

# Angles in Triangles and Parallel Lines

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 24

## Q Quick Review

The three interior angles of *any* triangle always add up to  $180^\circ$ . So if you know two angles, you can always find the third by subtracting from  $180^\circ$ . 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  $180^\circ$ .

◇ **Example:** In a triangle, two angles measure  $63^\circ$  and  $48^\circ$ . Find the third angle.

⇒ Every triangle's angles add to  $180^\circ$  — 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  $180^\circ$ , so subtract:  $180^\circ - 111^\circ = 69^\circ$ . A quick check:  $63 + 48 + 69 = 180$ . Perfect.

**Answer:**  $69^\circ$

## PRACTICE

Find the missing angle measure.

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

## ◆ Word Problems

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



## Answer Keys

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

### Step-by-Step Explanations

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



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