



Please note: All attempts have been made to ensure the accuracy and reliability of the information provided in this document.

Coordinate Geometry: The Line – Hints & Tips

General Hints and Tips

- 1 **Always draw diagrams.** This is useful in every question, but it is particularly helpful with questions relating to the circle or more difficult questions.
- 2 Make sure you **know which formulae are in the tables**, and where in the tables they are.
Formulae in the tables:

Slope of a line

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

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Distance between 2 points

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

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Midpoint formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

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Equation of a line (2 different formats)

$$(y - y_1) = m(x - x_1)$$

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Area of a triangle with one point at the origin

$$\left(\frac{1}{2} |x_1 y_2 - x_2 y_1| \right)$$

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Point dividing a line segment in the ratio a:b

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To find the angle between 2 lines:

$$\tan \theta = \pm (m_1 - m_2) / (1 + m_1 m_2)$$

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Perpendicular distance from a point to a line

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$$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

- 3 **Learn other formulae** off by heart.



The Line

- 1 To get an **equation of a line** you always need 2 things:
 - **A point**
 - **A slope**Once you have these, use the formula $y - y_1 = m(x - x_1)$
- 2 To check if a point is on a line, substitute it into the equation.
If the answer = 0, then the point is on the line, otherwise it is not.
- 3 To plot a line, you need two points on the line.
An easy way to find points on a line is:
Let $x = 0$, solve for y . This will give you a point $(0, y)$
Let $y = 0$, solve for x . This will give you a point $(x, 0)$
Use these two points to plot the line.
- 4 If a line **intersects the x-axis**, then **$y = 0$** at that point.
If a line **intersects the y-axis**, then **$x = 0$** at that point.
- 5 Use simultaneous equations to find the point of intersection between 2 lines.
- 6 If lines are **parallel**, their **slopes are equal**.
If lines are **perpendicular**, then multiplying their slopes together equals -1 (**$m_1 \cdot m_2 = -1$**)
An example - you want the slope of a line and are told it is perpendicular to another line with slope $2/3$
Turn it upside down and change the sign of it. So in this case, the slope of the line you want is $-3/2$
- 8 To use the area of a triangle formula ($\frac{1}{2}|x_1y_2 - x_2y_1|$) one of the points needs to be $(0,0)$.
If you are looking for the area of a triangle, where no points are at the origin $(0,0)$,
use translations to bring one of the points to $(0,0)$ and then use the formula as normal.
Alternatively, you can use the area = $\frac{1}{2}$ base x perpendicular height formula.
- 9 If 3 or more points lie on the same line, they are said to be collinear.
To check if 3 points (e.g. a, b, c) are collinear, see what the slopes of $|ab|$ and $|bc|$ are.
If they are the same, then the points are collinear, otherwise they are not.
An alternative way of doing this is to calculate the area of the triangle using the 3 points.
If the area = 0, then the points are collinear, otherwise they are not.