Section Overview

Professional Development

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.

Specific observation → Generalized conclusion

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.**