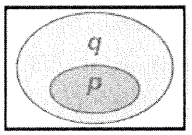
Geometry Honors
Notes -Section 2.2 Conditional Statements

Name KEY
Date _____ Period_____

Conditional Statements

DEFINITION	SYMBOLS	VENN DIAGRAM
A **conditional statement** is a statement that can be written in the form "if p, then q."	$p \rightarrow q$	
The **hypothesis** is the part p of a conditional statement following the word *if*.		
The **conclusion** is the part q of a conditional statement following the word *then*.		

Example 1: Identify the hypothesis and conclusion of each conditional.

A. If today is Thanksgiving Day, then today is Thursday.

Hypothesis: Today is Thanksgiving Day.

Conclusion: Today is Thursday.

B. A number is a rational number if it is an integer.

Hypothesis: A number is an integer.

Conclusion: A number is rational number.

C. "A number is divisible by 3 if it is divisible by 6."

Hypothesis: A number is divisible by 6.

Conclusion: A number is divisible by 3.

Implications / Conditionals

$p \rightarrow q$ (read "p implies q" or " if p, then q")

hypothesis conclusion

Different ways of writing $p \rightarrow q$:

- If p, then q
- p implies q
- Every p is a q (All p are q)
- p only if q
- q if p

CONVERSE: $q \rightarrow p$ (read: if q, then p)

Rewrite the following implications in four different ways:

1. All kites have perpendicular diagonals.

   1. If a figure is a kite, then it has perpendicular diagonals. converse:
   2. A figure is a kite only if it has perpendicular diagonals.
   3. A figure has perpendicular diagonals if it is a kite.
   4. Every kite has perpendicular diagonals.

2. All fish live in water.

   1. If an animal is a fish, then it lives in water. converse:
   2. The fact that an animal is a fish implies that it lives in water.
   3. An animal is a fish only if it lives in water.
   4. Animals live in water if they are fish.

Related Conditionals

Statement: $p \rightarrow q$ (H and then C)

Converse: $q \rightarrow p$ (switch H and C)

Inverse: $\sim p \rightarrow \sim q$ (negate H and C)

Contrapositive: $\sim q \rightarrow \sim p$ (switch and negate)

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1. *Statement*: If $x = 3$, then $x^2 = 9$. T

Converse: If $x^2 = 9$, then $x = 3$. F (x could be -3)

Inverse: If $x \neq 3$, then $x^2 \neq 9$. F (x could be -3)

Contrapositive: If $x^2 \neq 9$, then $x \neq 3$. T

2. *Statement*: If $x \neq 3$, then $x > 3$ F

Converse: If $x > 3$, then $x \neq 3$. T

Inverse: If $x = 3$, then x is not greater than 3. T

Contrapositive: If x is not greater than 3, then $x = 3$. F

3. *Statement:* If a number is even, then it is divisible by 2. T T

Converse: If a number is divisible by 2, then the number is even

Inverse: If a number is not even, then it is not divisible by 2. T

Contrapositive: If a number is not divisible by 2, then the number is not even. T

4. *Statement:* If $a = 0$, then $ab = 0$. T

Converse: If $ab = 0$, then $a = 0$. F (b could be 0)

Inverse: If $a \neq 0$, then $ab \neq 0$. F (b could be 0.)

Contrapositive: If $ab \neq 0$, then $a \neq 0$. T

5. *Statement:* If x is a prime number greater than 2, then x is odd. T F

Converse: If x is odd, then x is a prime number greater than 2.

Inverse: If x is not a prime number greater than 2, then x is not odd. F

Contrapositive: If x is not odd, then x is not a prime number greater than 2. T

a. Tell whether the original statement is true or false.
b. State the converse, inverse, and contrapositive of each statement. Then state whether each is true or false.

** Hint: translate the original statement into an ***If –, then*** – statement first.

6. *Statement:* This month (P) is March, only if today is St. Patrick's Day (q).

If this month is March, then today is St. Patrick's Day. F

Converse:
If today is St. Patrick's Day, then this month is March. T
Inverse:
If this month is not March, then today is not St. Patrick's Day T
Contrapositive:
If today is not St. Patrick's Day, then this month is not March. F

7. *Statement:* The fact that an angle is 23° (P) implies that it is acute (q).

If an angle is 23°, then it is acute. T

Converse:
If an angle is acute, then the angle is 23°. F
Inverse:
If an angle is not 23°, then it is not acute. F
Contrapositive:
If an angle is not acute, then the angle is not 23°. T

8. *Statement:* Every figure with four right angles (P) is a square (q).

If a figure has four right angles, then it is a square. F

Converse:
If a figure is a square, then it has four right angles. T
Inverse:
If a figure does not have four right angles, then the figure is not a square. T
Contrapositive:
If a figure is not a square, then the figure does not have four right angles. F

9. *Statement:* An integer ending in 5 (P) implies that it is divisible by 5 (q).

If an integer ends in 5, then the integer is divisible by 5. T

Converse:
If an integer is divisible by 5, then the integer ends in a 5.
Inverse:
If an integer doesn't end in 5, then the integer is not divisible by 5. F
Contrapositive:
If an integer is not divisible by 5, then the integer doesn't end in 5. T

* What do you notice about the T/F for conditionals, converse, inverse & contrapositive?