

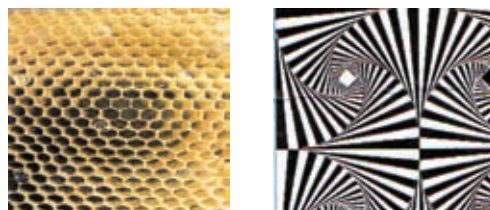
By studying this lesson you will be able to

- understand what tessellation is,
- identify pure tessellations and semi pure tessellations, and
- create tessellations.

28.1 Introducing Tessellation

Figures of surfaces which are attractive due to a certain shape occurring repeatedly in an organized manner are given below. Each of these creations enhances the beauty of the environment.

The fact that the shape that recurs is of one size and the shapes are organized in a pattern without any gaps in between them reveals the wonder of nature. Let us consider such creations further.



We have seen how bricks and tiles have been laid in attractive designs on the floors, roofs and courtyards of places of worship. Moreover, most bed spreads and clothes have beautiful designs on them. Several such designs are shown below. See whether you can identify the shapes in them.



Tessellation is the process of creating a design consisting of the repeated use of one or more shapes, closely fitted together without gaps or overlaps, on a plane surface.

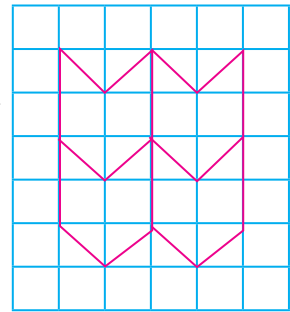
Based on this description, we can identify the creations in the above figures as tessellations.



Activity 1

Step 1 - Create a design by repeatedly drawing the shape in this figure on a page in your square ruled exercise book.

Step 2 - Colour your design appropriately and make it an attractive work of art.



On completing the above activity you would have ended up with a very attractive tessellation.

28.2 Pure Tessellation



Activity 2

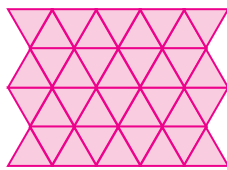


Figure 1

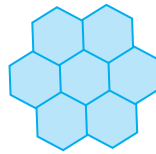


Figure 2

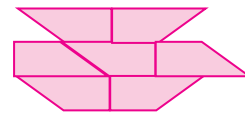


Figure 3

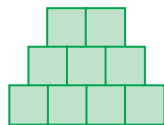


Figure 4

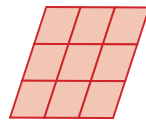


Figure 5

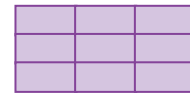



Figure 6

Figures of several tessellations that have been created using various shapes are given above. Copy the table given below and complete it after carefully observing the above tessellations.



Figure	Sketch of the shape
1	
2	
3	
4	
5	
6	

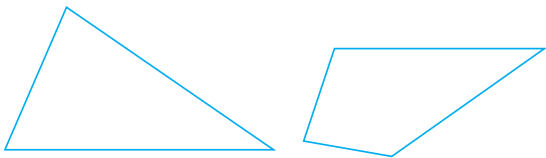
From the above activity it is clear that tessellation can be done using various shapes.

Tessellation that is done using just one shape is called pure tessellation.

According to this, all the tessellations considered in the above activity are pure tessellations.



Activity 3

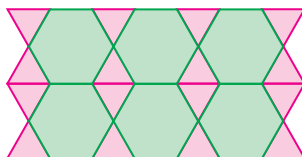


- Step 1** - Copy the triangle in the figure and cut out 10 triangular laminas of the same size using coloured paper.
- Step 2** - By using the cut out laminas, create a pure tessellation and paste it on a page of your exercise book.
- Step 3** - Copy the given quadrilateral and create a pure tessellation as above, and paste it on a page of your exercise book.

Exercise 28.1

- (1) Write down two facts that need to be considered when creating a tessellation.
- (2) What is a pure tessellation?
- (3) Create a pure tessellation by using any shape you like and paste it on your exercise book.

28.3 Semi pure tessellation



The above figure shows two tessellations that have been created using different shapes. Examine and see whether you can identify the shapes in the two figures.

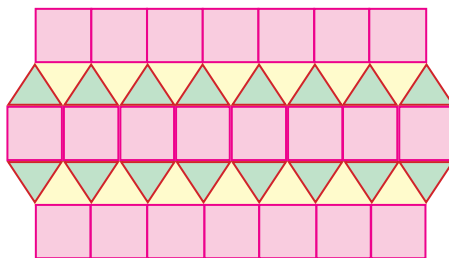
Tessellation that is done using two or more different shapes is called semi pure tessellation.



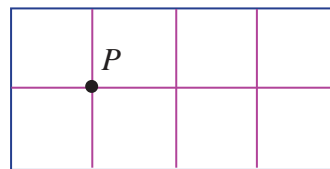
Activity 4

The figure shows a tessellation that has been created using triangles and quadrilaterals.

Create another tessellation using triangles and quadrilaterals and paste it in your exercise book.



The figure shows a tessellation that has been created using squares. A point at which vertices of several of these squares meet has been marked as P . As depicted in the figure, the angles of four squares are around the point P . Let us consider the sum of the angles around the point P .



The magnitude of an interior angle of the square = 90°

\therefore the sum of the angles around the point $P = 90^\circ \times 4 = 360^\circ$

We can similarly show that the sum of the angles around any point is equal to 360° .

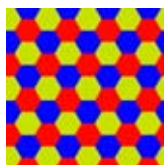
The sum of the angles around a vertex point of a tessellation created using rectilinear plane figures is 360° .



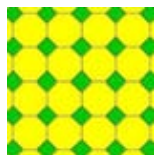
Accordingly, the shapes that are selected to create a tessellation should be such that the angle of 360° around a point can be covered by them without gaps and overlaps.

Exercise 28.2

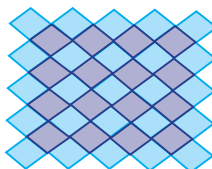
- (1) For each of the following tessellations, write down with reasons whether it is a pure tessellation or a semi pure tessellation.



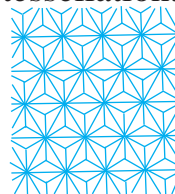
(i)



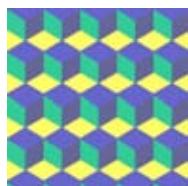
(ii)



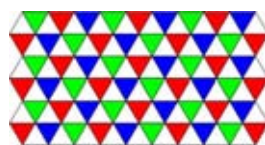
(iii)



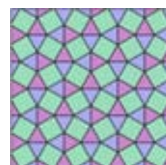
(iv)



(v)

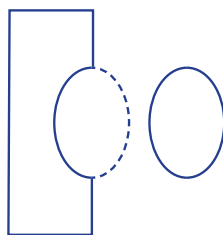


(vi)

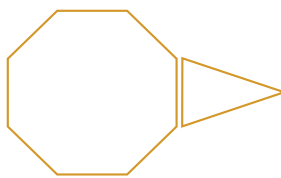


(vii)

- (2) From the following, select the pairs of shapes that can be used to create semi pure tessellations.



(a)



(b)

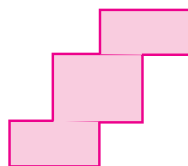


(c)



Activity 5

- Create a semi pure tessellation using two or more shapes that you like, and paste it in your exercise book.
- Create tessellations with each of the following shapes.



28.4 Creating tessellation designs



Activity 6

Step 1 - Cut out a rectangular shaped lamina.

Step 2 - On the lamina that you cut out, draw any shape that you like as shown in Figure 1. Now cut and separate out the shape you drew.

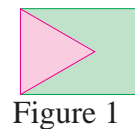


Figure 1

Step 3 - Paste the two parts that you obtained in Step 2 on a piece of cardboard as shown in Figure 2.

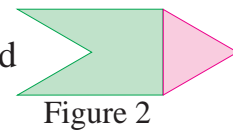
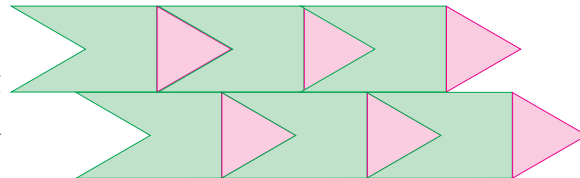


Figure 2

Step 4 - Using the net that you prepared in Step 3, cut out laminas using coloured paper and create a tessellation design.



- Following the steps of activity 6 above, create various attractive tessellation designs using different nets and display them.

Summary

- Tessellation is the process of creating a design consisting of the repeated use of one or more shapes, closely fitted together without gaps or overlaps, on a plane surface.
- Tessellation done using just one shape is called pure tessellation.
- Tessellation done using two or more shapes is called semi pure tessellation.