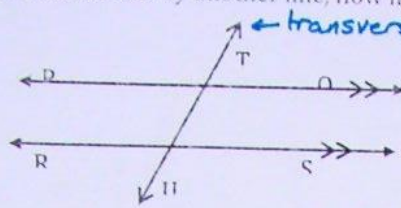


Corresponding, Alternate Interior, and Alternate Exterior Angles

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



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

\overline{TU} is a transversal

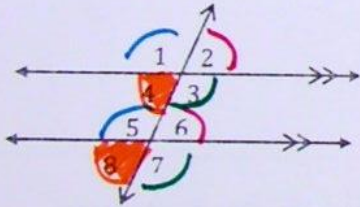
The extra arrows on two of the lines mean they are parallel.

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



Definition:

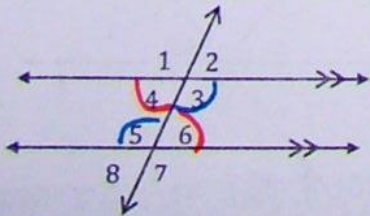
Name the corresponding angles for the following.

- 1) $\angle 1$ corresponds with \angle 5
- 2) $\angle 2$ corresponds with \angle 6
- 3) $\angle 3$ corresponds with \angle 7
- 4) $\angle 4$ corresponds with \angle 8

If two angles are *corresponding* angles,

then they are: congruent

ALTERNATE INTERIOR ANGLES



Definition:

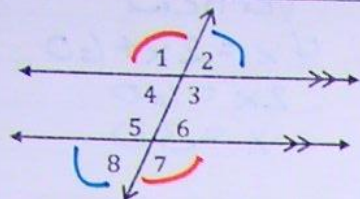
Name the alternate interior angle for the following angles.

- 1) $\angle 3$ is an alternate interior angle with \angle 5
- 2) $\angle 4$ is an alternate interior angle with \angle 6

If two angles are *alternate interior* angles,

then they are: congruent

ALTERNATE EXTERIOR ANGLES



Definition:

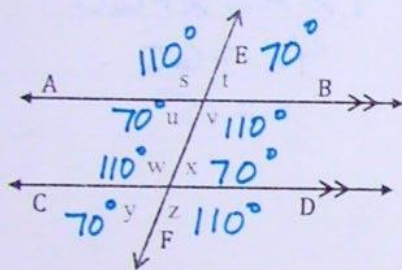
Name the alternate exterior angle for the following angles.

- 1) $\angle 1$ is an alternate exterior angle with \angle 7
- 2) $\angle 2$ is an alternate exterior angle with \angle 8

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 (AI), alternate exterior (AE), vertical (V), or supplementary (S).



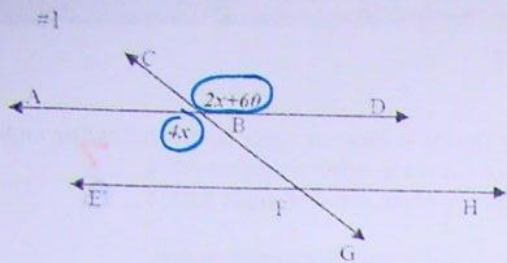
- | | |
|-----------------------------------|------------------------------------|
| 1) $\angle u, \angle x$ <u>AI</u> | 6) $\angle t, \angle x$ <u>C</u> |
| 2) $\angle w, \angle s$ <u>C</u> | 7) $\angle w, \angle z$ <u>V</u> |
| 3) $\angle t, \angle y$ <u>AE</u> | 8) $\angle v, \angle w$ <u>AI</u> |
| 4) $\angle s, \angle t$ <u>S</u> | 9) $\angle v, \angle z$ <u>C</u> |
| 5) $\angle w, \angle y$ <u>S</u> | 10) $\angle s, \angle z$ <u>AE</u> |
- $\angle y, \angle v$ S

11) If $m\angle s = 110^\circ$, write the measure of the remaining angles in the diagram.

Finding Unknown Angle Measures

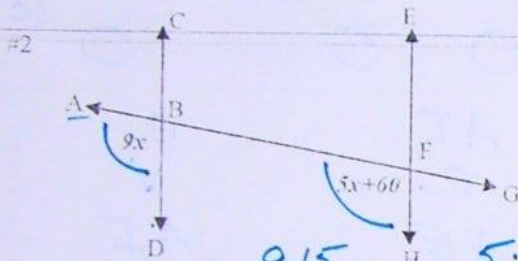
We will use the angle relationships that are formed when two parallel lines are intersected by a transversal to find the measures of missing angles. All of the angle relationships will either be supplementary or congruent.

Example A: The pair of angles are either vertical angles, alternate interior angles, alternate exterior angles, or corresponding angles; so they are congruent. All you have to do is set up and solve an equation where the expressions are congruent. Once you have solved for x , substitute that value back into each expression to find the measure of each angle.



Relationship: Vertical
 Equation: $4x = 2x + 60$
 $2x = 60$
 $x = 30$

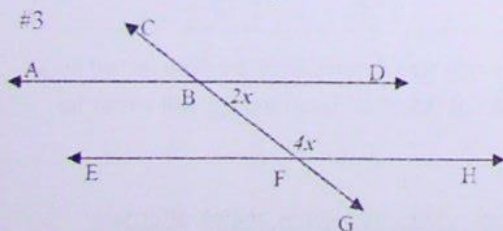
$x = 30$ $\angle ABG = 4 \cdot 30 = 120^\circ$ $\angle CBD = 2 \cdot 30 + 60 = 120^\circ$



Relationship: Corresponding
 Equation: $9x = 5x + 60$
 $4x = 60$
 $x = 15$

$x = 15$ $\angle ABD = 9 \cdot 15 = 135^\circ$ $\angle HFA = 5 \cdot 15 + 60 = 135^\circ$

Example B: Each pair of angles are supplementary to each other, which means the angles add up to 180° . All you have to do is set up and solve an equation where the expressions add up to equal 180° . Once you have solved for x , substitute that value back into each expression to find the measure of each angle.



Relationship: Supplementary
 Equation: $2x + 4x = 180$
 $6x = 180$
 $x = 30$

$x = 30$ $\angle FBD = 2 \cdot 30 = 60^\circ$ $\angle HFB = 4 \cdot 30 = 120^\circ$