

# Angle Relationships

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

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

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

## Q Quick Review

Some angle pairs come up again and again. **Complementary** angles add to  $90^\circ$ ; **supplementary** angles add to  $180^\circ$ . **Vertical angles** — the opposite angles formed by two crossing lines — are always *equal*. **Adjacent angles** on a straight line are supplementary (a *linear pair*). All the angles around a single point add up to  $360^\circ$ . Spotting which relationship you have lets you set up a quick equation and solve for the missing angle.

◇ **Example:** Two angles are supplementary. One measures  $115^\circ$ . Find the other.

⇒ “Supplementary” is the keyword — it means the two angles add up to  $180^\circ$ . So if one angle is  $115^\circ$ , the other must be whatever’s left:  $180^\circ - 115^\circ = 65^\circ$ . A good check:  $115 + 65 = 180$ , exactly a straight angle.

**Answer:**  $65^\circ$

## PRACTICE

Find the missing angle measure.

- |                                                   |       |                                                               |       |
|---------------------------------------------------|-------|---------------------------------------------------------------|-------|
| 1. Complement of $30^\circ$                       | _____ | 12. Angles around a point: $90^\circ, 120^\circ, 60^\circ, ?$ | _____ |
| 2. Complement of $45^\circ$                       | _____ | 13. Two complementary angles: $x$ and $4x$ . Find $x$ .       | _____ |
| 3. Complement of $72^\circ$                       | _____ | 14. Two supplementary angles: $x$ and $5x$ . Find $x$ .       | _____ |
| 4. Complement of $15^\circ$                       | _____ | 15. Supplementary: $x$ and $x + 40$ . Find $x$ .              | _____ |
| 5. Supplement of $100^\circ$                      | _____ | 16. Complementary: $2x$ and $x + 30$ . Find $x$ .             | _____ |
| 6. Supplement of $45^\circ$                       | _____ | 17. Vertical angles: $3x$ and $75^\circ$ . Find $x$ .         | _____ |
| 7. Supplement of $90^\circ$                       | _____ | 18. Linear pair: $4x$ and $2x$ . Find $x$ .                   | _____ |
| 8. Supplement of $135^\circ$                      | _____ | 19. Two angles form a right angle: $38^\circ$ and ?           | _____ |
| 9. Vertical angle to $62^\circ$                   | _____ | 20. Angles around a point: $4x$ . Find $x$ .                  | _____ |
| 10. Vertical angle to $118^\circ$                 | _____ |                                                               |       |
| 11. Linear pair: one angle is $73^\circ$ . Other? | _____ |                                                               |       |

## ◆ Word Problems

21. A drawbridge arm makes a  $58^\circ$  angle with the deck. The angle between the arm and the vertical post is complementary to it. Find that angle. \_\_\_\_\_
22. A road forks so that the two paths and the original road form a linear pair. One path makes a  $124^\circ$  angle with the road. What angle does the other path make? \_\_\_\_\_
23. Two streets cross. One of the four angles formed measures  $108^\circ$ . What is the measure of the angle directly across from it? \_\_\_\_\_
24. Around a center point, a pie chart is split into four sectors. Three of them measure  $90^\circ, 130^\circ, \text{ and } 50^\circ$ . What is the measure of the fourth sector? \_\_\_\_\_



## Answer Keys

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1. <input type="text" value="60°"/>   | 13. <input type="text" value="18°"/>  |
| 2. <input type="text" value="45°"/>   | 14. <input type="text" value="30°"/>  |
| 3. <input type="text" value="18°"/>   | 15. <input type="text" value="70°"/>  |
| 4. <input type="text" value="75°"/>   | 16. <input type="text" value="20°"/>  |
| 5. <input type="text" value="80°"/>   | 17. <input type="text" value="25°"/>  |
| 6. <input type="text" value="135°"/>  | 18. <input type="text" value="30°"/>  |
| 7. <input type="text" value="90°"/>   | 19. <input type="text" value="52°"/>  |
| 8. <input type="text" value="45°"/>   | 20. <input type="text" value="90°"/>  |
| 9. <input type="text" value="62°"/>   | 21. <input type="text" value="32°"/>  |
| 10. <input type="text" value="118°"/> | 22. <input type="text" value="56°"/>  |
| 11. <input type="text" value="107°"/> | 23. <input type="text" value="108°"/> |
| 12. <input type="text" value="90°"/>  | 24. <input type="text" value="90°"/>  |

### Step-by-Step Explanations

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Complementary angles add to <math>90^\circ</math>: <math>90 - 30 = 60^\circ</math>.</p> <p>2. <math>90 - 45 = 45^\circ</math>.</p> <p>3. <math>90 - 72 = 18^\circ</math>.</p> <p>4. <math>90 - 15 = 75^\circ</math>.</p> <p>5. Supplementary angles add to <math>180^\circ</math>: <math>180 - 100 = 80^\circ</math>.</p> <p>6. <math>180 - 45 = 135^\circ</math>.</p> <p>7. <math>180 - 90 = 90^\circ</math>.</p> <p>8. <math>180 - 135 = 45^\circ</math>.</p> <p>9. Vertical angles are equal.</p> <p>10. Vertical angles are equal.</p> <p>11. A linear pair is supplementary: <math>180 - 73 = 107^\circ</math>.</p> <p>12. Angles around a point sum to <math>360^\circ</math>: <math>360 - 90 - 120 - 60 = 90^\circ</math>.</p> <p>13. <math>x + 4x = 5x = 90</math>, so <math>x = 18^\circ</math>.</p> | <p>14. <math>x + 5x = 6x = 180</math>, so <math>x = 30^\circ</math>.</p> <p>15. <math>x + x + 40 = 180</math>, so <math>2x = 140</math> and <math>x = 70^\circ</math>.</p> <p>16. <math>2x + x + 30 = 90</math>, so <math>3x = 60</math> and <math>x = 20^\circ</math>.</p> <p>17. Vertical angles are equal: <math>3x = 75</math>, so <math>x = 25^\circ</math>.</p> <p>18. <math>4x + 2x = 6x = 180</math>, so <math>x = 30^\circ</math>.</p> <p>19. They are complementary: <math>90 - 38 = 52^\circ</math>.</p> <p>20. <math>4x = 360</math>, so <math>x = 90^\circ</math>.</p> <p>21. Complementary angles add to <math>90^\circ</math>, so the angle is <math>90 - 58 = 32^\circ</math>.</p> <p>22. A linear pair is supplementary, so the other angle is <math>180 - 124 = 56^\circ</math>.</p> <p>23. The angle directly across is a vertical angle, and vertical angles are always equal, so it is <math>108^\circ</math>.</p> <p>24. Angles around a point sum to <math>360^\circ</math>, so the fourth is <math>360 - 90 - 130 - 50 = 90^\circ</math>.</p> |
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