Geometry: Parallel Lines Cut by a Transversal

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DIRECTIONS *Use parallel line angle relationships to solve for x and find angle measures. Show all work.*

1 Corresponding Angles — Solve for x:

$\angle 1 = (3x + 20)^\circ, \quad \angle 5 = (5x - 8)^\circ$

Answer: _____

2 Alternate Interior Angles — Solve for x:

$\angle 3 = (4x + 15)^\circ, \quad \angle 6 = (7x - 12)^\circ$

Answer: _____

3 Co-Interior Angles — Solve for x:

$\angle 4 = (2x + 30)^\circ, \quad \angle 5 = (4x + 6)^\circ$

Answer: _____

4 Alternate Exterior Angles — Solve for x:

$\angle 1 = (6x - 5)^\circ, \quad \angle 8 = (4x + 25)^\circ$

Answer: _____

5 Corresponding Angles — Find x:

$\angle 2 = (2x + 10)^\circ, \quad \angle 6 = 110^\circ$

Answer: _____

6 Co-Interior Angles — Find m∠5:

$m\angle 4 = 65^\circ$

Answer: _____

7 Alternate Interior Angles — Find x and m∠3:

$\angle 3 = (5x + 12)^\circ, \quad \angle 6 = (8x - 18)^\circ$

Answer: _____

8 Alternate Exterior Angles — Find x and m∠1:

$m\angle 1 = (4x + 5)^\circ, \quad m\angle 8 = (6x - 25)^\circ$

Answer: _____

Answer Key & Solutions

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TEACHER NOTES *Corresponding, alternate interior, and alternate exterior angles are EQUAL. Co-interior (same-side interior) angles sum to 180°.*

1 Corresponding Angles — Solve for x:

$\angle 1 = (3x + 20)^\circ, \quad \angle 5 = (5x - 8)^\circ$

= $x = 14$

3x+20 = 5x–8 (corresponding angles are equal) → 28=2x → x=14.

2 Alternate Interior Angles — Solve for x:

$\angle 3 = (4x + 15)^\circ, \quad \angle 6 = (7x - 12)^\circ$

= $x = 9$

4x+15 = 7x–12 (alt. interior ∠s equal) → 27=3x → x=9.

3 Co-Interior Angles — Solve for x:

$\angle 4 = (2x + 30)^\circ, \quad \angle 5 = (4x + 6)^\circ$

= $x = 24$

Co-interior angles sum to 180°: (2x+30)+(4x+6)=180 → 6x+36=180 → x=24.

4 Alternate Exterior Angles — Solve for x:

$\angle 1 = (6x - 5)^\circ, \quad \angle 8 = (4x + 25)^\circ$

= $x = 15, \quad m\angle 1 = 85^\circ$

6x–5 = 4x+25 (alt. exterior ∠s equal) → 2x=30 → x=15.

5 Corresponding Angles — Find x:

$\angle 2 = (2x + 10)^\circ, \quad \angle 6 = 110^\circ$

= $x = 50$

2x+10 = 110 (corresponding) → 2x=100 → x=50.

6 Co-Interior Angles — Find m∠5:

$m\angle 4 = 65^\circ$

= $m\angle 5 = 115^\circ$

∠4 + ∠5 = 180° (co-interior) → ∠5 = 180°–65° = 115°.

7 Alternate Interior Angles — Find x and m∠3:

$\angle 3 = (5x + 12)^\circ, \quad \angle 6 = (8x - 18)^\circ$

= $x = 10, \quad m\angle 3 = 62^\circ$

5x+12 = 8x–18 → 30=3x → x=10. m∠3=5(10)+12=62°.

8 Alternate Exterior Angles — Find x and m∠1:

$m\angle 1 = (4x + 5)^\circ, \quad m\angle 8 = (6x - 25)^\circ$

= $x = 15, \quad m\angle 1 = 65^\circ$

4x+5 = 6x–25 (alt. exterior equal) → 30=2x → x=15. m∠1=4(15)+5=65°.