Geometry **(G.CO.9)** Name: ___________________________

Unit One B: If-Thens, Converses, & Parallels (IC27)

Date: _______________ Period: ______

If-then statements are also sometimes written as "if p, then q" or as p → q where this is read as, "p implies q" where p is the **hypothesis** of the statement and q is the **conclusion** of the statement.

Example: Write the statement "Adjacent angles have a common vertex" in if-then form.

The hypothesis is that two angles are adjacent and the conclusion is that the angles have a common vertex. So, the conditional can be written as follows:

If two angles are adjacent, then they have a common vertex.

Your Turn:

1. Write the statement "Missing practice three times results in being kicked off the team." by filling in the hypothesis and conclusion.

If _ someone misses practice 3 times ________________, then _ He/she will be kicked off the team.

2. Write the statement "An angle of 40° is acute" in if-then form by filling in the hypothesis and conclusion.

If __ an angle measures 40˚ __________________________, then _ it is acute __________.

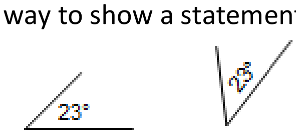
You can form another if-then statement by interchanging the hypothesis and the conclusion of the conditional. This new statement is called the **converse** of the original conditional. If a conditional is not in if-then form, it may be easier to write it in that form before writing the converse. The converse of p → q is q → p. **The converse of a true conditional is not necessarily TRUE**.

Example: Write the converse of the true conditional "Vertical angles are congruent." Determine if the converse is true or false. If it is false, give a counterexample.

A. First, write the conditional in if-then form: If two angles are vertical, then they are congruent.

B. Now, exchange the hypothesis and the conclusion to form the converse of the conditional.
Converse: If two angles are congruent, then they are vertical.

C. Decide whether the converse is TRUE or FALSE. This converse is FALSE because two congruent angles do not always have to be vertical. A counterexample is the way to show a statement is false and one is given below.



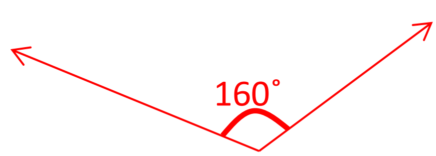
Your Turn:

If an angle measures 120˚, then it is obtuse.

3. Write the converse of the true conditional "An angle that measures 120° is obtuse." Determine if the converse is true or false. If it is false, give a counterexample.

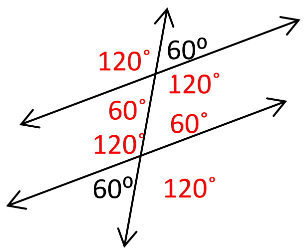
Converse: If an angle is obtuse, then it measures 120˚. TRUE FALSE

Counterexample if necessary:



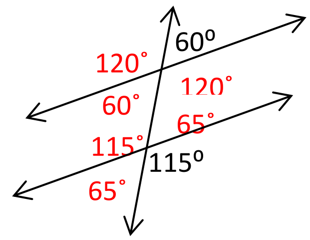
Looking at the diagrams below, fill in the missing angle measures using vertical angles and supplementary angles. Then decide whether you think the lines are parallel or not.

1.



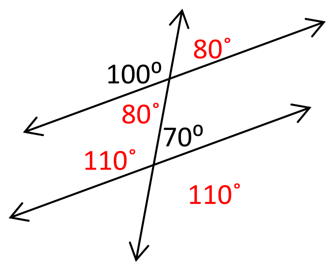
Yes

2.



No

3.



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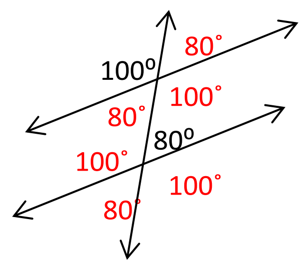
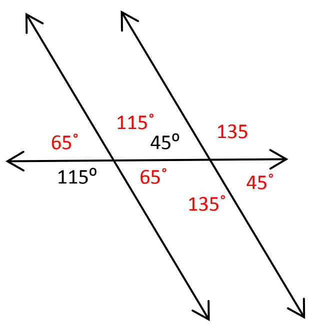
4.



Yes

5.



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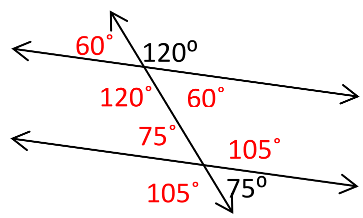
6.



No

Complete the following statements based on what you know about parallel lines so far, and write the converse of each one. Then, looking at the examples above, is the converse a true or false statement?

1. If lines are parallel, then alternate interior angles are __ ≅ _______.

Converse: __ If alt. int. <’s are ≅, then lines are //. ____________ TRUE FALSE

2. If lines are parallel, then alternate exterior angles are ≅ ________________.

Converse: ____ If alt. ext. <’s are ≅, then lines are //. ___________ TRUE FALSE

3. If lines are parallel, then same-side interior angles are Supplementary

Converse: _ If same side int. <’s are supplementary, then lines are //. TRUE FALSE

4. If lines are parallel, then same-side exterior angles are Supplementary

Converse: If same side ext. <’s are supplementary, then lines are //. TRUE FALSE

5. If lines are parallel, then corresponding angles are _____ ≅ _____.

Converse: ___ If corresponding <’s are ≅, then lines ____________ TRUE FALSE