Assignment 4

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***Abstract*—This document solves question based on triangle.**

Download all latex-tikz codes from

https://github.com/Matish007/Matrix−Theory−EE5609−/tree/master/Assignment_4

1 Problem

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

$$a) \quad \triangle APB \cong \triangle AQB \tag{1.0.1}$$

$$b) \quad BP = BQ \tag{1.0.2}$$

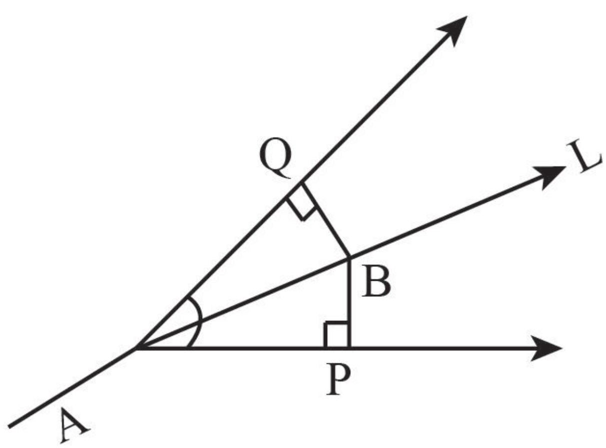

Fig. 0

2 Explanation

Given:-

$$\angle BAP = \angle BAQ \tag{2.0.1}$$

$$\angle AQB = \angle APB \tag{2.0.2}$$

In $\triangle ABQ$

$$\angle ABQ + \angle AQB + \angle BAQ = 180° \tag{2.0.3}$$

In $\triangle ABP$

$$\angle ABP + \angle APB + \angle BAP = 180° \tag{2.0.4}$$

Subtracting (2.0.3) and (2.0.4) and using (2.0.1) and (2.0.2) we get,

$$\angle ABQ = \angle ABP \tag{2.0.5}$$

$$\cos \angle ABQ = \cos \angle ABP \tag{2.0.6}$$

$$\frac{(\mathbf{B} - \mathbf{A})^T (\mathbf{B} - \mathbf{Q})}{\|\mathbf{B} - \mathbf{A}\| \left\|\mathbf{B} - \mathbf{Q}\right\|} = \frac{(\mathbf{B} - \mathbf{A})^T (\mathbf{B} - \mathbf{P})}{\|\mathbf{B} - \mathbf{A}\| \|\mathbf{B} - \mathbf{P}\|} \tag{2.0.7}$$

Now,multiplying both sides by $((\mathbf{A} - \mathbf{B})^T)^{-1}$ we get,

$$\frac{(\mathbf{B} - \mathbf{Q})}{\left\|\mathbf{B} - \mathbf{Q}\right\|} = \frac{(\mathbf{B} - \mathbf{P})}{\|\mathbf{B} - \mathbf{P}\|} \tag{2.0.8}$$

By (2.0.8) we can say that **B** is equidistant from the arms of $\angle A$,where **P** and **Q** represents points on the arms of $\angle A$

$$\therefore BP = BQ \tag{2.0.9}$$

Using (2.0.1),(2.0.2),(2.0.9) and AAS(Angle Angle Side) property of congruency we can say that:-

$$\triangle APB \cong \triangle AQB \tag{2.0.10}$$