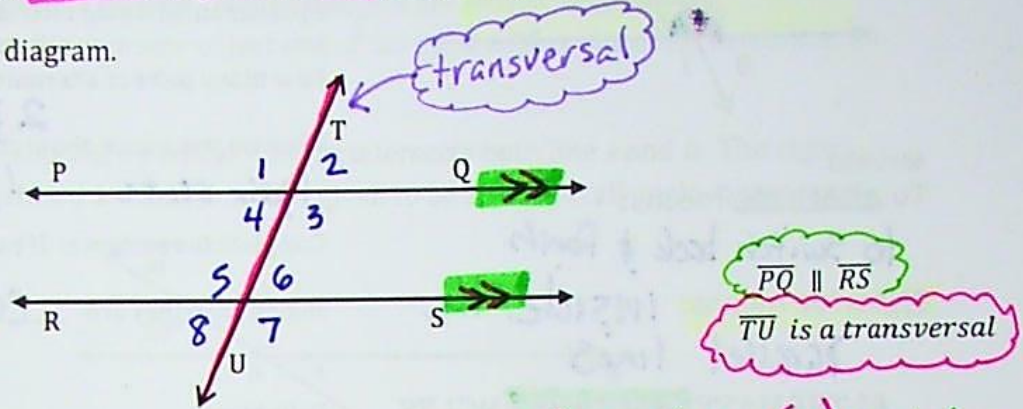~~ Unit 8, Page 19 ~~

Corresponding Angles, Alternate Interior, and Alternate Exterior Angles

If two parallel lines are intersected by another line, how many angles are formed?

Number them on the diagram.

transversal

$\overline{PQ} \parallel \overline{RS}$

$\overline{TU}$ is a transversal

The extra arrows on two of the lines mean they are ___**parallel (||) symbol**___.
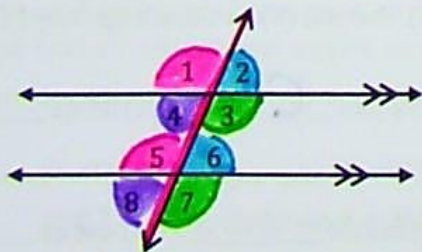
The line that intersects the two lines is called a ___**transversal**___.

The number of angles formed is ___**8**___.

The angles formed when parallel lines are cut by a transversal line have special relationships and are named according to those relationships with one another.

CORRESPONDING ANGLES

• Same side of transversal

• both are either above or below parallel lines

Definition:

Name the corresponding angles for the following.

1) ∠1 corresponds with ∠ __**5**__ (left/above)

2) ∠2 corresponds with ∠ __**6**__ (right/above)

3) ∠3 corresponds with ∠ __**7**__ (right/below)

4) ∠4 corresponds with ∠ __**8**__ (left/below)

What do you notice about the angle pairs above?
2 pairs of acute angles ∠2 & ∠6 ∠3 & ∠7
2 pairs of obtuse angles ∠1 & ∠5 ∠4 & ∠8

Complete the sentence: If two angles are *corresponding*

angles, then they are: ___**Congruent**___

ALTERNATE INTERIOR ANGLES
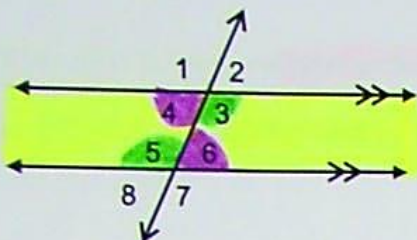
Word attack

To <u>alternate</u> means _to switch back and forth_

<u>INterior</u> means: _inside the parallel lines_

Definition:

Name the alternate interior angle for the following angles.
1) $\angle 3$ is an alternate interior angle with $\angle$ _5_
2) $\angle 4$ is an alternate interior angle with $\angle$ _6_

How many pairs of alternate interior angles are possible?
two pairs

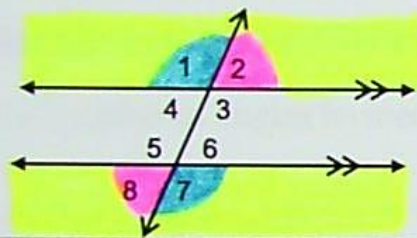What do you notice about the angle pairs above?
they are the same type (acute or obtuse)

Complete the sentence:
   If two angles are alternate interior angles,

then they are: _congruent_

ALTERNATE EXTERIOR ANGLES

Word attack

To <u>alternate</u> means _to switch back and forth_

<u>Exterior</u> means: _outside the parallel lines_

Definition:

Name the alternate exterior angle for the following angles.
1) $\angle 1$ is an alternate exterior angle with $\angle$ _7_
2) $\angle 2$ is an alternate exterior angle with $\angle$ _8_

How many pairs of alternate exterior angles are possible?
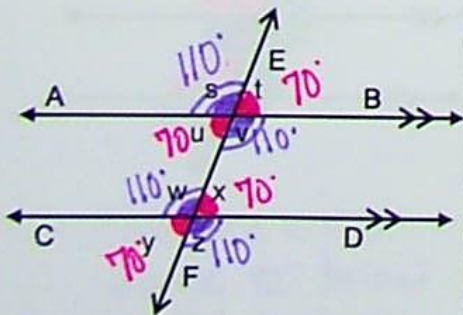_two pairs_

What do you notice about the angle pairs above?
they are the same type (acute or obtuse)

Complete the sentence:
   If two angles are alternate exterior angles,

then they are: _congruent_

Look at the diagram below. For each pair of angles, state whether they are corresponding (C), alternate interior (I), alternate exterior (E), vertical (V), or supplementary (S).

1) $\angle u$, $\angle x$ **I**	6) $\angle t$, $\angle x$ **C**	11) $\angle t$, $\angle u$ **V**
2) $\angle w$, $\angle s$ **C**	7) $\angle w$, $\angle z$ **V**	12) $\angle w$, $\angle x$ **S**
3) $\angle t$, $\angle y$ **E**	8) $\angle v$, $\angle w$ **I**	13) $\angle w$, $\angle s$ **C**
4) $\angle s$, $\angle t$ **S**	9) $\angle v$, $\angle z$ **C**	14) $\angle s$, $\angle v$ **V**
5) $\angle w$, $\angle y$ **S**	10) $\angle s$, $\angle z$ **E**	15) $\angle x$, $\angle z$ **S**

16) If m $\angle s$ = 110°, find the measure of the remaining angles.

$m\angle v =$ _110°_ $m\angle t =$ _70°_ $m\angle u =$ _70°_ $m\angle w =$ _110°_ $m\angle x =$ _70°_ $m\angle y =$ _70°_ $m\angle z =$ _110°_

Parallel Lines Cut by a Transversal

As explained in the previous section, when two parallel lines are intersected, or "cut," by a transversal, eight angles are formed. Any two angles are either congruent or supplementary! Given the measure of just one of the eight angles, the other seven can be determined.

Example: Lines a and b are parallel. Line m intersects both line a and b. The eight resulting angles are labeled 1 – 8, and m∡1 is given to be 25°. Find all angle measures.
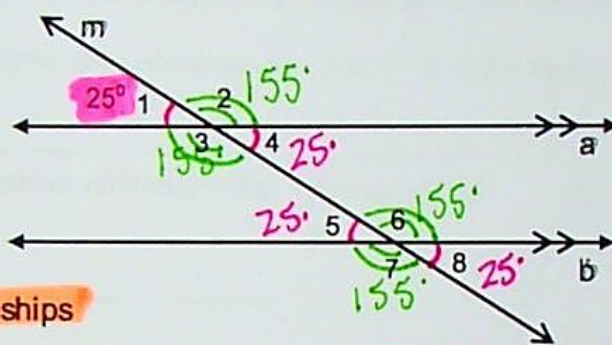
Step 1: Notice the relationships

∡1 and ∡4 are vertical angles and therefore ≅, so m∡4 = 25°.
Other pairs of vertical angles are ∡2 and ∡3, ∡5 and ∡8, ∡6 and ∡7.

∡1 is supplementary to ∡2, so the m∡2 = 180° - ∡1 = 180 - 25° = 155°.
∡1 is also supplementary to ∡3, so the m∡3 is also 155°.
Notice that ∡2 and ∡3 are vertical angles, and would have to be ≅ to each other.

Step 2: Corresponding angles have the same relative position, like ∡1 and ∡5 are both in the upper left section of the intersecting lines. Corresponding angles are always congruent, so m∡1 and m∡5 are both 25°. ∡5 and ∡8 are vertical angles, so m∡8 = 25°.

∡6 and ∡8 form a linear pair, so m∡6 = 180° - 25° = 155°.
∡6 and ∡7 are vertical angles, so m∡7 is also 155°.

Answer:

m∡**1**, m∡**4**, m∡**5** and m∡**8** (all) = _____ 25° _____ and are __acute__ angles

m∡**2**, m∡**3**, m∡**6** and m∡**7** (all) = _____ 155° _____ and are __obtuse__ angles