Angles of Polygons and Regular Tessellations Exploration

Objective: Calculate the interior angles of polygons and classify the regular tessellations of the plane.

Interior Angles of Polygons

1. Check that the sum of the angles in a triangle is 180° as follows: Cut out a triangle. Tear off the corners and put them together so that their vertices are touching. What do you see?

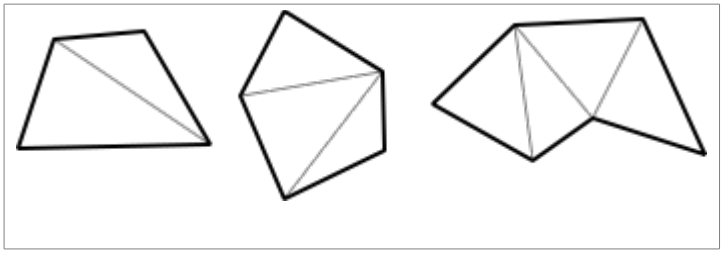
2. Draw some quadrilaterals (include some non-convex ones). For each one, show how to cut it into two triangles. Since the angle sum of each triangle is 180°, explain how you know the angle sum of each quadrilateral. What is the angle sum of a quadrilateral?

3. Any polygon can be cut into triangles by connecting its vertices with additional lines.
   How many triangles make up a 4-gon?

   How many triangles make up a 5-gon?

   How many triangles make up a 6-gon?

   How many triangles make up an n-gon?



Cutting polygons into triangles.

A bad way to cut into triangles.

4. Using the information from question 3 argue that:

The sum of the interior angles of an n-gon is (n – 2) x 180°

(I.e. Argue why the formula must be true)

5. Why does the "bad way to cut into triangles" fail to find the sum of the interior angles?

Regular Polygons

A **regular polygon** is a polygon with all sides the same length and all angles having the same angle measure.

6. a) Explain the following formula:

Each angle of a regular *n*-gon is $\frac{((n-2)x\,180)}{n}$.

b) Would this formula work for just any *n*-gon? Why or why not?

7. Complete the following table:

Number of Sides	3	4	5	6	7	8	9	10	11	12	15	20	50	100
Corner angle $\frac{((n-2)x\,180)}{n}$	60°	90°												

8. If regular polygons are going to fit around a vertex, then their angle measures have to divide evenly into 360°. Explain. Which of the angle measures in the table divide evenly into 360˚?

9. The table doesn't list every possible number of sides. How do you know that there are no other regular polygons with angles that divide evenly into 360˚, besides the ones mentioned on the list?

10. Which regular *n*-gons are the only ones that can tessellate the plane using just one type of tile?

Handin: A sheet with answers to all questions.