Angles in Triangles and Parallel Lines

Name: _____	Date: _____	Score: _____ / 24

Quick Review

The three interior angles of *any* triangle always add up to $\mathbf{180^\circ}$. So if you know two angles, you can always find the third by subtracting from 180°. An **exterior angle** of a triangle equals the *sum of the two remote interior angles*. When a line crosses two **parallel lines**, special pairs appear: *corresponding* angles and *alternate* angles are **equal**, while *co-interior* (same-side interior) angles are **supplementary** — they add to 180°.

◇ **Example:** In a triangle, two angles measure 63° and 48°. Find the third angle.
⇒ Every triangle's angles add to 180° — that's our anchor fact. First add the two angles we know: $63^\circ + 48^\circ = 111^\circ$. The third angle must make up the rest of the 180°, so subtract: $180^\circ - 111^\circ = 69^\circ$. A quick check: $63 + 48 + 69 = 180$. Perfect.
Answer: 69°

PRACTICE

Find the missing angle measure.

1. Triangle angles: $50^\circ,\ 60^\circ,\ ?$ _____
2. Triangle angles: $90^\circ,\ 35^\circ,\ ?$ _____
3. Triangle angles: $45^\circ,\ 45^\circ,\ ?$ _____
4. Triangle angles: $100^\circ,\ 25^\circ,\ ?$ _____
5. Triangle angles: $72^\circ,\ 72^\circ,\ ?$ _____
6. Equilateral triangle: each angle $=?$ _____
7. Triangle angles: $110^\circ,\ 40^\circ,\ ?$ _____
8. Right triangle, one acute angle 28°. Other acute angle? _____
9. Exterior angle of triangle; remote interiors $40^\circ, 65^\circ$ _____
10. Exterior angle 120°; one remote interior 50°. Other? _____
11. Parallel lines cut by a transversal: corresponding angle to 75° _____
12. Parallel lines: alternate interior angle to 110° _____
13. Parallel lines: co-interior (same-side) angle to 70° _____
14. Parallel lines: alternate exterior angle to 48° _____
15. Two angles on a straight line; one is 130°. Other? _____
16. Vertical angle to 85° _____
17. Triangle angles: $x,\ x,\ x$. Find x. _____
18. Triangle angles: $2x,\ 3x,\ 4x$. Find x. _____
19. Triangle angles: $x,\ x+10,\ x+20$. Find x. _____
20. Parallel lines: co-interior angles x and $3x$. Find x. _____

Word Problems

21. A triangular garden bed has corner angles. Two of them measure 58° and 74°. What is the measure of the third corner angle? _____
22. A ramp meets the ground forming a triangle. The ramp's angle with the ground is 22°, and the back support makes a 90° angle. Find the third angle of the triangle. _____
23. Two parallel railroad tracks are crossed by a straight road. The road makes a 65° angle with the first track. Find the co-interior (same-side interior) angle the road makes on the second track. _____
24. In a triangular truss, the three angles are in the ratio $2 : 3 : 5$. Find the measure of each angle. _____

Answer Keys

1. 70°
2. 55°
3. 90°
4. 55°
5. 36°
6. 60°
7. 30°
8. 62°
9. 105°
10. 70°
11. 75°
12. 110°
13. 110°
14. 48°
15. 50°
16. 85°
17. 60°
18. 20°
19. 50°
20. 45°
21. 48°
22. 68°
23. 115°
24. 36°, 54°, and 90°

Step-by-Step Explanations

1. $180 - 50 - 60 = 70^\circ$.
2. $180 - 90 - 35 = 55^\circ$.
3. $180 - 45 - 45 = 90^\circ$ — a right triangle.
4. $180 - 100 - 25 = 55^\circ$.
5. $180 - 72 - 72 = 36^\circ$ — an isosceles triangle.
6. All three angles are equal: $180 \div 3 = 60^\circ$.
7. $180 - 110 - 40 = 30^\circ$.
8. The two acute angles add to 90°: $90 - 28 = 62^\circ$.
9. An exterior angle equals the sum of the remote interiors: $40 + 65 = 105^\circ$.
10. The two remote interiors add to the exterior angle: $120 - 50 = 70^\circ$.
11. Corresponding angles are equal when lines are parallel.
12. Alternate interior angles are equal between parallel lines.
13. Co-interior angles are supplementary: $180 - 70 = 110^\circ$.
14. Alternate exterior angles are equal between parallel lines.
15. Angles on a straight line sum to 180°: $180 - 130 = 50^\circ$.
16. Vertical angles are always equal.
17. $3x = 180$, so $x = 60^\circ$.
18. $2x + 3x + 4x = 9x = 180$, so $x = 20^\circ$.
19. $3x + 30 = 180$, so $3x = 150$ and $x = 50^\circ$.
20. Co-interior angles sum to 180°: $x + 3x = 4x = 180$, so $x = 45^\circ$.
21. The angles of a triangle sum to 180°, so the third angle is $180 - 58 - 74 = 48^\circ$.
22. The third angle is $180 - 22 - 90 = 68^\circ$, since all three angles of a triangle add to 180°.
23. Co-interior angles between parallel lines are supplementary, so the angle is $180 - 65 = 115^\circ$.
24. Let the angles be $2x$, $3x$, $5x$. Then $2x + 3x + 5x = 10x = 180$, so $x = 18^\circ$. The angles are 36°, 54°, and 90°.

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