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 THAN YOU ARE AN ATHLETE.

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

STAtement: Given

IF-Then:

Converse: Switch hypothesis & Conclusion

Inverse: Negate the hypothesis & Conclusion

Contrapositive:
Negate the hypothesic 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

Pr 2.2A

#1–8