## Perpendicular Lines

i. Definition and Explanation

What are Perpendicular Lines? Perpendicular lines are two distinct lines that intersect (meet or cross each other) at a right angle.

- **Intersect:** This means the lines cross at a single point.

- **Right Angle:** A right angle is an angle that measures exactly 90 degrees (90°). It's often called a "square corner," like the corner of a book or a square tile.
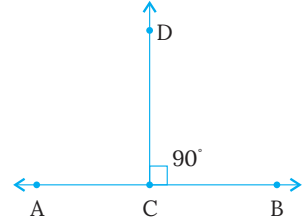
Think of it like a perfect "plus sign" (+) or the capital letter "L". The spot where the lines cross forms four right angles.

Real-World Examples:

- The corners of a window pane.

- The intersection of a wall and the floor.

- The lines on a sheet of graph paper.

- The hands of a clock at 3:00 or 9:00.

ii. Key Points and Important Terms

The Symbol for Perpendicular:

- In geometry, we use the symbol ⊥ to show that two lines are perpendicular.

- If Line AB is perpendicular to Line CD, we write it as: AB ⊥ CD.

- This is read as "Line AB is perpendicular to line CD."

The Right Angle Symbol:

- In diagrams, a small square (□) is drawn at the intersection of two lines to indicate that they form a right angle (90°).

- If you see this symbol, you know the lines are perpendicular, even if it's not explicitly stated.

Intersection Point:

- The single point where two perpendicular lines cross is called the point of intersection.

Four Right Angles:

- When two lines are perpendicular, they don't just form one 90° angle. They form four 90° angles at the point of intersection.

iii. Detailed Examples with Solutions

**Example 1:** Identifying Perpendicular Lines

Problem: Look at the diagram below. Which pair of lines is perpendicular?

Solution:

Analyze the intersections: Line 'a' intersects with both line 'b' and line 'c'.

Look for the right-angle symbol: The intersection of line 'a' and line 'b' has a small square symbol (□).

Conclusion: This symbol means they meet at a 90° angle. Therefore, line a ⊥ line b. The intersection of line 'a' and line 'c' does not have this symbol and is clearly not a 90° angle.
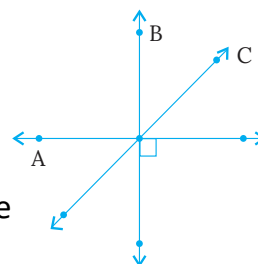
Example 2: Finding an Unknown Angle

**Problem:** In the diagram, we are told that line XY ⊥ line WZ. Find the value of angle 'a'.

Solution:

Understand the given information: The key information is XY ⊥ WZ.

Recall the definition: The symbol ⊥ means the lines are perpendicular, and perpendicular lines intersect at a 90° angle.

Apply the definition: Since the lines are perpendicular, all four angles formed at the intersection are 90°.

Conclusion: Therefore, the measure of angle 'a' is 90°.
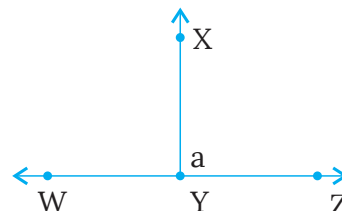
iv. Summary of Main Concepts

- **Definition:** Perpendicular lines are two lines that intersect at a right angle (90°).

- **Symbol:** The symbol for perpendicular is ⊥.

- **Identification:** You can identify perpendicular lines by being told (e.g., a ⊥ b) or by seeing the right-angle symbol (□) in a diagram.

- **Key Property:** When two lines are perpendicular, all four angles formed at the intersection are 90°.

- **Important Distinction:** All perpendicular lines are intersecting lines, but not all intersecting lines are perpendicular. The 90° angle is the special condition.