

## 2.2 Analyze Conditional Statements

Goal: Write definitions as conditional statements.



Conditional Statement (If-Then):

*hypothesis*                      *conclusion*  
If an animal meows, then it is a cat.



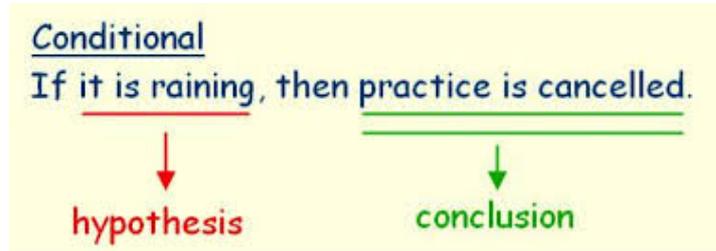
Conditional - a logical statement that has 2 parts,  
an "if" and a "then"

"if" part - is called the **hypothesis** or **antecedent**  
"then" part - is called the **conclusion** or **consequent**

Conditional = **IF...THEN** statement

**antecedent** - the statement that follows the "if"

**consequent** - the statement that follows the "then"



Ex. If it is raining then there are clouds in the sky.

Rewrite as a conditional:

All birds have feathers.

If it is a bird, then it has feathers.

Every right angle is  $90^\circ$ .

If it is a right angle then it is  $90^\circ$

If an angle is a right angle, then its measure is  $90^\circ$ .

Negation - a statement that is the opposite of the original statement "not"

The ball is red.

Negation:

The ball is not red.

The cat is not black.

Negation:

The cat is black.

$x + 2 > 10$ .

Negation:

$x + 2 \leq 10$ .

$x = 5$ .

Negation:

$x \neq 5$ .

Conditional	$p \Rightarrow q$	If p, then q.	$\Rightarrow$ if/then "implies"
Converse	$q \Rightarrow p$	If q, then p.	
Inverse	$\text{not } p \Rightarrow \text{not } q$	If it is not p, then it is not q.	
Contrapositive	$\text{not } q \Rightarrow \text{not } p$	If it is not q, then it is not p.	

Ex. Conditional: If  $\angle A = 100^\circ$ , then it is obtuse.

Converse: If it is obtuse, then  $\angle A = 100^\circ$ .

Inverse: If  $\angle A \neq 100^\circ$ , then it is not obtuse.

Contrapositive: If it is not obtuse, then  $\angle A \neq 100^\circ$

always be true together or false together

Equivalent Statements - when two statements are both true and false (same truth value)

( conditional and contrapositive )      ( converse and inverse )

Biconditional - when a conditional and the converse are both true and a single statement is written

Ex. Conditional: If  $\angle A = 90^\circ$ , then it is a right angle.

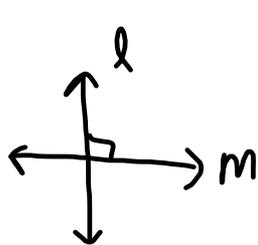
Converse: If  $\angle A$  is a right angle, then it is  $=$  to  $90^\circ$  .

Biconditional:  $\angle A = 90^\circ$  if and only if it is a right angle.

"iff" = if and only if

\* All good definitions can be written as a biconditional. \*

Two lines are perpendicular if and only if they intersect to form a right angle.



$l \perp m$   
 $\perp$  perpendicular  $90^\circ$   $\sphericalangle$  right angle

HW: Worksheet