

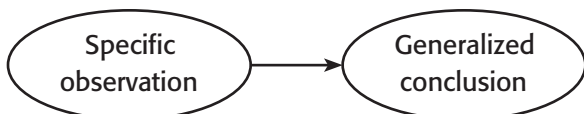
# Section Overview

## Inductive Reasoning

Lesson 2-1

**Why?** Scientists use inductive reasoning when they form hypotheses to test by experiment.

**Inductive reasoning** is used to make *conjectures* and continue patterns.



A generalized conclusion is a **conjecture**. To disprove a conjecture, you need only one **counterexample**.

By observing the triangles, you can make a conjecture about the pattern.



**Conjecture:** The color alternates between red and blue, and the triangle rotates 90° clockwise each time.

Based on the conjecture, the next triangle in the pattern is the following:



## Conditionals and Deductive Reasoning

Lessons 2-2, 2-3

**Why?** Deductive reasoning is the basis for proof in mathematics. Lawyers use deductive reasoning when presenting cases in court.

**Deductive reasoning** is the process of using logic to draw conclusions.

A **conditional statement** is an if-then statement. It has a **hypothesis** and a **conclusion**.

If  $p$ , then  $q$ .  
 $p \rightarrow q$

**Conditional:**  $p \rightarrow q$   
**Converse:**  $q \rightarrow p$   
**Inverse:**  $\sim p \rightarrow \sim q$   
**Contrapositive:**  $\sim q \rightarrow \sim p$

Logically equivalent

### Law of Detachment

If  $p \rightarrow q$  is a true statement and  $p$  is true, then  $q$  is true.

### Law of Syllogism

If  $p \rightarrow q$  and  $q \rightarrow r$  are true statements, then  $p \rightarrow r$  is a true statement.

## Biconditionals and Definitions

Lesson 2-4

**Why?** Definitions must be precise in order for people to communicate effectively.

A **biconditional statement** is an if-and-only-if statement.

$p$  if and only if  $q$ .

$p \leftrightarrow q$

This means both  $p \rightarrow q$  and  $q \rightarrow p$ .

Biconditionals are used to write precise **definitions**.