

## Number Puzzles and Sequences

### 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  $a \perp b$  and line  $b \parallel c$ , 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. $\perp$
3. Parallel Lines	C. Lines that intersect to form $90^\circ$ angles.
4. Perpendicular Symbol	D. An angle that measures exactly $90^\circ$ .
5. Intersecting Lines	E. Lines that cross at any angle.

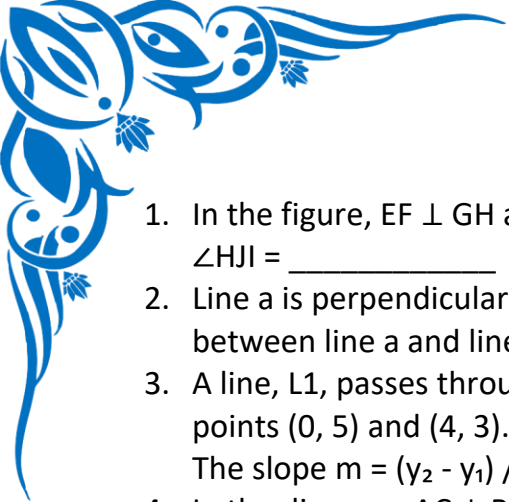
### C. Find the missing term(s) and describe the rule for each sequence.

1. 3, 8, 13, 18, \_\_\_\_, 28
2. 100, 50, 25, 12.5, \_\_\_\_
3. 7, 3, -1, -5, \_\_\_\_, \_\_\_\_
4. 1, 2, 4, 7, 11, 16, \_\_\_\_
5. 2, 3, 5, 8, 13, \_\_\_\_

### D. Find the next term in each sequence.

1. 4, 8, 12, 16, \_\_\_\_
2. 30, 27, 24, 21, \_\_\_\_
3. 2, 4, 8, 16, \_\_\_\_
4. 1, 4, 9, 16, 25, \_\_\_\_
5. 5, 11, 17, 23, 29, \_\_\_\_

### E. Challenge Questions



1. In the figure,  $EF \perp GH$  and  $\angle EHG = 145^\circ$ . Find the measure of  $\angle HJI$ .  
 $\angle HJI =$  \_\_\_\_\_
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,  $L_1$ , passes through the points  $(1, 2)$  and  $(3, 6)$ . Another line,  $L_2$ , 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,  $AC \perp BD$  and  $\angle BPE = 130^\circ$ . Find the measure of  $\angle PCB$ . (Hint: Angles on a straight line add up to  $180^\circ$ ).  
 $\angle PCB =$  \_\_\_\_\_
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  $90^\circ$ . 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  $90^\circ$ . If she measures an angle of  $88^\circ$ , 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. \_\_\_\_\_