Lesson 2 – *Distance between two points*

The shortest distance between two points is a straight line (segment). To calculate this distance between point $A(x_1, y_1)$ and point $B(x_2, y_2)$ we use the following formula:

$$d(A,B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

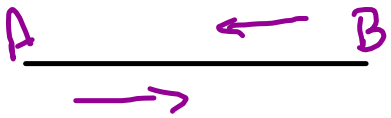
$c^2 = a^2 + b^2$

$c = \sqrt{a^2 + b^2}$

$\Delta x^2 + \Delta y^2$

The length is always expressed as a positive number.

(a segment with endpoints A and B is written as $\overline{AB}$)



Ex. Find the distance of $\overline{AB}$ given $A(4,3)$ and $B(7,7)$.

x_1 x_2 y_1 y_2

$$d(A,B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(7-4)^2 + (7-3)^2}$$

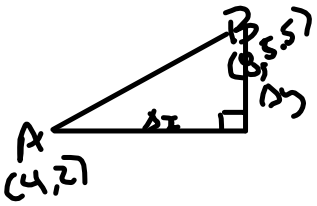
$$= \sqrt{(3)^2 + (4)^2}$$

$$= \sqrt{9 + 16}$$

$$= \sqrt{25}$$

= 5 units

Ex. $A(\overset{x_1}{4}, \overset{y_1}{2})$ $B(\overset{x_2}{8}, \overset{y_2}{5.5})$



$$d(A,B) = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$\sqrt{(8-4)^2 + (5.5-2)^2}$$

$$\sqrt{4^2 + 3.5^2}$$

$$\sqrt{16 + 12.25}$$

$$\sqrt{28.25}$$

$$5.32 \text{ u}$$

Ex. $C(6731, 2111)$ $D(9866, 1)$

x_1 y_1 x_2 y_2

$-4^2 \neq (-4)^2$

$-16 \neq 16$

$$d(C,D) = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$\sqrt{(9866-6731)^2 + (1-2111)^2}$$

$$\sqrt{3135^2 + (-2110)^2}$$

$$\sqrt{9828225 + 4452100}$$

$$\sqrt{14280325}$$

$$3778.93u$$

$(x_1, y_1) = (71, 66)$ $(x_2, y_2) = (711, 911)$

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

$\sqrt{(711 - 71)^2 + (911 - 66)^2}$

$\sqrt{(640)^2 + (845)^2}$

$\sqrt{409600 + 714025}$

$\sqrt{1123625}$

$= 1060.11792$

(x_m, y_m) $\quad x_m = \frac{x_1 + x_2}{2}$

$y_m = \frac{y_1 + y_2}{2}$

$d(A,B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$