The area of a triangle is 10 sq. unit. Two of its vertices are (2, 1) and (3, -2), the third vertex lying on y = x + 3. The coordinates of the third vertex can be,

(A)
$$\left(-\frac{3}{2},\frac{3}{2}\right)$$
 (B) (6, 9) (C) $\left(\frac{7}{2},\frac{13}{2}\right)$ (D) (-4, -1)

Select correct option(s).

Solution

Let third vertex be (x, x+3)

Area of triangle = $\frac{1}{2} \left| \sum x_1 (y_2 - y_3) \right| = 10$ $\therefore |2(-2 - x - 3) + 3(x + 3 - 1) + x(1 + 2)| = 20$ $\therefore -2(x + 5) + 3(x + 2) + 3x = \pm 20$ $\therefore x - 1 = \pm 5$ So, x = 6 or x = -4 Thus, the third vertex can be (6, 9) or (-4, -1) Hence, (B) & (D)