2.1 – 2.4 Quick Recap

2.1 Using Inductive Reasoning

Inductive Reasoning: is the process of using patterns to draw conclusions.

❒ You only need one counterexample to disprove a conjecture.

Example 1: Determine if the conjecture is true. If not, give a counterexample.

"The difference of two negative numbers is a positive number"

$-4-(-2)$
$=-4+2$
$=-2$ False

2.2 Conditional Statements

Conditional Statement: An "if …, then …" statement.

The part following the "if" is called the hypothesis and the part following the "then" is called the conclusion.

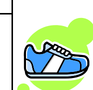
Example 2: Write the statement as a conditional statement. Then circle the hypothesis and underline the conclusion.

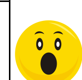
"Mrs. Baker is on vacation in London."

Conditional Statement: If Mrs. Baker is on vacation, then she is in London

Types of Statements:

A Conditional statement is a statement that can be written in the form "if p, then q."	$p \rightarrow q$
The Converse of a statement is formed by exchanging the hypothesis and conclusion.	$q \rightarrow p$
The inverse of a statement formed by negating the hypothesis and conclusion. Negation: The negation of statement *p* is "not p" written as ~p	$\sim p \rightarrow \sim q$
The Contrapositive of a statement is formed by exchanging and negating the hypothesis and conclusion.	$\sim q \rightarrow \sim p$





Example 3: Write the converse, inverse and contrapositive of the conditional statement. Then identify the truth value of each statement.

Conditional: "If two angles are complementary, then they are acute." T or F

Converse: If 2 ∡s are acute, then they are complementary T or F

Inverse: If 2 ∡s aren't complementary, then they aren't acute T or F

Contrapositive: If 2 ∡s aren't acute, then they aren't comp. T or F

The conditional and its contrapositive have the same truth value.

2.3 Law of Syllogism

Law of Syllogism: If p → q and q → r are true statements, then p → r is a true statement

The "q" statement needs to be the conclusion of one statement and the hypothesis of the other

Example 4: Given: If someone leaves their car lights on overnight, then their car battery will drain. If the battery is drained, their car might not start. If the car doesn't start, then they will be late for work. Make a conclusion based on the law of syllogism, if Alex left car lights on last night

Conclusion: Alex will be late for work. ☹

2.4 Biconditionals

A biconditional is one statement that contains a conditional and its converse.

In order for a biconditional to be true, both the conditional & its converse must be true.

Example 5: Determine if the biconditional is true. If false, give a counterexample.

The number, x^2, is positive if and only if the number is positive. $\boxed{\text{False}}$

F If a number x^2 is pos., then the number is positive.

T If a number is pos., then the number x^2 is pos.

If $x^2 = 16$, then x could be -4, not positive!