DISTANCE FORMULA

The distance formula is based on Pythagorean theorem for right-angled triangles. Initially, a horizontal and vertical component is constructed at right angles, such that they are perpendicular.

Each co-ordinate pair is then 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 given

$$d = \sqrt{(x_2 - x_1) + (y_2 - y_1)}$$

Note: ($x_2$-$x_1$) = difference in x (delta x), and the same goes for y

$$\therefore\ d = \sqrt{(3-2)+(6-3)}$$
$$d = \sqrt{(1)+(3)}$$
$$d = \sqrt{4}$$
$$d = 2\ \ units$$

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

$$d = \sqrt{(x_2 - x_1) + (y_2 - y_1)} = \sqrt{((3/4) - \sqrt{5}) + (\sqrt{6} - 4)} = \sqrt{((13/4) + \sqrt{5} - \sqrt{6})} = 1.74258$$