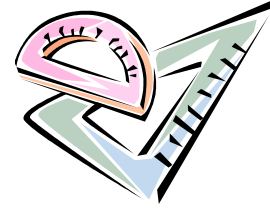# Constructing Task: Summing It Up

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.MD.5.   Recognize angles as geometric shapes that are formed
wherever two rays share a common endpoint, and understand concepts
of angle measurement:
a. An angle is measured with reference to a circle with its center at the common endpoint of the
rays, by considering the fraction of the circular arc between the points where the two rays
intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree
angle," and can be used to measure angles.
b. An angle that turns through n one-degree angles is said to have an angle measure of n
degrees.

MCC4.MD.6.   Measure angles in whole-number degrees using a protractor. Sketch angles of
specified measure.

MCC4.MD.7.   Recognize angle measure as additive. When an angle is decomposed into non-
overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts.
Solve addition and subtraction problems to find unknown angles on a diagram in real world and
mathematical problems, e.g., by using an equation with a symbol for the unknown angle
measure.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students need to be able to accurately measure an angle with a protractor. Also, students
need to be able to recognize a straight angle and know that its measure is 180°.

ESSENTIAL QUESTIONS

- How are the angles of a triangle related?
- What do we know about the measurement of angles in a triangle?

MATERIALS

- "Summing It Up" student recording sheet
- Ruler, Protractor, Scissors
- Piece of plain paper

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will explore the angle measures of a triangle and find that the sum of the angles is always 180°. While this is not a requirement of the CCGPS at 4th grade, it is an interesting way to recognize angle measure as additive from a different perspective which might inspire curiosity about summing other polygon angle measures.

Comments

To facilitate this task, provide a poster paper or a location on the board where students can record their angle measure sums. As students are working, comment about how different their triangles are.

Watch the sums students are finding; if they are very different from the expected 180°, encourage (or help) students to re-measure their angles and check their addition.

After completing this task, the websites below may be shared with the students to reinforce what they experienced by doing this task.

Task Directions

Students will follow the directions below from the "Summing It Up" student recording sheet.

You will be exploring the sum of the angle measures of a triangle.

Directions:

Part 1

1. Using a straightedge, make a triangle on a separate piece of paper. Make your triangle big enough to easily measure each angle.
2. Measure each angle of the triangle using a protractor.
3. Write the measure of each angle inside the angle.

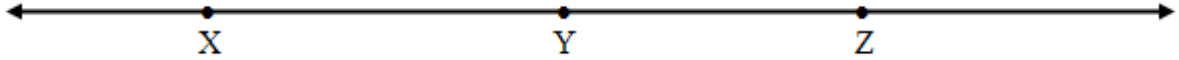Find the sum of the measures of the angles.

4. Record your sum on your paper and on the white board. **Sum of Angles_____**
5. Look at the class data on the white board. **What do you notice about the sum of the angle measures of triangles?**

Part 2

1. Look at ∠ XYZ below. **What type of angle is ∠ XYZ? What is the measure of ∠ XYZ? How do you know?**
2. Put a point on each vertex of your triangle.
3. Color each angle a different color as shown.
4. Cut out your triangle.
5. Carefully tear off each angle from your triangle.
6. Place the angles along the line below, placing the vertices of the angles on point Y on the line. Angles should not overlap.
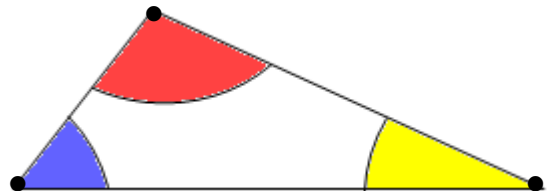
What do you notice? Compare your results with the results of your neighbors. On the back of this paper, write a conjecture about the sum of the angle measures of any triangle.

FORMATIVE ASSESSMENT QUESTIONS

- Is your triangle different from your elbow partner's triangle? How is it different?
- What did you find for the sum of the angle measures? Show how you measured one of the angles.
- What do you notice about the sums you and your classmates are finding?
- What do you know about a straight angle?
- How do the angles fit on ∠ XYZ?

DIFFERENTIATION

Extension
- Have students explore quadrilaterals in a manner similar to the way students explored triangles.
- To explore other shapes besides triangles and quadrilaterals, allow students to explore http://illuminations.nctm.org/ActivityDetail.aspx?ID=9.

Intervention
This task may be more manageable if done with a partner or in a small group with explicit teacher direction.

Name _____ Date _____

Summing It Up
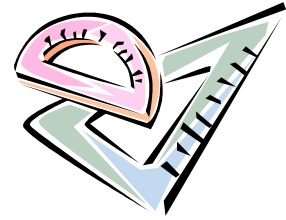
You will be exploring the sum of the angle measures of a triangle.
Directions:

Part 1
1. Using a straightedge, make a triangle on a separate piece of paper. Make your triangle big enough to easily measure each angle.
2. Measure each angle of the triangle using a protractor.
3. Write the measure of each angle inside the angle.
4. Find the sum of the measures of the angles.
5. Record your sum on your paper and on the white board. **Sum of Angles _____**
6. Look at the class data on the white board. **What do you notice about the sum of the angle measures of triangles?**

_____

_____

Part 2
7. Look at ∠ XYZ below. **What type of angle is ∠ XYZ? _____**

   What is the measure of ∠ XYZ? How do you know? _____

   _____
8. Put a point on each vertex of your triangle.
9. Color each angle a different color as shown.
10. Cut out your triangle.
11. Carefully tear off each angle from your triangle.
12. Place the angles along the line below, placing the vertices of the angles on point Y on the line. Angles should not overlap. **What do you notice? Compare your results with the results of your neighbors. On the back of this paper, write a conjecture about the sum of the angle measures of any triangle.**

X   Y   Z