Winston

2.3 Conditional Statements Guided Notes

Geometry

Definition of Conditional Statements:

Statement written in "if-then" format

Example 1: State the hypothesis and the conclusion.

p: hypothesis

q: conclusion

If you are a brunette (p), then you have brown hair (q).

Hypothesis: you are a brunette.

Conclusion: you have brown hair.

Statements can be written as Conditional Statements:

- Try to use the verb as the place where you will separate the hypothesis from the conclusion.
- Identify your p & q.

EXAMPLE 2:

WRITE A CONDITIONAL STATEMENT

Statement: Vertical angles (p) are (q) congruent.

Conditional Statement:

If the angles are vertical, then they are congruent.

EXAMPLE 3:

WRITE A CONDITIONAL STATEMENT

Statement: Two angles that form a linear pair (p) will be (q) supplementary.

Conditional Statement:

If two angles form a linear pair, then the angles are supplementary.

Counter Examples:

- Used to show a conditional statement is false.

A counter example must keep the hypothesis true, but the conclusion can be proven false.

EXAMPLE 4:

FIND A COUNTEREXAMPLE TO PROVE THE STATEMENT IS FALSE.

If $x^2=81$ (p), then x must equal 9 (q).

Counterexample:

$x = -9$ (proves it false)

EXAMPLE 5:

FIND A COUNTEREXAMPLE TO PROVE THE STATEMENT IS FALSE.

If $\angle A$ and $\angle B$ are complementary (p), then $m\angle A = 50°$ and $m\angle B = 40°$ (q).

Counterexample:

$m\angle A = 45°$
$m\angle B = 45°$

(a lot of other possibilities)

Type	Example	Symbols	Truth Value
Conditional T	If a polygon has exactly 3 sides, then the polygon is a triangle.	$p \rightarrow q$	The truth value of the contrapositive statement is the same.
Converse T	If a polygon is a triangle, then it has exactly 3 sides.	$q \rightarrow p$	The truth value of the inverse is the same
Inverse T	If a polygon does not have 3 sides, then the polygon is not a triangle.	$\sim p \rightarrow \sim q$	The truth value of the converse is the same
Contrapositive T	If a polygon is not a triangle, then it does not have exactly 3 sides.	$\sim q \rightarrow \sim p$	The truth value of the conditional statement is the same.
Biconditional iff	A polygon has exactly 3 sides <u>if and only if</u> the polygon is a triangle.	$p \leftrightarrow q$ (get rid of "if & then")	Only true iff the conditional, converse, inverse, and contra positive are true.

EXAMPLE 6: WRITE THE CONVERSE, INVERSE, AND CONTRAPOSITIVE. THEN FIND THE TRUTH VALUE FOR EACH STATEMENT. IF APPROPRIATE, THEN WRITE THE BICONDITIONAL STATEMENT.

p q

~~If~~ an angle is 90 degrees, ~~then~~ it is a right angle. TRUE

(T/F) Converse: If an angle is right angle, then the angle is 90 degrees.

(T/F) Inverse: If the angle is not 90 degrees, then it is not a right ∠.

(T/F) Contrapositive: If the angle is not a right angle then it is not 90°.

(T/F) Biconditional An angle is 90° iff it is a right angle.