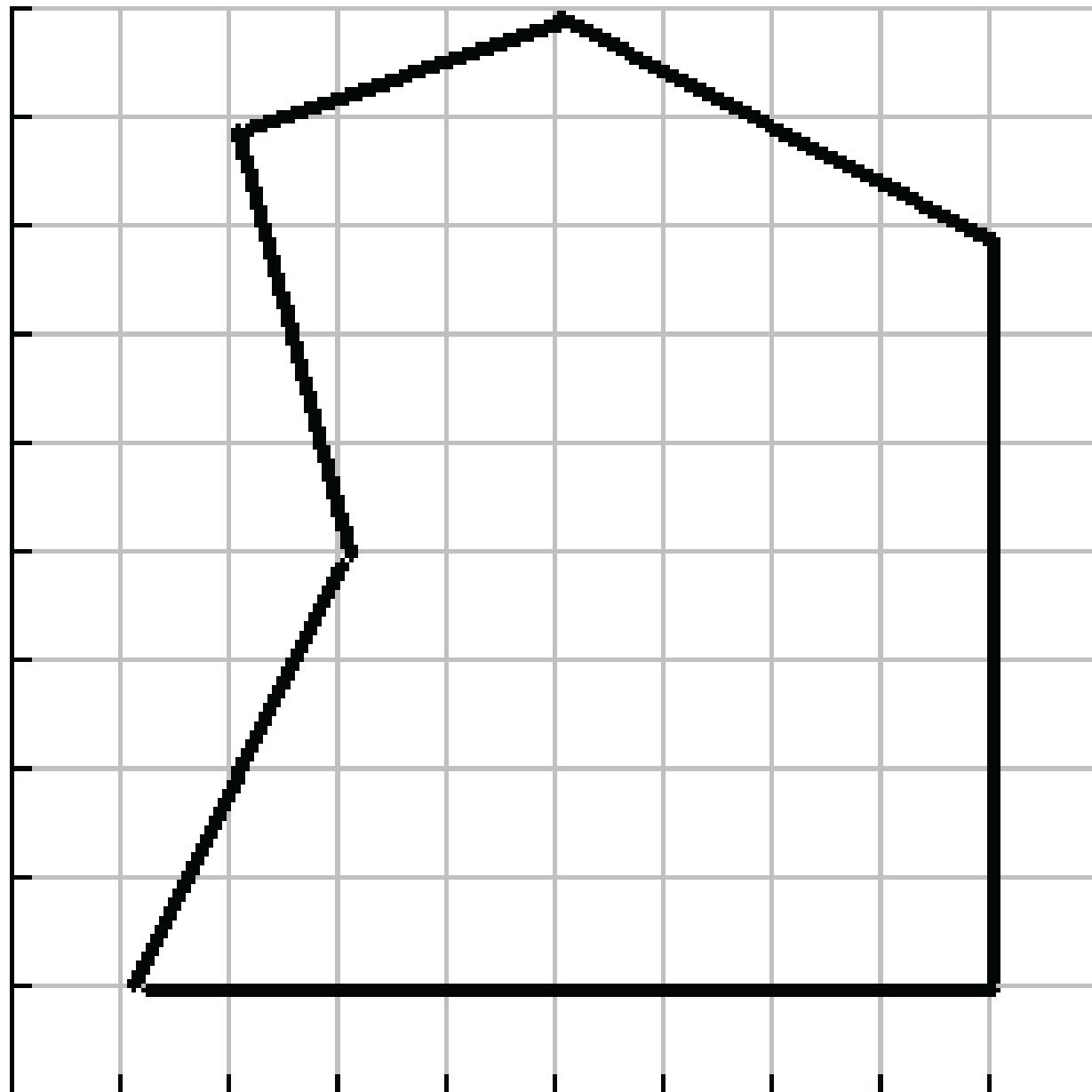


Do Now 1.9.14 “Unusual Area”

Javier is helping his uncle to tile a patio that has an irregular shape. He needs to calculate the approximate number of tiles he will need to cover the inside of the figure shown to the right.

What are some strategies you could give Javier to assist with his estimate?

NOTE: Each Square is equal to 1 square foot.



Learning Objective

We will solve for an unknown angle using properties of angles.

7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

CFU

What are we going to do?

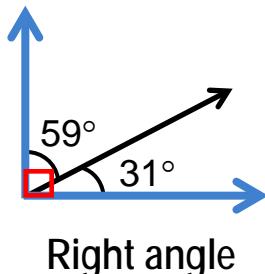
Activate Prior Knowledge

A right angle is an angle that measures 90° .

A straight angle is an angle that measures 180° .

Add the angle measures.

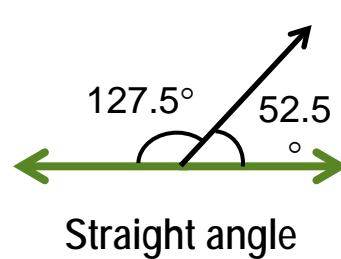
1.



$$\begin{array}{r} 59^\circ \\ + 31^\circ \\ \hline 90^\circ \end{array}$$

Right angle

2.



Straight angle

$$\begin{array}{r} 127.5^\circ \\ + 52.5^\circ \\ \hline 180^\circ \end{array}$$

Make Connection

Students, you already know the measure of a right angle (90°) and a straight angle (180°). Now, we will use these angles to help us solve for unknown angles.

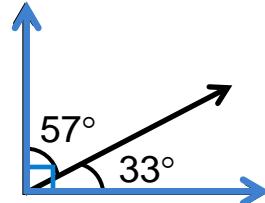
Properties₁ of Angles

Complementary Angles

$$m\angle A + m\angle B = 90^\circ$$

Two angles are **complementary angles** if their sum is 90° .

Complementary Corner



$$60^\circ + 30^\circ = 90^\circ$$

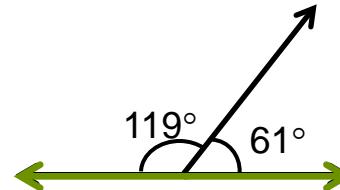
57° is the **complement** of 33° .

Supplementary Angles

$$m\angle A + m\angle B = 180^\circ$$

Two angles are **supplementary angles** if their sum is 180° .

Supplementary Straight



$$125^\circ + 55^\circ = 180^\circ$$

119° is the **supplement** of 61° .

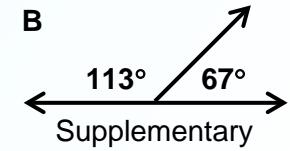
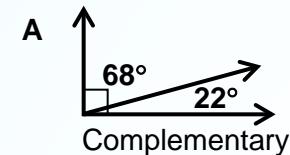
CFU I

How do you know that **figure A** shows complementary angles?

Figure A shows complementary angles because _____.

How do you know that **figure B** shows supplementary angles?

Figure B shows supplementary angles because _____.

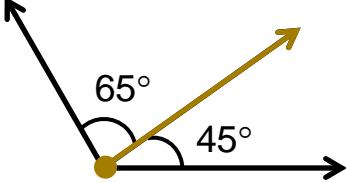
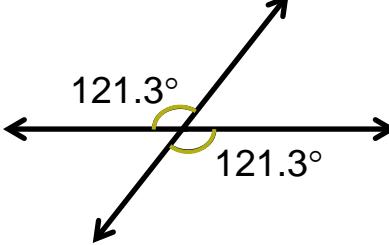


Go to Skill Dev I

Vocabulary

¹ distinctive feature of

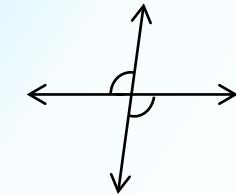
Properties of Angles

Adjacent Angles	Vertical Angles
$m\angle A + m\angle B = m\angle C$	$m\angle A = m\angle B$
Two angles are adjacent angles if they share a common ray and endpoint.	Two angles are vertical angles if they are formed by two intersecting lines and are not adjacent.
 $65^\circ + 45^\circ = 110^\circ$	 $121^\circ = 121^\circ$ <p>Vertical angles share only a vertex. The angle measures are equivalent.</p>

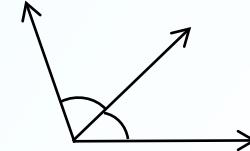
CFU 2

Which of the following figures shows vertical angles?
How do you know?

A



B



Explain why the other figure shows adjacent angles.



Go to Skill Dev 2

Can adjacent angles also be vertical?

Solve for unknown angle measures using properties of angles.

- 1 Determine² the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute³ the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

1. What is the measure of angle x ?

2. What is the measure of angle x ?

3. What is the complement of a 38° angle?

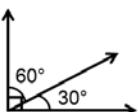
4. What is the complement of an 13.5° angle?

Vocabulary

- ² figure out
³ replace

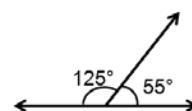
Complementary Angles

$$m\angle A + m\angle B = 90^\circ$$



Supplementary Angles

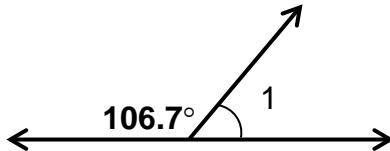
$$m\angle A + m\angle B = 180^\circ$$



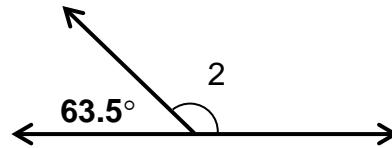
Solve for unknown angle measures using properties of angles.

- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

5. What is the measure of $\angle 1$?



6. What is the measure of $\angle 2$?



CFU

- 1 How did I/you determine the property of angles needed?
- 2 Once I/you substitute the given angle measure(s) into the equation, how can I solve for the missing angle?

Property of Angle: _____
Measure: _____

Property of Angle: _____
Measure: _____

7. What is the supplement of a 120.4° angle?

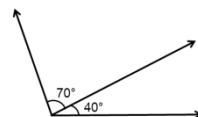
8. What is the supplement of a 30.5° angle?



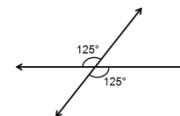
Go to
Concept Dev 2

Adjacent Angles

$$m\angle A + m\angle B = m\angle C$$

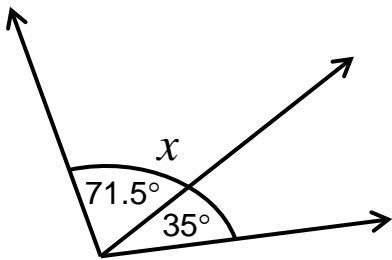
**Vertical Angles**

$$m\angle A = m\angle B$$

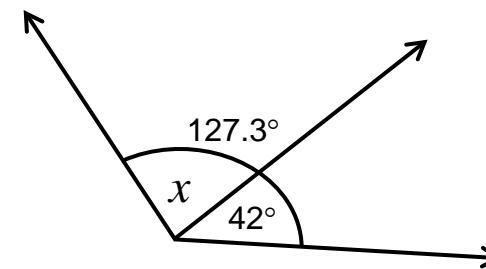
**Solve for unknown angle measures using properties of angles.**

- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

9. What is the measure of angle x ?



10. What is the measure of angle x ?

**CFU**

- 1** How did I/you determine the property of angles needed?
- 2** Once I/you substitute the given angle measure(s) into the equation, how can I solve for the missing angle?

Property of Angle: _____

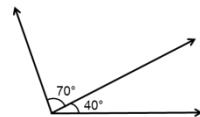
Measure: _____

Property of Angle: _____

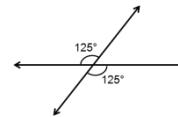
Measure: _____

Adjacent Angles

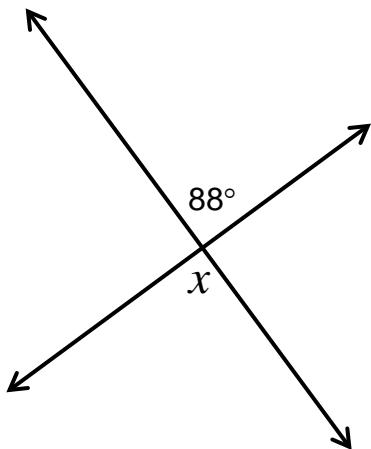
$$m\angle A + m\angle B = m\angle C$$

**Vertical Angles**

$$m\angle A = m\angle B$$

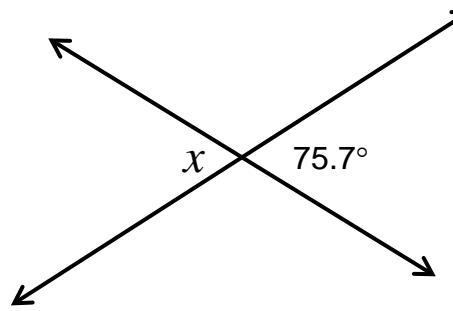
**Solve for unknown angle measures using properties of angles.**

- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

11. What is the measure of angle x ?

Property of Angle: _____

Measure: _____

12. What is the measure of angle x ?

Property of Angle: _____

Measure: _____

CFU

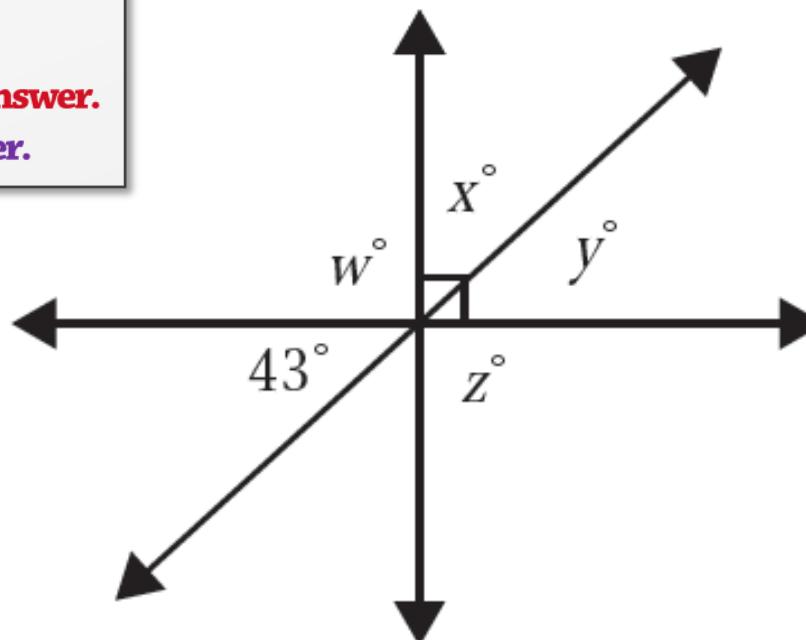
- 1** How did I/you determine the property of angles needed?
- 2** Once I/you substitute the given angle measure(s) into the equation, how can I solve for the missing angle?

Solving Math Problems

- 1 Determine what the question is asking.**
- 2 Determine the math concept required.**
- 3 Determine relevant information.**
- 4 Solve the problem, then interpret the answer.**
- 5 Check the reasonableness of your answer.**

CFU

- 1** How did I/you determine what the question is asking?
- 2** How did I/you determine the math concept required?
- 3** How did I/you determine the relevant information?
- 4** How did I/you solve and interpret the problem?
- 5** How did I/you check the reasonableness of the answer?



$$w^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$x^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$y^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$z^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

Complementary Angles $m\angle A + m\angle B = 90^\circ$

Supplementary Angles $m\angle A + m\angle B = 180^\circ$

Adjacent Angles $m\angle A + m\angle B = m\angle C$

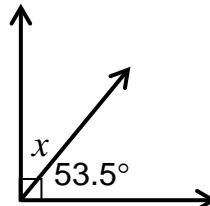
Vertical Angles $m\angle A = m\angle B$

Skill Closure

Solve for unknown angle measures using properties of angles.

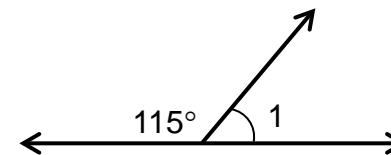
- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

1. What is the measure of angle x ?



Property of Angle: _____
Measure: _____

2. What is the measure of $\angle 1$?



Property of Angle: _____
Measure: _____

Access Common Core

$$m\angle A = 55^\circ$$

Which two angles would form complementary angles?

$$m\angle B = 30^\circ$$

How do you know?

$$m\angle C = 150^\circ$$

Which two angles would form supplementary angles?

$$m\angle D = 35^\circ$$

How do you know?

Summary Closure

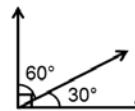
What did you learn today about solving for unknown angle measures using properties of angles?
(Pair-Share) Use words from the word bank.

Word Bank
angle
complementary
supplementary
adjacent
vertical
unknown

Independent Practice

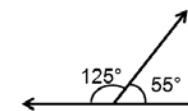
Complementary Angles

$$m\angle A + m\angle B = 90^\circ$$



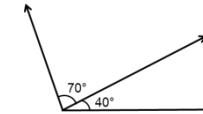
Supplementary Angles

$$m\angle A + m\angle B = 180^\circ$$



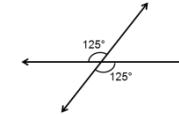
Adjacent Angles

$$m\angle A + m\angle B = m\angle C$$



Vertical Angles

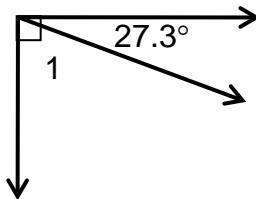
$$m\angle A = m\angle B$$



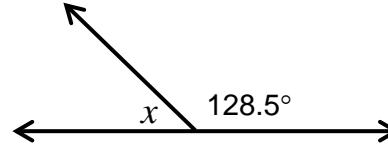
Solve for unknown angle measures using properties of angles.

- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

1. What is the measure of $\angle 1$?



2. What is the measure of angle x ?



Property of Angle: _____

Measure: _____

Property of Angle: _____

Measure: _____

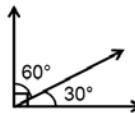
3. What is the complement of a 51.4° angle?

4. What is the supplement of a 62.6° angle?

Independent Practice (continued)

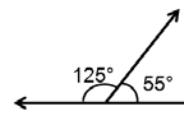
Complementary Angles

$$m\angle A + m\angle B = 90^\circ$$



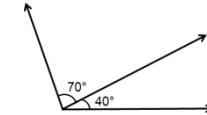
Supplementary Angles

$$m\angle A + m\angle B = 180^\circ$$



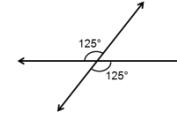
Adjacent Angles

$$m\angle A + m\angle B = m\angle C$$



Vertical Angles

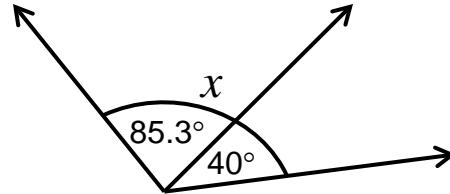
$$m\angle A = m\angle B$$



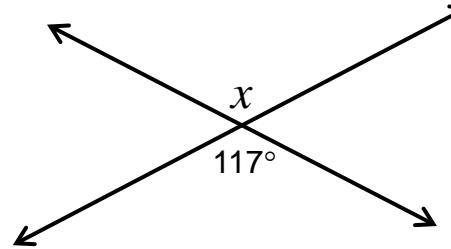
Solve for unknown angle measures using properties of angles.

- 1 Determine the property of angles needed.
- 2 Solve for the unknown angle measure using the property of angles as follows:
 - a Substitute the given angle measure(s) into the equation.
 - b Solve the equation.
- 3 Write the solution using the angle measure and degree symbol ($m\angle x = 45^\circ$).

5. What is the measure of angle x ?



6. What is the measure of angle x ?



Property of Angle: _____

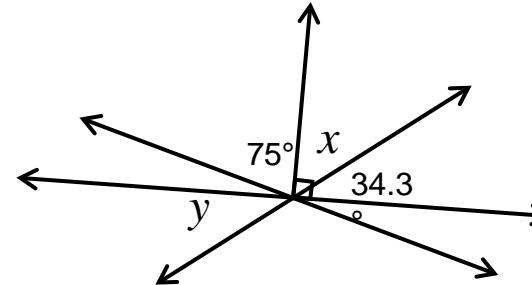
Measure: _____

Property of Angle: _____

Measure: _____

Independent Practice (Cont.)

1. What is the measure of angle x ?

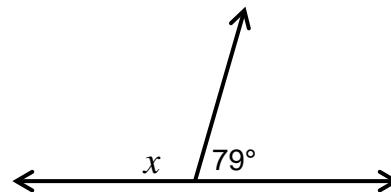


2. What is the measure of angle y ?

Access Common Core

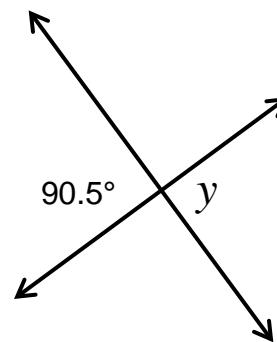
Felicia thinks that the measure of angle x is 16° .

Explain the mistake she made.



Xavier thinks that the measure of angle y is 89.5° .

Explain the mistake he made.

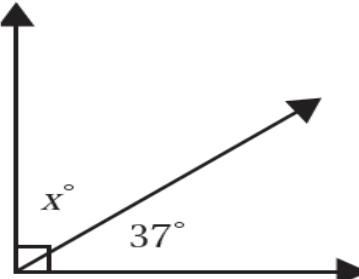


Complementary and Supplementary Angles

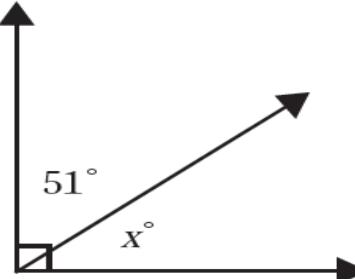
A right angle is a 90° angle. Two angles whose sum is 90° are complementary.

Find the missing angle.

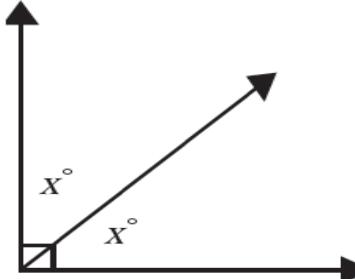
1.



2.



3.



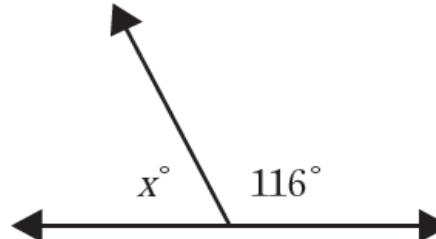
Hint:

$$x + x = 90$$

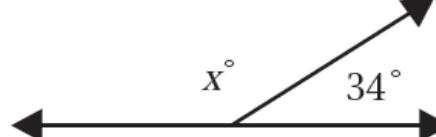
A straight angle is a straight line and measures 180° . Two angles whose sum is 180° are supplementary.

Find the missing angle.

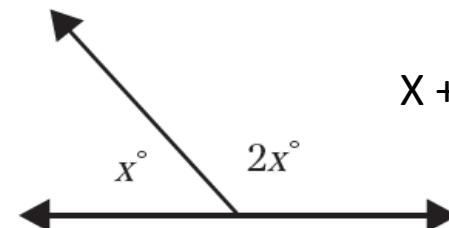
4.



5.



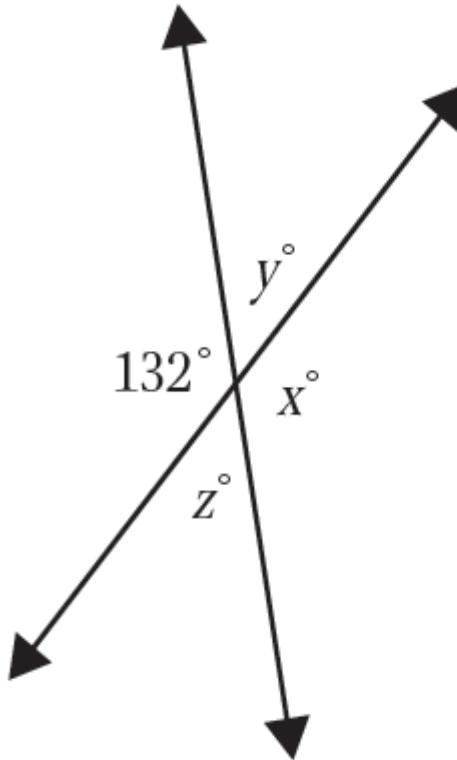
6.



Hint:

$$x + 2x = 180$$

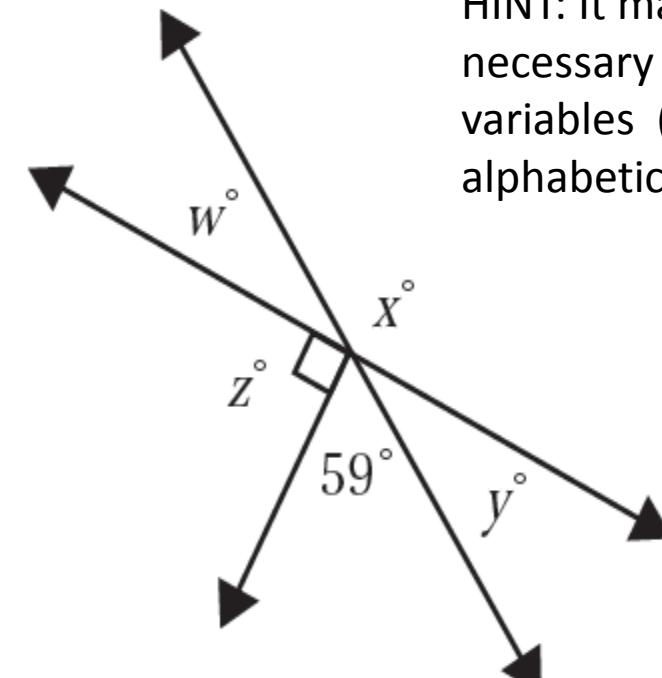
Use your knowledge of vertical angles, supplementary angles, complementary angles, and adjacent angles to determine the unknown angles for each figure below.



$$x^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$y^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$z^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$



HINT: It may be necessary to solve for variables (not in alphabetical order)

$$w^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$x^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$y^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$

$$z^\circ = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$