GIVEN 2 POINTS:

(x_1, y_1) (x_2, y_2)

DISTANCE FORMULA

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

① $(1,5)$ $(5,8)$

$x_1\ y_1$ $x_2\ y_2$

$$d = \sqrt{\left((8) - (5)\right)^2 + \left((5) - (1)\right)^2}$$

(y_2, y_1; x_2, x_1)

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

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

$$= \sqrt{25}$$

$$= 5$$

② $(-2, -3)$ $(7, -5)$

$x_1\ y_1$ $x_2\ y_2$

$$d = \sqrt{\left((-5) - (-3)\right)^2 + \left((7) - (-2)\right)^2}$$

(y_2, y_1; x_2, x_1)

$$= \sqrt{(-5+3)^2 + (7+2)^2}$$

$$= \sqrt{(-2)^2 + (9)^2}$$

$$= \sqrt{4 + 81}$$

$$= \sqrt{85}$$

$85 = 5 \cdot 17$

③ $(3\sqrt{2}, \sqrt{7})$ $(5\sqrt{2}, 4\sqrt{7})$

$x_1\ y_1$ $x_2\ y_2$

$$d = \sqrt{\left((4\sqrt{7}) - (\sqrt{7})\right)^2 + \left((5\sqrt{2}) - (3\sqrt{2})\right)^2}$$

(y_2, y_1; x_2, x_1)

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

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

$$= \sqrt{9(7) + 4(2)}$$

$$= \sqrt{63 + 8}$$

$$= \sqrt{71}$$

MIDPOINT FORMULA

GIVEN 2 POINTS

(x_1, y_1) (x_2, y_2)

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

④ $(2,7)$ $(4,3)$

$x_1\ y_1$ $x_2\ y_2$

$$M = \left(\frac{2+4}{2}, \frac{7+3}{2}\right)$$

$$= \left(\frac{6}{2}, \frac{10}{2}\right)$$

$$(3,5)$$

⑤ $(1,5)$ $(3,2)$

$x_1\ y_1$ $x_2\ y_2$

$$M = \left(\frac{1+3}{2}, \frac{5+2}{2}\right)$$

$$= \left(\frac{4}{2}, \frac{7}{2}\right)$$

$$= \left(2, \frac{7}{2}\right)$$

⑥ $(4\sqrt{3}, 2\sqrt{5})$ $(8\sqrt{3}, 3\sqrt{5})$

$x_1\ y_1$ $x_2\ y_2$

$$M = \left(\frac{4\sqrt{3} + 8\sqrt{3}}{2}, \frac{2\sqrt{5} + 3\sqrt{5}}{2}\right)$$

$$= \left(\frac{12\sqrt{3}}{2}, \frac{5\sqrt{5}}{2}\right)$$

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