Chapter 9: Transformational Geometry

SECTION 6: TESSELLATIONS

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I Can

- Use transformations to draw tessellations
- Identify regular and semi-regular tessellations and figures that will tessellate

Translation Symmetry

A pattern has **translation symmetry** if it can be translated along a vector so that the image coincides with the preimage.

A **frieze pattern** is a pattern that has translation symmetry along a line.

Translation Symmetry

Both of the frieze patterns shown below have translation symmetry. The pattern on the right also has **glide reflection symmetry** because it coincides with its image after a glide reflection.

Translation Symmetry

Identify the symmetry in each wallpaper border pattern.

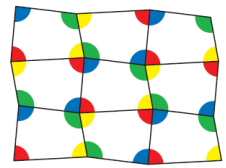
A.

B.

Tessellation

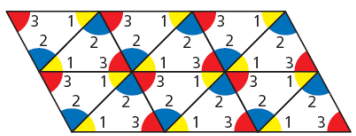
A **tessellation**, or *tiling*, is a repeating pattern that completely covers a plane with no gaps or overlaps. The measures of the angles that meet at each vertex must add up to 360°.

In the tessellation shown, each angle of the quadrilateral occurs once at each vertex. Because the angle measures of any quadrilateral add to 360°, any quadrilateral can be used to tessellate the plane. Four copies of the quadrilateral meet at each vertex.



Tessellations

The angle measures of any triangle add up to 180°. This means that any triangle can be used to tessellate a plane. Six copies of the triangle meet at each vertex as shown.



$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$

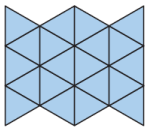
$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 1 + m\angle 2 + m\angle 3 = 360^\circ$

Regular vs. Irregular

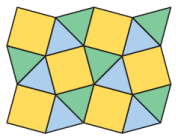
A **regular tessellation** is formed by congruent regular polygons.

A **semiregular tessellation** is formed by two or more different regular polygons, with the same number of each polygon occurring in the same order at every vertex.

Regular vs. Irregular



Regular tessellation

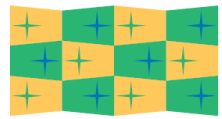


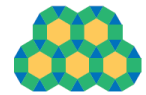
Semiregular tessellation

Every vertex has two squares and three triangles in this order: square, triangle, square, triangle, triangle.

Regular vs. Irregular

Classify each tessellation as regular, semiregular, or neither.





Will Polygons Tessellate?

Determine whether the given regular polygon(s) can be used to form a tessellation. If so, draw the tessellation.

A.

B.

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