Sum Them Up

Purpose

Students will investigate interior angles of triangles and quadrilaterals and discover their relationships. Students will discover that the sum of the interior angles of a triangle equals 180° and that the sum of the interior angles of a quadrilateral equals 360°.

Materials

For the teacher: copy of Black Line Master (BLM) *Sum Them Up*, large circle, black marker, large triangle
For each pair of students: triangle description card, quadrilateral description card
For each student: copy of BLM *Sum Them Up*, stickers or markers, scissors, glue or clear tape, protractor, large circle, large triangle, 2 index cards

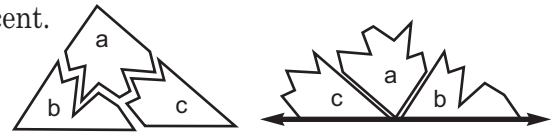
Activity

A. Pre-Activity Preparation

1. Prepare circles and triangles by cutting them from construction paper.
2. Draw a diameter across each circle using a black marker.
3. Prepare two sets of index cards; one set that lists a triangle description on each card and a second set that lists a quadrilateral description on each card. Make sure to include at least one of each of the following: right scale, right isosceles, acute scalene, acute isosceles, obtuse isosceles, square, rectangle, parallelogram, rhombus, kite, and a quadrilateral with no sides of the same.

B. Introducing the Investigation

1. Draw a square, a triangle, and a parallelogram on the chalkboard. Have students identify interior angles of these different geometric figures.
2. Hold up your paper triangle. Identify each interior angle, tear off each angle, attach the angles to the circle along the diameter so that they are adjacent.



3. Ask students to describe what they see. [A straight line or straight angle]
4. Ask students to find the sum of the three angles. [180°]

(continued)

EXTENDING THE ACTIVITY

Use the BLM for an additional activity. Have students extend the sides of each figure and measure the exterior angles. Tell students to formulate additional rules for interior and exterior angles.

MEETING INDIVIDUAL NEEDS

For those students requiring an additional challenge, assign a project to find sums of interior angles of regular polygons with more than four sides. Instead of having students measure the angles, direct them to draw triangles within the regular polygon that all have one connecting vertex. Have students use rules from this activity to find the sum of the interior angles of the polygon.

Standards Link
6.4.1

Activity (continued)

C. Investigation

1. Break the class into groups of two. Tell students that they will be tearing up triangles and quadrilaterals and putting the angles next to each other just as you did.
2. Explain that each partner is to write a description of a three-sided geometric figure and a four-sided geometric figure, one on each of the blank index cards. Hand his/her description to the other student in the group. Instruct that person to draw the three-sided figure and the four-sided figure according to the descriptions.
3. Have students compare their pictures with the student who wrote the instructions to see if the instructions were clear.
4. Hand out the cards: one triangle and one quadrilateral to each group and have the students draw these shapes so that they are fairly large (each group now has three triangles and three quadrilaterals).
5. Have students identify the angles of each figure by coloring each tip or putting a sticker close to the vertex.
6. Have students cut out their shapes and follow your example in part A, step 2. Direct them to do each figure one at a time.
7. Have students write a rule for their results.
8. Tell students to draw two more triangles that look different from their previous triangles, measure their angles, and add the measures.
9. Tell the students to draw two more quadrilaterals that look different from their previous quadrilaterals, measure their angles, and add the measures.

D. Discussion

1. Ask students to state any rules they found about the interior angles of triangles and quadrilaterals.
2. Distribute a copy of the BLM *Sum Them Up* to each student and discuss instructions with the class.

Classroom Assessment

Basic Concepts and Processes

During the activity and when reviewing the BLM, discuss the following questions with your students to gauge their understanding of the indicators:

What is meant by interior angles?

What is the sum of the interior angles of a right triangle?

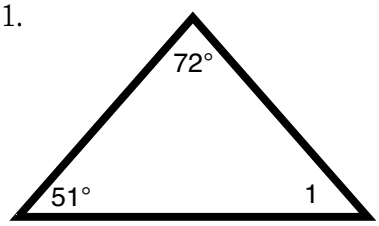
What is the sum of the interior angles of a square?

Name: _____

Sum Them Up

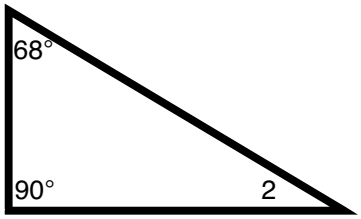
Compute the measure of the third angle of each triangle.

1.



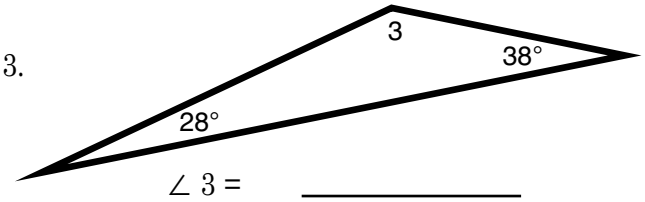
∠ 1 = _____

2.



∠ 2 = _____

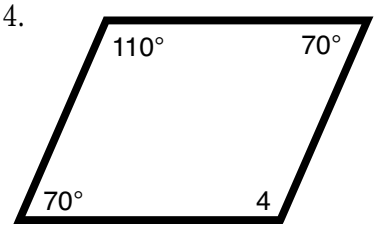
3.



∠ 3 = _____

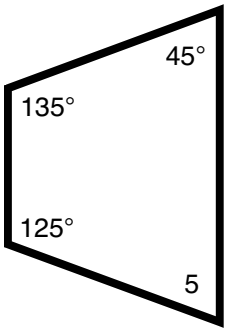
Compute the measure of the fourth angle of each quadrilateral.

4.



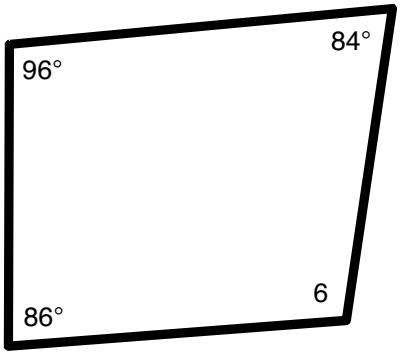
∠ 4 = _____

5.



∠ 5 = _____

6.



∠ 6 = _____

Sum Them Up

Teacher Directions

Distribute a copy of the BLM *Sum Them Up* to each student. Walk about the room and offer individual help when needed.

Answer Key

1. $\angle 1 = 57°$
2. $\angle 2 = 22°$
3. $\angle 3 = 114°$
4. $\angle 4 = 110°$
5. $\angle 5 = 55°$
6. $\angle 6 = 94°$