

## NOTES 2.1: CONDITIONAL STATEMENTS

Objective: I can write conditional statements & use logic to determine truth value.

**CONDITIONAL STATEMENT:** A statement written in an "if-then" format.

**HYPOTHESIS:** The phrase following, but not including, the word "if".

**CONCLUSION:** The phrase following, but not including, the word "then".

**EXAMPLE 1:** State the hypothesis and conclusion of the conditional statement below.

*If you have no more than two absences and a B-average, then you can be exempt from your final.*

**Hypothesis:** you have no more than two absences and a B-average

**Conclusion:** you can be exempt from your final

**EXAMPLE 2:** Rewrite the statement below as a conditional statement, then state the hypothesis and conclusion.

*A car with poor brakes is a menace on the highway.*

**Conditional:** If a car has poor brakes, then it is a menace on the highway.

**Hypothesis:** a car has poor brakes

**Conclusion:** it is a menace on the highway

**EXAMPLE 3:** Rewrite the statement below as a conditional statement, then state the hypothesis and conclusion.

*Mrs. Ellison gives her students homework on days that end in 'y'.*

**Conditional:**

*If Mrs. Ellison gives her students homework, then it is a day that ends in 'y'.*

**Hypothesis:**

*Mrs. Ellison gives her students homework*

**Conclusion:**

*it is a day that ends in 'y'.*

**CONVERSE STATEMENTS:** Formed by switching the hypothesis and the conclusion of a conditional statement.

**EXAMPLE 4:** State the converse of the conditional statement in **EXAMPLE 1.**

**Converse:** *If you can be exempt from your final, then you have no more than two absences and a B-average.*

**EXAMPLE 5:** Write the converse of the conditional statement below, then tell whether its **TRUE** or **FALSE**.


*If an angle has a measure of  $120^\circ$ , then it is an obtuse angle.*

**Converse:** *If an angle is obtuse, then it has a measure of  $120^\circ$ .*

**TRUE** or **FALSE**

**COUNTEREXAMPLE:** An example that follows the hypothesis but not the conclusion. (can be written or a picture.)

**EXAMPLE 6:** Give a counterexample for the converse statement in **EXAMPLE 5.**

**Counterexample:** An angle with a measure of  $130^\circ$ . OR 

NEGATION: The denial of a statement.

INVERSE: Formed by adding "not" to the hypothesis and the conclusion.

EXAMPLE 7: Write the inverse of the conditional statement below.

If you pass the STAAR test, then you will graduate.

Inverse: If you do not pass the STAAR test, then you will not graduate.

EXAMPLE 8: Write the inverse of the following statement. Determine if the inverse is true or false. If false, give a counterexample.

If school is in session, then it is a weekday.

Inverse: If school is not in session, then it is not a weekday.

TRUE or FALSE

Counterexample (if necessary): Summer

CONTRAPOSITIVE: Formed by changing the statement to its converse and then adding "not" to the hypothesis and the conclusion.

EXAMPLE 9: Write both the converse and the contrapositive of the conditional statement below.

If you run a red light, then you are breaking a traffic law.

Converse: If you are breaking a traffic law, then you run a red light.

Contrapositive: If you are not breaking a traffic law, then you are not running a red light.

EXAMPLE 10: Write the contrapositive of the conditional statement below, then determine if it is true or false. If false, give a counterexample.

If you ask to leave the classroom, then you must present your ID.

Contrapositive:

If you do not present your ID, then you cannot ask to leave the classroom.

TRUE or FALSE

Counterexample (if necessary):

A student who asks to leave the classroom but does not have an ID.

EXAMPLE 11: Write a conditional statement for the statement below, then write its converse, inverse, and contrapositive.

Seniors must pass English IV in order to graduate.

Conditional:

If a Senior passes English IV, then they can graduate.

Converse:

If a Senior can graduate, then they passed English IV.

Inverse:

If a Senior does not pass English IV, then they cannot graduate.

Contrapositive:

If a Senior cannot graduate, then they did not pass English IV.