Objective 1  Review Conditional, Converse, Inverse, and Contrapositive Statements

<table>
<thead>
<tr>
<th>Name</th>
<th>How to Write It (in words)</th>
<th>How to Write It (in Symbols)</th>
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</table>
| **Conditional** | Given: hypothesis p
conclusion q                                                                 | \( p \rightarrow q \) (if p then q) |
| **Converse**  | Switch the hypothesis and the conclusion.                       | \( q \rightarrow p \) (if q then p) |
| **Inverse**   | Negate the hypothesis and the conclusion of the conditional statement. | \( \sim p \rightarrow \sim q \) (if not p then not q) |
| **Contrapositive** | Negate the hypothesis and the conclusion of the converse statement. | \( \sim q \rightarrow \sim p \) (if not q then not p) |

Conditional and Contrapositive Statements are Equivalent Statements.
Converse and Inverse Statements are Equivalent Statements.

Work Video Exercises 1 & 2 with me.

Given \( p \) and \( q \), write each statement.

\[
p : m \angle A = m \angle B
q : \angle A \text{ is congruent to } \angle B
\]

1. \( \sim p \)

2. \( \sim p \rightarrow q \)

Pause and work Video Exercise 3.

Some statements have special names. Give the name for the exercise. (Here, \( p \rightarrow q \) is our original conditional statement.)

3. \( \sim p \rightarrow \sim q \)

Play and check.
Section 2.5 Deductive Reasoning

Pause and work Video Exercise 4.
Use the hypothesis \((p)\) and conclusion \((q)\) given to write the conditional statement.

\[ p: \text{a figure has seven sides} \]
\[ q: \text{the figure is a heptagon} \]

4. inverse

Play and check.

Objective 2 Understand and Use the Two Laws of Deductive Reasoning: The Law of Detachment and the Law of Syllogism

Deductive reasoning is the process of proving a specific conclusion from one or more general statements. A conclusion that is proved true by deductive reasoning is called a theorem.

A conclusion that is proved true by deductive reasoning is called a(n) __________.

Law of Detachment: If \( p \rightarrow q \) is a true conditional statement and \( p \) is true, then \( q \) is true.

Law of Syllogism: If \( p \rightarrow q \) is true and \( q \rightarrow r \) is true, then \( p \rightarrow r \) is a true conditional statement.

Work Video Exercises 5 & 6 with me.
If possible, use the Law of Detachment to make a conclusion. If it is not possible to make a conclusion, tell why. (Assume that the first statement \( p \rightarrow q \) is true.)

5. If three points are on the same line, then they are collinear.
Points \( X, Y, \) and \( Z \) are on line \( m \).
If possible, use the Law of Syllogism to make a conclusion. If it is not possible to make a conclusion, tell why. Assume the statement is true.

6. If a whole number ends in 6, then it is divisible by 2.  
   If a whole number ends in 4, then it is divisible by 2.

Pause and work Video Exercises 7 & 8.
Complete a. and b.

a. Make conclusions from the following statements.

b. Note which law you used to make a conclusion, the law of Detachment or the Law of Syllogism.

7. If you ride a bicycle, then you are exercising.  
   You ride a bicycle.

8. If you are studying botany, then you are studying biology.  
   If you are studying biology, then you are studying a science.

Play and check.