SECTION 2.1

"Conditional Statements"

Sep 9-12:45 PM

CONDITIONAL STATEMENT - A type of logical statement that has two parts: A "HYPOTHESIS" & a "CONCLUSION".

** The " if " contains the "HYPOTHESIS"
** The "then" contains the "CONCLUSION"

Words: If p, then q. **Symbols**: $p \rightarrow q$ (read as "p implies q")

IF-THEN FORM - The form of a conditional statement that uses "if", which is the hypothesis, and "then", which is the conclusion.

EX:
If it is noon in New York City, then it is 9 a.m. in California
Hypothesis Conclusion

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If-Then Form:

How can we rewrite the following in *if-then form?*

1. Two points are collinear if they are on the same line

If two points lie on the same line, then they are collinear

2. You are having fun if you are in Geometry class

3. A number divisible by 9 is also divisible by 3

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*** Conditional statements can be TRUE or FALSE**

To prove TRUE: Present an argument that is fulfilled for ALL cases presented.

EX: We made a conjecture that the product of two even numbers is even...it is true for ALL cases

To prove FALSE: Present a SINGLE counterexample.

Example:
If $x^2=9$ then $x=3$

EX: Write a counterexample...
"If a number is odd, then it is divisible by 3."
COUNTEREXAMPLE:

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NEGATION - The negative, or opposite, of a statement. The negation symbol is ~.

Words: "not p" **Symbol: "~p"**

*** Realize that we are not just saying the opposite...**

Ex:

Statement: "< A is acute."	Statement: "It is hot."
Negation:	Negation:

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CONVERSE - The statement formed by switching the hypothesis and conclusion of a conditional statement.

Ex: ***Conditional:*** **"If today is Thursday, then tomorrow is Friday."**

Converse: **"If tomorrow is Friday, then today is Thursday."**

Words: "If q, then p" **Symbols:** "$q \rightarrow p$"

INVERSE - The statement formed when you negate the hypothesis and conclusion of a conditional statement.

Ex: ***Conditional:*** **"If today is Thursday, then tomorrow is Friday."**

Inverse: **"If today is not Thursday, then tomorrow is not Friday."**

Words: "If not p, then not q" **Symbols:** "$\sim p \rightarrow \sim q$"

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CONTRAPOSITIVE - The statement formed when you negate the hypothesis & conclusion of the converse of a conditional statement.

Ex: *Conditional:* **"If today is Thursday, then tomorrow is Friday."**

Converse: **"If tomorrow is not Friday, then today is not Thursday."**

Words: "If not q, then not p" **Symbols:** "$\sim q \rightarrow \sim p$"

EQUIVALENT STATEMENTS - When two statements are both true or both false.

* A **conditional** statement is equivalent to its **contrapositive** and the **inverse** and **converse** are equivalent.

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Example:
Write the inverse, converse, and contrapositive:

***CONDITIONAL*: "If I am hungry, then I eat."**

CONVERSE:

INVERSE:

CONTRAPOSITIVE:

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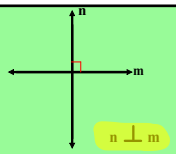
Perpendicular lines- Two lines that intersect to form a right angle.



Conditional Statement:
Using perpendicular lines definition-

1)"If two lines are perpendicular, then they intersect to form a right angle:"

2)"If two lines intersect to form a right angle, then the two lines are perpendicular"

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BICONDITIONAL STATEMENT - A statement that contains the phrase **"if and only if"**. Writing a biconditional statement is equivalent to writing a conditional statement and its converse.

Words: "p if and only if q" **Symbols:** "$p \leftrightarrow q$"

☆ " if and only if " can be abbreviated to " **iff** "

☆ A biconditional statement can be rewritten as a conditional statement and its converse:

It is Friday if and only if tomorrow is Saturday.

Conditional statement: If it is Friday, then tomorrow is Saturday

Converse: If tomorrow is Saturday, then it is Friday

** A biconditional statement can be either true or false. To be true, both the conditional statement and its converse must be ***true***. This means that a true biconditional statement is true both "forward" and "backward".

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Applying biconditional statements to postulates we already know:

Segment Addition Postulate says:

If B lies between points A and C, then AB + BC = AC.

What is the converse?

☆Combine the statements to produce a true biconditional statement:

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SECTION 2.1

Day 1 HW: pg. 71 #4 - 12 even, #13 - 20 all, #22, #24, #25 - 28 all

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