

1-1.4-4

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- 1) Find the coordinates of the point which divides the line segment joining the points $(4, -3)$ and $(8, 5)$ in the ratio $3 : 1$ internally

Solution: Let the position vectors of the points $(4, -3)$ and $(8, 5)$ be represented as \mathbf{A} and \mathbf{B} respectively. Therefore, we have:

$$\mathbf{A} = 4\mathbf{i} - 3\mathbf{j}$$

$$\mathbf{B} = 8\mathbf{i} + 5\mathbf{j}$$

Let the position vector of the point \mathbf{P} that divides the line segment \mathbf{AB} in the ratio $3 : 1$ internally be \mathbf{P} .

Using the section formula in vector form, the position vector \mathbf{P} is given by:

$$\mathbf{P} = \frac{m\mathbf{B} + n\mathbf{A}}{m + n}$$

where $m = 3$ and $n = 1$.

Substituting the values, we get:

$$\mathbf{P} = \frac{3(8\mathbf{i} + 5\mathbf{j}) + 1(4\mathbf{i} - 3\mathbf{j})}{3 + 1}$$

$$\mathbf{P} = \frac{(24\mathbf{i} + 15\mathbf{j}) + (4\mathbf{i} - 3\mathbf{j})}{4}$$

$$\mathbf{P} = \frac{(24\mathbf{i} + 4\mathbf{i}) + (15\mathbf{j} - 3\mathbf{j})}{4}$$

$$\mathbf{P} = \frac{28\mathbf{i} + 12\mathbf{j}}{4}$$

$$\mathbf{P} = 7\mathbf{i} + 3\mathbf{j}$$

Therefore, the coordinates of the point are $(7, 3)$.