

Shapes & Designs

Investigation 1

Standard: 7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. *Problems 1 and 5*

The **objectives** of the Investigation are to develop student:

1. Understanding of critical polygon properties (especially degree measure for angles)
2. Ability to estimate angle and rotation measures using benchmark angles
3. Skill in using standard tools for measuring and drawing angles
4. Intuition about ways that triangular shapes can be characterized by minimal side and angle information

Investigation 2

Standards: 7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.G.B.5 Use facts about complementary, supplementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

The central **objectives** of Investigation 2 are to:

1. Develop student understanding of several basic properties of polygons and their applications—the size and sums of interior and exterior angles and the explanation of tessellations in designs like the surfaces of honeycombs.
2. Students frequently use variables to represent quantities such as the number of angles/sides and the total angle sum and construct simple equations to reason about the quantities in question.

Investigation 3

Standards: 7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

The central **objective** in this Investigation is to develop student understanding of several basic properties of triangles and quadrilaterals. Students learn to apply these properties to building structures, making mechanical devices, and creating works of art. The Investigation explicitly addresses CCSSM objective 7.G.2, which calls for drawing geometric figures with given conditions, especially, “Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.” In the prior Investigations, students constructed some shapes, which depended more on angles. This Investigation uses both angle and side conditions as constraints.