LF L2 Midpoint

Friday, November 4, 2022 9:45 AM

LF L2 Midpoint

Lesson 2 Midpoint

Midpoint is the point that divides a line segment into two equal parts.

If A has coordinates (x_1, y_1) and B has coordinates (x_2, y_2), then the coordinates of the midpoint, M, of the line segment AB are given by

Midpoint Formula

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

Example 1

Determine the coordinates of the midpoint M of the line segment with endpoints A (–2, –3) and B (4, 7).

x_1 y_1 x_2 y_2

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

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

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

$$(1, 2)$$

x_m y_m

$(-4, 1)$ and $(6, 7)$

$(1, 4)$

Example 2

Given the line segment DE where the coordinates of one endpoint are D (–4, 5) and the coordinates of the midpoint are M (–1, 3), determine the coordinates of the other endpoint, E.

x_1 y_1 (x_2, y_2) x_m y_m

$$x_m = \frac{x_1 + x_2}{2}$$

$$-1 = \frac{-4 + x_2}{2}$$

$$-2 = -4 + x_2$$

$$2 = x_2$$

$$y_m = \frac{y_1 + y_2}{2}$$

$$3 = \frac{5 + y_2}{2}$$

$$6 = 5 + y_2$$

$$1 = y_2$$

$\therefore E(2, 1)$

Try AB

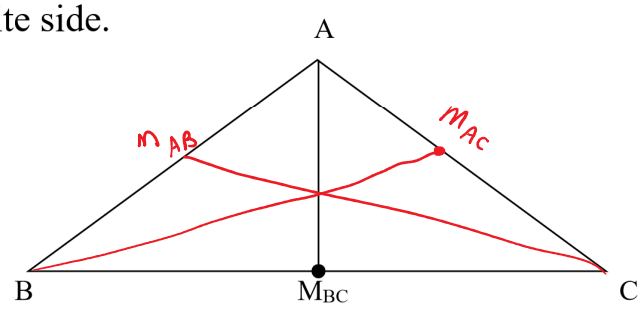
A(7, 0)

Midpoint M(3, 2)

Ans (–1, 4)

Determine the Lengths of Medians of a Triangle

A median is a line joining the vertex of a triangle with the midpoint on the opposite side.

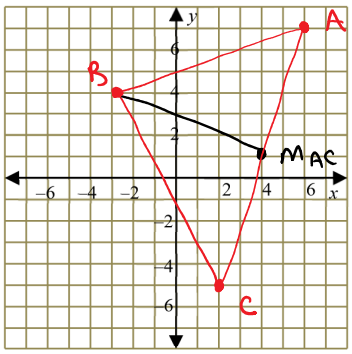


To calculate, must know: 1) the vertex of the median
2) the coordinates of the midpoint

Example 3

Given ΔABC has vertices A (6, 7), B (–3, 4) and C (2, –5), determine the length of the median from B to AC.

distance



$M = \left(\frac{6+2}{2}, \frac{7+(-5)}{2}\right)$

$= (4, 1)$

B(–3, 4)

d_{BM} or $BM = \sqrt{(-3-4)^2 + (4-1)^2}$

$= \sqrt{49 + 9}$

$= \sqrt{58}$ u