Section Formulae

SUBJECT : MATHEMATICS
CHAPTER NUMBER:10
CHAPTER NAME :VECTOR ALGEBRA

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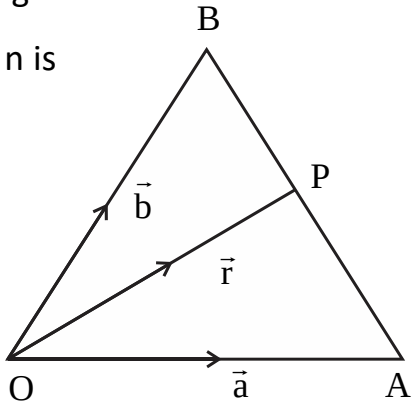
Position Vector of a Point Dividing a line Segment in a Given Ratio

Internal Division formulae:

Let A and B be two points represented by position vectors $\vec{a}$ and $\vec{b}$ with O as origin than the position vector of point P which divides AB internally in the ratio in m: n is given by $\vec{r} = \overrightarrow{OP} = \frac{m\vec{b}+n\vec{a}}{m+n}$



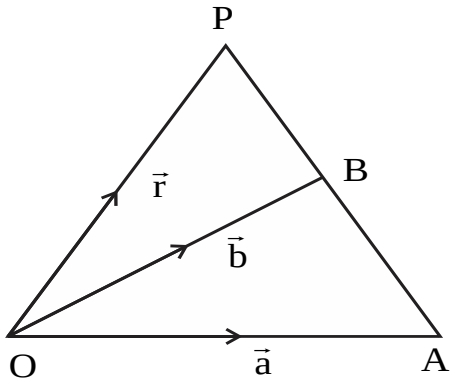
Midpoint formula: If P is the midpoint of $\overrightarrow{AB}$ then $m: n = 1: 1$

Then $P.V.$ of P is $\vec{r} = \frac{\vec{a}+\vec{b}}{2}$

Position Vector of a Point Dividing a line Segment in a Given Ratio

External Division formulae:

Let A and B be two points represented by position vectors $\vec{a}$ and $\vec{b}$ with O as origin than the position vector of point P which divides AB externally in the ratio in m: n is given by $\vec{r} = \overrightarrow{OP} = \frac{m\vec{b}-n\vec{a}}{m-n}$



EXAMPLE

Find the position vectors of the points which divide the join of points $2\vec{a} - 3\vec{b}$ and $\overrightarrow{3a} - 2\vec{b}$

Internally and externally in the ratio 2:3.

EXAMPLE

Find the position vector of point R which divides the line segment joining P and Q whose position vectors are $2\vec{a} + \vec{b}$ and $\vec{a} - 3\vec{b}$ externally in the ratio 1: 2.

Also, show that P is the midpoint of the line RQ.

EXAMPLE

If $\vec{a}$ and $\vec{b}$ be the position vectors of points A and B respectively, Find the position vectors of the point C in AB produced such that $\overrightarrow{AC}=3\overrightarrow{AB}$

EXAMPLE

Find the lengths of the medians of the triangle formed by $A(4,2), B(1,-2)$ and $C(-2,6)$ by vector method.

Assignments

1. (a) Write two vectors having same (I) direction (ii) magnitude.

   (b) Give an example of two vectors having same magnitude but opposite directions

   (c) Give an example of two vectors having same directions but different magnitudes.

2. Exercise 10.2 from NCERT.

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