

NCERT Solutions for Class 10 Maths Chapter 7 Coordinate Geometry

EXERCISE 7.3

Question 1.

Find the area of the triangle whose vertices are:

(i) $(2, 3), (-1, 0), (2, -4)$

(ii) $(-5, -1), (3, -5), (5, 2)$

Solution.

$$\text{Area of the triangle} = \frac{1}{2} [x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2)]$$

(i) Area of the triangle $= \frac{1}{2} [2 (0 + 4) - 1 (-4 - 3) + 2 (3 - 0)]$

$$= \frac{1}{2} (8 + 7 + 6)$$

$$= \frac{21}{2} \text{ Square units}$$

(ii) Area of the triangle $= \frac{1}{2} [-5 (-5 - 2) + 3 (2 + 1) + 5 (-1 + 5)]$

$$= \frac{1}{2} (35 + 9 + 20)$$

$$= 32 \text{ square units}$$

Question 2.

In each of the following find the value of 'k', for which the points are collinear

(i) $(7, -2), (5, 1), (3, k)$

(ii) $(8, 1), (k, -4), (2, -5)$

Solution.

(i) For collinear points, area of triangle formed by them is zero

Therefore, for points (7, - 2) (5, 1), and (3, k), area = 0

$$\frac{1}{2} [7 (1 - k) + 5 (k + 2) + 3 (-2 - 1)] = 0$$

$$7 - 7k + 5k + 10 - 9 = 0$$

$$-2k + 8 = 0$$

$$k = 4$$

(ii) For collinear points, area of triangle formed by them is zero.

Therefore, for points (8, 1), (k, - 4), and (2, - 5), area = 0

$$\frac{1}{2} [8 (-4 + 5) + k (-5 - 1) + 2 (1 + 4)] = 0$$

$$8 - 6k + 10 = 0$$

$$6k = 18$$

$$k = 3$$

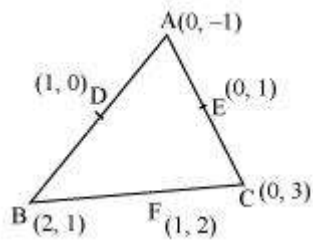
Question 3.

Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0, -1), (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle

Solution.

Let the vertices of the triangle be A (0, - 1), B (2, 1), C (0, 3).

Let D, E, F be the mid-points of the sides of this triangle. Coordinates of D, E, and F are given by



$$D = \left(\frac{0+2}{2}, \frac{-1+1}{2} \right) = (1, 0)$$

$$E = \left(\frac{0+0}{2}, \frac{3-1}{2} \right) = (0, 1)$$

$$F = \left(\frac{2+0}{2}, \frac{1+3}{2} \right) = (1, 2)$$

$$\text{Area of the triangle (DEF)} = \frac{1}{2} [1(2 - 1) + 1(1 - 0) + 0(0 - 2)]$$

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

$$= 1 \text{ square unit}$$

$$\text{Area of the triangle (ABC)} = \frac{1}{2} [0(1 - 3) + 2(3 - 1) + 0(-1 - 1)]$$

$$= \frac{1}{2} * 8$$

$$= 4 \text{ square units}$$

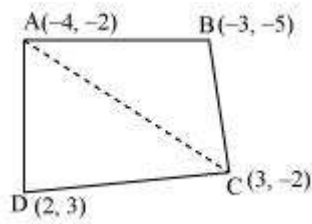
Therefore, required ratio = 1: 4

Question 4.

Find the area of the quadrilateral whose vertices, taken in order, are $(-4, -2)$, $(-3, -5)$, $(3, -2)$ and $(2, 3)$

Solution:

Let the vertices of the quadrilateral be A $(-4, -2)$, B $(-3, -5)$, C $(3, -2)$, and D $(2, 3)$. Join AC to form two triangles $\triangle ABC$ and $\triangle ACD$



$$\text{Area of the triangle (ABC)} = \frac{1}{2} [-4 (-5 + 2) - 3 (-2 + 2) + 3 (-2 + 5)]$$

$$= \frac{1}{2} (12 + 0 + 9)$$

$$= \frac{21}{2} \text{ Square units}$$

$$\text{Area of the triangle (ACD)} = \frac{1}{2} [-4 (-2 - 3) + 3(3 + 2) + 2 (-2 + 2)]$$

$$= \frac{1}{2} (20 + 15 + 0)$$

$$= \frac{35}{2} \text{ Square units}$$

$$\text{Area of Quadrilateral ABCD} = \text{Area of the triangle (ABC)} + \text{Area of the triangle (ACD)}$$

$$= \frac{21}{2} + \frac{35}{2}$$

$$= 28 \text{ Square units}$$

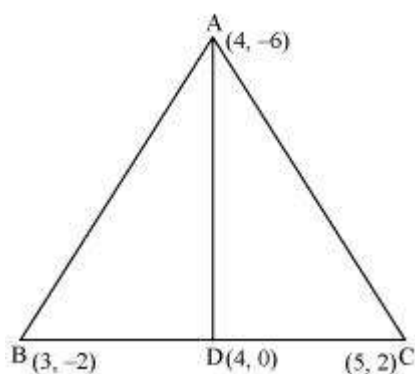
Question 5.

You have studied in Class IX, (Chapter 9, Example 3), that a median of a triangle divides it into two triangles of equal areas. Verify this result for ΔABC whose vertices are $A(4, -6)$, $B(3, -2)$ and $C(5, 2)$

Solution.

Let the vertices of the triangle be $A(4, -6)$, $B(3, -2)$, and $C(5, 2)$

Let D be the mid-point of side BC of ΔABC . Therefore, AD is the median in ΔABC



Coordinates of point D = $(\frac{3+5}{2}, \frac{-2+2}{0}) = (4, 0)$

Area of the triangle (ABC) = $= \frac{1}{2} [4 (-2 - 0) + 3 (0 + 6) + 4 (-6 + 2)]$

$$= \frac{1}{2} (-8 + 18 - 16)$$

= -3 Square units

However, area cannot be negative. Therefore, area of $\triangle ABD$ is 3 square units

Area of the triangle (ADC) = $= \frac{1}{2} [4 (0 - 2) + 4 (2 + 6) + 5 (-6 - 0)]$

$$= \frac{1}{2} (-8 + 32 - 30)$$

= -3 Square units

However, area cannot be negative. Therefore, area of $\triangle ADC$ is 3 square units

Clearly, median AD has divided $\triangle ABC$ in two triangles of equal areas