Geometry

2.2 Analyze Conditional Statements

# Conditional Statements

Logical statement with two parts

Hypothesis

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conclusion

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Often written in If-Then form

Hypothesis

* If part contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conclusion

* Then part contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**If we confess our sins, then He is faithful and just to forgive us our sins.** 1 John 1:9

Conclusion

Hypothesis

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## If-then Statements p 🡪 q

Will happen

The if part implies that the then part \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Does NOT

The then part \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ imply that the first part happened.

Focus: If you are hungry, then you should eat.

Good reasoning

John is hungry, so… \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Not good reasoning

Megan should eat, so… \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hypothesis

## Converse q 🡪 p

Switch the hypothesis and conclusion

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**If we confess our sins, then he is faithful and just to forgive us our sins.**

we confess our sins

p = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

he is faithful and just to forgive us our sins

q = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

we confess our sins

he is faithful and just to forgive us our sins

Converse = If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Does not necessarily make a true statement (It doesn’t even make any sense.)

## Negation ~p

Turn it to the opposite

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The board is white.

The board is not white

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Inverse ~p 🡪 ~q

Negating *both the hypothesis and conclusion*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If we confess our sins, then he is faithful and just to forgive us our sins.

p

\_\_\_\_\_\_\_ = we confess our sins

q

\_\_\_\_\_\_\_ = he is faithful and just to forgive us our sins

he is not faithful and just to forgive us our sins

we don’t confess our sins

Inverse = If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Not necessarily true (He could forgive anyway)

## Contrapositive ~q 🡪 ~p

Take the converse of the inverse

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If we confess our sins, then he is faithful and just to forgive us our sins.

p = we confess our sins q = he is faithful and just to forgive us our sins

we don’t confess our sins

he is not faithful and just to forgive us our sins

Contrapositive = If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Always true.

Write the following in If-Then form and then write the converse, inverse, and contrapositive

All whales are mammals.

If-Then: If it is a whale, then it is a mammal.

Converse: If it is a mammal, then it is a whale.

Inverse: If it is not a whale, then it is not a mammal.

Contrapositive: if it is not a mammal, then it is not a whale.

## Biconditional Statement

converse

If-then

Logical statement where the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are both true

iff

Written with “if and only if” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

An angle is a right angle if and only if it measure 90°.

biconditional

If-then

All definitions can be written as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ statements

m

r

Perpendicular Lines

⊥

Form right angles

Lines that intersect to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m \_\_\_\_\_\_\_\_ r

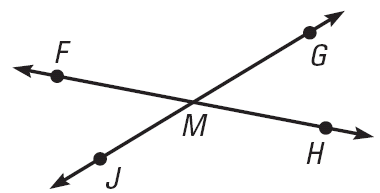
Write this definition as an if-then statement.

If lines intersect to form right angles, then they are perpendicular.

Write this definition as a biconditional statement.

Lines are perpendicular iff they intersect to form right angles.

Use the diagram shown. Decide whether each statement is true. Explain your answer using the definitions you have learned.

1. ∠JMF and ∠FMG are supplementary

True, linear pairs are supplementary

1. Point M is the midpoint of

False, no information given

1. ∠JMF and ∠HMG are vertical angles.

True, intersecting lines form vertical angles

False, no information given

Assignment: 82 #4-20 even, 26, 28, 32, 36-52 even, 53-55 all = 24 total