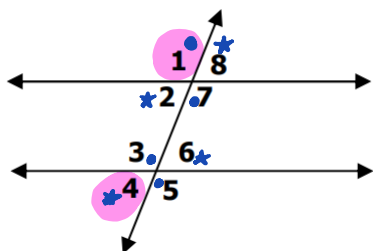# 8-6 Parallel Lines Cut by a Transversal – Day 2

"I can use angle relationships to find the measure of missing angles."

Warm Up: Given the diagram below, find each angle as stated…

If $m\angle 7 = 100°$, then $m\angle 3 =$ __100__   If $m\angle 3 = 140°$, then $m\angle 8 =$ __40°__

If $m\angle 7 = 175°$, then $m\angle 6 =$ __5__   If $m\angle 4 = 30°$, then $m\angle 1 =$ __150°__

If $m\angle 7 = 120°$, then $m\angle 5 =$ __120__   If $m\angle 4 = 40°$, then $m\angle 2 =$ __40°__

If $m\angle 4 = 20°$, then $m\angle 7 =$ __160__   If $m\angle 7 = 125°$, then $m\angle 4 =$ __55__

When looking for the value of x or an angle measurement that consists of algebraic expressions in a diagram such as the ones you see on this page, you must set up an __equation__ to answer the problem. To do this, you must know the angle relationship between the angles that you are working with.

● Are they __Supplementary__ (sum to 180⁰) OR __Complementary__ (sum to 90⁰)?

● Are they __Congruent__ to each other? vertical, alternate interior, alternate exterior, corresponding?

If you know the relationship, then you can set up an equation to find the value of x.

Exercise 1- **Based off the diagram below, answer the following questions:**

a) What is the angle relationship between < 4 and < 5?

   Alt. Interior   * Congruent

b) The m<4 = $5x - 10$ and the m<5 = $3x + 40$. Find the m<5.

$$5x - 10 = 3x + 40$$
$$-3x \qquad -3x$$
$$2x - 10 = 40$$
$$+10 \qquad +10$$
$$\frac{2x}{2} = \frac{50}{2} \qquad \boxed{x = 25}$$

$$3(25) + 40$$
$$\boxed{m<5 = 115°}$$

Not Drawn to Scale
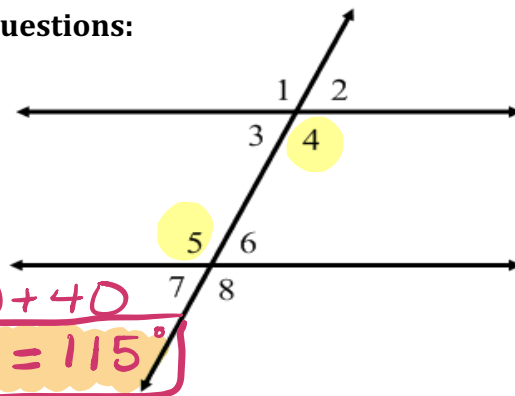
Exercise 2- **In the figure below, $\overleftrightarrow{EF}$ intersects parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ at G and H.**

a) What is the name of the relationship of $\angle AGH$ and $\angle CHF$?

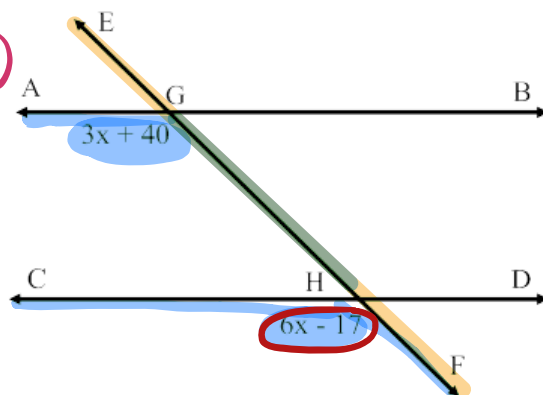   **Corresponding (congruent)**

b) What is the value of x?

$$3x + 40 = 6x - 17$$
$$-3x \qquad -3x$$
$$40 = 3x - 17$$
$$+17 \qquad +17$$
$$\frac{57}{3} = \frac{3x}{3} \qquad \boxed{x = 19}$$

c) What is the $\angle CHF$?

$$6(19) - 17 = \boxed{97°}$$

Problem Set:

1. Given the problems below, solve for x:

   (a)

   $75°$ $11x - 2$

   $75 = 11x - 2$
   $+2 \quad +2$
   $\dfrac{77}{11} \quad \dfrac{11x}{11}$
   $\boxed{7 = x}$

   (b)

   $23x - 5$ $21x + 5$

   $23x - 5 = 21x + 5$
   $-21x \qquad -21x$
   $\dfrac{2x - 5 = 5}{\quad +5 \quad +5}$
   $\dfrac{2x = 10}{2} \quad \dfrac{}{2}$
   $\boxed{x = 5}$
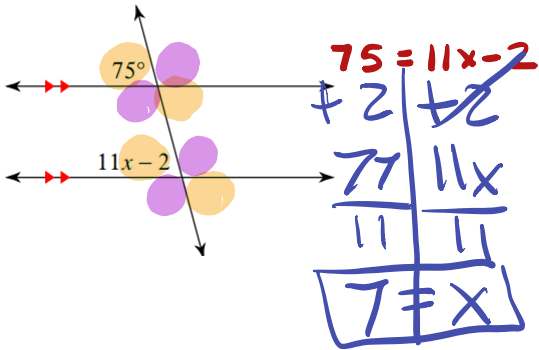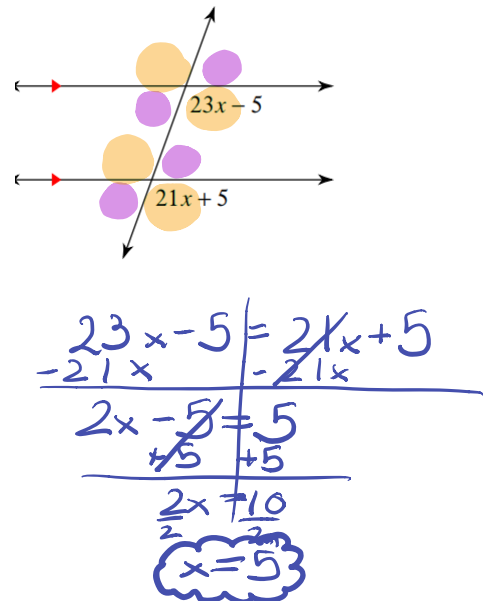
2. In the accompanying diagram, parallel lines $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are intersected $\overleftrightarrow{EF}$ by at G and H. respectively. $m < CHG = x + 20$ and $m < DHG = 3x$.

   a) $m < CHG = \underline{60°}$

   b) $m < DHG = \underline{120°}$

   c) $m < AGH = \underline{120°}$

   d) $m < FHD = \underline{60°}$

   E

   A   G   B

   C $x + 20$ $3x$ D
   H
   F

   Not Drawn to Scale

   $3x + x + 20 = 180$

   $4x + 20 = 180$
   $\quad -20 \quad -20$
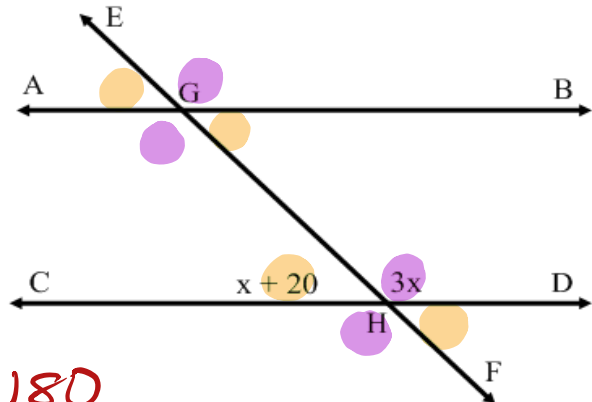 $\dfrac{4x}{4} = \dfrac{160}{4}$
   $x = 40$

3. In the accompanying diagram, parallel lines $\overline{AB}$ and $\overline{CD}$ are intersected by transversal $\overline{EF}$ at G and H, respectively. If $m < AGH = 4x + 30$ and $m < GHD = 7x - 9$, what is the value of x?

   E

   A   G   B
   $4x + 30$

   C   H $7x - 9$ D

   F

   Not Drawn to Scale