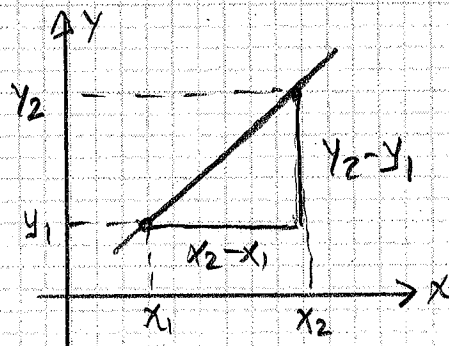
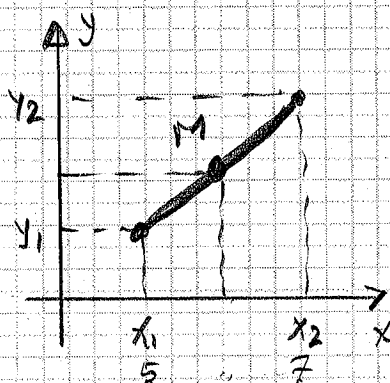
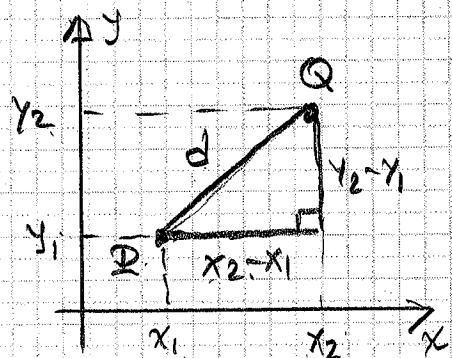


DISTANCE, MIDPOINT AND SLOPE

$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

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

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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

EX: Given the two points: $A = \begin{matrix} x_1 & y_1 \\ (1, 2) \end{matrix}$ and $B = \begin{matrix} x_2 & y_2 \\ (4, 6) \end{matrix}$, find the distance between them, the coordinates of the midpoint and the slope of the line that goes through A and B

$$d = \sqrt{(4-1)^2 + (6-2)^2} = \sqrt{9+16} = \sqrt{25} = 5$$

$$M = \left(\frac{1+4}{2}, \frac{2+6}{2} \right) = \left(\frac{5}{2}, 4 \right)$$

$$m = \frac{6-2}{4-1} = \frac{4}{3}$$

Ex: Use the distance formula to show that the triangle with vertices $A = (1, 1)$, $B = (2, 3)$ and $C = (4, 2)$ is a right triangle

$$d_{AB}^2 = (2-1)^2 + (3-1)^2 = 1 + 4 = 5$$

$$d_{BC}^2 = (4-2)^2 + (2-3)^2 = 4 + 1 = 5$$

$$d_{AC}^2 = (4-1)^2 + (2-1)^2 = 9 + 1 = 10$$

$$d_{AB}^2 + d_{BC}^2 = d_{AC}^2$$

