



Matteman

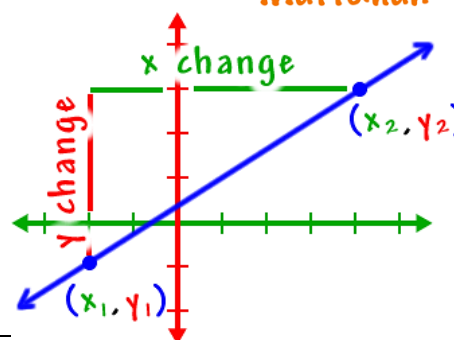
# HIGH SCHOOL MATHEMATICS

## COORDINATE GEOMETRY

### Gradient

The slope of a line is called its gradient.

$$m = \frac{\text{change in } y - \text{axis}}{\text{change in } x - \text{axis}} \rightarrow m = \frac{y_2 - y_1}{x_2 - x_1}$$



### Equation of a straight line

Equation of a straight line could be written in the form of  $y = mx + c$  or  $ax + by + c = 0$ .

If you know **the coordinates of one point** on the line and **the gradient** you will be able to write its equation by using the following formula.

Coordinates  $(x_1, y_1)$  and Gradient  $m$   $\rightarrow$  Equation could be written as:  $y - y_1 = m(x - x_1)$

### Mid-point

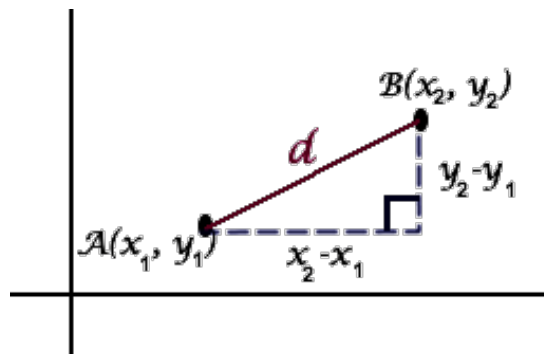
$A(x_1, y_1)$  and  $B(x_2, y_2)$  the coordinates of the mid-point  $M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

### Distance between two points (The length of a line segment)

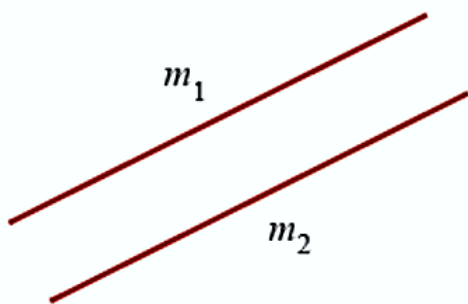
The distance between points A and B with coordinates

$A(x_1, y_1)$  and  $B(x_2, y_2)$  is

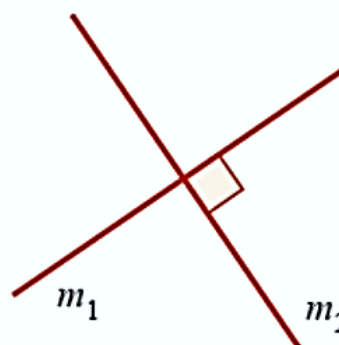
$$|AB| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



### Parallel and Perpendicular lines



parallel lines:  $m_1 = m_2$

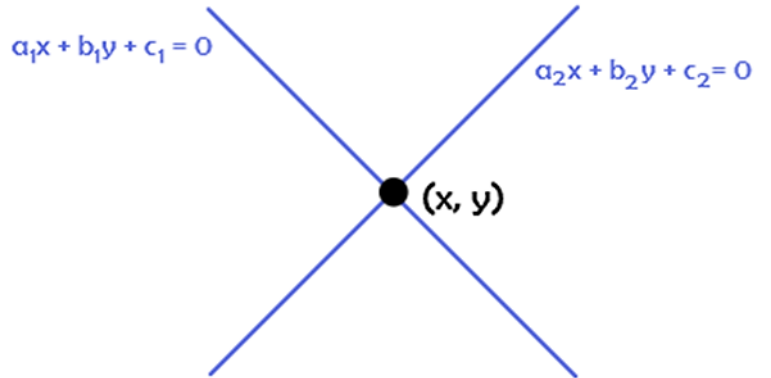


perpendicular lines:  $m_1 m_2 = -1$

### Point of intersection

Two lines intersect at a point  $(x, y)$  as long as they are not parallel to each other.

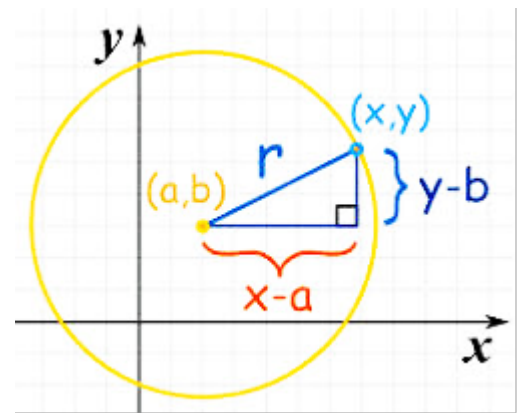
To find the coordinates of this particular point you need to solve their equations simultaneously.



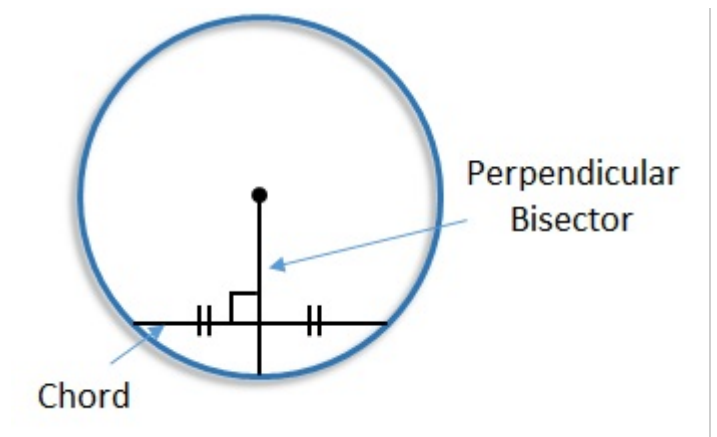
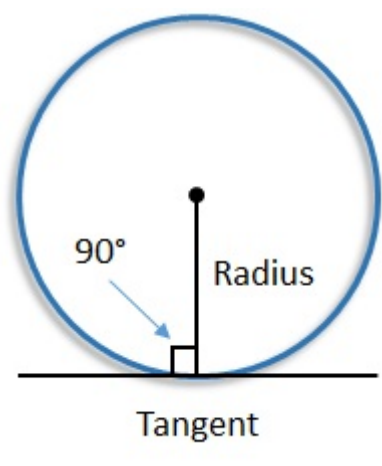
### Circle equations

A circle with centre  $C(a, b)$  and radius of  $r$  is represented by the equation:

$$(x - a)^2 + (y - b)^2 = r^2$$



### Circle theorems that you need to recall



### Shortest distance

The shortest distance from a point to a line is the perpendicular distance.

To visualise this, you can look this figure

