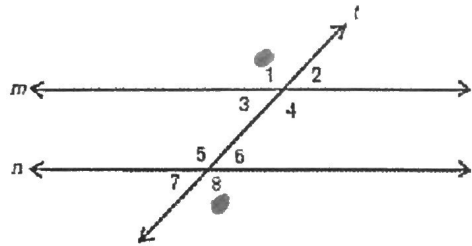## Parallel Lines

Definition:

Parallel Lines are two lines that never intersect. They are always the same distance apart.

Alternate Exterior Angles
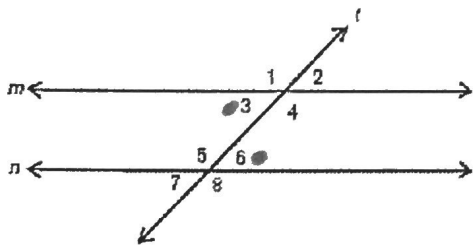
Definition:

Two angles in the ___exterior___ of the parallel lines and on ___alternate___ sides.

Alternate Exterior Angles Theorem:

If 2 ___parallel lines___ are cut by a transversal, then the pairs of alternate exterior angles are ___Congruent___.

Other Alternate Exterior Angles: $\angle 1 \cong \angle 8$ $\angle 2 \cong \angle 7$ $\Rightarrow$ $m\angle 1 = m\angle 8$
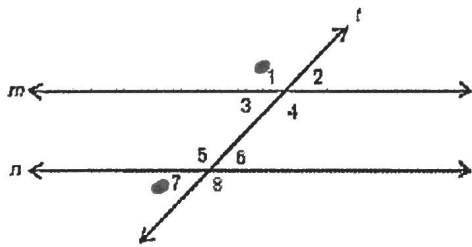
Alternate Interior Angles

Definition:

Two angles in the ___interior___ of the parallel lines and on ___alternate___ sides.

Alternate Interior Angles Theorem:

If 2 ___parallel lines___ are cut by a transversal, then the pairs of alternate interior angles are ___Congruent___

Other Alternate Interior Angles: $\angle 3 \cong \angle 6$ $\angle 4 \cong \angle 5$ $\Rightarrow$ $m\angle 3 = m\angle 6$

Consecutive (Same Side) Exterior Angles
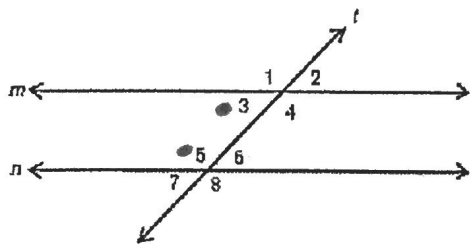
Definition:

Two angles in the ___exterior___ of the parallel lines and on ___Same___ sides.

Consecutive (Same Side) Exterior Angles Theorem:

If 2 ___parallel lines___ are cut by a transversal, then the pairs of consecutive exterior angles are ___Supplementary___ $\Rightarrow m\angle 1 + m\angle 7 = 180$

Other Same Side Exterior Angles: $\angle 1, \angle 7$ and $\angle 2, \angle 8$

Consecutive (Same Side) Interior Angles

Definition:

Two angles in the ___interior___ of the parallel lines and on ___Same___ sides.

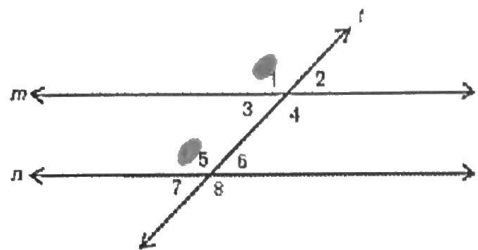**Consecutive (Same Side) Interior Angles Theorem:**

If 2 ___parallel lines___ are cut by a transversal, then the pairs of consecutive interior angles are ___Supplementary___

Other Same Side Interior Angles:

$\angle 3, \angle 5$ and $\angle 4, \angle 6$

$\Rightarrow m\angle 3 + m\angle 5 = 180$
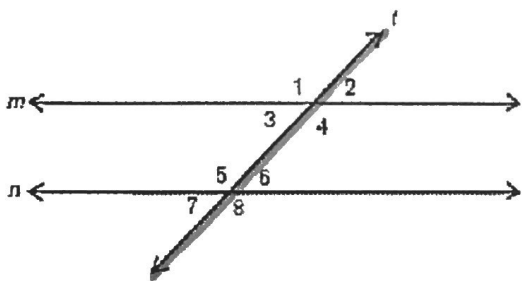
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Corresponding Angles

Definition:
Two angles that lie in the _same position_ .

Corresponding Angles Postulate:
If 2 _parallel lines_ are cut by a transversal, then the pairs of corresponding angles are _Congruent_.

Other Corresponding Angles: $\angle 1 \cong \angle 5$ $\angle 2 \cong \angle 6$ $\angle 3 \cong \angle 7$ $\angle 4 \cong \angle 8$

Transversal

Definition:
A _Transversal_ is a line that intersects two or more coplanar lines at different points.

Summary of Parallel Line Relationships

Relationships with Parallel & Non Parallel Lines		
Angle Type	Parallel Lines	Non Parallel Lines
Alternate Exterior Angles	✓ Congruent	X
Alternate Interior Angles	✓ Congruent	X
Same Side Exterior Angles	✓ Supplementary	X
Same Side Interior Angles	✓ Supplementary	X
Corresponding Angles	✓ Congruent	X
Vertical Angles	✓ Congruent	Congruent

Practice:
1. If the measure of angle 1 = 67° and a is parallel to d, find all other angles of the same measure.

$180 - 67 =$
$113°$
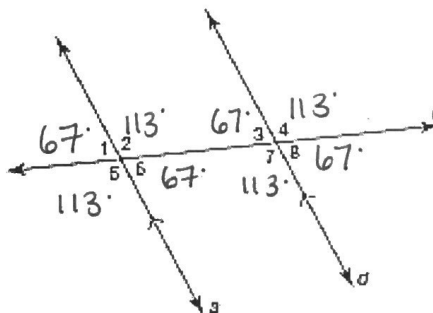
2. Find the measure of the following:

a. Solve for x: b. m∠ECF   c. m∠DCE

$70 + 4x + 22 = 180$ $70°$ $110°$
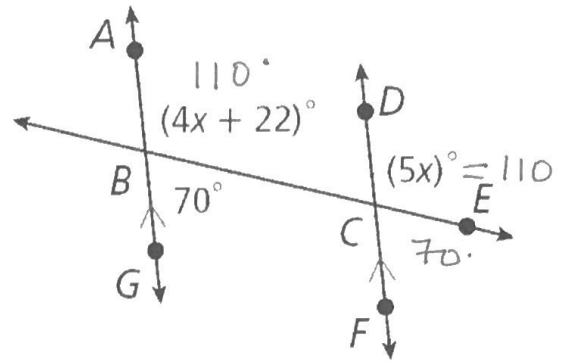
$4x + 92 = 180$

$4x = 88$

$x = 22$

$4(22) + 22 = 110°$

3. Find the measure of the following:

a. Solve for x: b. m∠EDG
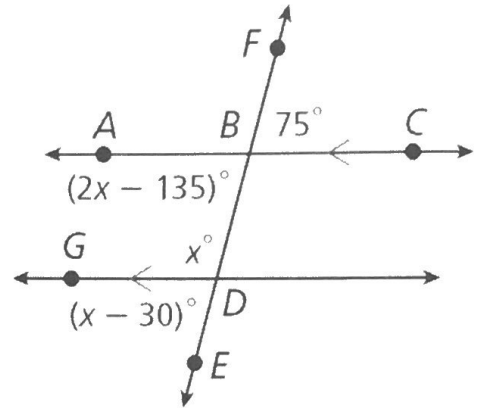
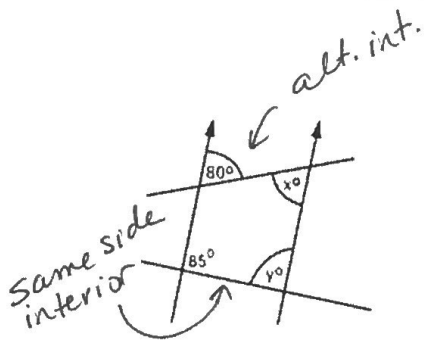$2x - 135 = 75$ $75°$

$2x = 210$

$x = 105°$

$2(105) - 135 = 75°$

c. How did you solve for x? What is another way you could have solved for x?

_____I used vertical angles. I could have used corresponding
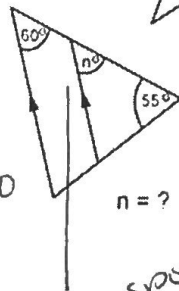angles and set $2x - 135 = x - 30$._____

4. What is the value of x, y, n, and a?

alt. int.

80°

same side
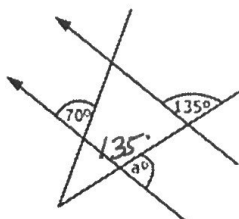interior

85°

x = ?   y = ?

X = 80   85 + y = 180
                y = 95

60°

n = ?

Corresponding
n = 60°

70°   135°

135°
90°

a = ?

Corresponding
and linear
Pair
$180 - 135 = 45°$

x = _____80°_____

y = _____95°_____

n = _____60°_____

a = _____45°_____

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