If your birthday is in August, then you were born in the summer.

Conditional: another name for an "if-then" statement

Hypothesis: the "if" part of a conditional

Conclusion: the "then" part of a conditional

Truth Value of a conditional:

the outcome of a conditional is either True or False

To show a conditional is true
you must show that every time the hypothesis is true, the conclusion is also true.

To show a conditional is false
you only need to find one example for which it is not true (counterexample)

Find the truth value of this conditional.

If a number is a multiple of 4, then it is even

There is an infinite number of multiples of 4 so how can you prove this statement is true?

By inductive reasoning you've reached this conclusion so this conditional is only a conjecture.

Inductive Reasoning: reasoning based on patterns you notice from many observations.

Counterexample: Example(s) that show a conjecture is false.

Conjecture: The sum of the digits of any multiple of nine is also a multiple of nine.

Is this conjecture true or false.

If false, give a counterexample

Conjecture:
If you square any number, then the resulting number is greater than the original number.

Is this conjecture true or false.

If false, give a counterexample

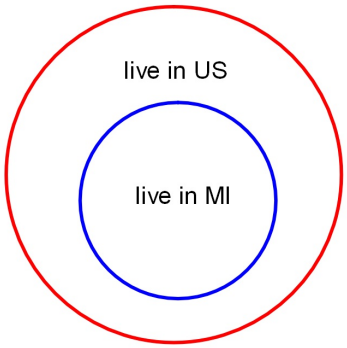
because

$1^2 = 1$

and the number you end up with
is equal to what you started with.

Representing a conditional with a Venn Diagram:

If you live in Michigan, then you live in the US.



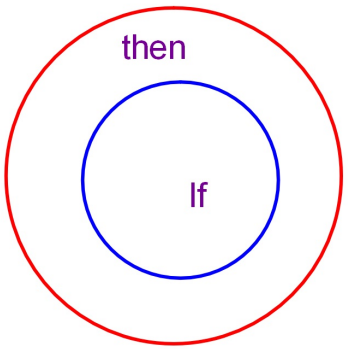
A generic if-then statement:

In words:

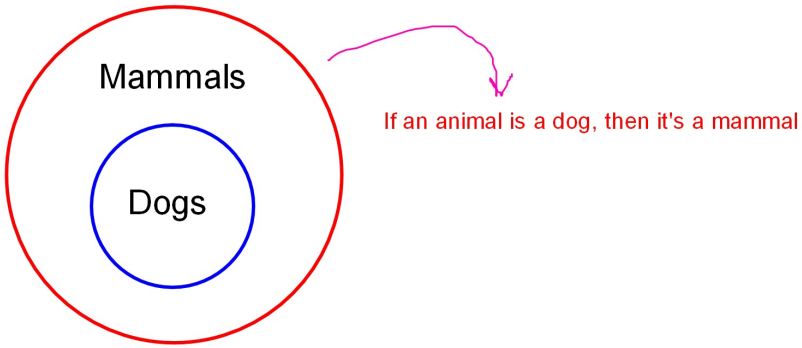
"If p, then q"

In symbols

$p \rightarrow q$



Write a conditional represented by the Venn Diagram



Converse of a conditional

A conditional that switches the hypothesis and conclusion.

If a number is a multiple of 4, then it is even

Is this statement true or false? True

Write the converse of this conditional:

if every even, then it's a multiple of 4?

Is the converse true? If not, give a counterexample

false because 6 is even but not a mult of 4

Write a conditional whose converse is false.

if you live in Ontario, then you live in Canada

Converse: If you live in Canada, then you live in Ontario

False, because you could live in Canada but live in Nova Scotia not Ontario.

Write a conditional whose converse is true:

Example:

Conditional: If a number is a multiple of two, then it's even.

This is true.

Converse: If a number is even, then it is a multiple of two.

This is also true.

given this conditional:

$p \longrightarrow q$

Write the converse in symbols:

$q \rightarrow p$