1.7 -1.8 - Logic Statements

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Theorems = Statements that have been proven true.

Thm: If two angles are right angles, then they are congruent.

1.7-1.8 - Logic Statements

If ________ Then ________

Conditional

If $\longrightarrow$ Hypothesis (p)

Then $\longrightarrow$ Conclusion (q)

$\boxed{\begin{array}{l}\text{If } p\text{, then } q \\ p \rightarrow q\end{array}}$

$p \rightarrow q$

$p \Rightarrow q$

p --> q

ALL OK!

Statements of Logic - Notation

Conditional	p --> q (If p, then q)	
Converse	q --> p	FLIP
Inverse	~p --> ~q (~ means NOT)	NOT
Contrapositive	~q --> ~p	FLIP & NOT

Statements of Logic - Example #1 (Theorem)

Conditional p --> q (If p, then q)
If two angles are right angles, then they are congruent.

Converse q --> p
If two angles are congruent, then they are right angles.

Inverse ~p --> ~q
If two angles are not right angles, then they are not congruent.

Contrapositive ~q --> ~p
If two angles are not congruent, then they are not right angles.

Statements of Logic - Example #2 (Definition)

Conditional p --> q (If p, then q)
If an angle is a right angle, then it has a measure of 90 degrees.

Converse q --> p
If an angle has a measure of 90 degrees, then it is a right angle.

Inverse ~p --> ~q
If an angle is a not a right angle, then it does not have a measure of 90 degrees.

Contrapositive ~q --> ~p
If an angle does not have a measure of 90 degrees, then it is not a right angle.

Statements of Logic - Example #3 (Random)

Conditional p --> q (If p, then q)
If my car has a flat tire, then I am late for work.

Converse q --> p
If I am late for work, then my car has a flat tire.

Inverse ~p --> ~q
If my car does not have a flat tire, then I am not late for work.

Contrapositive ~q --> ~p
If I am not late for work, then my car does not have a flat tire.

1.7 -1.8 - Logic Statements

Statements of Logic

Conditional p --> q (If p, then q)

If my car has a flat tire, then I am late for work.

Contrapositive ~q --> ~p

If I am not late for work, then my car does not have a flat tire.

The conditional and the contrapositive will always have the same truth value (true or false). If one is true, then both will be true. If one is false, both will be false.

Mental Floss - Wed Sept 20th

Write the converse, inverse, and contrapositive of the following conditional statement:

"If I work late, then I am not home in time for dinner."

Converse: If I am not home in time for dinner, then I work late.

Inverse: If I do not work late, then I am home in time for dinner.

Contrapositve: If I am home in time for dinner, then I did not work late.

Linking Logic Statements

If my car has a flat tire, then I am late for work.	t --> w
If I am late for work, then I will be fined.	w --> f
If I am fined, then I will not be able to make my car payment.	f --> ~p

Conclusion:

If my car has a flat tire, then I will not be able to make my car payment.

Linking Logic Statements

If my cats do not die, then they will not starve.	~d --> ~s
If I am not able to get into my house, then my cats will starve.	~h --> s
If I lose my keys, then I will not be able to get into my house.	k --> ~h
If my cats do not haunt me in my sleep, then they will not die.	~x --> ~d

s→d

d→x

Conclusion:

If I lose my keys, then my cats will haunt me in my sleep.

k --> ~h ~h --> s s→d d→x

Linking Logic Statements - No Words

~d --> c

~a --> ~d

~w --> ~r r→w

a --> b ~b→~a

w --> ~b

Conclusion?

r→w w --> ~b ~b→~a ~a --> ~d ~d --> c

r→c or ~c→~r