

What Are Your Angles?

Strand: Measurement and Geometry

Topic: Working with angles

Primary SOL: 8.5 The student will use the relationships among pairs of angles that are vertical angles, adjacent angles, supplementary angles, and complementary angles to determine the measure of unknown angles.

Materials

- Protractor
- *What Are Your Angles?* activity sheet (attached)

Vocabulary

acute angles, angles, degrees, obtuse angles, protractor, rays, right angles, straight angles, vertex (earlier grades)

adjacent angles, complementary angles, reflex angles, supplementary angles, vertical angles (8.5)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Review how to measure angles with a protractor. As students measure angles, have them practice naming them, describing them as acute, right, obtuse, and straight.
2. Distribute the *What Are Your Angles?* activity sheet. Group students in pairs, and have partners work together to complete the activity. As students work, circulate around the room to ask questions of the partners and answer their questions. (*Note: Student definitions of the angle pairs may not be as descriptive as yours, but as long as their definitions are mathematically correct and they can justify them, you may choose to acknowledge them as correct and acceptable.*)

Assessment

- **Questions**
 - How are complementary and supplementary angles similar? How are they different?
 - If angle 1 and angle 2 are supplementary, what is the measure of angle 2 ($m\angle 2$) when the measure of angle 1 = $m\angle 2 + 72^\circ$? Defend your answer.
- **Journal/Writing Prompts**
 - Angles 1 and 2 are supplementary. State whether they can also be vertical, and explain why or why not.

Extensions and Connections (for all students)

- Have student pairs draw examples of vertical angles, adjacent angles, supplementary angles, and complementary angles. Then, have them switch drawings with other student pairs, measure the angles and describe the relationships.

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- Have each student create a drawing of a house showing all of the types of angles and angle pairs being studied.
- Have students use an interactive geometry computer program to draw and measure angles.
- Have students measure angles around the school building and find examples of vertical angles, adjacent angles, supplementary angles, and complementary angles.

Strategies for Differentiation

- Direct students to make an angle vocabulary glossary in which they include a drawing to represent the definition of each angle and angle pair.
- Have students stand and model with their arms each type of angle. Have them work with partners to model the angle pairs (vertical angles, adjacent angles, supplementary angles, and complementary angles).
- Have students color-code angle pairs by coloring the rays different colors to indicate vertical angles, adjacent angles, supplementary angles, and complementary angles.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

What Are Your Angles?

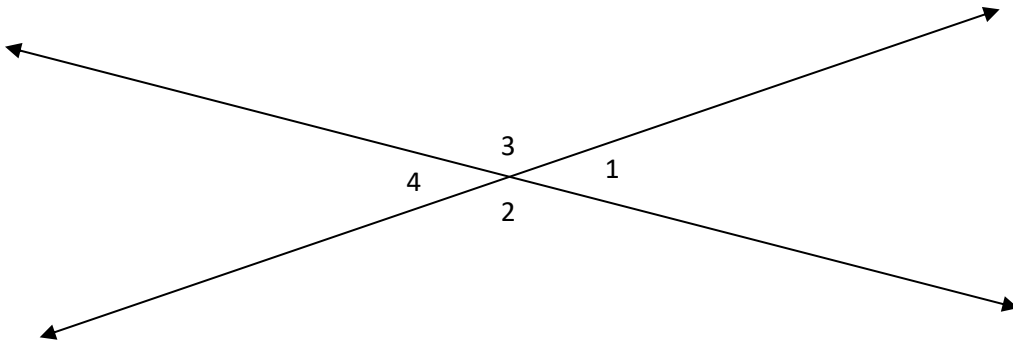
Name _____ Date _____

Vertical Angles

$\angle 1$ and $\angle 4$ are vertical angles. Measure angle 1: $m\angle 1 = \underline{\hspace{2cm}}^\circ$.

Now use your knowledge of vertical and corresponding angles to find the other missing angles. Assume $\angle 2$ and $\angle 3$ are vertical angles.

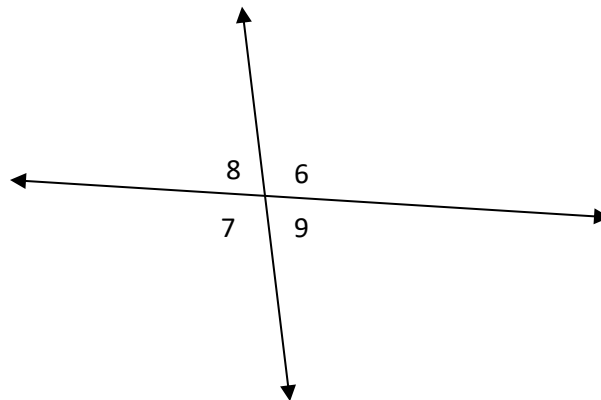
$$m\angle 2 = \underline{\hspace{2cm}}^\circ \quad m\angle 3 = \underline{\hspace{2cm}}^\circ \quad m\angle 4 = \underline{\hspace{2cm}}^\circ$$



$\angle 6$ and $\angle 7$ are vertical angles. Measure angle 6: $m\angle 6 = \underline{\hspace{2cm}}^\circ$.

Now use your knowledge of vertical and corresponding angles to find the other missing angles. Assume $\angle 8$ and $\angle 9$ are vertical angles.

$$m\angle 7 = \underline{\hspace{2cm}}^\circ \quad m\angle 8 = \underline{\hspace{2cm}}^\circ \quad m\angle 9 = \underline{\hspace{2cm}}^\circ$$



What is the relationship between the measures of vertical angles?

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Draw a pair of vertical angles.

Write a definition of vertical angles.

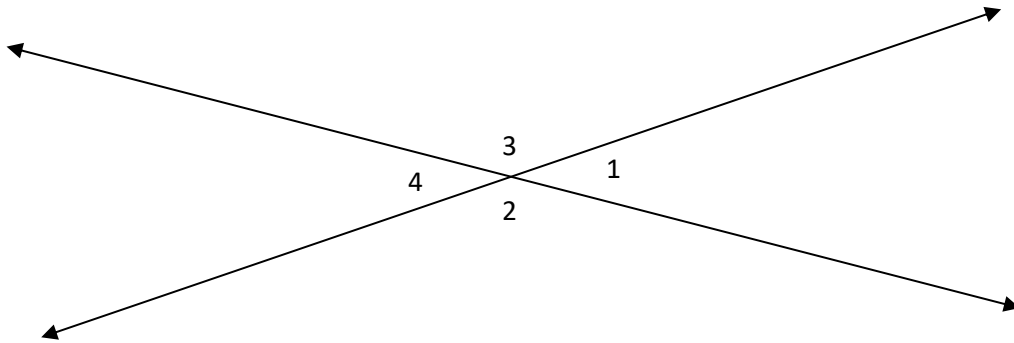
Use your figure to test your definition. Does your definition hold true? Why, or why not? Write a new definition, if necessary.

Supplementary Angles

$\angle 1$ and $\angle 2$ are supplementary angles. Measure angle 1: $m\angle 1 = \underline{\hspace{1cm}}^\circ$.

Now use your knowledge of supplementary and corresponding angles to find the other missing angles. Assume $\angle 2$ and $\angle 3$ are vertical angles.

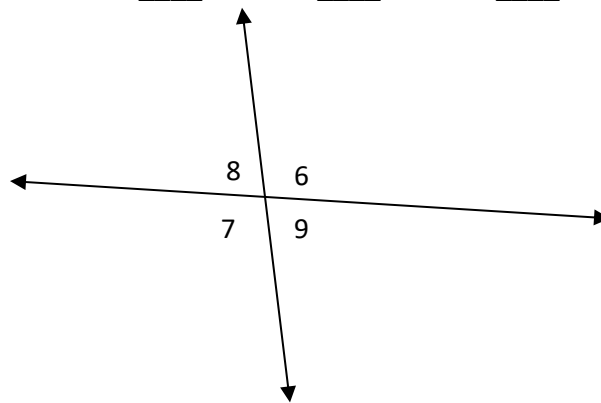
$$m\angle 2 = \underline{\hspace{1cm}}^\circ \quad m\angle 3 = \underline{\hspace{1cm}}^\circ \quad m\angle 4 = \underline{\hspace{1cm}}^\circ$$



$\angle 6$ and $\angle 9$ are supplementary angles. Measure angle 6: $m\angle 6 = \underline{\hspace{1cm}}^\circ$.

Now use your knowledge of supplementary and corresponding angles to find the other missing angles. Assume $\angle 8$ and $\angle 9$ are vertical angles.

$$m\angle 7 = \underline{\hspace{1cm}}^\circ \quad m\angle 8 = \underline{\hspace{1cm}}^\circ \quad m\angle 9 = \underline{\hspace{1cm}}^\circ$$



What is the relationship between the measures of supplementary angles?

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Draw a pair of supplementary angles.

Write a definition of supplementary angles.

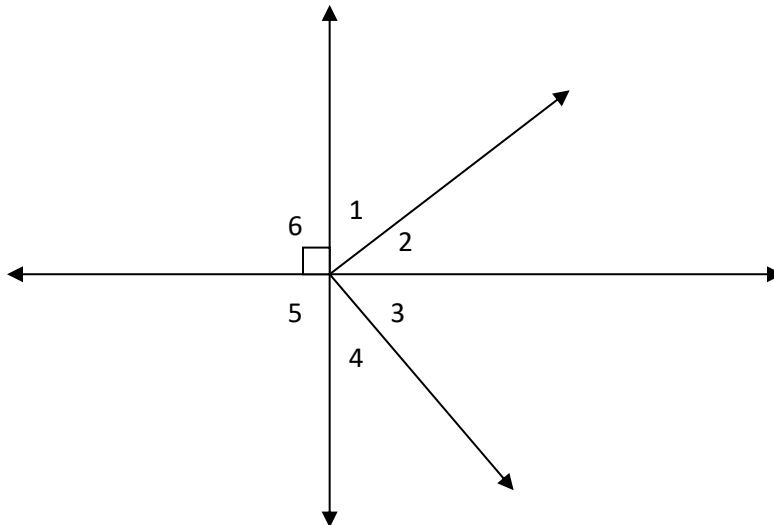
Use your figure to test your definition. Does your definition hold true? Why, or why not? Write a new definition, if necessary.

Complementary Angles

$\angle 1$ and $\angle 2$ are complementary angles. Measure angle 1: $m\angle 1 = \underline{\hspace{2cm}}^\circ$.

Now use your knowledge of complementary and corresponding angles to find the other missing angles.

$m\angle 2 = \underline{\hspace{2cm}}^\circ$ $m\angle 3 = \underline{\hspace{2cm}}^\circ$ $m\angle 4 = \underline{\hspace{2cm}}^\circ$ $m\angle 5 = \underline{\hspace{2cm}}^\circ$ $m\angle 6 = \underline{\hspace{2cm}}^\circ$



What is the relationship between the measures of complementary angles?

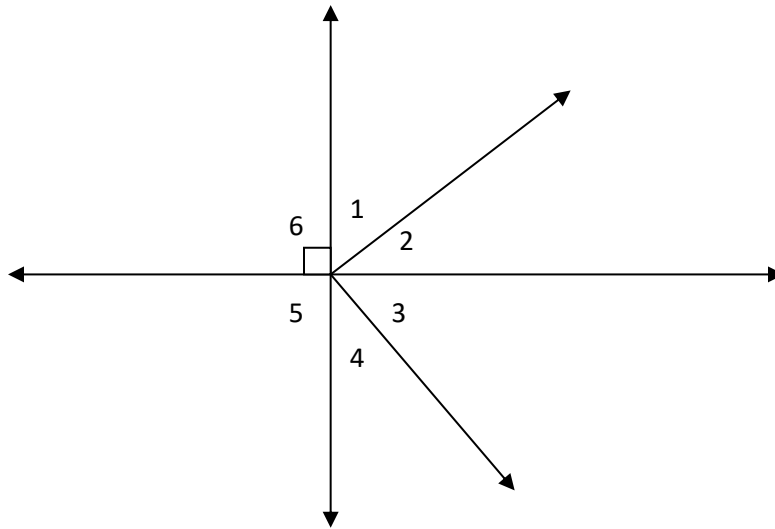
Draw a pair of complementary angles.

Write a definition of complementary angles.

Use your figure to test your definition. Does your definition hold true? Why, or why not? Write a new definition below if necessary.

Adjacent Angles

$\angle 1$ and $\angle 2$ are adjacent angles. $\angle 2$ and $\angle 3$ are adjacent angles. $\angle 4$ and $\angle 5$ are adjacent angles.



What does *adjacent* mean?

What angles are adjacent to $\angle 6$?