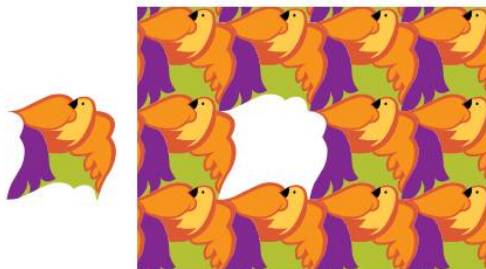


3.2 Rep-Tile Triangles

Forming Rep-Tiles With Similar Triangles

Rep-tiles must tessellate, but not every shape that tessellates is a rep-tile.

- Are the birds in the tessellation below rep-tiles?



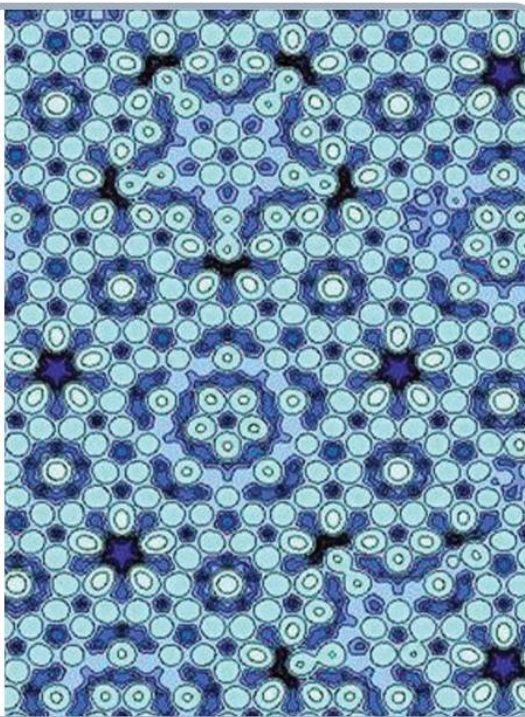
In Problem 3.1, you determined which quadrilaterals are rep-tiles. In this Problem, you will investigate which triangles are rep-tiles.



Which types of triangles are rep-tiles?

Did You Know?

Mathematicians and scientists are very interested in rep-tiles. They share many properties with strange, newly discovered, crystal-like figures called quasicrystals. Quasicrystals do not have the translational symmetry of ordinary crystals, but they have other properties that ordinary crystals do not have. Scientists are currently researching the properties of quasicrystals and why they work. Quasicrystals are used to insulate wires and to coat mechanical parts to prevent erosion and wear. Quasicrystals even work well as a coating for non-stick frying pans!



**Problem 3.2**

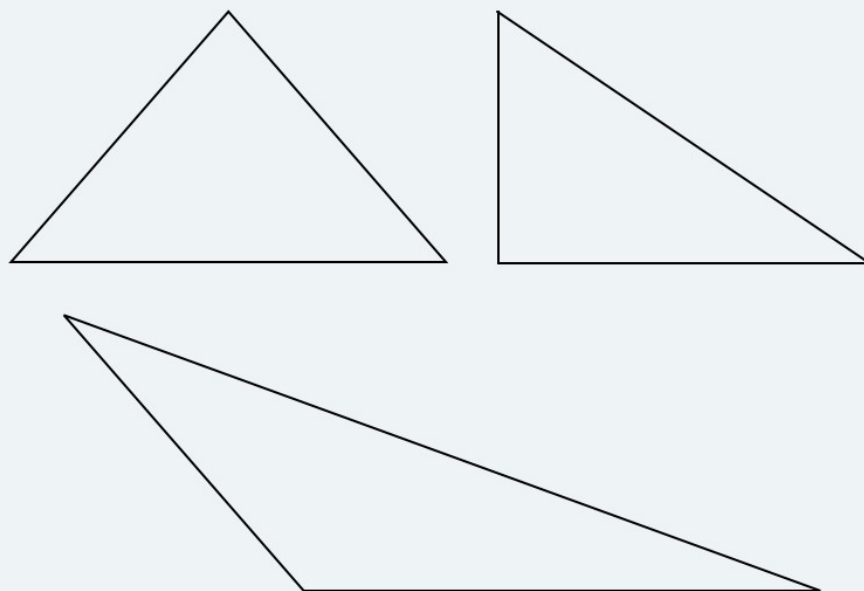
Sketch or use your Shapes Set to make several copies of these shapes:

- a right triangle
- an isosceles triangle
- a scalene triangle

- A** Which of these triangles is a rep-tile? Make a sketch to show how copies of the original figure fit together to make a larger, similar triangle.
- B** Look at your sketches from Question A.
1. What is the scale factor from each original triangle to each larger triangle? Explain your reasoning.
 2. How is the perimeter of the larger triangle related to the perimeter of the original?
 3. How is the area of the larger triangle related to the area of the original?
- C**
1. Extend the rep-tile patterns you made in Question A. Do this by sketching additional copies of the original triangle to make even larger triangles that are similar to the original. Show how the copies fit together.
 2. Find the scale factor from each original triangle to each new triangle.
 3. What do the scale factors tell you about the corresponding side lengths, perimeters, angles, and areas?

Problem 3.2 *continued*

- D** Study the rep-tile patterns you sketched for Questions A and C. Copy each of the triangles below. Then divide each triangle into four or more smaller, similar triangles.



- E**
1. Suppose you are given a rectangle or triangle rep-tile and a scale factor of 5. How many copies of your rep-tile would be needed to make the scale copy? Explain your reasoning.
 2. It takes nine copies of a certain rep-tile to make a similar figure. What is the scale factor between the original rep-tile and the image? Explain.
 3. Tomoko claims that all triangles are rep-tiles. Is this true? Explain.



Homework starts on page 60.