

Objectives

Identify, write, and analyze the truth value of conditional statements.

Write the inverse, converse, and contrapositive of a conditional statement.

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 <i>if</i> .		
The conclusion is the part q of a conditional statement following the word <i>then</i> .		

Venn Diagram

The **inner** oval represents the **hypothesis**, and the **outer** oval represents the **conclusion**.

Conditional:

Babies cry.

If then form:

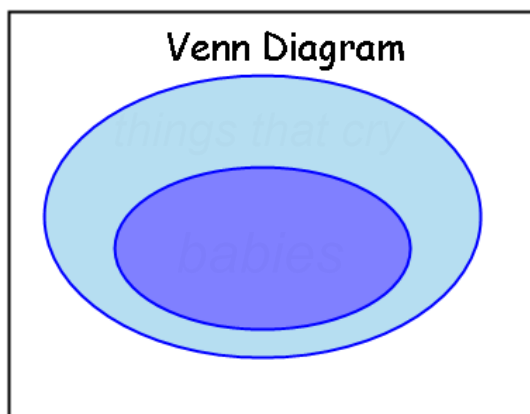
If it is a baby then it cries

Hypothesis:

it is a baby

Conclusion:

it cries



Example 1: Identifying the Parts of a Conditional Statement

Identify the hypothesis and conclusion of each conditional.

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

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

Example 2: Writing a Conditional Statement

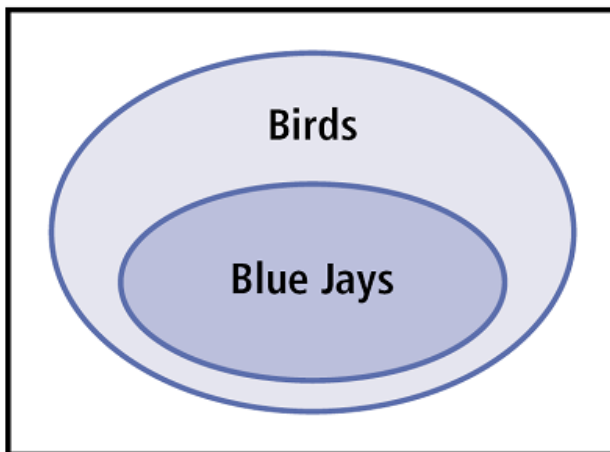
Write a conditional statement from the following. Figure out which part of the statement depends on the other.

An obtuse triangle has exactly one obtuse angle.

If it is an obtuse triangle then it has one obtuse angle.

Two angles that are complementary are acute.

If 2 angles are complementary then they are acute.



Venn Diagram

Example 3: Analyzing the Truth Value of a Conditional Statement

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

If this month is August, then next month is September.

If two angles are acute, then they are congruent.

If a number is odd, then it is divisible by 3.

The CONVERSE

exchanging the hypothesis and conclusion.

Conditional $p \rightarrow q$

If it is a baby, then it will cry.

Converse $q \rightarrow p$

If it will cry, then it is a baby.

The **negation** of statement p is "not p ," written as $\sim p$. The negation of a true statement is false, and the negation of a false statement is true.

The **inverse**
negating the hypothesis and conclusion.

$$\sim p \rightarrow \sim q$$

Conditional

If it is a baby, then it will cry.

Inverse

If it is **not** a baby, then it will **not** cry.

The **contrapositive**
exchanging and negating the hypothesis and conclusion.

$$\sim q \rightarrow \sim p$$

It is the negation of the converse.

Converse

If it will cry, then it is a baby.

Contrapositive

If it will not cry, then it is not a baby.

Example 4: Biology Application

Write the converse, inverse, and contrapositive of the conditional statement. Use the Science Fact to find the truth value of each.

If an animal is an adult insect, then it has six legs.

Science Fact

Adult insects have six legs.

No other animals have six legs.

If an animal is an adult insect, then it has six legs.

Converse: If an animal has six legs, then it is an adult insect.

Inverse: If an animal is not an adult insect, then it does not have six legs.

Contrapositive: If an animal does not have six legs, then it is not an adult insect.