Worksheet – *Section 3-2 Angles and Parallel Lines*

Objectives:
- Understand the **parallel lines cut by a transversal theorem** and **it's converse**
- Find **angle measures** using the Theorem
- Use **algebra to find unknown variable** and angle measures involve **parallel lines and transversals**
- Use **Auxiliary lines** to find unknown angle measures

Parallel Lines and Angle Pairs

When two parallel lines are cut by a transversal, the following pairs of angles are congruent.
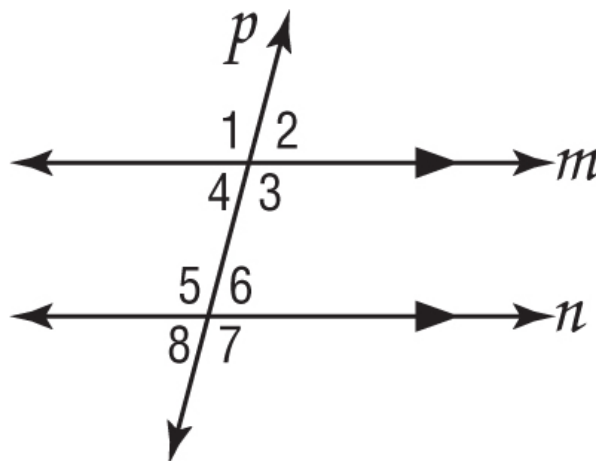
- corresponding angles

- alternate interior angles

- alternate exterior angles
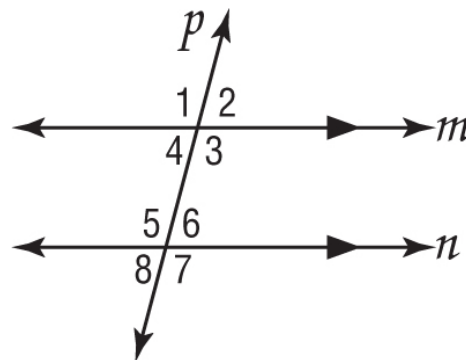
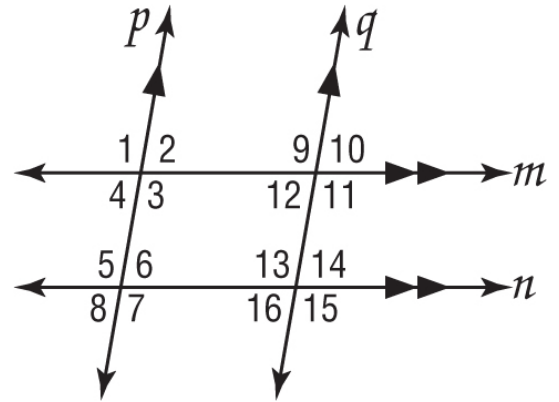Also, consecutive interior angles are supplementary.

Example:
In the figure, $m\angle 2$ = 75. Find the measures of the remaining angles.

In the figure, $m\angle 3$ = 102. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.

a. $\angle 5$ b. $\angle 6$
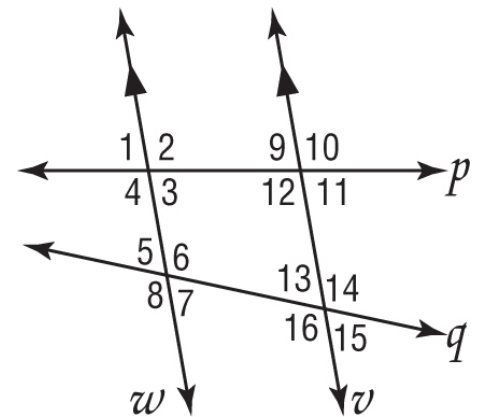
c. $\angle 11$ d. $\angle 7$

e. $\angle 15$ f. $\angle 14$

Practice

In the figure, $m\angle 9$ = 80 and $m\angle 5$ = 68. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.

a. $\angle 12$ b. $\angle 1$

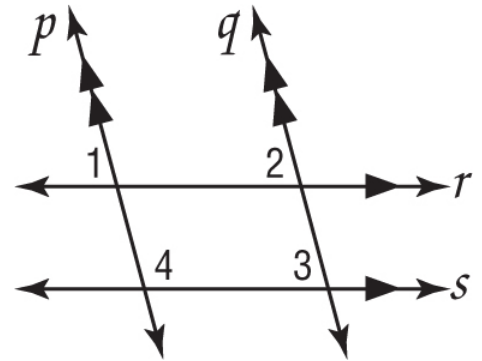c. $\angle 4$ d. $\angle 3$

e. $\angle 7$ f. $\angle 16$

Algebra and Angle Measures

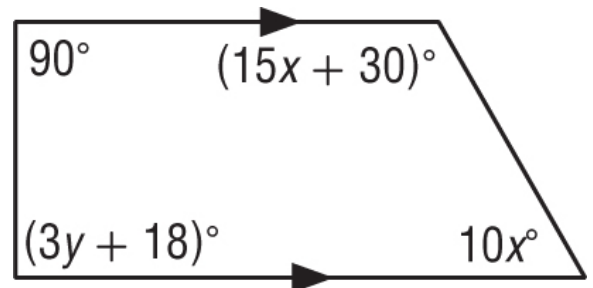Algebra can be used to find unknown values in angles formed by a transversal and parallel lines.

Example:
If $m\angle 1 = 3x + 15$, $m\angle 2 = 4x - 5$, and $m\angle 3 = 5y$, find the value of x and y.
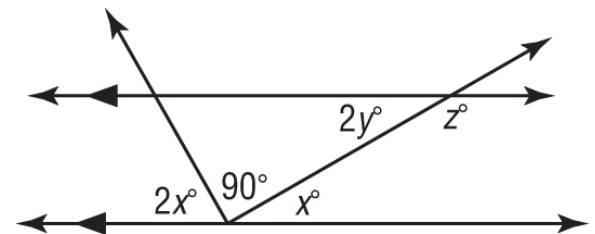

Example:

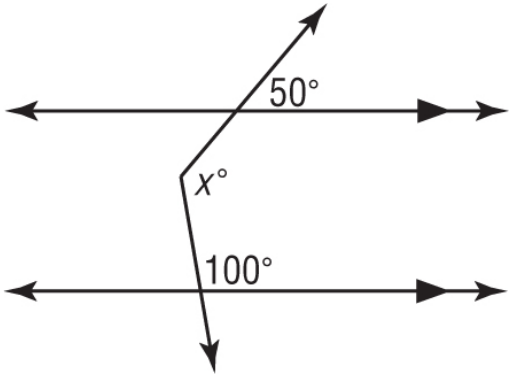Find the value of the variable(s) in each figure.
Explain your reasoning.

$90°$ $(15x + 30)°$

$(3y + 18)°$ $10x°$

Example:

Find the value of the variable(s) in each figure. Explain your reasoning.

$2y°$ $z°$

$2x°$ $90°$ $x°$

Example(Using a 3rd parallel Line – Auxilury Line)

$50°$

$x°$

$100°$

Practice:

Find the value of the variable(s) in each figure. Explain your reasoning.

$3x°$

$2y°$

$4y°$ $(5x - 20)°$

Practice:

Find the value of the variable(s) in each figure. Explain your reasoning.

$(4z + 6)°$

$x°$

$106°$

$2y°$
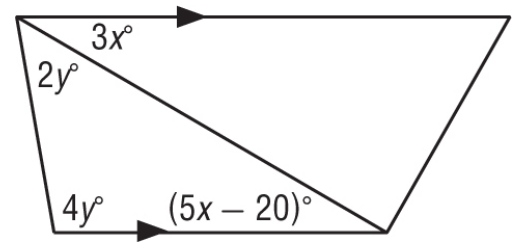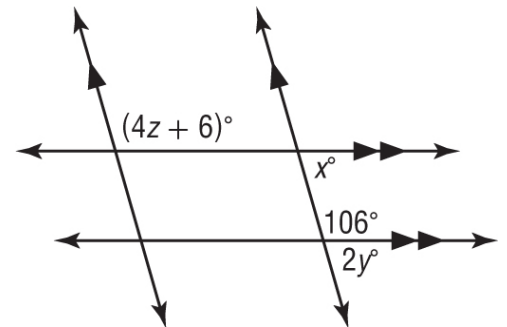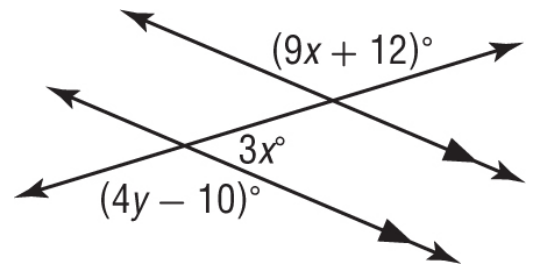
In the figure, $m\angle 2 = 92$ and $m\angle 12 = 74$. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.
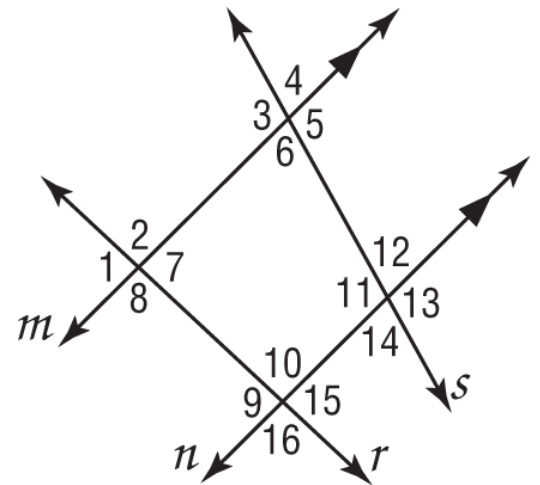
1. $\angle 10$
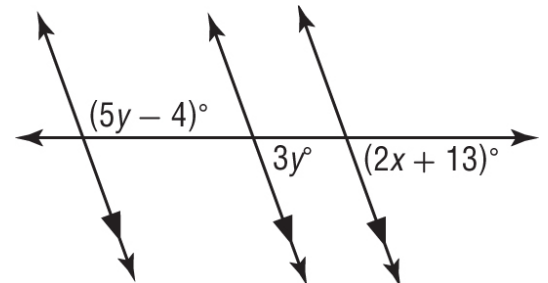
2. $\angle 8$

3. $\angle 9$

4. $\angle 5$

5. $\angle 11$

6. $\angle 13$

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7. Find the value of the variable(s) in each figure. Explain your reasoning.

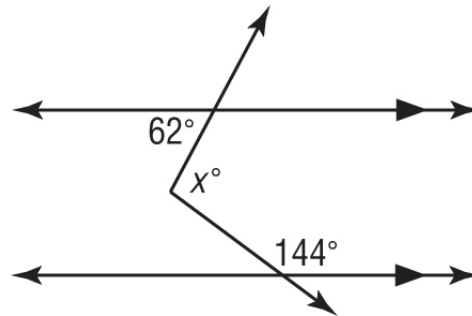$(9x + 12)°$

$3x°$

$(4y - 10)°$

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8. Find the value of the variable(s) in each figure. Explain your reasoning.

$(5y - 4)°$

$3y°$ $(2x + 13)°$

9. Find x. (*Hint*: Draw an auxiliary line.)
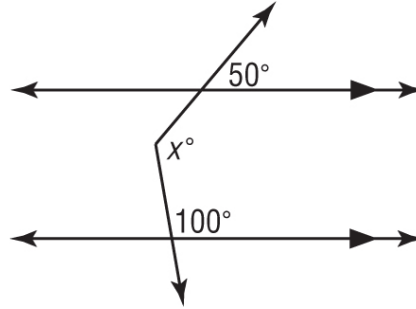
10. Find x. (*Hint*: Draw an auxiliary line.)

11. A diagonal brace strengthens the wire fence and prevents it from sagging. The brace makes a 50° angle with the wire as shown. Find the value of the variable.