



Conditional Statements: True or False in Geometry

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Learning Objectives

- Identify the hypothesis and conclusion of a conditional statement
- Rewrite verbal statements in if-then form
- Translate conditional statements into symbolic form using p and q
- Determine whether a conditional statement is true or false

Read each item carefully and write your answer in the space provided, showing reasoning where required.

1. Identify the hypothesis of the conditional statement: 'If two angles are vertical, then they are congruent.'

If two angles are vertical, then they are congruent.

Answer: _____

2. Identify the conclusion of the conditional statement: 'If a polygon has three sides, then it is a triangle.'

If a polygon has three sides, then it is a triangle.

Answer: _____

3. Rewrite the statement in if-then form: 'All right angles measure 90 degrees.'

All right angles measure 90 degrees.

Answer: _____

4. Rewrite the statement in if-then form: 'Complementary angles sum to 90 degrees.'

Complementary angles sum to 90 degrees.

Answer: _____

5. Write the symbolic form of: 'If a figure is a square (p), then it has four equal sides (q).'

$p \rightarrow q$

Answer: _____

6. Given p: 'an angle measures 90 degrees' and q: 'the angle is a right angle,' translate $p \rightarrow q$ back into a verbal conditional statement.

$p \rightarrow q$

Answer: _____



7. Determine whether the conditional is true or false: 'If a number is even, then it is divisible by 2.'

If a number is even, then it is divisible by 2.

Answer: _____

8. Determine whether the conditional is true or false: 'If a shape is a quadrilateral, then it is a square.'

If a shape is a quadrilateral, then it is a square.

Answer: _____

9. Determine whether the conditional is true or false: 'If two lines are perpendicular, then they intersect to form right angles.'

If two lines are perpendicular, then they intersect to form right angles.

Answer: _____

10. Number Bender Challenge: Identify the hypothesis and conclusion, write the statement in symbolic form, and decide if it is true or false: 'If an angle is obtuse, then its measure is greater than 90 degrees and less than 180 degrees.'

If an angle is obtuse, then its measure is greater than 90° and less than 180° .

Answer: _____





This worksheet covers conditional (if-then) statements: identifying hypothesis and conclusion, rewriting verbal statements in if-then form, expressing statements in symbolic form ($p \rightarrow q$), and evaluating the truth value of conditionals based on the hypothesis and conclusion.

Solutions

1. Identify the hypothesis of the conditional statement: 'If two angles are vertical, then they are congruent.'

If two angles are vertical, then they are congruent.

→ The hypothesis is the part of the conditional that follows the word 'if'.

→ The phrase that follows 'if' is 'two angles are vertical', which is the hypothesis.

Answer: Two angles are vertical.

2. Identify the conclusion of the conditional statement: 'If a polygon has three sides, then it is a triangle.'

If a polygon has three sides, then it is a triangle.

→ The conclusion is the part of the conditional that follows the word 'then'.

→ The phrase that follows 'then' is 'it is a triangle', which is the conclusion.

Answer: It is a triangle.

3. Rewrite the statement in if-then form: 'All right angles measure 90 degrees.'

All right angles measure 90 degrees.

→ Identify the hypothesis: an angle is a right angle.

→ Identify the conclusion: it measures 90 degrees.

→ Combine them into the form 'If hypothesis, then conclusion.'

Answer: If an angle is a right angle, then it measures 90 degrees.

4. Rewrite the statement in if-then form: 'Complementary angles sum to 90 degrees.'

Complementary angles sum to 90 degrees.

→ Identify the hypothesis: two angles are complementary.

→ Identify the conclusion: their sum is 90 degrees.

→ Write in the form 'If hypothesis, then conclusion.'

Answer: If two angles are complementary, then their sum is 90 degrees.

5. Write the symbolic form of: 'If a figure is a square (p), then it has four equal sides (q).'

$p \rightarrow q$

→ Let p represent the hypothesis: a figure is a square.

→ Let q represent the conclusion: it has four equal sides.

→ The symbolic form of a conditional is hypothesis implies conclusion, written $p \rightarrow q$.

Answer: $p \rightarrow q$



6. Given p : 'an angle measures 90 degrees' and q : 'the angle is a right angle,' translate $p \rightarrow q$ back into a verbal conditional statement.

$$p \rightarrow q$$

→ The symbol p arrow q means 'if p , then q .'

→ Substitute the meaning of p after 'if' and the meaning of q after 'then.'

→ The verbal form is: If an angle measures 90 degrees, then the angle is a right angle.

Answer: If an angle measures 90 degrees, then the angle is a right angle.

7. Determine whether the conditional is true or false: 'If a number is even, then it is divisible by 2.'

If a number is even, then it is divisible by 2.

→ Check the hypothesis: a number is even.

→ Check the conclusion: every even number is divisible by 2 by definition.

→ Since the hypothesis being true always makes the conclusion true, the conditional is true.

Answer: True

8. Determine whether the conditional is true or false: 'If a shape is a quadrilateral, then it is a square.'

If a shape is a quadrilateral, then it is a square.

→ A quadrilateral is any four-sided polygon.

→ A rectangle that is not a square is a counterexample: it is a quadrilateral but not a square.

→ Since the hypothesis can be true while the conclusion is false, the conditional is false.

Answer: False

9. Determine whether the conditional is true or false: 'If two lines are perpendicular, then they intersect to form right angles.'

If two lines are perpendicular, then they intersect to form right angles.

→ By definition, perpendicular lines intersect to form right angles.

→ Whenever the hypothesis (lines are perpendicular) is true, the conclusion (they form right angles) is also true.

→ Therefore the conditional statement is true.

Answer: True

10. Number Bender Challenge: Identify the hypothesis and conclusion, write the statement in symbolic form, and decide if it is true or false: 'If an angle is obtuse, then its measure is greater than 90 degrees and less than 180 degrees.'

If an angle is obtuse, then its measure is greater than 90° and less than 180° .

→ Hypothesis (p): an angle is obtuse.

→ Conclusion (q): its measure is greater than 90 degrees and less than 180 degrees.

→ Symbolic form: $p \rightarrow q$.

→ By the definition of an obtuse angle, the measure is always between 90 and 180 degrees, so the conditional is true.

Answer: $p \rightarrow q$, True

