

Bell Ringer

Section B-2

Given the conditional statement "If a fruit is an orange, then it contains vitamin C", find the following:

1. The converse

If vit.C \rightarrow orange F

2. The inverse

Not ora \rightarrow not vit C. F

3. The contrapositive

Not vit C \rightarrow not orange T

True

Review.

4. Multiply. $\begin{bmatrix} 2 & 3 \\ 0 & 5 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 \\ 4 & 3 \end{bmatrix}$

$$= \begin{bmatrix} 10 & 13 \\ 20 & 15 \end{bmatrix}$$

Solutions

Section B-2

Given the conditional statement "If a fruit is an orange, then it contains vitamin C", find the following:

1. The converse

If the fruit contains vitamin C, then it is an orange.

2. The inverse

If the fruit is not an orange, then it does not contain vitamin C.

3. The contrapositive

If the fruit does not contain vitamin C, then it is not an orange.

Review.

4. Multiply. $\begin{bmatrix} 2 & 3 \\ 0 & 5 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 \\ 4 & 3 \end{bmatrix}$ $\begin{bmatrix} 10 & 13 \\ 20 & 15 \end{bmatrix}$

pg H74



pH74



Solve It: Getting Ready!



Look at the examples of the insects and noninsects below. How would you complete the following sentence: "If an animal is an insect, then. . ." ? Explain your reasoning.

Insects			Noninsects		
					
Ant	Fly	Beetle	Spider	Tick	Centipede



Solve It: Getting Ready!



Look at the examples of the insects and noninsects below. How would you complete the following sentence: "If an animal is an insect, then..."? Explain your reasoning.

Insects			Noninsects		
					
Ant	Fly	Beetle	Spider	Tick	Centipede
6 legs			8 legs	8 legs	many legs
3 body sections			2 body sections		

Answer:

All of the insects have 6 legs and bodies with 3 sections. None of the noninsects have 6 legs and bodies with 3 sections. So you can complete the sentence with "... it has 6 legs." or "... its body has 3 sections." or "... it has 6 legs and its body has 3 sections."

If polygon is a square, then it has 4 congruent sides & 4 right angles

If polygon has 4 \cong sides, & 4 right \angle s, then it's a square

iff

Biconditional statement...

pg H74

In the Solve It, you used conditional statements. A **biconditional** is a single true statement that combines a true conditional and its true converse. You can write a biconditional by joining the two parts of each conditional with the phrase *if and only if*.

Essential Understanding A definition is good if it can be written as a biconditional.

A good definition... can be written as a biconditional

pH74

What is the converse of the following true conditional? If the converse is also true, rewrite the statements as a biconditional. **not in book**

If the sum of the measures of two angles is 180, then the two angles are supplementary.*

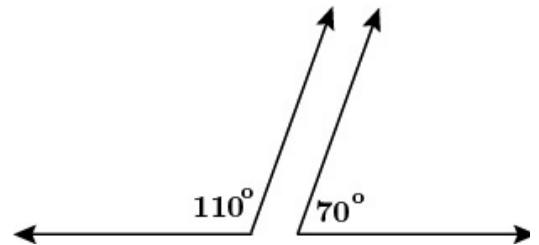
Converse: **If \angle s are supp.**

Then, they sum to 180°

Biconditional:

(broad def)

2 Angles are supp. iff they sum to 180° *



Got It?
pg H74

What is the converse of the following true conditional? If the converse is also true, rewrite the statements as a biconditional.

If two angles have equal measure, then the angles are congruent.

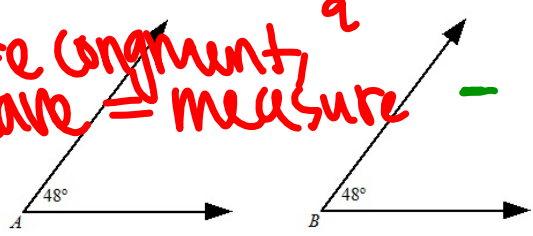
Converse:

If q , then p

If 2 angles are congruent, then they have = measure

Biconditional:

2 angles are congruent, iff they have = measure



take note

Key Concept Biconditional Statements

A biconditional combines $p \rightarrow q$ and $q \rightarrow p$ as $p \leftrightarrow q$.

Example

A point is a midpoint if and only if it divides a segment into two congruent segments.

$p \leftrightarrow q$ Symbols

$p \leftrightarrow q$

How to Read It

" p if and only if q "

You can write a biconditional as two conditionals that are converses.

pH75


Problem 2
Identifying the Conditionals in a Biconditional


What are the two conditional statements that form this biconditional?

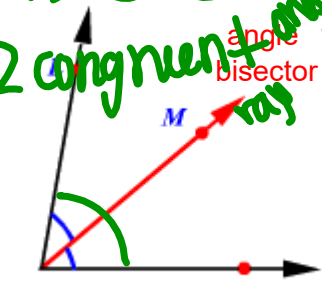
A ray is an angle bisector if and only if it divides an angle into two congruent angles.

Conditional:

If your ray divides an angle in 2 congruent angles then it's an angle bisector

Converse:

If ~~is~~ a ray is an a.b., then it divides an angle into 2 \cong angles



Got It? What are the two conditionals that form this biconditional?

pg H75

Two numbers are reciprocals if and only if their product is 1.

Conditional:

If two #'s are reciprocals,
Then their product is one

Converse:

If product of 2 #'s is one,
Then they are reciprocals

$$\frac{1}{3} \cdot \frac{3}{1} = \frac{1}{1}$$

original number

reciprocal (flip the fraction)

product of 1

Good definition...

Undefined terms such as *point*, *line*, and *plane* are the building blocks of geometry. You understand the meanings of these terms intuitively. Then you use them to define other terms such as *segment*.

A good definition is a statement that can help you identify or classify an object.

A good definition has several important components.

- ✓ A good definition uses clearly understood terms. These terms should be commonly understood or already defined.
- ✓ A good definition is precise. Good definitions avoid words such as *large*, *sort of*, and *almost*.
- ✓ A good definition is reversible. That means you can write a good definition as a true biconditional.

pH76



Problem 3

Writing a Definition as a Biconditional



not in book

Is this definition of *quadrilateral* reversible? If yes, write it as a true biconditional.

Definition: A quadrilateral is a polygon with four sides.*

Good definition?



Conditional: **If** a polygon has 4 sides, **then** it's a **quad***

Converse: **If** a polygon is a **quad**, **then** it has **4 sides***

Biconditional: **A poly is a quad iff it has 4 sides**

Got It? Is this definition of *straight angle* reversible? If yes, write it as a true biconditional.
pg H77

A straight angle is an angle that measures 180.



Good definition?



180°

Conditional:



Converse:

Biconditional:

**Problem 4****Identifying Good Definitions**

not in book

**Multiple Choice** Which of the following is a good definition?~~A~~ A fish is an animal that swims.~~B~~ Giraffes are animals with very long necks.~~C~~ Rectangles have four corners. D A penny is a coin worth one cent. ✓**Components of a Good Definition:**

- ✓ A good definition is reversible.
- ✓ A good definition uses clearly defined terms.
- ✓ A good definition is precise.

Got It?
pg H77

a. Is the following statement a good definition? Explain.

A square is a figure with four right angles.

Good definition?

Conditional:

Converse:

Biconditional:

B3 #s 9-16 all, 19-31 odds

