Tessellations

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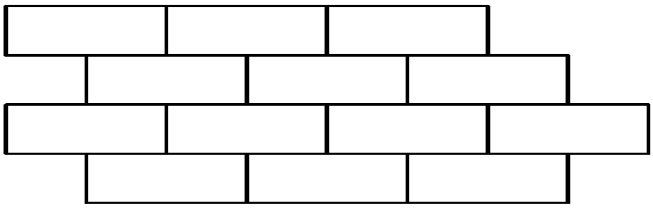
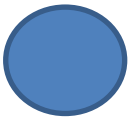
A **tessellation** is created when a shape is repeated over and over again to cover the plane without any overlaps or gaps.

1. **The picture below can be extended to a tessellation of the plane. Add a few blocks to continue the tessellation.**



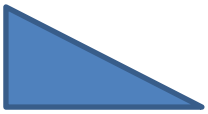
2. **What shape is used in this tessellation?**

3. Which of these shapes can be used to make a tessellation?

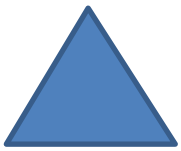
a. 

d. 

b. 

e. 

c. 

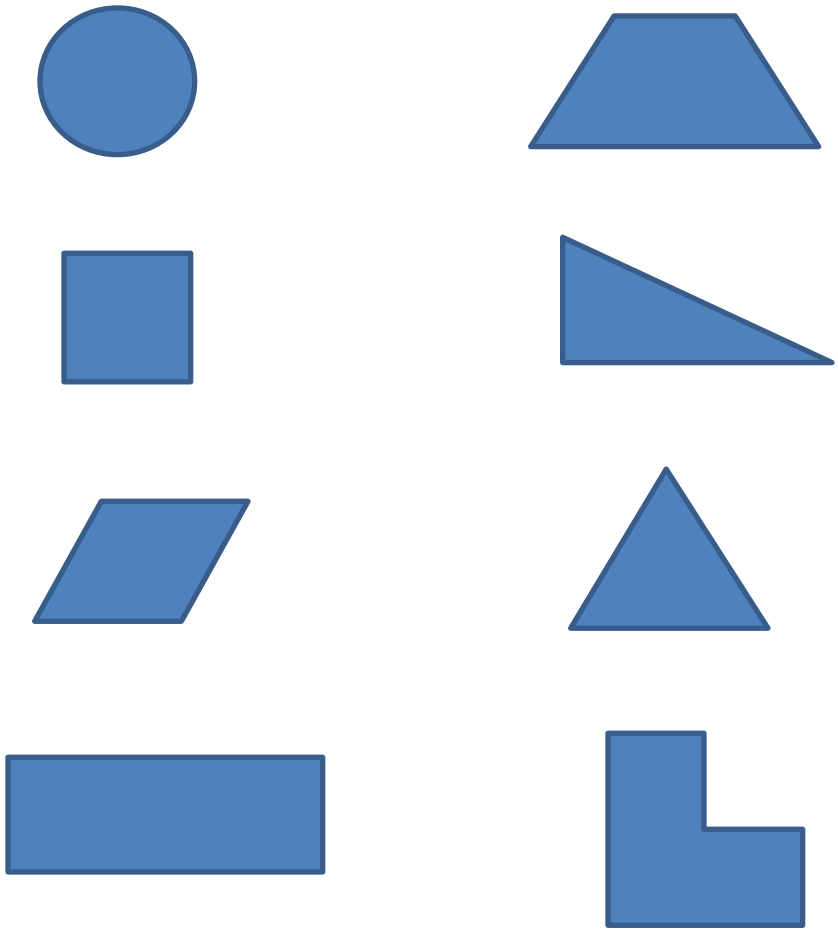
f. 

How do you determine whether a shape can form a tessellation?

Tessellations by One Regular Polygon

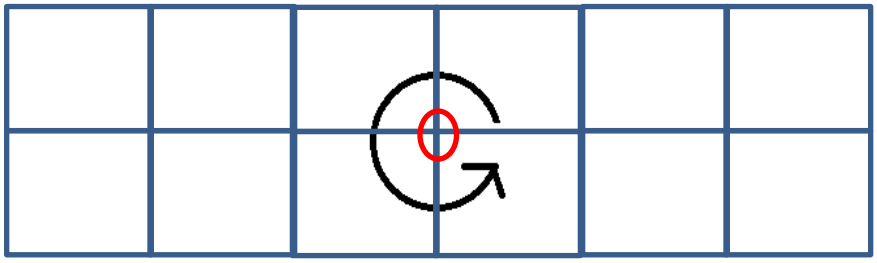
A **regular polygon** is a shape with **all sides equal** and **all angles equal**. Some regular polygons tessellate. Others do not.

4. Which of the shapes below are regular polygons? Remember, to be regular, a polygon must have all equal sides AND all equal angles.



A **vertex** of a tessellation is a point where three or more corners of the tessellating shapes are joined.

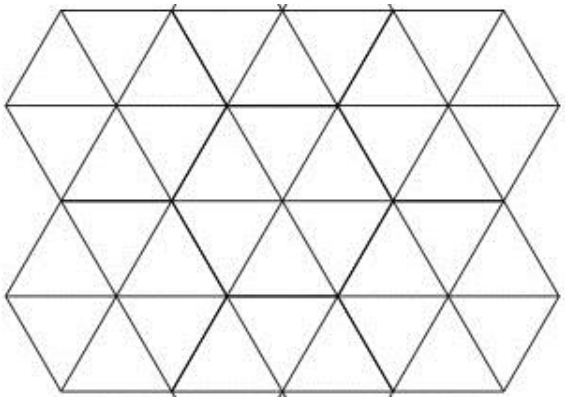
For example, these squares fit together to make one full turn at a vertex, with no overlapping parts and no gaps. The square is therefore a regular polygon that tessellates.



5a. Look at the figure above. Draw a circle around any vertex of this tessellation.

5b. How many squares are intersected by the circle you drew?

Here is a tessellation of regular triangles.

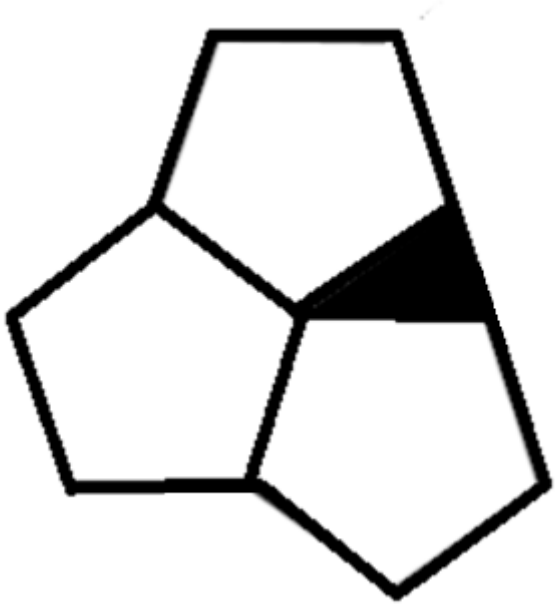


6a. Draw a circle around a vertex in this tessellation.

6b. How many regular triangles are needed to complete one full turn at a vertex of the tessellation so that there are no gaps and no overlapping parts?

7a. Use your pentagons to try to make a tessellation. Share what you have made with a neighbor.

7b. Explain why the arrangement of regular pentagons below is not a tessellation.



8a. Use your shapes to see if regular hexagons tessellate. Why or why not?

8b. Look at the figure you have built with your hexagons. How many regular hexagons are needed to complete one full turn at a vertex of the tessellation so that there are no gaps and no overlapping parts?