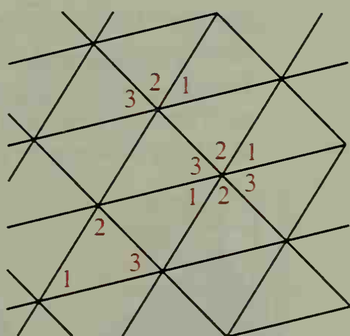
Handbook for Integrating Coordinate and Transformational Geometry

The purpose of the following sections is to enable students to study coordinate geometry and transformational geometry throughout the year, interspersed with their study of traditional (synthetic) geometry. Teachers will need to present Lessons 13-1 through 13-7 after Chapter 4 and Lessons 14-1 through 14-4 after Chapter 5. (Complete instructions are provided in the Teacher's Edition.) The sections presented here are to follow each of Chapters 3 through 11, and a final section, called "Deciding Which Method to Use in a Problem," provides guidance in selecting the approach that best suits a problem. Each section is intended for use *after* the chapter listed with its title.

Translation and Rotation **(Chapter 3)**

Objective: Study the effect of the basic transformations of translation and rotation upon polygons.

You may have noticed from putting a jigsaw puzzle together that the size and shape of a piece do not change if you slide or spin it around on the table. The same is true of polygons in the plane. Consider the pattern of identical triangles shown below. A pattern of identical shapes that fills the plane in this way is called a *tiling*, or *tessellation*.



You could create this pattern by first sliding a triangle and leaving copies of it across the plane. If you then put your finger on a vertex of one triangle and spin the triangle 180 degrees, the result is an "upside-down" triangle that fills in the rest of the pattern. Notice that the angle measures of the triangles are not altered by these movements, so we can number the angles in the diagram.

The movements of sliding and spinning are known in geometry as *translations* and *rotations*. They are examples of *transformations* that preserve length and angle measure.

Example

a. In the diagram above, find three numbered angles whose measures add up to a straight angle.

b. What does this tell you about the sum of the measures of the angles of a triangle?

c. There are 3 sets of lines that *look* parallel. What theorem or postulate tells you that they *must be* parallel?