Math computing

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NCERT 9.7.1.5

This question is from class 9 ncert chapter 7.triangles

1. Line l is the bisector of an angle $\angle A$ and B is any point on l. BP and BQ are perpendiculars from B to the arms of $\angle A$. Show that:

   (a) $\triangle APB \cong \triangle AQB$

   (b) $BP = BQ$ or B is equidistant from the arms of $\angle A$.

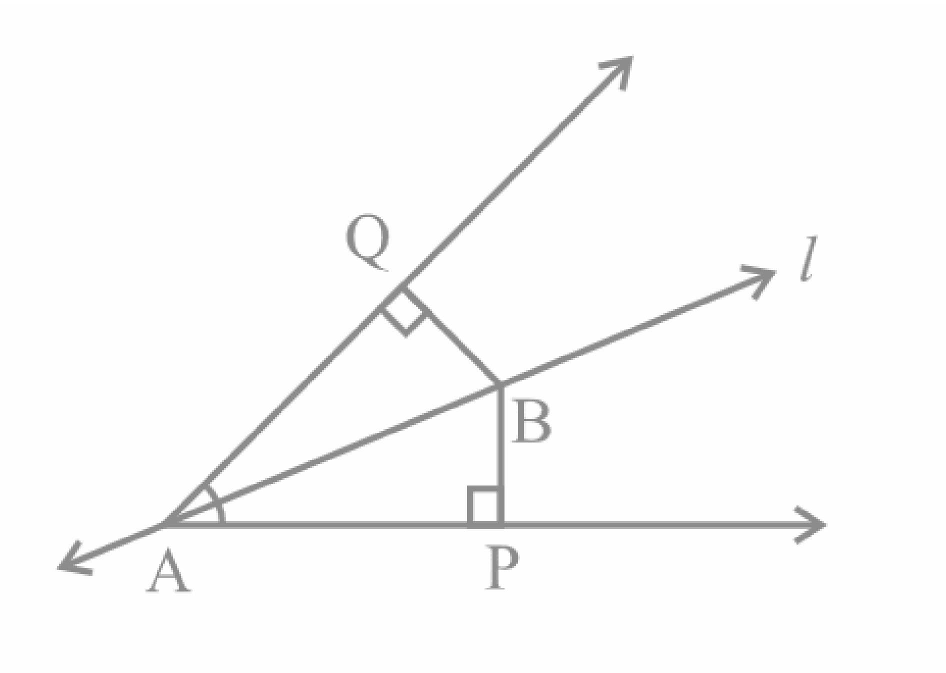

Figure 1: $\triangle AQB \quad and \quad \triangle APB$

Construction steps:

1. (a) let ,consider the point A be the origin

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{1}$$

(b) Assuming the distance between point A and B be 5 ,and also considering the point B on same axis ,So

$$\mathbf{B} = \begin{pmatrix} 5 \\ 0 \end{pmatrix} \tag{2}$$

(c) let assume the distance between point A and P be 4 ,and let the line AB makes an angle $30°$ anticlock wise with line AP.

$$r = 4 \tag{3}$$

$$\angle PAB = \theta = 30° \tag{4}$$

(d) Now the coordinates of point P will be,

$$\mathbf{P} = \begin{pmatrix} r\cos\theta \\ -r\sin\theta \end{pmatrix} \tag{5}$$

$$= \begin{pmatrix} 4\cos 30° \\ -4\sin 30° \end{pmatrix} \tag{6}$$

on calculating

$$\mathbf{P} = \begin{pmatrix} 3.464101 \\ -2 \end{pmatrix} \tag{7}$$

(e) Similarly , let assume the distance between point A and Q also be 4 , and the line AB makes an angle $30°$ clock wise with line AQ. Now the coordinates of point Q be,

$$\angle QAB = \theta = 30° \tag{8}$$

$$\mathbf{Q} = \begin{pmatrix} r\cos\theta \\ r\sin\theta \end{pmatrix} \tag{9}$$

$$= \begin{pmatrix} 4\cos 30° \\ 4\sin 30° \end{pmatrix} \tag{10}$$

on calculating

$$\mathbf{Q} = \begin{pmatrix} 3.464101 \\ 2 \end{pmatrix} \tag{11}$$

(f) Now the coordinates of A,B,P,Q are calculated .

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}, \mathbf{P} = \begin{pmatrix} 3.464101 \\ -2 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 3.464101 \\ 2 \end{pmatrix} \tag{12}$$

Joining these points forms the required figure

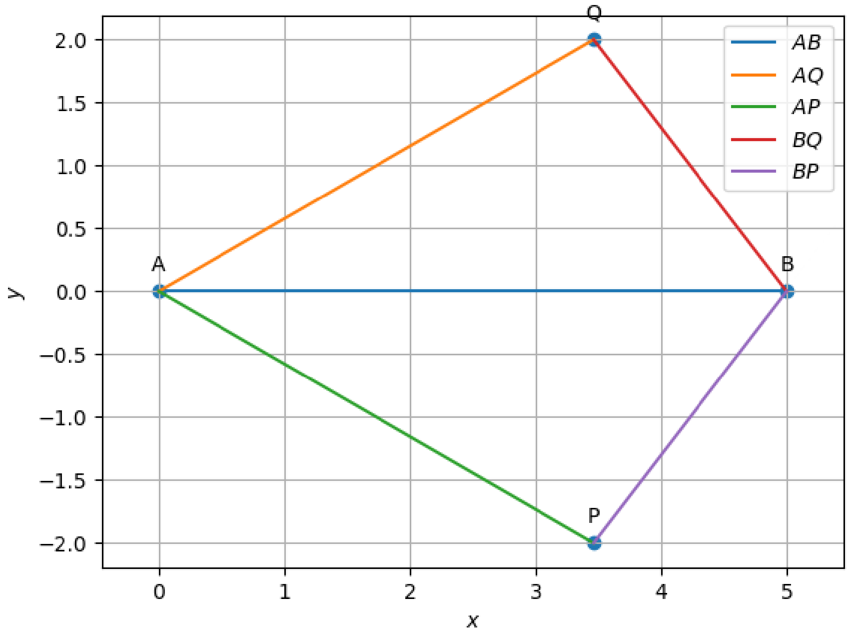

Figure 2: $\triangle APB \quad and \quad \triangle AQB$