

# Assignment 1

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## 1 Assignment 1

**Question 21 :** Find the coordinates of the points which divide, internally and externally, the line joining the point  $(a+b, a-b)$  to the point  $(a-b, a+b)$  in the ratio  $a: b$ .

**Solution :**

Let us consider P be the point which divides the AB line segment in the ratio  $a: b$  internally and externally. Suppose  $\vec{a}$  and  $\vec{b}$  are the position vectors of the points **A** and **B** respectively referred to the origin **O** and  $\vec{c}$  be the position vector of point **P** which we have to find out.

Given that the coordinates of A point =  $(a+b, a-b)$  and coordinates of B point =  $(a-b, a+b)$ . So,

$$\mathbf{A} = \vec{a} = \left[ (a+b) \hat{i} + (a-b) \hat{j} \right]^\top \quad (1)$$

$$\vec{a} = (a+b)\hat{i} + (a-b)\hat{j} \quad (2)$$

$$\mathbf{B} = \vec{b} = \left[ (a-b) \hat{i} + (a+b) \hat{j} \right]^\top \quad (3)$$

$$\vec{b} = (a-b)\hat{i} + (a+b)\hat{j} \quad (4)$$

and

$$\frac{AP}{PB} = \frac{a}{b} \quad (5)$$

According the Internal Division Section Formula, coordinates of **P**:

$$\mathbf{P}(x_1, y_1) = \left( \frac{a(a-b) + b(a+b)}{a+b}, \frac{a(a+b) + b(a-b)}{a+b} \right) \quad (6)$$

According the External Division Section Formula, coordinates of **P**:

$$\mathbf{P}(x_2, y_2) = \left( \frac{a(a-b) - b(a+b)}{a-b}, \frac{a(a+b) - b(a-b)}{a-b} \right) \quad (7)$$

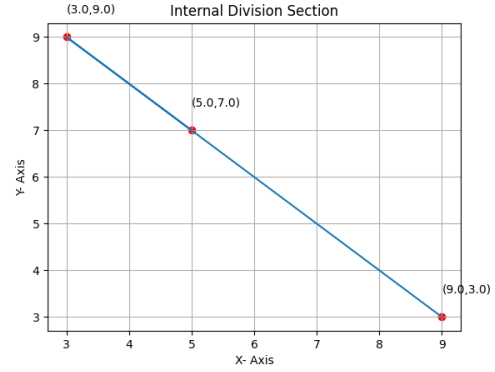


Figure 1: Internal Division Section

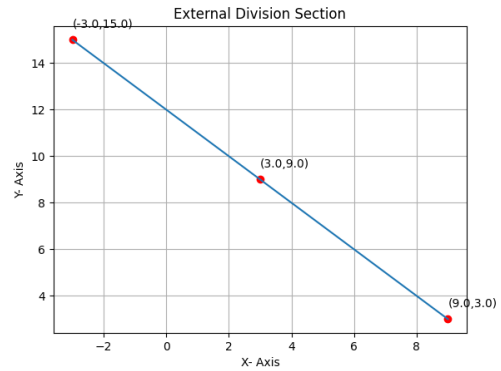


Figure 2: External Division Section