

LESSON
2.2**Study Guide***For use with pages 79–85***GOAL Write definitions as conditional statements.****Vocabulary**

A **conditional statement** is a logical statement that has two parts, a hypothesis and a conclusion.

When a conditional statement is written in **if-then form**, the “if” part contains the **hypothesis** and the “then” part contains the **conclusion**.

The **negation** of a statement is the opposite of the original statement.

To write the **converse** of a conditional statement, switch the hypothesis and conclusion.

To write the **inverse** of a conditional statement, negate both the hypothesis and conclusion.

To write the **contrapositive** of a conditional statement, first write the converse and then negate both the hypothesis and the conclusion.

When two statements are both true or are both false, they are called **equivalent statements**.

If two lines intersect to form a right angle, then they are **perpendicular lines**.

A **biconditional statement** is a statement that contains the phrase “if and only if.”

EXAMPLE 1 Rewrite four related conditional statements

Write the if-then form, the converse, the inverse, and the contrapositive of the statement “Basketball players are athletes.” Decide whether each statement is *true* or *false*.

Solution

If-then form If you are a basketball player, then you are an athlete.

True, basketball players are athletes.

Converse If you are an athlete, then you are a basketball player.

False, not all athletes play basketball.

Inverse If you are not a basketball player, then you are not an athlete.

False, even if you don’t play basketball, you can still be an athlete.

Contrapositive If you are not an athlete, then you are not a basketball player.

True, a person who is not an athlete cannot be a basketball player.

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Exercises for Example 1

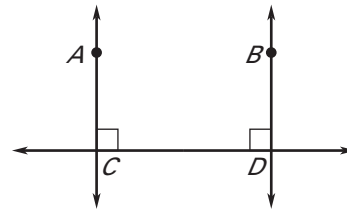
Write the if-then form, the converse, the inverse, and the contrapositive of the statement. Decide whether each statement is *true* or *false*.

- All 180° angles are straight angles.
- All cats are mammals.

EXAMPLE 2 Use definitions

Decide whether each statement about the diagram is true. Explain your answer using the definitions you have learned.

- $\overrightarrow{AC} \perp \overrightarrow{CD}$
- $\angle ACD$ and $\angle BDC$ are complementary.


Solution

- This statement is true. The right angle symbol in the diagram indicates that the lines intersect to form a right angle. So the lines are perpendicular.
- This statement is false. Both angles are right angles, so the sum of their measures is not 90° .

Exercises for Example 2

Use the diagram in Example 2. Decide whether each statement about the diagram is true. Explain your answer using the definitions you have learned.

- $\angle ACD$ and $\angle BDC$ are supplementary.
- $\overrightarrow{AC} \perp \overrightarrow{BD}$

EXAMPLE 3 Write a biconditional

Write the definition of supplementary angles as a biconditional.

Solution

Definition If two angles are supplementary angles, then the sum of their measures is 180° .

Converse If the sum of the measures of two angles is 180° , then they are supplementary angles.

Biconditional Two angles are supplementary angles if and only if the sum of their measures is 180° .

Exercises for Example 3

Rewrite the definition as a biconditional.

- If two angles are complementary angles, then the sum of their measures is 90° .
- If a polygon is equilateral, then all of its sides are congruent.