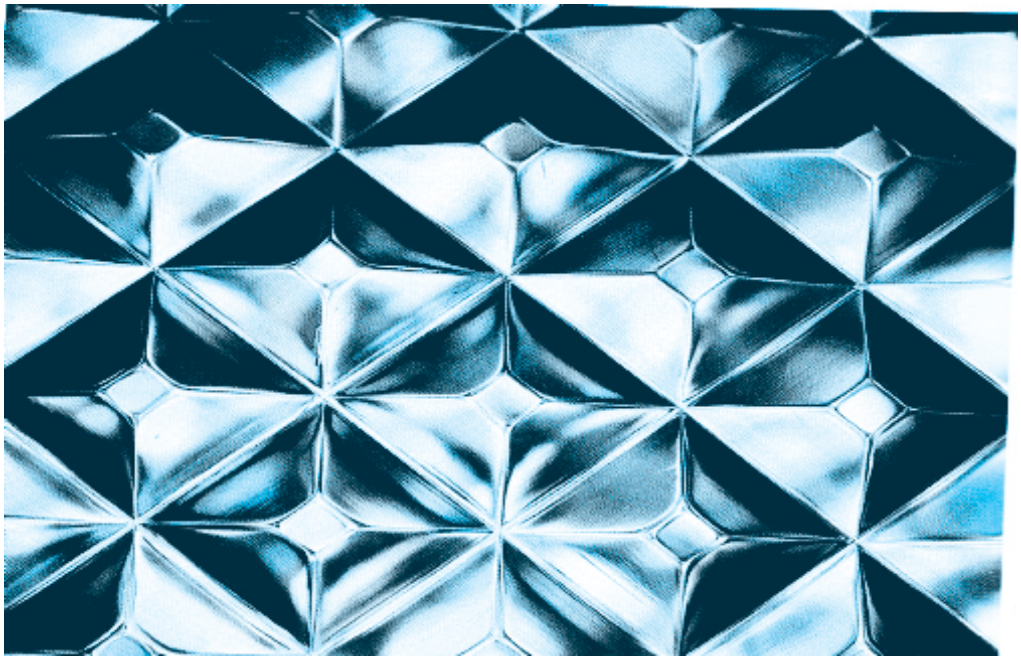
28 Tessellation

By studying this chapter you will be able to get a good understanding of,

- ★ the concept of tessellation.
- ★ describing a pure tessellation.
- ★ constructing tessellations.

28.1 Tessellation

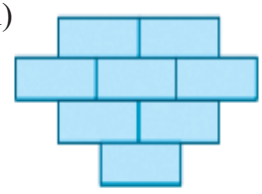


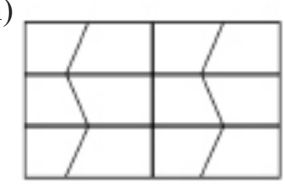
From ancient times various types of bricks and tiles have been used to beautify buildings and the land near them.

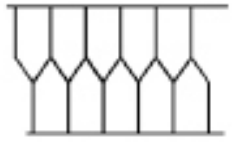
Such beautifications can be seen mostly at religious places and government institutions.

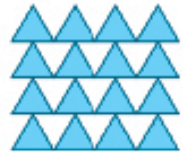
Can you see such beautification in the above figure? Can you identify the geometrical shapes in it? How many geometrical shapes have been used for each beautification? A few such preparations are given on the next page. Observe them well.

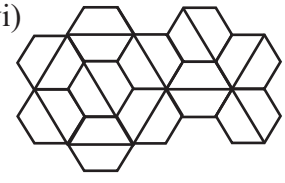
(i) 

(ii) 

(iii) 

(iv) 

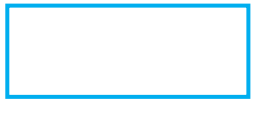
(v) 

(vi) 

When observing the above preparations the following conclusions can be arrived at.

- These preparations have been done using one or more shapes.
- Each of the shapes is equal in size.
- The shapes have been laid so that there are no gaps between them and they do not overlap.
- The shapes are laid according to some pattern. An arrangement of one kind of shape or a few kinds of shapes as shown above covering a certain space without gaps and overlapping is called a **Tessellation.**

Activity 28.1

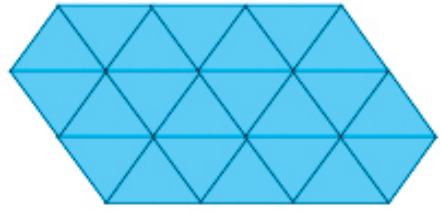


(i) A rectangle of length 3 cm and breadth 1.5 cm is given in the figure.
(ii) Copy this figure and cut out 20 of these rectangular shapes.
(iii) Paste them on some paper and get three different tessellations.
(iv) Paint your three tessellations so that you get three different patterns.

An arrangement of a shape or a few shapes on a plane, in a pattern so that one will not fall on another and there will be no gap in between shapes is called a **tessellation.**

Exercise 28.1

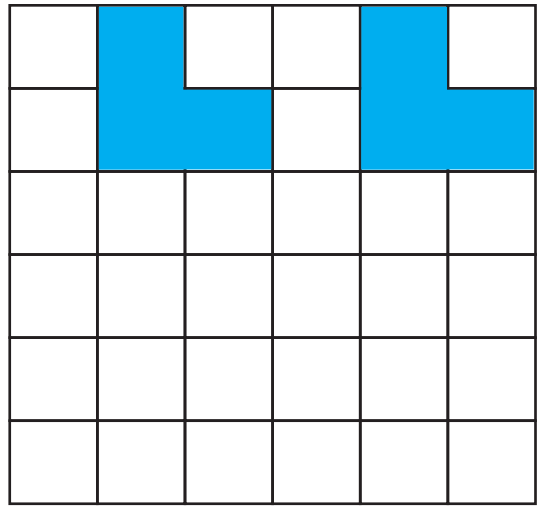
(1)



(i) Name a shape that can be seen in this tessellation.
(ii) Name two other shapes that can be seen apart from what you named above.

(2) Write three qualities that can be seen in a tessellation.

(3)

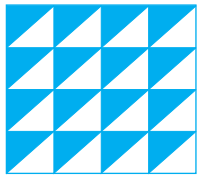
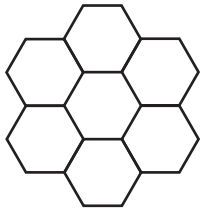
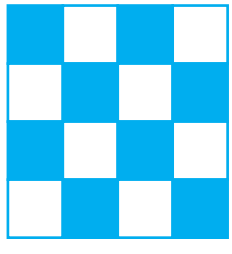


Copy this figure and complete it to get a tessellation.

(4) Construct a tessellation you like on a square ruled sheet of paper.

(5) Name three situations where tessellations can be seen in the surrounding environment.

28.2 Pure tessellations

Tessellation	Number of shapes used	Shape used
	01	A right angled triangle
	01	A regular hexagon
	01	A square

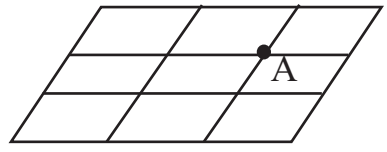
Can you state the common feature that can be seen in these tessellations? A single shape has been used for each of these tessellations.

A tessellation in which only one shape is used is called a pure tessellation.

28.3 The points of vertices of a tessellation

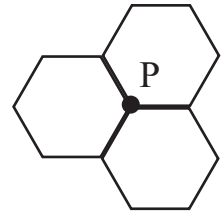
Examine the following tessellation.

(1)



- This is a tessellation obtained using the shape of a parallelogram.
- The vertices of the parallelograms meet at the point 'A'.
- 'A' is a vertex point.

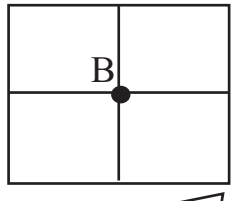
(2)



- The vertices of the hexagons meet at point 'P'.
- 'P' is a vertex point.

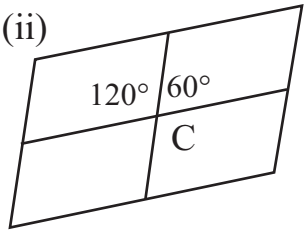
In a tessellation having geometrical shapes, the points at which the vertices of the shapes meet are called vertex points and all the shapes are around these points.

(i)



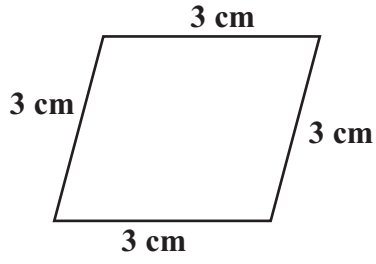
In this tessellation, 'B' is a vertex point. The sum of the angles around 'B' is, $90^{\circ} \times 4 = 360^{\circ}$

(ii)



The sum of the angles at the vertex point 'C' is,
$120^{\circ} + 60^{\circ} + 120^{\circ} + 60^{\circ} = 360^{\circ}$

Activity 28.2



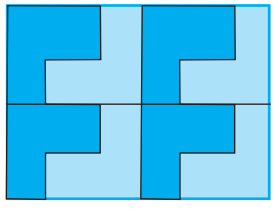
(i) Copy on a sheet of paper the rhombus given in the figure.
(ii) Measure its angles and get the values.
(iii) Copy a few such rhombuses and cut them out.
(iv) Construct a pure tessellation from these rhombus shapes.
(v) Name a vertex point of it as 'P'.
(vi) Find the sum of the angles at the vertex point.

The sum of the angles around a vertex point of a tessellation made of rectilinear plane figures is 360^0.

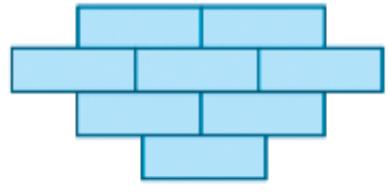
Exercise 28.2

(1) Examine the following tessellations and select the pure tessellations out of them and write their numbers.

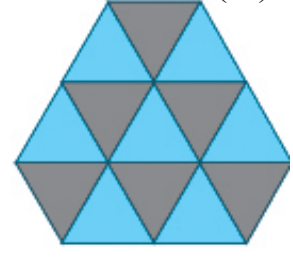
(i)



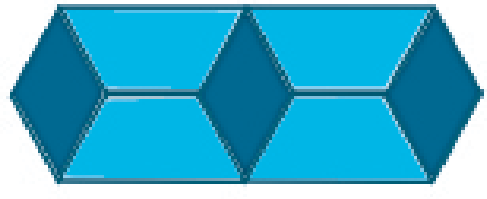
(ii)



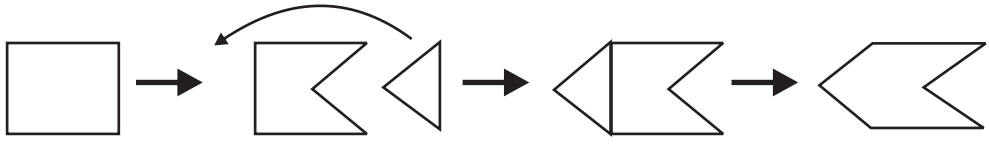
(iii)



(iv)



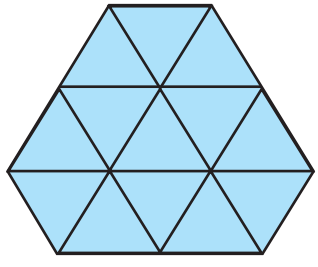
(2) Given below is a new shape obtained by cutting a part of a square and connecting the cut out part in a different way.



(i) Draw a square and cut out a part and construct a new shape as above.

(ii) Obtain a tessellation with that shape.

(3)



(i) Mark a vertex point in this tessellation of regular polygons and name it.

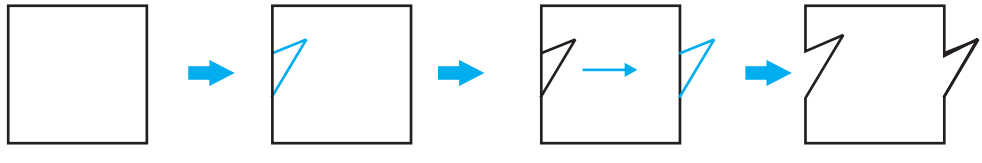
(ii) Show that the sum of the angles around the vertex point is 360^0.

(4) Can a tessellation be made by using a scalene triangle?

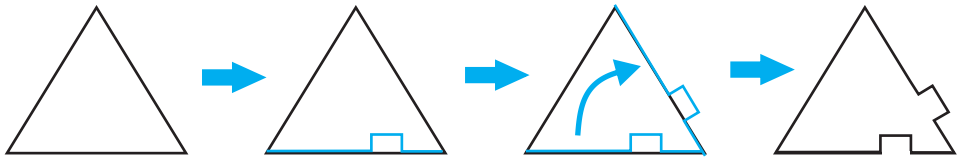
(5) Draw any quadrilateral. Draw about 10 copies of it and cut them out. Examine whether a pure tessellation can be constructed by using them.

(6) Obtain tessellations by using the shapes prepared as below.

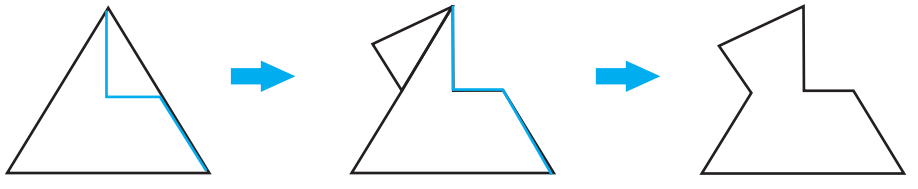
(i)



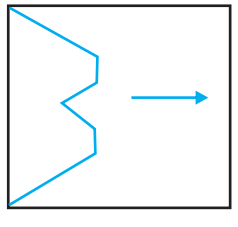
(ii)



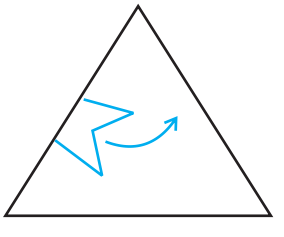
(iii)



(vi)



(v)



Summary

- An arrangement of a shape or a few shapes on a plane without leaving gaps or overlapping is called a **tessellation**.
- A tessellation constructed using only one shape is called a **pure tessellation.**
- In a tessellation, the points at which the vertices of the geometrical shapes meet are called **vertex points.**
- In a tessellation the sum of the angles around a vertex point is 360^{o}.