Geometry Unit 3: Proofs

If-Then Statements;
Converses

Warmup

- How you feel when you hear about proofs…

https://www.youtube.com/watch?v=H07zYvkNYL8

If-Then Statements; Converses

- **Content Objective**: Students will be able to identify the hypothesis and conclusion of conditional statements.

- **Language Objective**: Students will be able to identify and state counterexamples for conditional statements, if they exists.

Conditional Statements

- **If-then statements,** or **conditional statements,** are statements that begin with a hypothesis (the "If") and leads to a conclusion (the "Then").

- The basic form of an if-then statement is:

$$If\ p, then\ q$$

- Where p is the hypothesis, and q is the conclusion.
- Example (More real world): If it rains, then my car will be covered in dirt.
- Example (In Geometry): If B is between A and C, then $AB + BC = AC$.

Conditional Statements

- Conditional Statements are not always written with the "If" first. Here are some examples (They all mean the same thing).

General Form	*Example*
p implies q.	$x^2 = 25$ implies $x < 10$
p only if q.	$x^2 = 25$ only if $x < 10$
q if p.	$x < 10$ if $x^2 = 25$

Converses

- The **Converse** of a conditional statement is formed by switching the hypothesis and conclusion.
- Statement: If p, then q. Converse: If q, then p.

- A statement and its converse say different things. In some cases, a statement can be true, but its converse can come out to be false.

Statement: If $4x = 20$, then $x = 5$.

True Converse: If $x = 5$, then $4x = 20$.

Counterexample

- An If-then statement is false if an example can be found where the hypothesis is true, but the conclusion is false. We call this a **Counterexample.**

- It only takes one counterexample to disprove a statement.

  Statement: If $x^2 = 25$, then $x = 5$

  Counterexample: x could also equal -5.

- Thus the statement is disproven.