

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° . 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.

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

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