

Lesson 2-2

Conditional Statements

Day 2

If two angles are vertical angles, then they are congruent

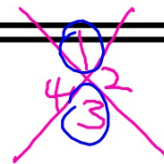
Hypothesis: Two angles are vertical angles

IF P then Q

Conclusion:

True or False? True

Make a Venn diagram



If it is cloudy outside, then it's raining

Hypothesis:

Conclusion:

True or False?

Make a Venn diagram

If two angles are complementary, they are congruent

Hypothesis:

Conclusion:

True or False?

Make a Venn diagram



Related Conditionals

Definition	Symbols
A conditional is a statement that can be written in the form "If p , then q ."	$p \rightarrow q$



Related Conditionals

Definition	Symbols
The converse is the statement formed by exchanging the hypothesis and conclusion.	$q \rightarrow p$



Related Conditionals

Definition	Symbols
The inverse is the statement formed by negating the hypothesis and conclusion.	$\sim p \rightarrow \sim q$ <u>not</u>

$x = 4$
 ~~$x = 4$~~
 $x \neq 4$

Related Conditionals

Definition	Symbols
The contrapositive is the statement formed by both exchanging and negating the hypothesis and conclusion.	$\sim q \rightarrow \sim p$

$x > 1$
 $x \leq 1$

[]

[]

		T or F?
Conditional $P \rightarrow Q$	If two angles are vertical angles, then they are congruent	T
Converse $Q \rightarrow P$	(F) two angles are \cong (then) they are vertical angles	F
Inverse $\neg P \rightarrow \neg Q$	(F) Not vert. $\&$ (then) not \cong	F
Contra-Positive $\neg Q \rightarrow \neg P$	(F) two angles are not \cong (then) they are not vertical angles	T

		T or F?
Conditional $P \rightarrow Q$	If <u>it's cloudy</u> , then <u>it's raining</u>	F
Converse $Q \rightarrow P$	[if] raining [then] cloudy	True
Inverse $\sim P \rightarrow \sim Q$	[if] not cloudy [then] not raining	True
Contra-Positive $\sim Q \rightarrow \sim P$	[if] not raining [then] not cloudy	F

		T or F?
Conditional $P \rightarrow Q$	If two angles are complementary, then <u>they are congruent</u>	F
Converse $Q \rightarrow P$	If congruent then complement.	F
Inverse $\sim P \rightarrow \sim Q$	If not complement, then not congruent	F
Contra-Positive $\sim Q \rightarrow \sim P$	If not congruent then not complement.	F

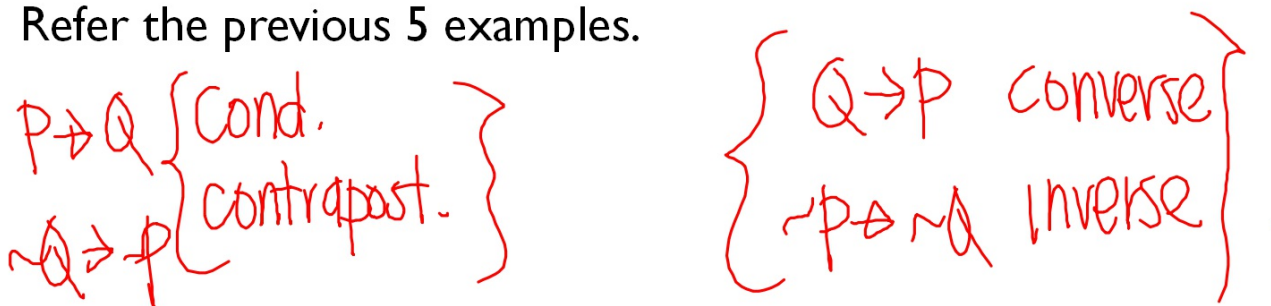
Cats have 4 paws

T or F?

	Cats have 4 paws	T or F?
Conditional	IF cat then 4 paws	T
Converse	4 paws cat	F
Inverse	not cat not 4 paws	F
Contra-Positive	not 4 paws, not cat	T

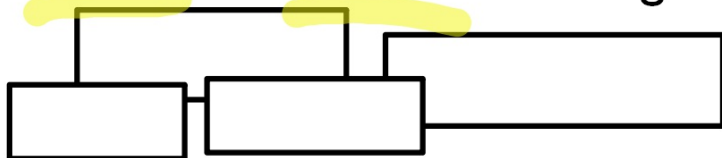
Statement	Example	Truth Value	
Conditional			
Converse	If $\angle A$ is obtuse, then $m\angle A = 95^\circ$.		
Inverse			
Contrapositive			

What can you determine about the truth of the conditional, converse, inverse, and contra-positive? What patterns do you see? Refer the previous 5 examples.



Related conditional statements that have the same truth value are called **logically equivalent statements**.

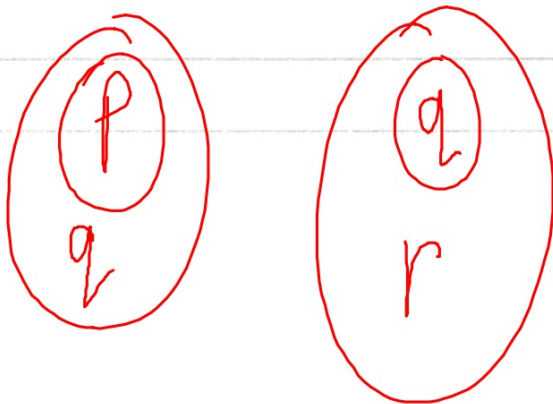
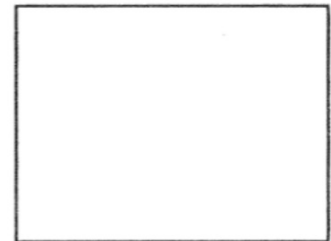
The conditional and contrapositive are logically equivalent
 The inverse and converse are logically equivalent



5. If you know $q \rightarrow p$, what other symbolic statement can you make? Explain.
CONVERSE

$\sim p \rightarrow \sim q$ inverse

7. In the box, draw a Venn diagram that conveys $p \rightarrow q$ and $q \rightarrow r$. Describe it. Write at least two symbolic statements that you can infer using the diagram.



Lesson Quiz: Part II

Identify the hypothesis and conclusion of each conditional.

4. Write the converse, inverse, and contrapositive of the conditional statement "If Maria's birthday is February 29, then she was born in a leap year."

Find the truth value of each.

HW 2.2b
 AP (p59) skip #5
 & PS (p60)

2-2 Conditional Statements

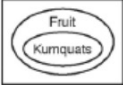
Additional Practice

Identify the hypothesis and conclusion of each conditional.

1. If you can see the stars, then it is night. Hypothesis: _____ Conclusion: _____
 2. A pencil writes well if it is sharp. Hypothesis: _____ Conclusion: _____

Write a conditional statement from each of the following.

3. Three noncollinear points determine a plane.

4.  _____

Determine if each conditional is true. If false, give a counterexample.

5. If two points are noncollinear, then a right triangle contains one obtuse angle.

6. If a liquid is water, then it is composed of hydrogen and oxygen.

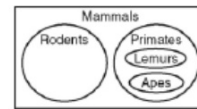
7. If a living thing is green, then it is a plant.

8. "If G is at 4, then GH is 3." Write the converse, inverse, and contrapositive of this statement. Find the truth value of each.



- Converse: _____
 Inverse: _____
 Contrapositive: _____

This chart shows a small part of the *Mammalia* class of animals, the mammals. Write a conditional to describe the relationship between each given pair.



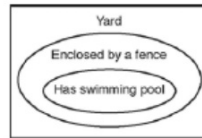
9. primates and mammals _____
 10. lemurs and rodents _____
 11. rodents and apes _____
 12. apes and mammals _____

Problem Solving

2-2 **Problem Solving**
Conditional Statements

1. Write the converse, inverse, and contrapositive of the conditional statement. Find the truth value of each.
If it is April, then there are 30 days in the month.

2. Write a conditional statement from the diagram. Then write the converse, inverse, and contrapositive. Find the truth value of each.



Use the table and the statements listed. Write each conditional and find its truth value.

p : 1777 q : 30 stars r : after 1818 s : less than 50 stars

U.S. Flag	
Year	Number of Stars
1777	13
1818	20
1848	30
1959	50

3. $p \rightarrow q$ _____

4. $r \rightarrow s$ _____

5. $q \rightarrow s$ _____

Choose the best answer.

6. What is the converse of "If you saw the movie, then you know how it ends"?
- A If you know how the movie ends, then you saw the movie.
 - B If you did not see the movie, then you do not know how it ends.
 - C If you do not know how the movie ends, then you did not see the movie.
 - D If you do not know how the movie ends, then you saw the movie.
7. What is the inverse of "If you received a text message, then you have a cell phone"?
- F If you have a cell phone, then you received a text message.
 - G If you do not have a cell phone, then you did not receive a text message.
 - H If you did not receive a text message, then you do not have a cell phone.
 - J If you received a text message, then you do not have a cell phone.