Lesson 1: Complementary and Supplementary Angles

Classwork

Opening

As we begin our study of unknown angles, let us review key definitions.

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| Term | Definition |
|  | Two angles and , with a common side , are  *angles* if is in the interior of . |
|  | When two lines intersect, any two non-adjacent angles formed by those lines are called   *angles,* or  *angles*. |
|  | Two lines are if they intersect in one point, and any of the angles formed by the intersection of the lines is . Two segments or rays are if the lines containing them are lines. |

Complete the missing information in the table below. In the ‘Statement’ column, use the illustration to write an equation that demonstrates the angle relationship; use all forms of angle notation in your equations.

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| Angle Relationship | Abbreviation | Statement | Illustration |
| Adjacent Angles |  | The measurements of adjacent angles add. |  |
| Vertical Angles |  | Vertical angles have equal measures. |  |

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| Angles on a Line |  | If the vertex of a ray lies on a line but the ray is not contained in that line, then the sum of measurements of the two angles formed is . |  |
| Angles at a Point |  | Suppose three or more rays with the same vertex separate the plane into angles with disjointed interiors.  Then the sum of all the measurements of the angles is . |  |

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| Angle Relationship | Definition | Diagram |
| Complementary Angles |  |  |
| Supplementary Angles |  |  |

Exercise 1

1. In a complete sentence, describe the relevant angle relationships in the diagram. Write an equation for the angle relationship shown in the figure and solve for . Confirm your answers by measuring the angle with a protractor.

**Example 1**

The measures of two supplementary angles are in the ratio of . Find the two angles.

Exercises 2–4

1. In a pair of complementary angles, the measurement of the larger angle is three times that of the smaller angle. Find the measurements of the two angles.
2. The measure of a supplement of an angle is more than twice the measure of the angle. Find the two angles.
3. The measure of a complement of an angle is more than three times the angle. Find the two angles.

**Example 2**

Two lines meet at the common vertex of two rays. Set up and solve an appropriate equation for and .

Problem Set

1. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations to determine and .

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1. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations for and .
2. The supplement of the measurement of an angle is less than three times the angle. Find the angle and its supplement.
3. The measurement of the complement of an angle exceeds the measure of the angle by . Find the angle and its complement.
4. The ratio of the measurement of an angle to its complement is . Find the angle and its complement.
5. The ratio of the measurement of an angle to its supplement is . Find the angle and its supplement.
6. Let represent the measurement of an acute angle in degrees. The ratio of the complement of to the supplement of is . Guess and check to determine the value of . Explain why your answer is correct.