

LESSON
1.5

Study Guide

For use with pages 35–41
GOAL Use special angle relationships to find angle measures.

Vocabulary

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

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

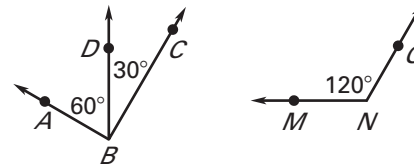
Adjacent angles are two angles that share a common vertex and side, but have no common interior points.

Two adjacent angles are a **linear pair** if their noncommon sides are opposite rays.

Two angles are **vertical angles** if their sides form two pairs of opposite rays.

EXAMPLE 1 Identify complements and supplements

In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.


Solution

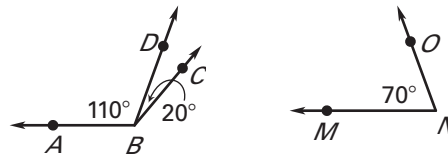
Because $60^\circ + 30^\circ = 90^\circ$, $\angle ABD$ and $\angle DBC$ are complementary angles.

Because $60^\circ + 120^\circ = 180^\circ$, $\angle ABD$ and $\angle MNO$ are supplementary angles.

Because $\angle ABD$ and $\angle DBC$ share a common vertex and side, they are adjacent angles.

Exercise for Example 1

- In the figure, name a pair of complementary angles, a pair of supplementary angles, and a pair of adjacent angles.


EXAMPLE 2 Find measures of a complement and a supplement

- Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 50^\circ$, find $m\angle 2$.
- Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 3 = 105^\circ$, find $m\angle 4$.

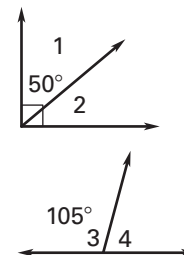
Solution

- You can draw a diagram with complementary adjacent angles to illustrate the relationship.

$$m\angle 2 = 90^\circ - m\angle 1 = 90^\circ - 50^\circ = 40^\circ$$

- You can draw a diagram with supplementary adjacent angles to illustrate the relationship.

$$m\angle 4 = 180^\circ - m\angle 3 = 180^\circ - 105^\circ = 75^\circ$$



LESSON
1.5**Study Guide** *continued*
*For use with pages 35–41***Exercises for Example 2**

- Given that $\angle 1$ is a complement of $\angle 2$ and $m\angle 1 = 55^\circ$, find $m\angle 2$.
- Given that $\angle 3$ is a supplement of $\angle 4$ and $m\angle 3 = 80^\circ$, find $m\angle 4$.

EXAMPLE 3 **Identify angle pairs**

Identify all of the linear pairs and all of the vertical angles in the figure at the right.

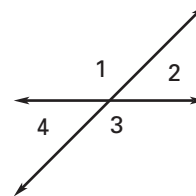
Solution

To find linear pairs, look for adjacent angles whose noncommon sides are opposite rays.

$\angle 1$ and $\angle 2$ are a linear pair. $\angle 2$ and $\angle 3$ are also a linear pair. $\angle 3$ and $\angle 4$ are also a linear pair. $\angle 1$ and $\angle 4$ are also a linear pair.

To find vertical angles, look for angles formed by intersecting lines.

$\angle 1$ and $\angle 3$ are vertical angles. $\angle 2$ and $\angle 4$ are also vertical angles.

**EXAMPLE 4** **Find angle measures in a linear pair**

Solve for x in the diagram at the right. Then find the measure of each angle.

Solution

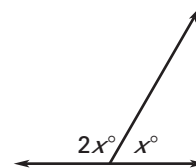
The two angles form a linear pair. Use the fact that the angles of a linear pair are supplementary to write an equation.

$$x^\circ + 2x^\circ = 180^\circ \quad \text{Write an equation.}$$

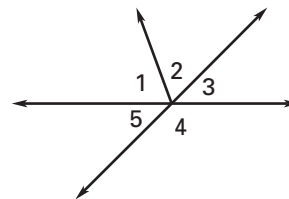
$$3x = 180 \quad \text{Combine like terms.}$$

$$x = 60 \quad \text{Divide each side by 3.}$$

The measures of the angles are 60° and $2(60^\circ) = 120^\circ$.

**Exercises for Examples 3 and 4**

- Identify all of the linear pairs and all of the vertical angles in the figure at the right.



Solve for x in the diagram. Then find the measure of each angle.

