GIVEN 2 POINTS
(x_1, y_1) (x_2, y_2)

DISTANCE FORMULA

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

MIDPOINT FORMULA

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

#1 $(3, -5)$ $(9, -7)$
x_1 y_1 x_2 y_2

$$d = \sqrt{\left((-7) - (-5)\right)^2 + \left((9) - (3)\right)^2}$$
(y_2 y_1 x_2 x_1)

$$= \sqrt{(-7+5)^2 + (9-3)^2}$$
$$= \sqrt{(-2)^2 + (6)^2}$$
$$= \sqrt{4 + 36}$$
$$= \sqrt{40}$$
$$\sqrt{2 \cdot 2 \cdot 2 \cdot 5}$$
$$2\sqrt{10}$$

#2 $(3\sqrt{2}, 2\sqrt{5})$ $(-\sqrt{2}, 4\sqrt{5})$
x_1 y_1 x_2 y_2

$$d = \sqrt{\left((4\sqrt{5}) - (2\sqrt{5})\right)^2 + \left((-\sqrt{2}) - (3\sqrt{2})\right)^2}$$
(y_2 y_1 x_2 x_1)

$$= \sqrt{\left(2\sqrt{5}\right)^2 + (-4\sqrt{2})^2}$$
$$= \sqrt{2^2(\sqrt{5})^2 + (-4)^2(\sqrt{2})^2}$$
$$= \sqrt{4(5) + 16(2)}$$
$$= \sqrt{20 + 32}$$
$$= \sqrt{52}$$
$$= \sqrt{2 \cdot 2 \cdot 13}$$
$$= 2\sqrt{13}$$

#3 $(-5, -9)$ $(-3, -4)$
x_1 y_1 x_2 y_2

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
$$= \left(\frac{-5-3}{2}, \frac{-9-4}{2}\right)$$
$$= \left(\frac{-8}{2}, \frac{-13}{2}\right)$$
$$= \left(-4, -\frac{13}{2}\right)$$

#4 $(\sqrt{40}, -3)$ $(\sqrt{10}, 13)$
$(\sqrt{2 \cdot 2 \cdot 2 \cdot 5}, -3)$
$(2\sqrt{10}, -3)$ $(\sqrt{10}, 13)$

$$M = \left(\frac{2\sqrt{10} + \sqrt{10}}{2}, \frac{-3+3}{2}\right)$$
$$= \left(\frac{3\sqrt{10}}{2}, \frac{0}{2}\right)$$
$$\left(\frac{3\sqrt{10}}{2}, 0\right)$$