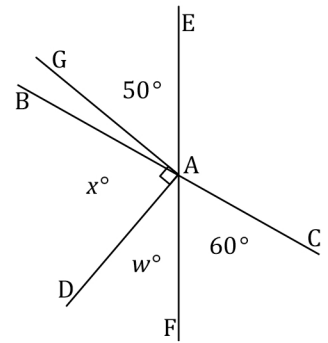
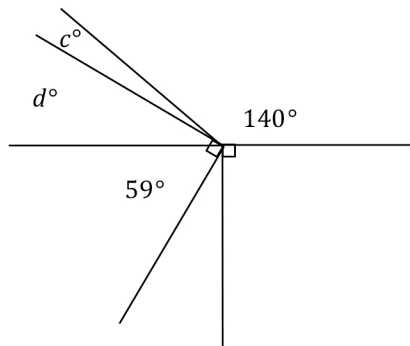


## Solving for Unknown Angles Using Equations

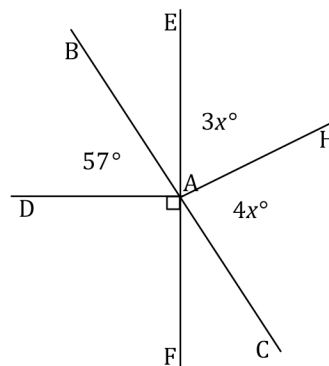
and meet at . and form a right angle. Set up and solve an equation to find the values of and .



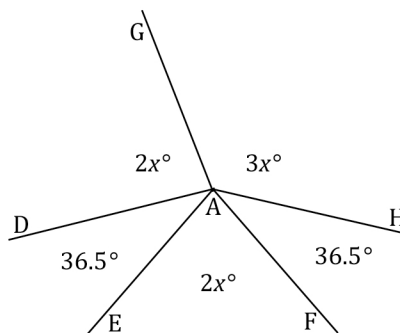
1. Four rays have a common vertex on a line. Set up and solve an equation to find the value of  $c$ .



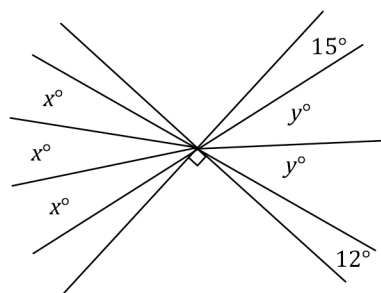
2. Lines  $BD$  and  $EF$  meet at  $A$ . Set up and solve an equation to find the value of  $x$ . Find the measurements of  $\angle BAH$  and  $\angle CAF$ .



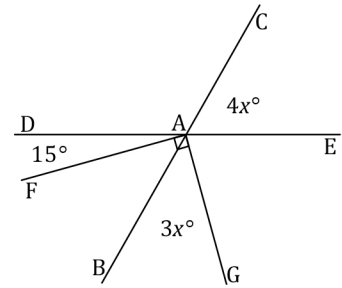
3. Five rays meet at a point. Set up and solve an equation to find the values of  $x$  and  $y$ . Find the measurements of  $\angle GAD$  and  $\angle HAF$ .



4. Two perpendicular lines meet at the common vertex of seven rays. Set up and solve an equation to find the values of  $x$  and  $y$ .

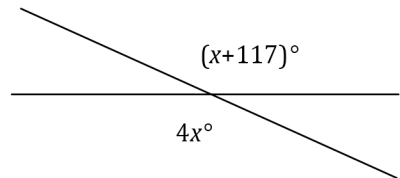


5. Two lines meet at the common vertex of two perpendicular rays. Set up and solve an equation to find the value of  $x$ . Find the measurements of  $\angle DAF$  and  $\angle GAE$ .



6. Three angles are at a point. The second angle is  $20^\circ$  more than the first, and the third angle is  $10^\circ$  more than the second. Find the measurements of all three angles.
7. Five angles are at a point. The measurement of each angle is one of five consecutive, positive whole numbers.
- Determine the measurements of all five angles.
  - Compare the expressions you used for the three angles and their combined expression. Explain how they are equivalent and how they reveal different information about this situation.
8. Let  $x$  be the measurement of an angle. The ratio of the measurement of the complement of the angle to the measurement of the supplement of the angle is  $\frac{1}{2}$ . Use a tape diagram to find the measurement of this angle.

9. Two lines meet at a point. Set up and solve an equation to find the value of  $x$ . Find the measurement of one of the vertical angles.



10. The difference between three times the measurement of the complement of an angle and the measurement of the supplement of that angle is  $18^\circ$ . What is the measurement of the angle?

Lines \_\_\_\_\_ and \_\_\_\_\_ meet at \_\_\_\_\_ . Rays \_\_\_\_\_ and \_\_\_\_\_ form a right angle. Set up and solve an equation to find the values of \_\_\_\_\_ and \_\_\_\_\_ .

vert. \_\_\_\_\_  
add \_\_\_\_\_  
complementary \_\_\_\_\_  
on a line \_\_\_\_\_

Set up and solve an equation for the unknown angle based on the relevant angle relationships in the diagram. Add labels to diagrams as needed to facilitate their solutions. List the appropriate angle fact abbreviation for any step that depends on an angle relationship.

1. Four rays have a common vertex on a line. Set up and solve an equation to find the value of \_\_\_\_\_ .

complementary \_\_\_\_\_  
on a line \_\_\_\_\_

2. Lines \_\_\_\_\_ and \_\_\_\_\_ meet at \_\_\_\_\_ . Set up and solve an equation to find value of \_\_\_\_\_. Find the measurements of \_\_\_\_\_ and \_\_\_\_\_.  
complementary \_\_\_\_\_  
on a line \_\_\_\_\_

The measurement of \_\_\_\_\_ .  
The measurement of \_\_\_\_\_ .

**Scaffolding:**  
Students struggling to organize their solution may benefit from prompts such as the following:

- Write an equation to model this situation.
- Explain how your equation describes the situation.
- Solve and interpret the solution. Is it reasonable?

3. Five rays meet at a point. Set up and solve an equation to find the values of \_\_\_\_\_. Find the measurements of \_\_\_\_\_ and \_\_\_\_\_ .

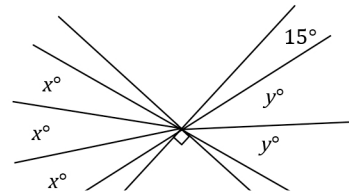
at a point \_\_\_\_\_

The measurement of \_\_\_\_\_ .

The measurement of \_\_\_\_\_ .

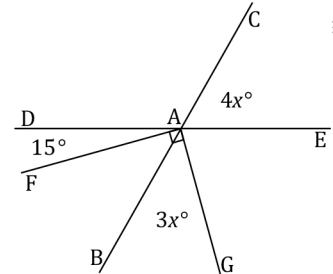
4. Two perpendicular lines meet at the common vertex of seven rays. Set up and solve an equation to find the values of \_\_\_\_\_ and \_\_\_\_\_ .

\_\_\_\_\_ on a line  
\_\_\_\_\_ vert.



5. Two lines meet at the common vertex of two perpendicular rays. Set up and solve an equation to find the value of \_\_\_\_\_. Find the measurements of \_\_\_\_\_ and \_\_\_\_\_ .

The measurement of \_\_\_\_\_ vert.  
The measurement of \_\_\_\_\_ add  
\_\_\_\_\_ add



The measurement of \_\_\_\_\_ .

The measurement of \_\_\_\_\_ .

6. Three angles are at a point. The second angle is \_\_\_\_\_ more than the first, and the third angle is \_\_\_\_\_ more than the second. Find the measurements of all three angles.

Angle 1:

Angle 2:

Angle 3:

7. Five angles are at a point. The measurement of each angle is one of five consecutive, positive whole numbers.

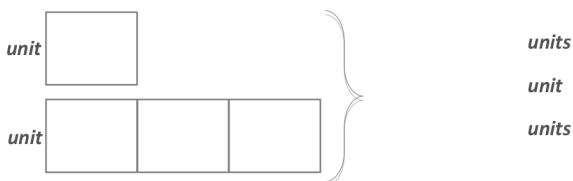
- a. Determine the measurements of all five angles.

Angle measures are: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ .

- b. Compare the expressions you used for the three angles and their combined expression. Explain how they are equivalent and how they reveal different information about this situation.

By the commutative and associative laws, \_\_\_\_\_ is equal to \_\_\_\_\_  
\_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_, which is equal to \_\_\_\_\_ + \_\_\_\_\_. The first expression, \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_, shows the sum of five unknown numbers where the second is \_\_\_\_\_ more than the first, the third is \_\_\_\_\_ more than the second, and so on. The expression \_\_\_\_\_ shows the sum of five times an unknown number with \_\_\_\_\_ .

8. Let \_\_\_\_\_ be the measurement of an angle. The ratio of the measurement of the complement of the angle to the measurement of the supplement of the angle is \_\_\_\_\_. Use a tape diagram to find the measurement of this angle.



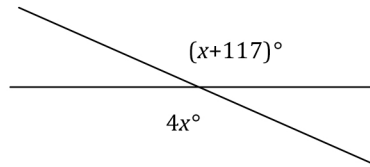
MP.  
2  
&

The measurement of the angle that satisfies these criteria is .

9. Two lines meet at a point. Set up and solve an equation to find the value of . Find the measurement of one of the vertical angles.

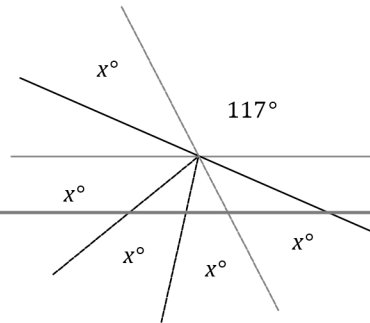
A solution can include a modified diagram (as shown) and the supporting algebra work:

— —  
vert.



Each vertical angle: .

Solutions may also include the full equation and solution:



10. The difference between three times the measurement of the complement of an angle and the measurement of the supplement of that angle is . What is the measurement of the angle?

— —  
The measurement of the angle is .