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.
Example:
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.

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

Practice:
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Homework:

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. \( \angle 13 \)

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

8. Find the value of the variable(s) in each figure. Explain your reasoning.
9. Find $x$. (*Hint*: Draw an auxiliary line.)

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