Suppose the endpoints of a line segment are $A(x_1, y_1)$ and $B(x_2, y_2)$. If we start from point A, then point $P(x, y)$ divides line segment AB in the ratio of $\frac{a}{b}$. To find the coordinates of point P, use the following formula:

$$P\left(\frac{bx_1 + ax_2}{b + a}, \frac{by_1 + ay_2}{b + a}\right).$$

Example 1

Find the coordinates of the point that is one-quarter of the distance from A to B. The coordinates of point A are (1,1) and those of point B are (4,6).

Example 2

Find the coordinates of the point that is ¾ of the way from point A to point B. The coordinates of point A are (1,1) and those of point B are (4,6).

Example 3

Point A is (-24, -20). Point B is (12, 53). Determine the coordinates of the point that is 7/16 of the way from point B to point A.

Example 4

Point A is (-2.5, -1.5). Point B is (5, 1). Determine the coordinates of the point that is 3/8 of the way from point A to point B.

Example 5

Find the mid-point between points A (1, 1) and B (4,6).

## Example 6

This Cartesian graph shows an airplane's flight path. The departure point is A(−24, −20) and the destination is point B(12, 53). Determine the coordinates of the point where the plane made a refuelling stop if this point divides $\overline{AB}$ in the ratio of $\frac{7}{9}$. Show all the steps in the solution.