

# 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.

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| 1. Triangle angles: $50^\circ$ , $60^\circ$ , ? _____                          | 11. Parallel lines cut by a transversal: corresponding angle to $75^\circ$ _____ |
| 2. Triangle angles: $90^\circ$ , $35^\circ$ , ? _____                          | 12. Parallel lines: alternate interior angle to $110^\circ$ _____                |
| 3. Triangle angles: $45^\circ$ , $45^\circ$ , ? _____                          | 13. Parallel lines: co-interior (same-side) angle to $70^\circ$ _____            |
| 4. Triangle angles: $100^\circ$ , $25^\circ$ , ? _____                         | 14. Parallel lines: alternate exterior angle to $48^\circ$ _____                 |
| 5. Triangle angles: $72^\circ$ , $72^\circ$ , ? _____                          | 15. Two angles on a straight line; one is $130^\circ$ . Other? _____             |
| 6. Equilateral triangle: each angle =? _____                                   | 16. Vertical angle to $85^\circ$ _____   |
| 7. Triangle angles: $110^\circ$ , $40^\circ$ , ? _____                         | 17. Triangle angles: $x$ , $x$ , $x$ . Find $x$ . _____                          |
| 8. Right triangle, one acute angle $28^\circ$ . Other acute angle? _____       | 18. Triangle angles: $2x$ , $3x$ , $4x$ . Find $x$ . _____                       |
| 9. Exterior angle of triangle; remote interiors $40^\circ$ , $65^\circ$ _____  | 19. Triangle angles: $x$ , $x + 10$ , $x + 20$ . Find $x$ . _____                |
| 10. Exterior angle $120^\circ$ ; one remote interior $50^\circ$ . Other? _____ | 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  $58^\circ$  and  $74^\circ$ . 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  $22^\circ$ , and the back support makes a  $90^\circ$  angle. Find the third angle of the triangle. \_\_\_\_\_
23. 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. \_\_\_\_\_
24. In a triangular truss, the three angles are in the ratio  $2 : 3 : 5$ . Find the measure of each angle. \_\_\_\_\_



## Answer Keys

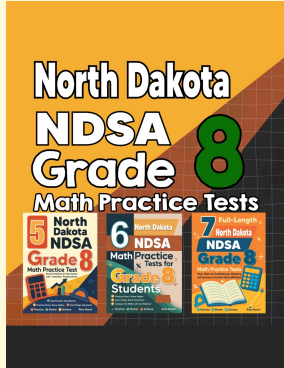
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| 1. <input type="text" value="70°"/>   | 13. <input type="text" value="110°"/>              |
| 2. <input type="text" value="55°"/>   | 14. <input type="text" value="48°"/>               |
| 3. <input type="text" value="90°"/>   | 15. <input type="text" value="50°"/>               |
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| 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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