

# Tessellations That Use Rotations

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**Description:** Students construct an irregularly-shaped tile based on an equilateral triangle, and then use rotation to tessellate the plane with it.

**Technology Strength:** By creating the tessellation and then dynamically changing the original tile, students get a deeper understanding of the what makes the tessellation work.

**Objectives:** Use rotation to tessellate; explore rotational symmetry

**Prerequisites:** Experience with equilateral triangles, translation, tessellation, and rotation

**Suggested Grade Level:** 9 to 10

**Sketchpad Level:** Intermediate

**Suggested Duration:** 45 minutes

**Suggested Classroom Setting:** Whole Class, Student Pairs. This activity, designed for use by student pairs, can be easily modified for whole-class use.

**Preparation:** Review the Activity Notes. Work through the steps on the worksheet and make a copy of the worksheet for each student. See the presentation sketch for an example of completed student work.

**Materials:** None

**Student Worksheet(s):** Tessellations That Use Rotations

**Student Sketch:** Tessellations Using Rotation.gsp

**Presentation Sketch:** Twisted Triangles Work.gsp

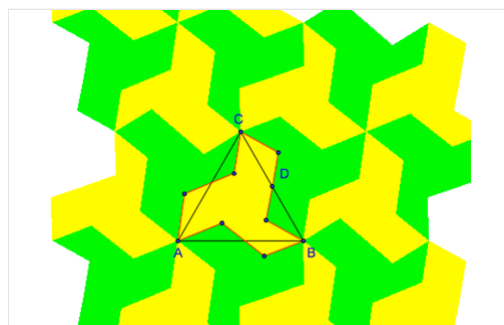
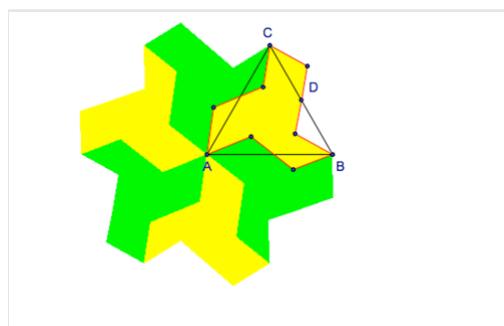
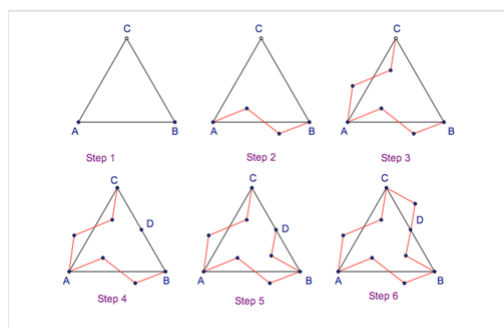
**Vocabulary:** Tessellate, tessellation, rotational symmetry

**Sketchpad Version:** GSP5

## Using the Sketch:

Students construct an equilateral triangle, labeled  $ABC$ , and use rotation to construct an irregularly-shaped tile based on the triangle. Students mark point  $A$  as the center of rotation and rotate the tile five times by the appropriate number of degrees to surround point  $A$  with tiles. They then mark point  $D$  as the center of rotation, where point  $D$  is the midpoint of segment  $BC$ , and rotate the group of six tiles by  $180^\circ$ .

Next, students examine the tiles around various points and determine the rotational symmetry about these points. Finally, they use the appropriate rotations to fill in tiles around points  $B$  and  $C$  and then experiment with their tessellation by dragging one of the original vertices.



## Sketch Tips:

Sketch Tips show skills needed in this activity, and the step at which the skill is first used.

Sketch Tip	Tip Sheet or Tip Video
Step 1: Use a custom tool from a different document	Using Custom Tools
Step 3: Rotate an object using <b>Transform   Rotate</b>	Rotating and Dilating
Step 4: Construct a midpoint using <b>Construct   Midpoint</b>	Constructing Points
Step 9: Color an object using <b>Display   Color</b>	Changing Color
Step 11: Undo actions using <b>Edit   Undo</b>	Undoing and Redoing