10&11Sep
1-1
Logic and Properties

- I can identify the hypothesis and conclusion of a conditional statement.
- Given a biconditional statement, I can write two conditional statements.
- I can write a biconditional statement from 2 conditional statements.
- I can give a counterexample to refute a claim.

Converse

LOGIC CLIP

(Click the paperclip.)

Logic (2.1).flv

Discussion of logic from clip.

A **conditional statement** ($p \rightarrow q$) has two parts, a hypothesis and a conclusion. When the conditional statement is written in **if-then form,** the 'if' part contains the **hypothesis** (p) and the 'then' part contains the **conclusion.** (q)

Give the Hypothesis and the conclusion of the following statements:

Conditional Statement:

If she is made out of wood, then she is a witch.

Hypothesis: She is made out of wood.

Conclusion: She is a witch.

If you are a Caveman, then you are awesome.

Hypothesis: You are a caveman.

Conclusion: You are awesome

A **biconditional statement** is a statement that contains the phrase "If and only if." or "iff" $(q \leftrightarrow p)$

Writing a biconditional statement is equivalent to writing a conditional statement and its converse.

Rewrite the biconditional statement as two conditional statements.

1. An animal meows if and only if it is a cat.

P Q Q↔P

P→Q If an animal meows, then it is a cat. ✓

Q→P If it is a cat, then the animal meows ✓

converse

TRUE

2. It's Friday night iff we are having pizza for dinner.

Conditional Statements:

P→Q If it's Friday night, then we're having pizza.

T

converse

Q→P If we are having pizza for dinner, then it's Friday night. F

Counterexample: I had pizza Tues.

FALSE

Rewrite the true statement in two **if-then** form statements.
Then, combine them using if and only if to form a biconditional statement.
Lastly, state whether the biconditional statement is true or false.

1. Two angles are supplementary if their sum is 180°.

iff

P → Q

Q → P

Q ↔ P (iff)

(Conditional)
(Converse)
(Biconditional)

True or False: Counterexample

2. An angle that measures 30° is an acute angle.

P Q

IFF

Cond: If angle measures 30°, then it is acute ✓

Converse: If it acute, then its angle measures 30°. ✗ (counter example: 45°)

BIC: An angle measures 30° iff it is an acute angle

$P \rightarrow Q$

What is the conclusion of the following hypotheses, creating a conditional statement

1. If the sum of the measures of the interior angles is 180°,

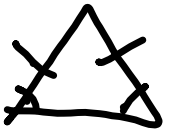
then it is a triangle

(*what kind of polygon is it?*)

2. If the sum of two interior angles in a triangle is 90°, then

the third angle is 90°

(*what is the measurement of the third angle?)*



3. If two side-lengths of a triangle are congruent, then

angles are congruent. Isosceles triangle

(*what do we know about two of the angles? or, what kind of triangle is it?)*

Is the biconditional statement of these conditional statements true?

1. If the sum of the measures of the interior angles is 180°,

then **it is a triangle.**

2. If the sum of two interior angles in a triangle is 90°, then **the third angle measures 90°**

3. If two side-lengths of a triangle are congruent, then **two angles are congruent.**

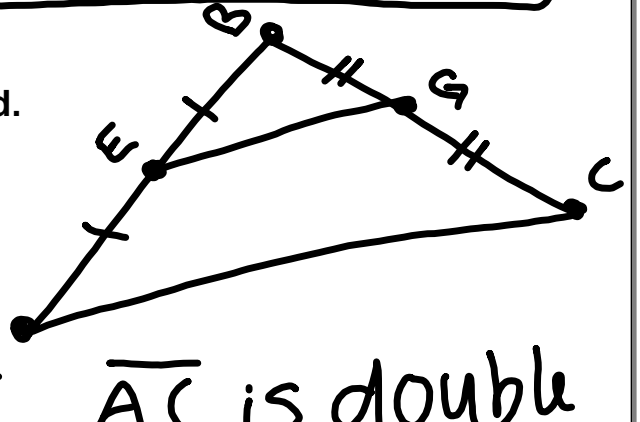
(or)

3. If two side-lengths of a triangle are congruent, then **it is an isosceles triangle.**

Let's get you so you can finish your green homework by considering this conditional statement.

If a triangle has a *midsegment* connecting the midpoint of two sides of a triangle, then it is || to the third side of the triangle and half as long.

Draw a picture labeled as described.

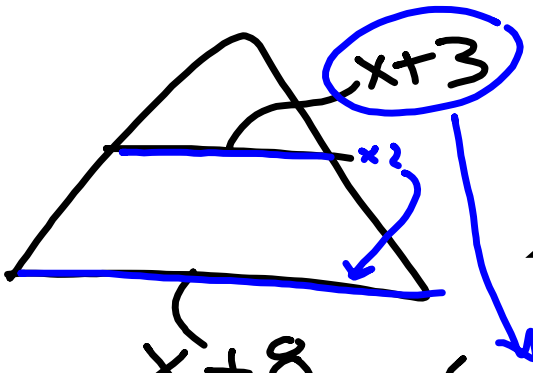


$\overline{AE} \cong \overline{EB}$

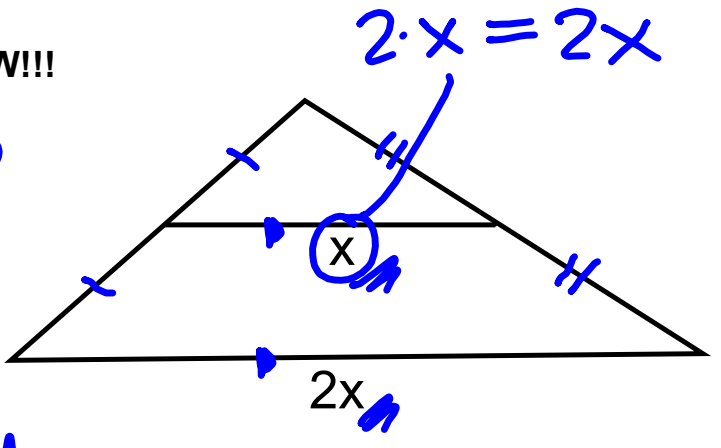
Midsegment: $\overline{EG}$

$\overline{AC}$ is double the length of $\overline{EG}$.

Let's try #15 in your HW!!!



$2 \cdot (x+3) = x+8$



$2 \cdot x = 2x$

Decide if the statements are True or False.
If False, give a counterexample.

1. All living things need water.

2. Everyone in movies can act.

3. No new computer has a floppy disk drive.

4. Everyone has an Instagram.