Solution

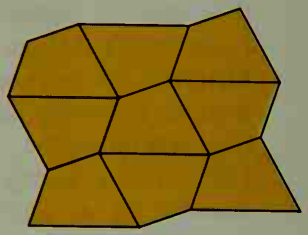
a. Every straight angle is made up of one $\angle 1$, one $\angle 2$, and one $\angle 3$.

b. Since each triangle in the diagram is also made up of one $\angle 1$, one $\angle 2$, and one $\angle 3$, the sum of the measures of a triangle must equal the measure of a straight angle, or 180.

c. Postulate 11

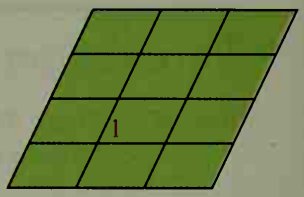
Exercises

1. The repetitive pattern at the right is a tiling of the plane with identical quadrilaterals (four-sided polygons). What does it tell you about the sum of the angle measures in a quadrilateral? Explain.



2. In the tessellation shown in Exercise 1, it is possible to slide, or glide, the lower left quadrilateral so it fits exactly on top of the lower right quadrilateral. Is it possible to glide the lower left quadrilateral so it fits exactly on any of the other quadrilaterals?

3. The figure shows a tiling of the plane by parallelograms, which are quadrilaterals having parallel opposite sides.



a. Copy the diagram and mark all angles that must be congruent to $\angle 1$ if you reason from Postulate 10.

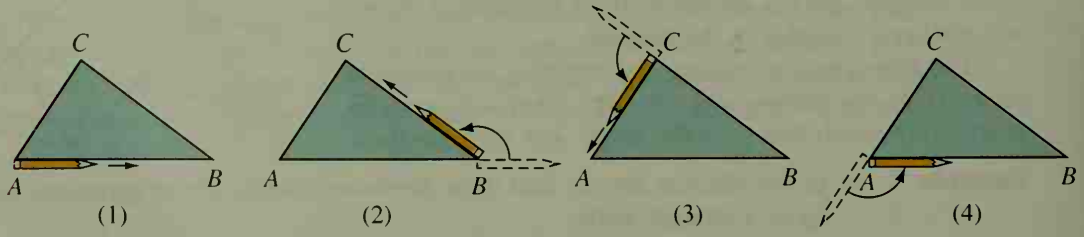
b. Mark any additional angles on the diagram that are also congruent to $\angle 1$, and tell why they are congruent to $\angle 1$.

c. This exercise suggests a theorem about the opposite angles of a parallelogram. State this theorem.

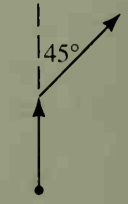
4. Draw a triangle ABC and place a pencil at A as shown in Figure 1. Glide the pencil along $\overline{AB}$ until the eraser is at B and then rotate it about B as shown in Figure 2. Now glide it to C and rotate it about C (Figure 3). Finally glide it back to A and rotate it about A (Figure 4).

a. Through how many degrees has your pencil rotated?

b. What theorem is suggested by this exercise?



5. Suppose you follow these instructions: Walk 1 m north, then walk 1 m northeast. As the diagram shows, you turn through a 45° angle.



a. Copy the diagram and continue according to these additional instructions: Walk 1 m east, 1 m southeast, 1 m south, 1 m southwest, 1 m west, and 1 m northwest.

b. What is the total number of degrees through which you turned?