

Lesson 3-6

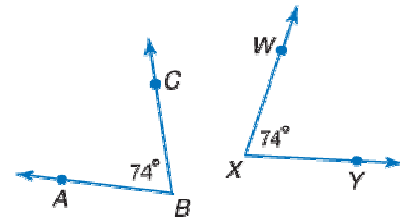
Example 1

Tell whether each conditional is true or false.

- If two lines are perpendicular, then they intersect.
- If two angles are equal in measure, then they are vertical angles.

Solution

- Perpendicular lines are defined as two lines that intersect to form right angles. So, the conditional is true.
- Consider $\angle ABC$ and $\angle WXY$ shown. They both have equal measure so the hypothesis is true. However, they are not vertical angles so the conclusion is false. Therefore, $\angle ABC$ and $\angle WXY$ are a counterexample, and the conditional is false.



Example 2

DRAFTING People who draw plans must apply this true statement: If two angles are vertical angles, then they are equal in measures. Write the converse of the statement. Is it also true?

Solution

Interchange the hypothesis and the conclusion of the given statement.

Statement: If two angles are vertical angles, then they are equal in measure.

hypothesis

conclusion

Converse: If two angles are equal in measure, then they are vertical angles.

hypothesis

conclusion

By definition, vertical angles do have equal measure, and so the given statement is true. Part b of Example 1 demonstrated that angles that are equal in measure are not necessarily vertical angles, and so the converse is false.

Example 3

Write this definition as two conditionals and as a single biconditional.

A straight angle is an angle whose measure is exactly 180° .

Solution

The definition leads to two true conditionals.

If an angle is a straight angle, then its measure is exactly 180° .

If the measure of an angle is 180° , then it is a straight angle.

These can be combined into a single biconditional as follows.

An angle is a straight angle if and only if its measure is exactly 180° .