The **Converse** in math means to switch the hypothesis and the conclusion of the if/then statement. 

- **Hypothesis** - the "if" part of the sentence.
- **Conclusion** - the "then" part of the sentence.

If a polygon has three sides, then it is a triangle.

**Hypothesis**

Is this statement true or false?

Write the converse of the statement above.

If a polygon is a triangle, then it has three sides.

Is the converse of the statement true or false?

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**Example: Converse**

- If two angles are a linear pair, then the two angles are supplementary. (T/F)
- Converse:
  - If the two angles are supplementary, then the two angles are a linear pair. (T/F)
In geometry, parallel lines are lines in a plane which do not intersect.

$\overline{EF}$ is a transversal

Transversal- A line that intersects 2 coplanar lines at 2 distinct points.

When 2 lines are cut by a transversal, 8 angles are formed and have special names based on their location of the diagram.

When these lines are parallel, there are important things that are true about these angle pairs!
Corresponding Angles

If parallel lines are cut by a transversal, then corresponding angles are equal in measure or congruent.

\[ \angle 1 \cong \angle 5 \]
\[ \angle 2 \cong \angle 6 \]
\[ \angle 3 \cong \angle 7 \]
\[ \angle 4 \cong \angle 8 \]

The converse is also true!

ex. Given, \( a \parallel b \). Find the value of \( x \) and explain.

\[ 3x = 60 \]
\[ \frac{3}{3} = \frac{60}{3} \]
\[ x = 20 \]

Corresponding \( \angle s \cong \angle \text{b/c} \) the lines are \( \parallel \).
Converse for Corresponding angles

If two lines are intersected by a transversal such that a pair of corresponding angles are equal in measure or congruent, then the lines are parallel.

If \( \angle s \) are \( \equiv \) in measure or \( \cong \):
- \( m\angle 1 = m\angle 5 \) \( \angle 1 \cong \angle 5 \)
- \( m\angle 2 = m\angle 6 \) \( \angle 2 \cong \angle 6 \)
- \( m\angle 3 = m\angle 7 \) \( \angle 3 \cong \angle 7 \)
- \( m\angle 4 = m\angle 8 \) \( \angle 4 \cong \angle 8 \)

Then \( AB \parallel CD \)

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ex  Transversal \( \overrightarrow{EF} \) intersects \( AB \) and \( CD \), as shown in the diagram below.

Write a statement that could be used to prove \( AB \parallel CD \) using corresponding angles.

\[ \text{IF } \angle 2 \cong \angle 6, \text{ then } AB \parallel CD \]
If parallel lines are cut by a transversal, then interior angles on the same side are supplementary.

The converse is also true!

If \( \overline{AB} \parallel \overline{CD} \), then \( \angle 4, \angle 5 \) are supplementary and \( \angle 3, \angle 6 \) are supplementary.

**Example:**

Given, \( \ell \parallel m \). Find the value of \( x \) and explain.

\[
2x + 13 + 3x + 17 = 180
\]

\[
5x + 30 = 180
\]

\[
\frac{5x}{5} = \frac{150}{5}
\]

\[
x = 30
\]
Converse for Interior angles on the same side of the transversal

If two lines are cut by a transversal such that a pair of same side interior angles are supplementary, then the lines are parallel.

If $\angle 4$, $\angle 5$ are supplementary or $\angle 3$, $\angle 6$ are supplementary,
then $\overline{AB} \parallel \overline{CD}$.

ex

Transversal $\overrightarrow{EF}$ intersects $\overrightarrow{AB}$ and $\overrightarrow{CD}$, as shown in the diagram below.

Write a statement that could be used to prove $\overrightarrow{AB} \parallel \overrightarrow{CD}$ using interior angles on the same side of the transversal.
Alternate Interior Angles

If parallel lines are cut by a transversal, then alternate interior angles are equal in measure or congruent.

The converse is also true!

If $AB \parallel CD$, then

Alternate Interior $\angle$s are $\neq$ in measure or $\cong$

$m\angle 3 = m\angle 5$

$m\angle 4 = m\angle 6$

ex

Given, $\ell \parallel m$. Find the value of $x$ and explain.
Converse for Alternate Interior Angles

If two lines are cut by a transversal such that a pair of alternate interior angles are equal in measure or congruent, then the lines are parallel.

If $\angle 3$ are $= \angle 5$ in measure or $\cong$

$m\angle 3 = m\angle 5$
$m\angle 4 = m\angle 6$

Then $AB \parallel CD$

ex

Transversal $EF$ intersects $AB$ and $CD$, as shown in the diagram below.

Write a statement that could be used to prove $AB \parallel CD$ using alternate interior angles.
Alternate Exterior Angles

If two lines are cut by a transversal such that a pair of alternate exterior angles are equal in measure or congruent, then the lines are parallel.

The converse is also true!

Name a pair of alternate exterior angles...

DO NOW!

Using the diagram below, name the following pairs:

- Corresponding Angles:
- Consecutive Interior Angles:
- Alternate Exterior Angles:
- Alternate Interior Angles:
When the lines are parallel...

**Alternate exterior**

**Alternate interior**

**Corresponding**

**Same-side interior**

SUMMARY!!

*Given parallel lines:*

1. Alternate interior angles
2. Alternate exterior angles
3. Corresponding angles
4. Same side interior (consecutive interior) angles are
We will do the constructions on Tuesday or Wednesday.

Constructing Parallel Lines
http://www.mathopenref.com/constparallel.html

Construct a line parallel to \( AB \) that passes through Point \( R \).
Try it again!

Construct a line parallel to line m, through point A.