Geometry Notes 2-4 Oct 1

Biconditional Statements and Definitions

A **biconditional statement** combines a conditional statement, "if *p*, then *q*," with its converse, "if *q*, then *p*."

Conditional: If the sides of a triangle are congruent, then the angles are congruent. T

Converse: If the angles of a triangle are congruent, then the sides are congruent. T

Biconditional: The sides of a triangle are congruent if and only if the angles are congruent. T

Write the conditional statement and converse within each biconditional.

1. Lindsay will take photos for the yearbook if and only if she doesn't play soccer.

Cond. If Lindsay takes photos for the yearbook, then she doesn't play soccer.

Conv. If Lindsay doesn't play soccer, then she takes photos for the yearbook

2. $m\angle ABC = m\angle CBD$ if and only if $\overrightarrow{BC}$ is an angle bisector of $\angle ABD$.

Cond. If $m\angle ABC = m\angle CBD$, then $\overrightarrow{BC}$ is an angle bisector of $\angle ABD$.

Conv. If , then

For each conditional, write the converse and a biconditional statement.

3. If you can download 6 songs for $5.94, then each song costs $0.99.

Converse _____

Biconditional _____

4. If a figure has 10 sides, then it is a decagon.

Converse If a figure is a decagon, then it has 10 sides

Biconditional A figure has 10 sides if and only if it is decagon

If and only if

A biconditional statement is false if either the conditional statement is false or its converse is false.

Biconditional: An angle is acute if and only if its measure is not 90°. False

Conditional: If an angle is acute, then its measure is not 90°. ***True***

Converse: If the measure of an angle is not 90°, then it is acute. ***False (why?)***

Definitions can be written as biconditionals.

Definition: Circumference is the distance around a circle.

Biconditional: A measure is the circumference if and only if it is the distance around a circle.

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

5. Points are collinear if and only if they lie on the same line. T

6. An angle in a triangle measures 90° if and only if the triangle is a right triangle. T
   CK: $p \to q$ and $q \to p$

7. $a = 4$ and $b = 3$ if and only if $ab = 12$. F
   $a = 6$, $b = 2$
   H → C T
   C → H if $ab = 12$ then $a = 4$ & $b = 3$

Write each definition as a biconditional.

8. An isosceles triangle has at least two congruent sides.
   A triangle is isosceles if and only if it has at least two congruent sides.

9. An acute triangle has three angles with measures less than 90°.
   A triangle is acute if and only if it has 3 angles with measures less than 90°.