

Linear Coordinate Geometry

Let point ② be (x_2, y_2)	Let point ① be (x_1, y_1)
Difference $(x_2 - x_1, y_2 - y_1)$	Distance ² $(x_2 - x_1)^2 + (y_2 - y_1)^2$
Gradient m	$(y_2 - y_1) / (x_2 - x_1)$
If perpendicular	$m_1 \times m_2 = -1$

Let point ② be (x_2, y_2)	Let point ① be (x_1, y_1)
Sum	$\{ (x_2 + x_1), (y_2 + y_1) \}$
Midpoint	$\{ \frac{1}{2}(x_2 + x_1), \frac{1}{2}(y_2 + y_1) \}$

Write out coordinates ① M ② vertically. x and y coord. in equal steps.

Useful method for working out when given ① and M.

Linear equation $y = mx + c$ (c is y-intercept)

Rewrite $y - y_1 = mx$

Effective moves the coordinates *down* by y_1 while fixing the line

Hence we deduce $y - y_1 = m(x - x_1)$

Thus we can deduce the equation given just one point and gradient.

With an expression for m, if given two points we can write

$$\frac{y - y_1}{y_2 - y_1} = \frac{(x - x_1)}{(x_2 - x_1)}$$

Typical Problem

Given coordinates of two points find equation perpendicular bisector.

Step 1 Find gradient of the joining line and the midpoint.

Step 2 Use $m_1 \times m_2 = -1$ to find gradient bisector.

Step 3 Using midpoint value and new gradient write new equation

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