Perpendicular Lines

A. Fill in the Blanks

1. Perpendicular lines intersect to form a _____ angle.
2. In a coordinate plane, a horizontal line and a vertical line are always _____.
3. The diagonals of a _____ are perpendicular, but the diagonals of a rectangle are not. (Hint: a four-sided shape)
4. If two lines are perpendicular, the four angles they create at the intersection each measure _____ degrees.
5. If line a ⊥ b and line b || c, then line a must be _____ to line c.

B. Match the Following;

Column A	Column B
1. Perpendicular Lines	A. Lines that never intersect.
2. Right Angle	B. ⊥
3. Parallel Lines	C. Lines that intersect to form 90° angles.
4. Perpendicular Symbol	D. An angle that measures exactly 90°.
5. Intersecting Lines	E. Lines that cross at any angle.

C. Practice Problems

1. If ∠1 = 90°, what is the measure of ∠3?
2. What is the sum of ∠2 and ∠3?
3. Lines l and m are perpendicular. Find x.

x = _____

4. Lines PQ and RS are perpendicular. Find x.

x = _____

5. In the figure, AB ⊥ CD. Find x.

x = _____

D. Warm-up Questions

1. What is the measure of the angle formed by two perpendicular lines?
2. What is the symbol used to show that two lines are perpendicular?
3. Look at the rectangle ABCD below. Name a pair of sides that are perpendicular.

4. If line m is perpendicular to line n, are all four angles at their intersection 90°? (Yes/No)

5. Which of the following real-world examples shows perpendicular lines? a) Railway tracks b) The corners of a book c) The rungs of a ladder

E. Challenge Questions

1. In the figure, EF ⊥ GH and ∠EJG = 145°. Find the measure of ∠HJI.
   ∠HJI = _____
2. Line a is perpendicular to line b. Line c is also perpendicular to line b. What is the relationship between line a and line c? Explain your reasoning.
3. A line, L1, passes through the points (1, 2) and (3, 6). Another line, L2, passes through the points (0, 5) and (4, 3). Are these two lines perpendicular? (Hint: Find the slope of each line. The slope $m = (y_2 - y_1) / (x_2 - x_1)$).
4. In the diagram, AC ⊥ BD and ∠BPE = 130°. Find the measure of ∠PCB. (Hint: Angles on a straight line add up to 180°).
   ∠PCB = _____
5. The corners of a cube represent points. The edges represent lines. If you are at one corner of a cube, how many edges connected to that corner are perpendicular to each other?

F. Word Problems & Application

1. A carpenter is building a rectangular window frame. He measures one corner and finds it is 90°. What does this tell him about the two pieces of wood that form that corner?

2. On a city map, 1st Avenue runs perfectly North-South and Washington Street runs perfectly East-West. What is the geometric relationship between the avenue and the street?

3. You are programming a robot to draw a plus sign (+). You program it to draw a vertical line segment. What instruction must you give the robot to draw the second line segment to complete the sign correctly?

4. A sailboat's mast is perpendicular to its deck. If the deck is perfectly flat and represents the x-axis on a coordinate plane, what kind of line does the mast represent?

5. To ensure a wall is perpendicular to the floor, a builder uses a tool to check if the angle is 90°. If she measures an angle of 88°, is the wall perpendicular? What might be a consequence of this?

G. True or False

1. Any two lines that cross are perpendicular. _____

2. Two lines are perpendicular if their slopes are equal. _____

3. The adjacent sides of a perfect square are perpendicular. _____

4. It is possible for two lines to be both parallel and perpendicular. _____

5. A line with a slope of 0 is perpendicular to a line with an undefined slope. _____