Name_____ Date_____

2.1 Conditional Statements

For use with Exploration 2.1

Essential Question When is a conditional statement true or false?

A *conditional statement*, symbolized by $p \rightarrow q$, can be written as an "if-then statement" in which p is the *hypothesis* and q is the *conclusion*. Here is an example.

If $\underbrace{\textit{a polygon is a triangle}}_{\text{hypothesis, } p}$, *then* $\underbrace{\textit{the sum of its angle measures is } 180^\circ}_{\text{conclusion, } q}$.

1 EXPLORATION: Determining Whether a Statement Is True or False

Work with a partner. A hypothesis can either be true or false. The same is true of a conclusion. For a conditional statement to be true, the hypothesis and conclusion do not necessarily both have to be true. Determine whether each conditional statement is true or false. Justify your answer.

a. If yesterday was Wednesday, then today is Thursday.

b. If an angle is acute, then it has a measure of 30°.

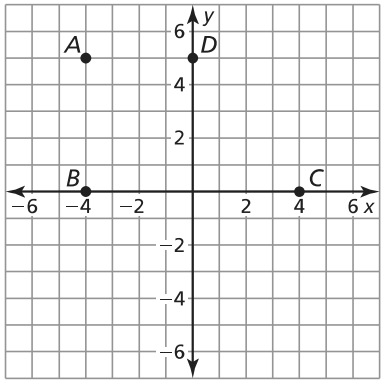
c. If a month has 30 days, then it is June.

d. If an even number is not divisible by 2, then 9 is a perfect cube.

2 EXPLORATION: Determining Whether a Statement Is True or False?

Work with a partner. Use the points in the coordinate plane to determine whether each statement is true or false. Justify your answer.

a. $\triangle ABC$ is a right triangle.



Name _____ Date _____

2.1 Conditional Statements (continued)

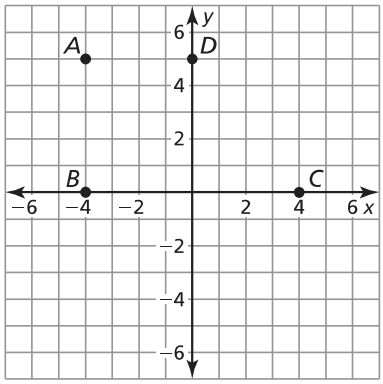
2 EXPLORATION: Determining Whether a Statement Is True or False (continued)

b. $\triangle BDC$ is an equilateral triangle.

c. $\triangle BDC$ is an isosceles triangle.

d. Quadrilateral $ABCD$ is a trapezoid.

e. Quadrilateral $ABCD$ is a parallelogram.



3 EXPLORATION: Determining Whether a Statement Is True or False

Work with a partner. Determine whether each conditional statement is true or false. Justify your answer.

a. If $\triangle ADC$ is a right triangle, then the Pythagorean Theorem is valid for $\triangle ADC$.

b. If $\angle A$ and $\angle B$ are complementary, then the sum of their measures is 180°.

c. If figure $ABCD$ is a quadrilateral, then the sum of its angle measures is 180°.

d. If points A, B, and C are collinear, then they lie on the same line.

e. If $\overleftrightarrow{AB}$ and $\overleftrightarrow{BD}$ intersect at a point, then they form two pairs of vertical angles.

Communicate Your Answer

4. When is a conditional statement true or false?

5. Write one true conditional statement and one false conditional statement that are different from those given in Exploration 3. Justify your answer.

Name _____ Date _____

2.1 Notetaking with Vocabulary (continued)

Core Concepts

Conditional Statement

A **conditional statement** is a logical statement that has two parts, a *hypothesis* p and a *conclusion* q. When a conditional statement is written in **if-then form**, the "if" part contains the **hypothesis** and the "then" part contains the **conclusion**.

Words If p, then q. **Symbols** $p \rightarrow q$ (read as "p implies q")

Notes:

Negation

The **negation** of a statement is the *opposite* of the original statement. To write the negation of a statement p, you write the symbol for negation $(\sim)$ before the letter. So, "not p" is written $\sim p$.

Words not p **Symbols** $\sim p$

Notes:

Related Conditionals

Consider the conditional statement below.

Words If p, then q. **Symbols** $p \rightarrow q$

Converse To write the **converse** of a conditional statement, exchange the hypothesis and the conclusion.

Words If q, then p. **Symbols** $q \rightarrow p$

Inverse To write the **inverse** of a conditional statement, negate both the hypothesis and the conclusion.

Words If not p, then not q. **Symbols** $\sim p \rightarrow \sim q$

Name_____ Date_____

2.1 Notetaking with Vocabulary (continued)

Related Conditionals (continued)

Contrapositive To write the **contrapositive** of a conditional statement, first write the converse. Then negate both the hypothesis and the conclusion.

Words If not q, then not p. **Symbols** $\sim q \rightarrow \sim p$

A conditional statement and its contrapositive are either both true or both false. Similarly, the converse and inverse of a conditional statement are either both true or both false. In general, when two statements are both true or both false, they are called **equivalent statements**.

Notes:

Biconditional Statement

When a conditional statement and its converse are both true, you can write them as a single *biconditional statement*. A **biconditional statement** is a statement that contains the phrase "if and only if."

Words p if and only if q **Symbols** $p \leftrightarrow q$

Any definition can be written as a biconditional statement.

Notes: