

## 2-2

## Conditional Statements

Take note

## Key Concept Conditional Statements

## Definition

A **conditional** is an *if-then* statement.

The **hypothesis** is the part  $p$  following *if*.

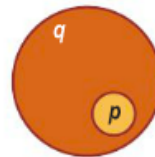
The **conclusion** is the part  $q$  following *then*.

## Symbols

$$p \rightarrow q$$

Read as  
"if  $p$  then  $q$ " or  
" $p$  implies  $q$ ."

## Diagram

**Problem 1** Identifying the Hypothesis and the Conclusion

What are the hypothesis and the conclusion of the conditional?

If an angle measures 130, then the angle is obtuse.



**Problem 2** Writing a Conditional



How can you write the following statement as a conditional?  
Vertical angles share a vertex.

2. How can you write "Dolphins are mammals" as a conditional?

The **truth value** of a conditional is either *true* or *false*.

3. Is the conditional *true* or *false*? If it is false, find a counterexample.
  - a. If a month has 28 days, then it is February.
  - b. If two angles form a linear pair, then they are supplementary.

The **negation** of a statement  $p$  is the opposite of the statement. The symbol is  $\sim p$  and is read “not  $p$ .”

Take note

### Key Concept Related Conditional Statements

Statement	How to Write It	Example	Symbols	How to Read It
<b>Conditional</b>	Use the given hypothesis and conclusion.	If $m\angle A = 15$ , then $\angle A$ is acute.	$p \rightarrow q$	If $p$ , then $q$ .
<b>Converse</b>	Exchange the hypothesis and the conclusion.	If $\angle A$ is acute, then $m\angle A = 15$ .	$q \rightarrow p$	If $q$ , then $p$ .
<b>Inverse</b>	Negate both the hypothesis and the conclusion of the conditional.	If $m\angle A \neq 15$ , then $\angle A$ is not acute.	$\sim p \rightarrow \sim q$	If not $p$ , then not $q$ .
<b>Contrapositive</b>	Negate both the hypothesis and the conclusion of the converse.	If $\angle A$ is not acute, then $m\angle A \neq 15$ .	$\sim q \rightarrow \sim p$	If not $q$ , then not $p$ .

Below are the truth values of the related statements above. **Equivalent statements** have the same truth value.

Statement	Example	Truth Value
Conditional	If $m\angle A = 15$ , then $\angle A$ is acute.	True
Converse	If $\angle A$ is acute, then $m\angle A = 15$ .	False
Inverse	If $m\angle A \neq 15$ , then $\angle A$ is not acute.	False
Contrapositive	If $\angle A$ is not acute, then $m\angle A \neq 15$ .	True

A conditional and its contrapositive are equivalent statements. They are either both true or both false. The converse and inverse of a statement are also equivalent statements.

4. What are the converse, inverse, and contrapositive of the conditional statement below? What are the truth values of each? If a statement is false, give a counterexample.

If a vegetable is a carrot, then it contains beta carotene.