

Coordinate Geometry

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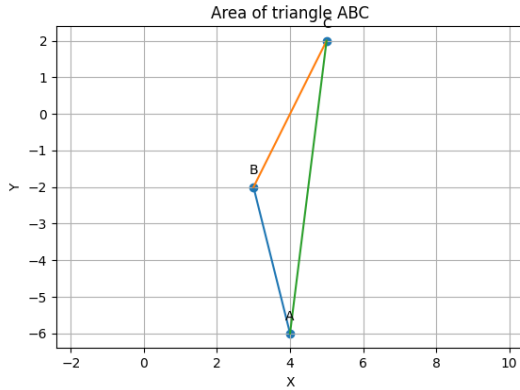
Class 10th Maths - Chapter 7

This is Problem-5 from Exercise 7.3

QUESTION: Median of a triangle divides it into two equal triangles of same areas. Verify this result for triangle ABC whose vertices are A(4,-6) B(3,-2) C(5,2)

Solution:

Construction



Let AD be the median of triangle ABC

Then,

(0.0.1)

Coordinates of point D = Midpoint of BC

(0.0.2)

$$= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{3 + 5}{2}, \frac{-2 + 2}{2} \right) = (4, 0)$$

(0.0.3)

(0.0.4)

$$\text{Area of triangle ABD} = \frac{1}{2} |(AB \times BD)|$$

(0.0.5)

$$= \frac{1}{2} \begin{vmatrix} 1 & -1 \\ -4 & -2 \end{vmatrix}$$

(0.0.6)

$$= \frac{1}{2} ((-2) - (4))$$

(0.0.7)

$$= \frac{1}{2} (-6)$$

(0.0.8)

$$= -3 \text{ square units}$$

(0.0.9)

However the area cannot be negative. Therefore the area of triangle ABD is equal to 3 square units

(0.0.10)

$$\text{Area of triangle ACD} = \frac{1}{2} |(AC \times CD)|$$

(0.0.11)

$$= \frac{1}{2} \begin{vmatrix} -1 & 1 \\ -8 & 2 \end{vmatrix}$$

(0.0.12)

$$= \frac{1}{2} ((-2) - (-8))$$

(0.0.13)

$$= \frac{1}{2} (6)$$

(0.0.14)

$$= 3 \text{ square units}$$

(0.0.15)

The area of both sides is the same. Thus, median AD has divided ABC into two triangles of equal areas.