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**
$$\frac{(y2 - y1)}{(x2 - x1)}$$

- **Distance between 2 points**
$$\sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

- **Midpoint formula**
$$\left(\frac{x1 + x2}{2}, \frac{y1 + y2}{2}\right)$$

- **Equation of a line (2 different formats)**
$(y - y1) = m(x - x1)$

- **Area of a triangle with one point at the origin**
$(½|x1y2 - x2y1|)$

- **Point dividing a line segment in the ratio a:b**

- **To find the angle between 2 lines:**
$Tan\theta = \pm(m1 - m2)/(1 + m1.m2)$

- **Perpendicular distance from a point to a line**
$$\frac{|ax1 + by1 + c|}{\sqrt{a^2 + b^2}}$$

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 (**$m_1.m_2$ = -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.