A tessellation is a repeating pattern of plane figures that completely covers a plane with no gaps or overlaps. The simplest kind of tessellation is a regular tessellation: a repeating pattern of congruent regular polygons.

Does every regular polygon tessellate? If not, what kinds of regular tessellations are possible?

1. Draw an equilateral triangle. Use rotated and/or translated copies of the triangle to create a section of a tessellation. Does the triangle tessellate?
2. How many triangles meet at each vertex in the tessellation? What is the measure of each angle of the triangle? What is the total angle measure of all the angles that meet at a vertex?
3. Write Based on your observations in 2, how can you use the interior angle measure of a regular polygon to determine whether it will tessellate?
4. What are the interior angle measures of the regular polygons with 4, 5, 6,and 7 sides?
5. Which of these regular polygons can tessellate?
6. Model Make a quick sketch of the tessellating regular polygons you found in 2.
7. Predict Are there any regular polygons with more than 8 sides that can tessellate? How do you know?
8. Write a complete list of possible regular tessellations. A semiregular tessellation is a repeating pattern formed by two or more regular polygons in which the same number of each polygon occurs in the same order at every vertex and it completely covers a plane with no gaps or overlaps.
9. The semiregular tessellation shown is made of congruent regular octagons and congruent squares. How many polygons meet at each vertex? What is the sum of the polygons’ interior angles at each vertex?

**Tessellating with Triangles and Quadrilaterals**

1. Create a tessellation by translating this parallelogram.
2. Analyze Will every parallelogram tessellate? What properties of parallelograms indicate that they will or will not tessellate?
3. Predict Will every quadrilateral tessellate? Why?

Tessellations may feature different kinds of symmetry. The regular polygon

tessellations you saw above have several lines of symmetry and also feature

rotational symmetry. Look at the three tessellations below (in your book).

1. Which tessellation above is semiregular? Justify your answer.
2. Which of these tessellations have rotational symmetry around the center of the tessellation? What is the angle of rotation for each of them?
3. Which of these tessellations have lines of symmetry?

**Investigation Practice**

a. This figure (in the book) is a trapezium. Will the trapezium tessellate?

b. Rotate the trapezium 180° around its top right vertex, and sketch the resulting figure.

c. Translate the figure from part b to create a section of a tessellation.

d. Does this tessellation have rotational symmetry? If so, what is the angle of rotation?

e. Does this tessellation have lines of symmetry?