

**WEEKLY HOME STUDY PACKAGE - WEEK 5 (02/08/21 – 06/08/21)**

Subject	MATHEMATICS	Year/Level	11
Strand	5 – Coordinate Geometry		
Sub-strand	5.2 – Parallel and perpendicular lines		
Content Learning Outcome	Study and use gradients of parallel and perpendicular lines		

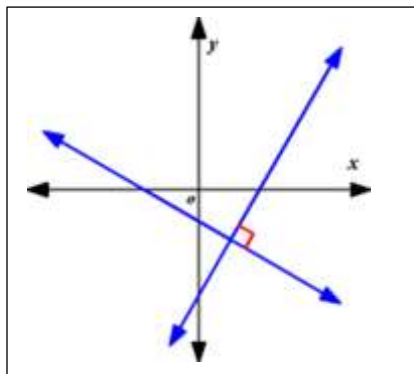
LESSON NOTES:

Perpendicular lines are lines that intersect at right angles.

If you multiply the slopes of two perpendicular lines in the plane, you get -1 .

$$\text{That is: } m_1 \cdot m_2 = -1$$

That is, the slopes of perpendicular lines are opposite reciprocals.



(Exception: Horizontal and vertical lines are perpendicular, though you can't multiply their slopes, since the slope of a vertical line is undefined.)

We can write the equation of a line perpendicular to a given line if we know a point on the line and the equation of the given line.

Example: Write the equation of a line that passes through the point (1,3) and is perpendicular to the line $y = 3x + 2y$.

$$\begin{aligned} m_1 &= 3 \\ 3 \times m_2 &= -1 \\ m_2 &= \frac{-1}{3} \end{aligned}$$

New Equation: $y = mx + c$

$$3 = \frac{-1}{3}(1) + c$$

$$3 = \frac{-1}{3} + c$$

$$c = 3\frac{1}{3} = \frac{10}{3}$$

$$y = \frac{-1}{3}x + \frac{10}{3}$$

Example: What is the equation for the line that is perpendicular to $4x - 3y = 6$ through point (4,6)?

$$3y = 4x - 6$$

$$y = \frac{4}{3}x - 2$$

$$m_1 = \frac{4}{3}$$

$$\frac{4}{3} \times m_2 = -1$$

$$m_2 = \frac{-3}{4}$$

New Equation: $y = mx + c$

$$6 = \frac{-3}{4}(4) + c$$

$$6 = -3 + c$$

$$c = 9$$

$$y = \frac{-3}{4}x + 9$$

ACTIVITIES:

1. If one line passes through the points (0, -4) and (-1, -7) and another line passes through the points (3, 0) and (-3, 2). Are these lines parallel or perpendicular? **[2 marks]**
2. Find the slope of a line perpendicular to the line $y = -4x + 9$. **[1 mark]**
3. What is the equation of a line that passes through the point (-1, -2) and is perpendicular to $-5x = 6y + 18$? **[2 marks]**