Chapter 1

1.1 Writing Conditional, Converse, and Inverse Statements and Determining the Truth Value of these Statements

Concepts to Learn

- Write Conditional Statements

- Write Converses

- Write Inverses

- Determine the Truth Value of Conditional Statements, Converses, and Inverses

Definitions Applicable to Exercises 1.1

- □ square: is a quadrilateral with four equal sides and four equal angles (90 degree angles, or right angles).

- □ hypotenuse: the side of a right triangle opposite the right angle

- □ rectangle: a quadrilateral with four right angles

- □ quadrilateral: a polygon with four sides

- □ polygon: a closed figure bounded by straight sides

- □ parallelogram: a quadrilateral whose opposite sides are both parallel and equal in length

- □ pentagon: a five-sided polygon

- □ hexagon: a six-sided polygon

- □ right triangle: a triangle with one right angle

- □ obtuse triangle: a triangle in which one of the angles is obtuse (more than 90° and less than 180°); it will have one obtuse angle and two acute angles.

EXERCISES 1.1

Conditional Statements

An *if-then statement* is also known as a conditional statement.
For example,

"If A, then B" says that if A occurs, then B will occur. This can be written as follows: A → B.

The symbol → means implies. Thus, A → B reads "If A, then B," or "A implies B." This does not mean that B implies A.

For problems 1 and 2, rewrite the following statement as a conditional statement ("If..., then..." form).

1. The sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse.

_____

_____

2. Rectangles are quadrilaterals.

_____

_____

Converses and Inverses

Conditional Statement: A → B:

Converse of A → B: B → A

Inverse of A → B: not A → not B

Write the following conditional statement as a converse and as an inverse.

3. If a polygon has five sides, then it is a pentagon.

Converse: _____

_____

Inverse: _____

_____

Determining the Truth Value of Conditional, Converse, and Inverse Statements

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4. **Determine the truth value of the conditional statement, its converse, and its inverse.**

Conditional: If a polygon is a square, then it is a quadrilateral.

(True or False?) _____

Converse: If a polygon is a quadrilateral, then it is a square.

(True or False?) _____

Inverse: If a polygon is not a quadrilateral, then it is not a square.

(True or False?) _____

5. **Determine the truth value of the conditional statement, its converse, and its inverse.**

Conditional: If a polygon is a quadrilateral, then it is a parallelogram.

Converse: If a polygon is a parallelogram, then it is a quadrilateral.

Inverse: If a polygon is *not* a quadrilateral, then it is *not* a parallelogram.

Conditional (True or False?)_____Converse (True or False?)_____

Inverse (True or False?)_____

6. **Determine the truth value of the conditional statement, its converse, and its inverse.**

Conditional: If a triangle has exactly one obtuse angle, then it is an obtuse triangle.

Converse: If a triangle is an obtuse triangle, then it has exactly one obtuse angle.

Inverse: If a triangle does *not* have exactly one obtuse angle, then it is *not* an obtuse triangle.

Conditional (True or False?)_____Converse (True or False?)_____

Inverse (True or False?)_____

Conditional, Converse, and Inverse Statements

In problems 7 through 9, rewrite the following statement as a conditional statement (if..., then...form). Then, write each conditional statement as a converse and as an inverse.

7. Triangles have three sides.

Conditional Statement: _____

_____

Converse: _____

_____

Inverse: _____

_____

8. Hexagons have six sides.

Conditional Statement: _____

_____

Converse: _____

_____

Inverse: _____

_____

9. In a right triangle, the longest side is the hypotenuse.

Conditional Statement: _____

_____

Converse: _____

_____

Inverse: _____

_____

Selected Answers to Exercises 1.1

1. If a triangle is a right triangle, then the sum of squares of the legs is equal to the square of the hypotenuse.

2. If a polygon is a rectangle, then it is a quadrilateral.

3. *Converse:*   If a polygon is a pentagon, then it has five sides.
    Inverse: If a polygon does *not* have five sides, then it is *not* a pentagon.

4. *Conditional:*   True; *Converse:* False; *Inverse:* True