Lesson 1: Complementary and Supplementary Angles

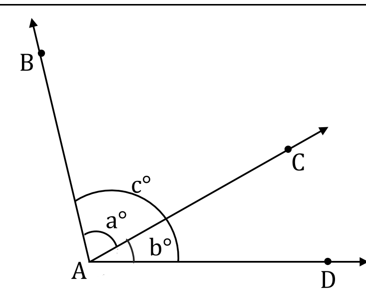
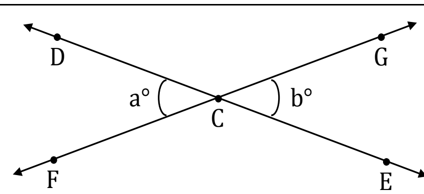
Classwork

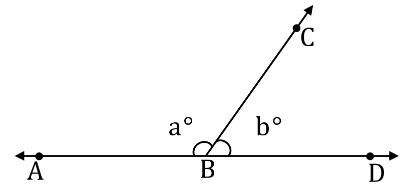
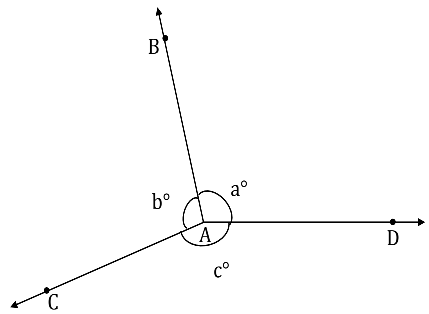
Opening

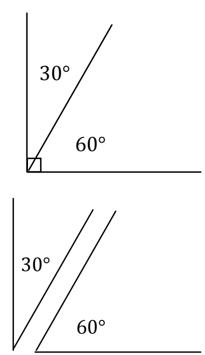
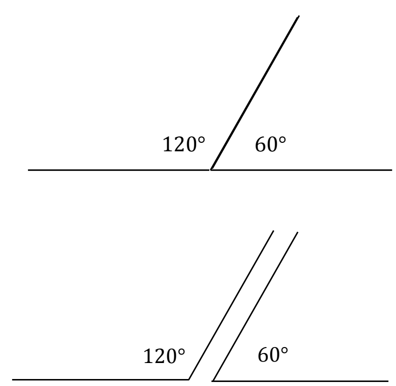
As we begin our study of unknown angles, let us review key definitions.

Term	Definition
	Two angles $\angle AOC$ and $\angle COB$, with a common side $\overrightarrow{OC}$, are ____________ *angles* if C is in the interior of $\angle AOB$.
	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.

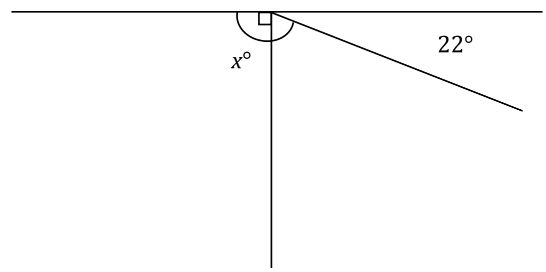
Angle Relationship	Abbreviation	Statement	Illustration
Adjacent Angles		The measurements of adjacent angles add.	
Vertical Angles		Vertical angles have equal measures.	

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°.	

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

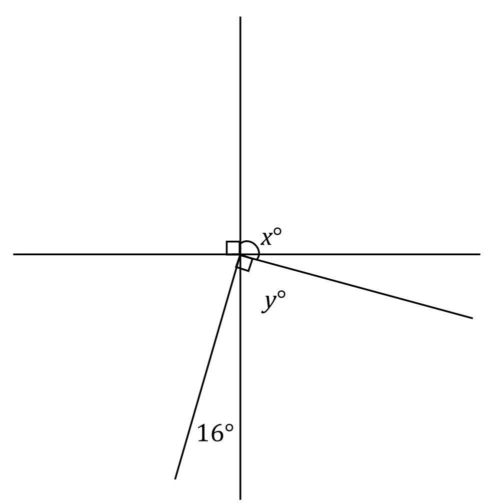
2. In a pair of complementary angles, the measurement of the larger angle is three times that of the smaller angle. Find the measurements of the two angles.

3. The measure of a supplement of an angle is $6°$ more than twice the measure of the angle. Find the two angles.

4. The measure of a complement of an angle is $32°$ more than three times the angle. Find the two angles.

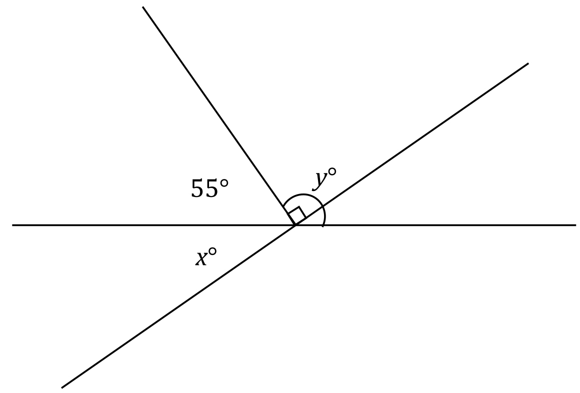
Example 2

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

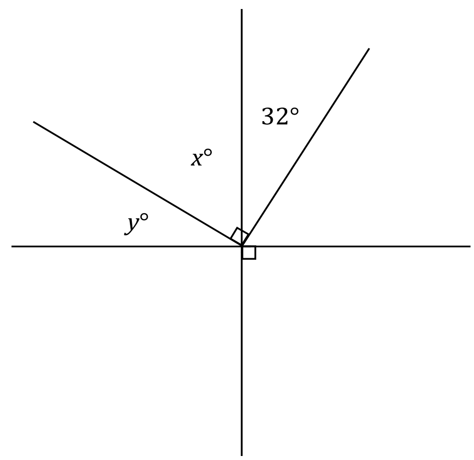


Problem Set

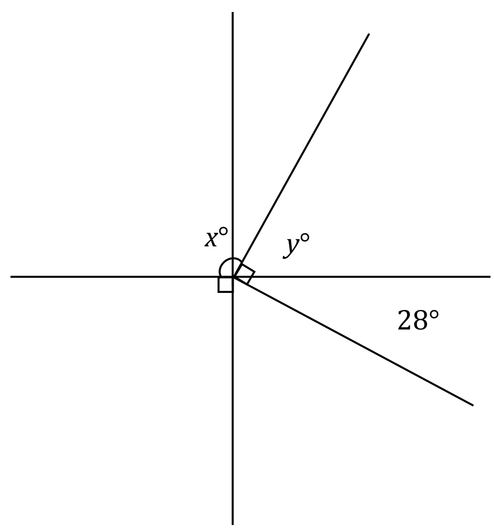
1. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations to determine x and y.



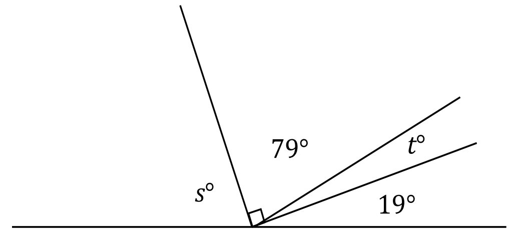
2. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations to determine x and y.



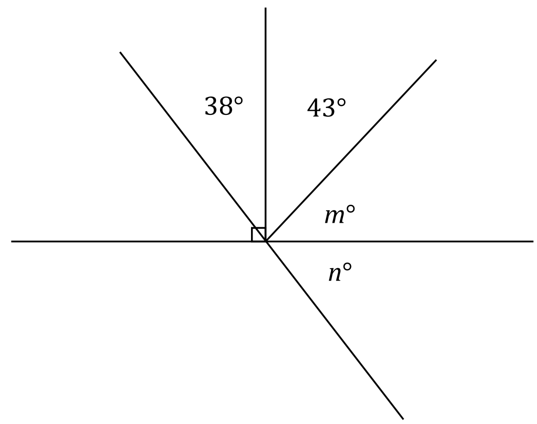
3. Two lines meet at the common vertex of two rays. Set up and solve an appropriate equation for x and y.



4. Set up and solve the appropriate equations for s and t.



5. Two lines meet at the common vertex of two rays. Set up and solve the appropriate equations for m and n.



6. The supplement of the measurement of an angle is $16°$ less than three times the angle. Find the angle and its supplement.

7. The measurement of the complement of an angle exceeds the measure of the angle by 25%. Find the angle and its complement.

8. The ratio of the measurement of an angle to its complement is $1:2$. Find the angle and its complement.

9. The ratio of the measurement of an angle to its supplement is $3:5$. Find the angle and its supplement.

10. 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.