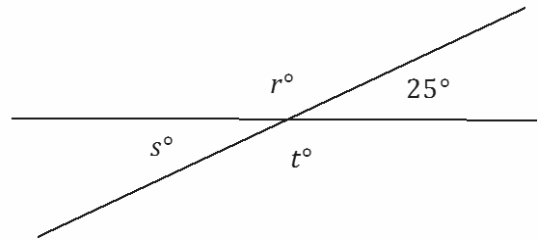# Lesson 2: Solving for Unknown Angles Using Equations
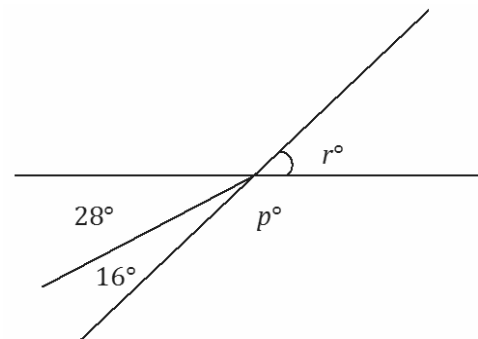
Classwork

Opening Exercise

Two lines meet at a point. In a complete sentence, describe the relevant angle relationships in the diagram. Find the values of r, s, and t.
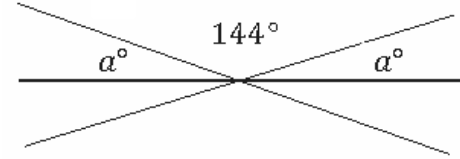

Example 1

Two lines meet at a point that is also the endpoint of a ray. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to find the value of p and r.
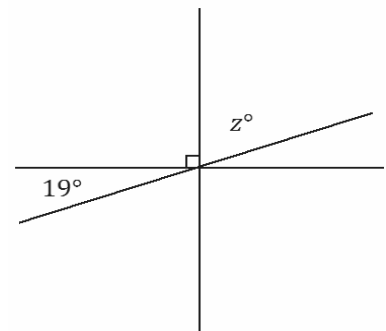
Exercise 1

Three lines meet at a point. In a complete sentence, describe the relevant angle relationship in the diagram.
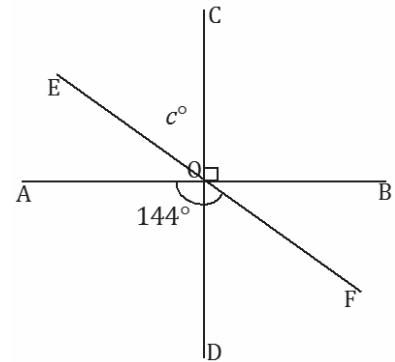Set up and solve an equation to find the value of a.

Example 2

Three lines meet at a point. In a complete sentence, describe the relevant angle
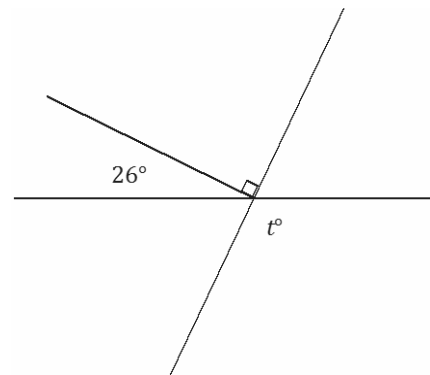relationships in the diagram. Set up and solve an equation to find the value of z.

Exercise 2

Three lines meet at a point; $\angle AOF = 144°$. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to determine the value of c.

Example 3

Two lines meet at a point that is also the endpoint of a ray. The ray is perpendicular to one of the lines as shown. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to find the value of t.
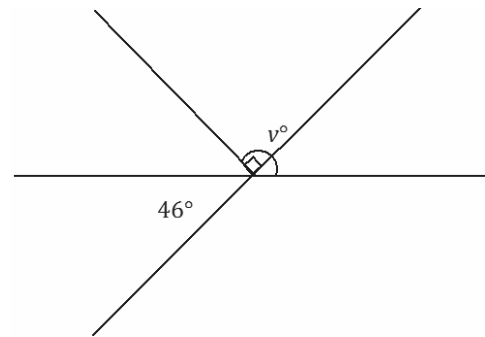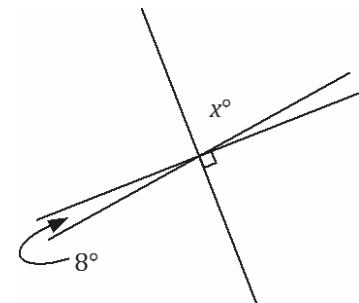
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Exercise 3

Two lines meet at a point that is also the endpoint of a ray. The ray is perpendicular to one of the lines as shown. In a complete sentence, describe the relevant angle relationships in the diagram. You may add labels to the diagram to help with your description of the angle relationship. Set up and solve an equation to find the value of v.
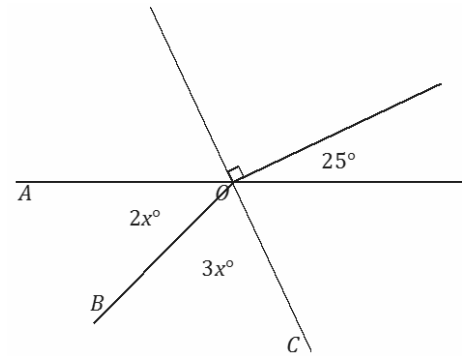
Example 4

Three lines meet at a point. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to find the value of x. Is your answer reasonable? Explain how you know.

Exercise 4

Two lines meet at a point that is also the endpoint of two rays. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to find the value of x. Find the measurements of $\angle AOB$ and $\angle BOC$.

Exercise 5

a. In a complete sentence, describe the relevant angle relationships in the diagram. Set up and solve an equation to find the value of x. Find the measurements of $\angle AOB$ and$\angle BOC$.
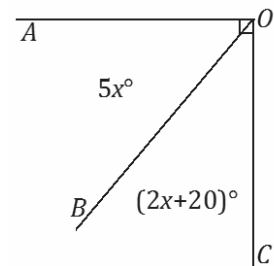
b. Katrina was solving the problem above and wrote the equation $7x + 20 = 90$. Then, she rewrote this as $7x + 20 = 70 + 20$. Why did she rewrite the equation in this way? How does this help her to find the value of x?

<div style="border:1px solid">

Lesson Summary

- To solve an unknown angle problem, identify the angle relationship(s) first to set up an equation that will yield the unknown value.

- Angles on a line and supplementary angles are not the same relationship. *Supplementary* angles are two angles whose angle measures sum to 180° whereas *angles on a line* are two or more adjacent angles whose angle measures sum to 180°.
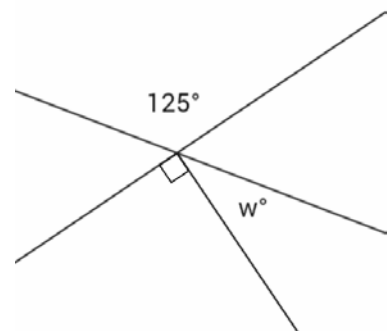
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Problem Set

1. Two lines meet at a point that is also the endpoint of a ray.
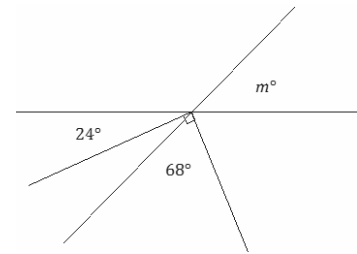   Set up and solve an equation to find the value of c.
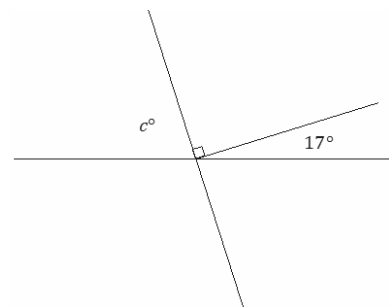
2. Two lines meet at a point that is also the endpoint of a ray. Set up and solve an equation to find the value of a. Explain why your answer is reasonable.
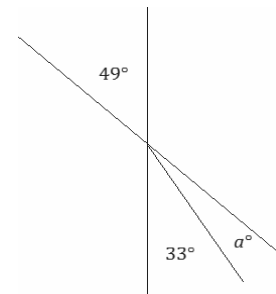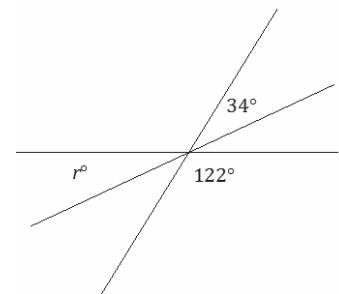

3. Two lines meet at a point that is also the endpoint of a ray. Set up and solve an equation to find the value of w.
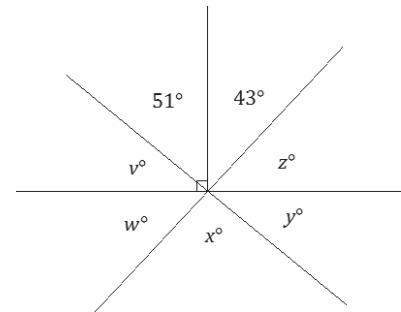
4. Two lines meet at a point that is also the vertex of an angle. Set up and solve an equation to find the value of m.
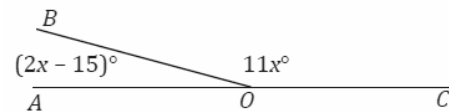
5. Three lines meet at a point. Set up and solve an equation to find the value of r.
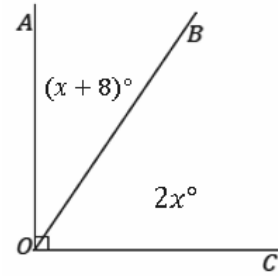
6. Three lines meet at a point that is also the endpoint of a ray. Set up and solve an equation to find the value of each variable in the diagram.
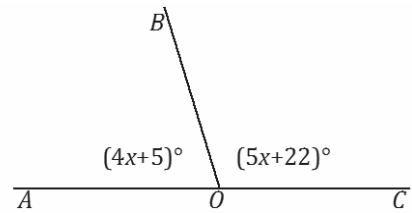
7. Set up and solve an equation to find the value of x. Find the measurement of $\angle AOB$ and of $\angle BOC$.

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8. Set up and solve an equation to find the value of x. Find the measurement of $\angle AOB$ and of $\angle BOC$.

9. Set up and solve an equation to find the value of x. Find the measurement of $\angle AOB$ and of $\angle BOC$.

10. Write a verbal problem that models the following diagram. Then, solve for the two angles.