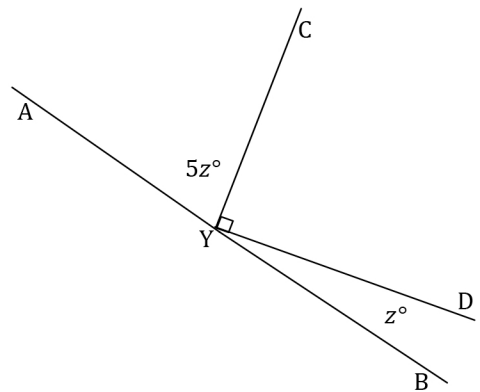
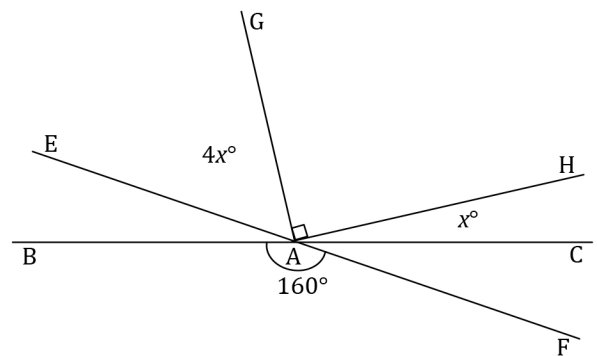


Solving for Unknown Angles Using Equations

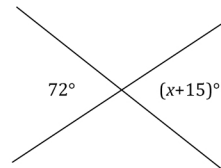
1. Two rays have a common vertex on a line. Set up and solve an equation to find the value of z . Find the measurements of angles $\angle A$ and $\angle B$.



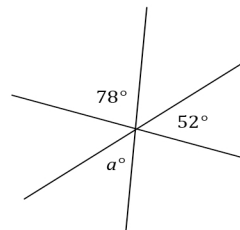
2. Two lines meet at the common vertex of two rays. Set up and solve an equation to find the value of x . Find the measurements of angles $\angle E$ and $\angle H$.



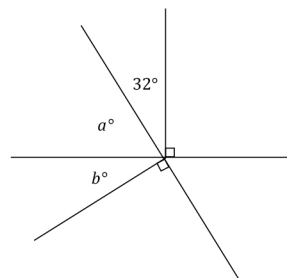
1. Two lines meet at a point. Set up and solve an equation to find the value of .



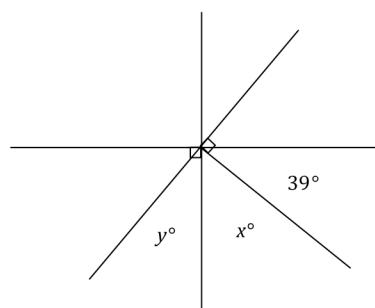
2. Three lines meet at a point. Set up and solve an equation to find the value of . Is your answer reasonable? Explain how you know.



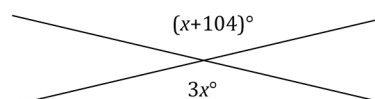
3. Two lines meet at the common vertex of two rays. Set up and solve an equation to find the values of and .



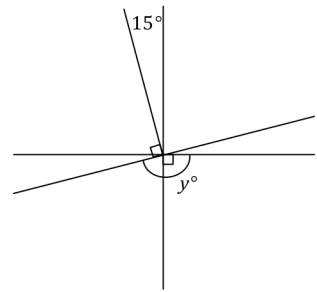
4. Two lines meet at the common vertex of two rays. Set up and solve an equation to find the values of and .



5. Two lines meet a point. Find the measurement of a vertical angle. Is your answer reasonable? Explain how you know.



6. Three lines meet at the vertex of a ray. Set up and solve an equation to find the value of y .



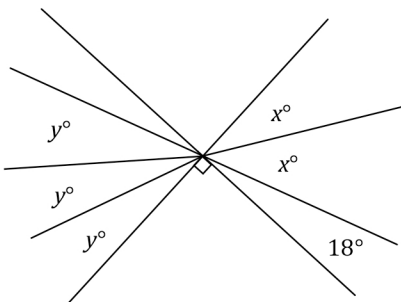
7. Three angles are at a point. The second angle is $2x$ more than the first, and the third angle is $3x$ more than the second angle.

- Find the measurement of all three angles.
- Compare the expressions you used for the three angles and their combined expression. Explain how they are equal and how they reveal different information about this situation.

8. Four adjacent angles are on a line. The measurements of the four angles are four consecutive even numbers. Determine the measurements of all four angles.

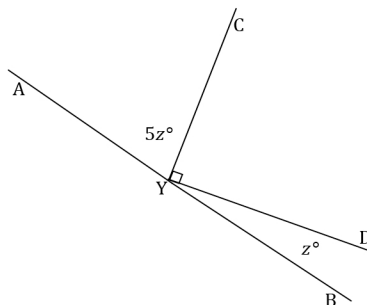
9. Three angles are at a point. The ratio of the measurement of the second angle to the measurement of the first angle is $2:3$. The ratio of the measurement of the third angle to the measurement of the second angle is $3:4$. Determine the measurements of all three angles.

10. Solve for x and y in the following diagram.



1. Two rays have a common vertex on a line. Set up and solve an equation to find the value of z . Find the measurements of angles $\angle A$ and $\angle C$.

on a line



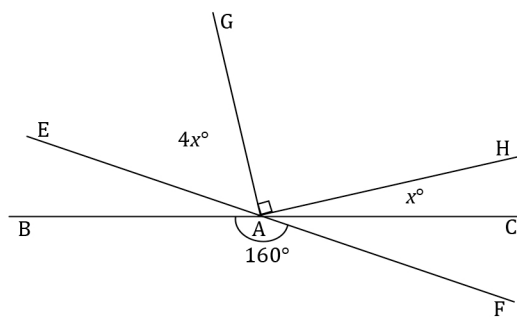
The measurement of $\angle A$ is _____.

The measurement of $\angle C$ is _____.

Scaffolded solutions:

- Use equation above.
 - The angle marked $5z^\circ$, the right angle, and the angle with measurement z° are angles on a line. Their measurements sum to _____.
 - The answers seem reasonable because the measurement of $\angle A$ is _____ once _____ is substituted, which is slightly smaller than a right angle, and the measurement of $\angle C$ is _____, which is an acute angle.
2. Two lines meet at the common vertex of two rays. Set up and solve an equation to find the value of x . Find the measurements of angles $\angle E$ and $\angle H$.

vert



The measurement of $\angle E$ is _____.

The measurement of $\angle H$ is _____.

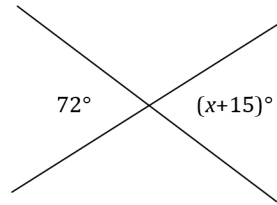
Scaffolding:

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?

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. Two lines meet at a point. Set up and solve an equation to find the value of x .

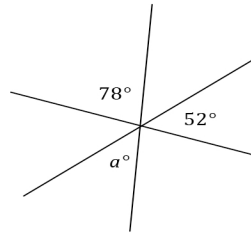
vert



2. Three lines meet at a point. Set up and solve an equation to find the value of a . Is your answer reasonable? Explain how you know.

Let $a =$ _____.

vert
on a line



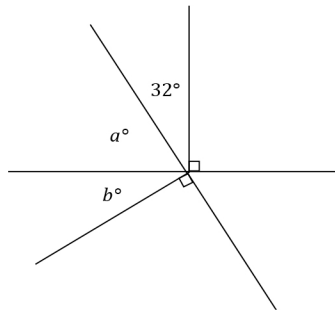
Since _____, _____.

The answers seem reasonable since they are similar in magnitude to the angle.

3. Two lines meet at the common vertex of two rays. Set up and solve an equation to find the values of a and b .

on a line

on a line



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?

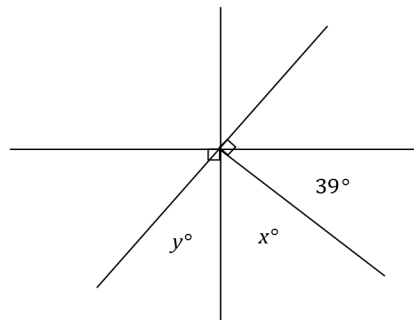
Scaffolded solutions:

- a. Use equation above.
- b. The angle marked a , the angle with measurement b , and the right angle are angles on a line. Their measurements sum to _____.
- c. The answers seem reasonable because once the values of a and b are substituted, it appears that the two angles (a and b) form a right angle. We know those two angles should form a right angle because the angle adjacent to it is a right angle.

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

y on a line

x on a line



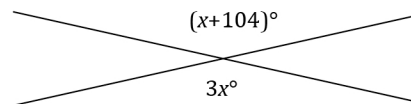
5. Two lines meet a point. Find the measurement of a vertical angle. Is your answer reasonable? Explain how you know.

x vert

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

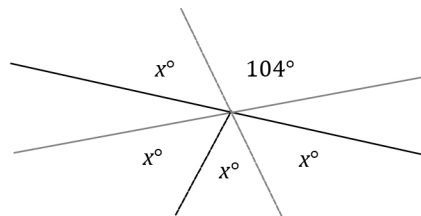
The answer seems reasonable because a rounded value of x and $3x$, which are reasonable close for a check.

would make the numeric value of each expression



Solutions may also include the full equation and solution:

x vert



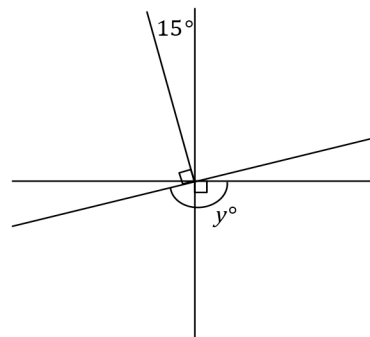
6. Three lines meet at the vertex of a ray. Set up and solve an equation to find the value of y .

Let x and y be the measurements of the indicated angles.

x vert.

x complementary

y on a line



7. Three angles are at a point. The second angle is _____ more than the first, and the third angle is _____ more than the second angle.

a. Find the measurement of all three angles.

_____ at a point

Angle 1:

Angle 2:

Angle 3:

b. Compare the expressions you used for the three angles and their combined expression. Explain how they are equal 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 three unknown numbers, where the second is _____ more than the first, and the third is _____ more than the second. The expression _____ shows the sum of three times an unknown number with _____.

8. Four adjacent angles are on a line. The measurements of the four angles are four consecutive even numbers. Determine the measurements of all four angles.

_____ on a line

The four angle measures are: _____, _____, _____, and _____.

9. Three angles are at a point. The ratio of the measurement of the second angle to the measurement of the first angle is _____. The ratio of the measurement of the third angle to the measurement of the second angle is _____.

Let the smallest measure of the three angles be _____. Then the measure of the second angle is _____, and the measure of the third angle is _____.

_____ at a point

Angle 1

Angle 2

Angle 3

Scaffolding:
Teachers may need to review the term “consecutive” for students to successfully complete Problem Set 7.

10. Solve for x and y in the following diagram.

on a line
vert.

