

TUESDAY, OCTOBER 4

WARM-UP:

FIND A COUNTEREXAMPLE TO SHOW THAT
THE CONJECTURE IS FALSE.

CONJECTURE: THE DIFFERENCE OF TWO
POSITIVE NUMBERS IS
ALWAYS POSITIVE.

$$1 - 2 = -1$$

2.2 ANALYZE CONDITIONAL STATEMENTS

A **CONDITIONAL STATEMENT** IS A LOGICAL STATEMENT THAT HAS TWO PARTS, A *HYPOTHESIS* AND A *CONCLUSION*. WHEN A CONDITIONAL STATEMENT IS WRITTEN IN **IF-THEN FORM**, THE "IF" PART CONTAINS THE **HYPOTHESIS** AND THE "THEN" PART CONTAINS THE **CONCLUSION**.

IF IT IS RAINING, THEN THERE ARE CLOUDS IN THE SKY.

HYPOTHESIS: *It is raining.*

CONCLUSION: *There are clouds in the sky.*

EXAMPLE 1**Rewrite a statement in if-then form**

Rewrite the conditional statement in if-then form.

- a. All birds have feathers.
- b. Two angles are supplementary if they are a linear pair.

SOLUTION

First, identify the hypothesis and the conclusion.
When you rewrite the statement in if-then form, you may need to reword the hypothesis or conclusion.

- a. **All birds** have **feathers**.

If an animal is a bird, then it has feathers.

TWO ANGLES ARE SUPPLEMENTARY IF THEY ARE A LINEAR PAIR.

hypothesis

IF TWO ANGLES ARE A LINEAR PAIR, THEN
THEY ARE SUPPLEMENTARY.

Conclusion

REWRITE THE CONDITIONAL STATEMENT IN IF-THEN FORM.

1) ALL 90° ANGLES ARE RIGHT ANGLES

IF THE MEASURE OF AN ANGLE IS 90° , THEN IT IS A RIGHT ANGLE.

2) $2X + 7 = 1$, BECAUSE $X = -3$.

IF $2X + 7 = 1$, THEN $X = -3$.

3) WHEN $N = 9$, $N^2 = 81$

IF $N = 9$, THEN $N^2 = 81$.

4) TOURISTS AT THE ALAMO ARE IN TEXAS.

IF TOURISTS ARE AT THE ALAMO, THEN
THEY ARE IN TEXAS.

THE **NEGATION** OF A STATEMENT IS THE *OPPOSITE* OF THE ORIGINAL STATEMENT.

STATEMENT: THE BALL IS RED.

NEGATION: THE BALL IS *NOT* RED.

STATEMENT: THE CAT IS *NOT* BLACK.

NEGATION: THE CAT IS BLACK.

TO WRITE THE **CONVERSE** OF A
CONDITIONAL STATEMENT, EXCHANGE THE
HYPOTHESIS AND THE CONCLUSION.

IF-THEN FORM:

IF YOU ARE A SOCCER PLAYER ^H THAN YOU
ARE AN ATHLETE.

CONVERSE:

IF YOU ARE AN ATHLETE THAN YOU ARE A
SOCCER PLAYER.

Statement: Given

IF-Then :


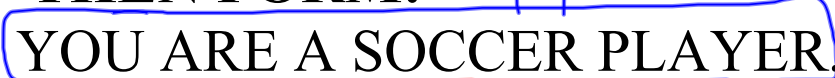

Converse: Switch hypothesis
at Conclusion

Inverse: Negate the hypothesis
+ Conclusion

Contrapositive:

Positive
Negate the hypothesis
and Conclusion And then
switch them

TO WRITE THE **INVERSE** OF A CONDITIONAL STATEMENT, NEGATE BOTH THE HYPOTHESIS AND THE CONCLUSION.

IF-THEN FORM: 
IF  YOU ARE A SOCCER PLAYER, THEN YOU
 ARE AN ATHLETE.

INVERSE:
IF YOU ARE NOT A SOCCER PLAYER, THEN
YOU ARE NOT AN ATHLETE.

TO WRITE THE **CONTRAPOSITIVE**, FIRST WRITE THE CONVERSE AND THEN NEGATE BOTH THE HYPOTHESIS AND THE CONCLUSION.

IF-THEN FORM:

IF YOU ARE A SOCCER PLAYER THAN YOU ARE AN ATHLETE.

CONVERSE: IF YOU ARE AN ATHLETE, THEN YOU ARE A SOCCER PLAYER.

CONTRAPOSITIVE. IF YOU ARE NOT AN ATHLETE, THEN YOU ARE NOT A SOCCER PLAYER.

EXAMPLE 2**Write four related conditional statements**

Write the if-then form, the converse, the inverse, and the contrapositive of the conditional statement “Guitar players are musicians.” Decide whether each statement is *true* or *false*.

SOLUTION

If-then form: If you are a guitar player, then you are a musician.

True, guitars players are musicians.

Converse: If you are a musician, then you are a guitar player.

False, not all musicians play the guitar.

EXAMPLE 2**Write four related conditional statements**

Inverse: If you are not a guitar player, then you are not a musician.

False, even if you don't play a guitar, you can still be a musician.

Contrapositive: If you are not a musician, then you are not a guitar player.

True, a person who is not a musician cannot be a guitar player.

GUIDED PRACTICE**for Example 2**

Write the converse, the inverse, and the contrapositive of the conditional statement. Tell whether each statement is *true* or *false*.

5. If a dog is a Great Dane, then it is large

ANSWER

Converse: If the dog is large, then it is a Great Dane,
False

Inverse: If dog is not a Great Dane, then it is not large,
False

Contrapositive: If a dog is not large, then it is not a
Great Dane, True

ANTS ARE INSECTS.

IF-THEN:

IF it is An Ant
then it is An Insect.

True

CONVERSE:

If it is An insect
Then it is An Ant.

False

INVERSE:

If it is Not An Ant
then it is not an insect

False

CONTRAPOSITIVE:

If it is not An insect
then it is not An Ant.

True

P-2.2A

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