Geometry: Angle Measures of Intersecting Lines

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

1 Vertical Angles — Solve for x:

$\angle 1 = (3x + 15)^\circ, \quad \angle 3 = (5x - 9)^\circ$

Answer: _____

2 Linear Pair — Solve for x:

$\angle 1 = (4x + 5)^\circ, \quad \angle 2 = (6x - 5)^\circ$

Answer: _____

3 Find the supplement of the angle:

73°

Answer: _____

4 Vertical Angles — Find x and m∠A:

$m\angle A = (8x - 10)^\circ, \quad m\angle C = (6x + 20)^\circ$

Answer: _____

5 Complementary Angles — Solve for x:

$\angle P = (2x + 12)^\circ, \quad \angle Q = (3x - 2)^\circ$

Answer: _____

6 Linear Pair — Find x and both angle measures:

$\angle 1 = (x + 10)^\circ, \quad \angle 2 = (2x + 5)^\circ$

Answer: _____

7 Two lines intersect. Find m∠2, m∠3, and m∠4:

$m\angle 1 = 72^\circ$

Answer: _____

8 Vertical Angles — Find x and m∠1:

$m\angle 1 = (5x + 3)^\circ, \quad m\angle 2 = (7x - 9)^\circ$

Answer: _____

Answer Key & Solutions

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TEACHER NOTES *Key rules: Vertical angles are equal. Linear pairs sum to 180°. Supplementary angles sum to 180°. Complementary angles sum to 90°.*

1 Vertical Angles — Solve for x:

$\angle 1 = (3x + 15)^\circ, \quad \angle 3 = (5x - 9)^\circ$

= $x = 12$

3x+15 = 5x–9 (vertical angles are equal) → 24 = 2x → x = 12.

2 Linear Pair — Solve for x:

$\angle 1 = (4x + 5)^\circ, \quad \angle 2 = (6x - 5)^\circ$

= $x = 18$

Linear pair sums to 180°: (4x+5)+(6x–5)=180 → 10x=180 → x=18.

3 Find the supplement of the angle:

73°

= 107°

180° – 73° = 107°.

4 Vertical Angles — Find x and m∠A:

$m\angle A = (8x - 10)^\circ, \quad m\angle C = (6x + 20)^\circ$

= $x = 15, \quad m\angle A = 110^\circ$

8x–10 = 6x+20 → 2x=30 → x=15. m∠A = 8(15)–10 = 110°.

5 Complementary Angles — Solve for x:

$\angle P = (2x + 12)^\circ, \quad \angle Q = (3x - 2)^\circ$

= $x = 16$

(2x+12)+(3x–2)=90 → 5x+10=90 → 5x=80 → x=16.

6 Linear Pair — Find x and both angle measures:

$\angle 1 = (x + 10)^\circ, \quad \angle 2 = (2x + 5)^\circ$

= $x = 55,\ \angle 1 = 65^\circ,\ \angle 2 = 115^\circ$

(x+10)+(2x+5)=180 → 3x+15=180 → x=55.

7 Two lines intersect. Find m∠2, m∠3, and m∠4:

$m\angle 1 = 72^\circ$

= $m\angle 2 = 108^\circ,\ m\angle 3 = 72^\circ,\ m\angle 4 = 108^\circ$

∠3=∠1 (vertical). ∠2=∠4=180°–72°=108° (linear pairs).

8 Vertical Angles — Find x and m∠1:

$m\angle 1 = (5x + 3)^\circ, \quad m\angle 2 = (7x - 9)^\circ$

= $x = 6, \quad m\angle 1 = 33^\circ$

5x+3=7x–9 → 12=2x → x=6. m∠1 = 5(6)+3 = 33°.