Midpoint of a Line Segment

1. Points $A(-4,\ 7)$ and $B(10,\ -1)$ are endpoints of a line segment.

    Determine the midpoint, M, of $\overline{AB}$, also known as M_{AB}.

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

So:

$$M\left(\frac{-4 + 10}{2},\ \frac{7 + (-1)}{2}\right) = \left(\frac{6}{2},\ \frac{6}{2}\right) = (3,\ 3)$$

2. A line segment has one endpoint $P(6,\ -3)$ and midpoint $M(2, 5)$.

    Determine the coordinates of the other endpoint, Q.

For x:

$$2 = \frac{6 + x}{2} \Rightarrow 4 = 6 + x \Rightarrow x = -2$$

For y:

$$5 = \frac{-3 + y}{2} \Rightarrow 10 = -3 + y \Rightarrow y = 13$$

Therefore: $M(3,\ 3)$

3. The midpoint of line segment $\overline{RS}$ is $M(-1, 4)$.

Determine the co-ordinates of the other endpoint, S.

For x:

$$-1 = \frac{-7 + x}{2} \Rightarrow -2 = -7 + x \Rightarrow x = 5$$

For y:

$$4 = \frac{9 + y}{2} \Rightarrow 8 = 9 + y \Rightarrow y = -1$$

Therefore: $S(5, -1)$