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 $∠AOC$ and $∠COB$, with a common side $\rightharpoonaccent{OC}$, are  *angles* if $C $is in the interior of $∠AOB$. |
|  | 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 $90°$. 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 $180°$. |  |
| 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 $360°$. |  |

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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 $x$. Confirm your answers by measuring the angle with a protractor.

**Example 1**

The measures of two supplementary angles are in the ratio of $2:3$. 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 $6°$ more than twice the measure of the angle. Find the two angles.
3. The measure of a complement of an angle is $32°$ 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$ x$ and $y$.

Problem Set

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

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2. Set up and solve the appropriate equations for $s$ and $t$.



1. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations for $m$ and $n$.
2. The supplement of the measurement of an angle is $16°$ 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 $25\%$. Find the angle and its complement.
4. The ratio of the measurement of an angle to its complement is $1:2$. Find the angle and its complement.
5. The ratio of the measurement of an angle to its supplement is $3:5$. Find the angle and its supplement.
6. Let$ x$ represent the measurement of an acute angle in degrees. The ratio of the complement of $x$ to the supplement of $x$ is $2:5$. Guess and check to determine the value of $x$. Explain why your answer is correct.