MIDPOINT FORMULA

The midpoint formula is based on finding the average between two points in order to find the Cartesian co-ordinate that is of equal distance to both of the points that falls on a linear function (commonly denoted as f(x))

Each co-ordinate pair is initially identified as (x_1, y_1) and (x_2, y_2)

Suppose two points on the Cartesian plane are given by (2,3) and (3,6)

Assume that (2,3) is co-ordinate point 1 and that (3,6) is co-ordinate point 2.

Hence one can infer that

$X_1 = 2$, $y_1 = 3$, $X_2 = 3$ and $y_2 = 6$

Values can then be substituted into the general form

$$\left(\frac{x_1+x_2}{2}\right),\left(\frac{y_1+y_2}{2}\right) = \left(\frac{2+3}{2}\right),\left(\frac{3+6}{2}\right)$$

∴ The co-ordinate point of the midpoint can be denoted by $\left(\frac{5}{2},\frac{9}{2}\right)$

A more complex example involving surds and fractional numbers

Assume that (√5,(3/4)) is co-ordinate point 1 and that (4,√6) is co-ordinate point 2.

Hence one can infer that

$X_1 = \sqrt{5}$, $y_1 = 4$, $X_2 = 3/4$ and $y_2 = \sqrt{6}$

Values can then be substituted into the general form and simplified

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

$$\therefore \left(\frac{\sqrt{5}+4}{2}\right),\left(\frac{\frac{3}{4}+\sqrt{6}}{2}\right) = \left(2+\frac{\sqrt{5}}{2},\frac{4\sqrt{6}+3}{2}\right)$$