

# Parallel and Perpendicular Lines

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

## Q Quick Review

Lines can have special relationships with each other. **Parallel lines** are always the same distance apart and never cross, no matter how far they go — think of the two long rails of a train track. **Perpendicular lines** cross each other and make a *right angle* ( $90^\circ$ ) where they meet, like the corner of a window. Lines that cross but do *not* make a right angle are called **intersecting lines**. A quick way to remember: parallel lines stay apart forever, while perpendicular lines meet to form a perfect square corner.

◇ **Example:** Two lines cross each other, and the angle where they meet measures exactly  $90^\circ$ . What is the relationship between the two lines?  
 ⇒ First notice that the lines do cross, so they are at least intersecting. The special clue is the angle at the crossing point: it is exactly  $90^\circ$ , a right angle. Lines that cross and form a right angle have a special name — they are perpendicular. So these two lines are perpendicular.

**Answer:** perpendicular

## PRACTICE

Name the relationship between the lines or describe the figure in each problem.

- |  |  |
|--|--|
| 1. Two lines that never cross and stay the same distance apart _____ | 20. Two roads that cross at a slanted, non-square corner _____     |
| 2. Two lines that cross and form a $90^\circ$ angle _____            | 14. The shelves of a tall bookcase _____                           |
| 3. The two long rails of a train track _____                         | 15. The lines of the letter T _____                                |
| 4. The corner where two walls of a room meet _____                   | 16. Two lines that will never meet no matter how far they go _____ |
| 5. Two lines that cross but do not make a $90^\circ$ angle _____     | 17. The hands of a clock at 3:00 _____                             |
| 6. The top and bottom edges of a chalkboard _____                    | 18. Two pencils laid down so they cross like a slanted X _____     |
| 7. The two lines that form a plus sign + _____                       | 19. The two sides of a road that a car drives between _____        |
| 8. The lines of the letter X _____                                   | 20. The lines that form the corner of a picture frame _____        |
| 9. The opposite sides of a rectangle _____                           |  |
| 10. Two sides of a rectangle that share a corner _____               |  |
| 11. The two long edges of a ruler _____                              |  |
| 12. Lines that meet to form a perfect square corner _____            |  |

### ◆ Word Problems

21. Liam is drawing a map. He draws Maple Street and Oak Street so they cross each other and form a perfect  $90^\circ$  corner. What is the relationship between the two streets? \_\_\_\_\_
22. On the soccer field, the two long sidelines run straight down the field and never get closer together or cross. What kind of lines are the two sidelines? \_\_\_\_\_
23. Sofia notices that the floor and one wall of her classroom meet to form a square corner. What is the relationship between the floor and that wall? \_\_\_\_\_
24. Noah draws two lines that cross in the middle of his page, but the angles they make are not square corners. What is the best name for these two lines? \_\_\_\_\_



## Answer Keys

- |                   |                        |
|-------------------|------------------------|
| 1. parallel       | 13. intersecting       |
| 2. perpendicular  | 14. parallel           |
| 3. parallel       | 15. perpendicular      |
| 4. perpendicular  | 16. parallel           |
| 5. intersecting   | 17. perpendicular      |
| 6. parallel       | 18. intersecting       |
| 7. perpendicular  | 19. parallel           |
| 8. intersecting   | 20. perpendicular      |
| 9. parallel       | 21. perpendicular      |
| 10. perpendicular | 22. parallel lines     |
| 11. parallel      | 23. perpendicular      |
| 12. perpendicular | 24. intersecting lines |

### Step-by-Step Explanations

- |   |   |
|---|---|
| <p>1. Lines that never meet and stay equally apart are parallel.</p> <p>2. Crossing at a right angle of <math>90^\circ</math> makes the lines perpendicular.</p> <p>3. Train rails stay the same distance apart forever, so they are parallel.</p> <p>4. Walls meet at a square corner of <math>90^\circ</math>, so they are perpendicular.</p> <p>5. They cross but the angle is not a right angle, so they are simply intersecting.</p> <p>6. The top and bottom edges stay the same distance apart, so they are parallel.</p> <p>7. A plus sign is made of two lines crossing at <math>90^\circ</math>, so they are perpendicular.</p> <p>8. The two strokes of an X cross, but not at a right angle, so they are intersecting.</p> <p>9. Opposite sides of a rectangle never meet and stay equally apart — parallel.</p> <p>10. Sides that meet at a rectangle's corner form a <math>90^\circ</math> angle, so they are perpendicular.</p> <p>11. A ruler's long edges stay the same distance apart, so they are parallel.</p> <p>12. A perfect square corner is a right angle, so the lines are perpendicular.</p> <p>13. They cross but the corner is not square, so the roads are just intersecting.</p> <p>14. Each shelf stays the same distance from the next, so the shelves are parallel.</p> | <p>15. The line across the top of a T meets the stem at <math>90^\circ</math>, so they are perpendicular.</p> <p>16. Lines that never meet, staying equally apart, are parallel.</p> <p>17. At 3:00 the clock hands form a <math>90^\circ</math> angle, so they are perpendicular.</p> <p>18. The pencils cross but not at a right angle, so they are intersecting.</p> <p>19. The two sides of a road stay the same distance apart, so they are parallel.</p> <p>20. A picture-frame corner is a <math>90^\circ</math> angle, so those lines are perpendicular.</p> <p>21. Lines that cross and make a right angle of <math>90^\circ</math> are perpendicular, so the two streets are perpendicular.</p> <p>22. The sidelines stay the same distance apart and never meet, which means they are parallel lines.</p> <p>23. A square corner is a <math>90^\circ</math> right angle, so the floor and the wall are perpendicular.</p> <p>24. The lines cross but do not make a <math>90^\circ</math> angle, so they are simply intersecting lines.</p> |
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