

## Parallel and Perpendicular Lines

Parallel lines run alongside each other and never meet. Perpendicular lines cross at a perfect right angle ( $90^\circ$ ). Most pairs of lines fit one of those two patterns.

Type	Definition
Parallel	Two lines that never cross and stay the same distance apart
Perpendicular	Two lines that cross at a $90^\circ$ (right) angle
Intersecting	Two lines that cross (at any angle)

### Key Concepts

- Parallel lines** stay the same distance apart and never touch.
- Perpendicular lines** cross at a perfect right angle ( $90^\circ$ ). They form a “+”-shape or a square corner.
- Two lines that simply **cross** are *intersecting*. Perpendicular lines are a special case where the crossing happens at  $90^\circ$ .
- Examples: railroad tracks (parallel), the corner of a book (perpendicular), the letter X (intersecting but not perpendicular).

### Worked Examples

① Two lines never touch and stay the same distance apart. Are they parallel or perpendicular?

 Never touch + same distance = parallel.

 **Answer:** *Parallel*

② Two lines cross and form a  $90^\circ$  angle. What are they?

 Crossing at  $90^\circ$  = perpendicular.

 **Answer:** *Perpendicular*

③ Name a pair of parallel lines you see in a classroom.

 Anything that runs side-by-side without crossing: the two long edges of a desk, opposite walls, the top and bottom edges of a whiteboard.

 **Answer:** *The top and bottom edges of a whiteboard*

### Practice Problems

Identify parallel, perpendicular, or other.

- Never cross, same distance apart  $\Rightarrow$  ? \_\_\_\_\_
- Cross at a  $90^\circ$  angle  $\Rightarrow$  ? \_\_\_\_\_
- Cross, but not at  $90^\circ$   $\Rightarrow$  ? \_\_\_\_\_
- Railroad tracks are \_\_\_\_\_.
- A plus sign (+) has \_\_\_\_\_ lines. \_\_\_\_\_
- The letter H has \_\_\_\_\_ lines. \_\_\_\_\_

7. Opposite sides of a rectangle are \_\_\_\_\_.

\_\_\_\_\_

8. Adjacent sides of a rectangle are \_\_\_\_\_.

\_\_\_\_\_

9. Do parallel lines form an angle? (Y/N)

\_\_\_\_\_

10. Can two perpendicular lines be parallel? (Y/N)

\_\_\_\_\_

11. The letter T has a pair of \_\_\_\_\_ lines.

\_\_\_\_\_

12. Floor and wall meet at a \_\_\_\_\_ angle.

\_\_\_\_\_

### Study Tips

-  Look for the small square symbol at a corner — it means  $90^\circ$  (perpendicular).
-  Parallel lines always go in the same direction and never get closer or farther apart.
-  In a rectangle, opposite sides are parallel and adjacent sides are perpendicular.

### Word Problems

1. Maya looks at the lines on a basketball court. The two sidelines run side by side and never cross. Are they parallel or perpendicular?

Answer: \_\_\_\_\_

2. The horizontal and vertical bars on a window frame meet at right angles. What type of lines are they?

Answer: \_\_\_\_\_

**Answer Key — with Friendly Explanations****Practice Problems**

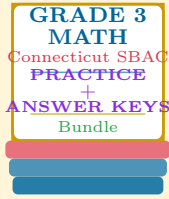
1. Parallel.  
 **Answer:** *Parallel*
2. Perpendicular.  
 **Answer:** *Perpendicular*
3. Intersecting (but not perpendicular).  
 **Answer:** *Intersecting*
4. Parallel.  
 **Answer:** *Parallel*
5. Perpendicular.  
 **Answer:** *Perpendicular*
6. Parallel (the two upright sides).  
 **Answer:** *Parallel*
7. Parallel.  
 **Answer:** *Parallel*
8. Perpendicular.  
 **Answer:** *Perpendicular*
9. No — they don't meet.  
 **Answer:** *No*
10. No — perpendicular lines must cross, so they aren't parallel.  
 **Answer:** *No*
11. Perpendicular.  
 **Answer:** *Perpendicular*
12. Right angle ( $90^\circ$ ).  
 **Answer:** *Right ( $90^\circ$ )*

**Word Problems**

1. Side by side, never cross = parallel.  
 **Answer:** *Parallel*
2. Cross at  $90^\circ$  = perpendicular.  
 **Answer:** *Perpendicular*

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