Math Computing

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NCERT 9.7.1.7

This question is from class 9 ncert chapter 7.triangles

1. **AB** is a line segment and **P** is its mid-point. **D** and **E** are points on the same side of **AB** such that $\angle BAD = \angle ABE$ and $\angle EPA = \angle DPB$. Show that
   (a) $\triangle$**DAP** $\cong \triangle$**EBP**
   (b) **AD** = **BE**

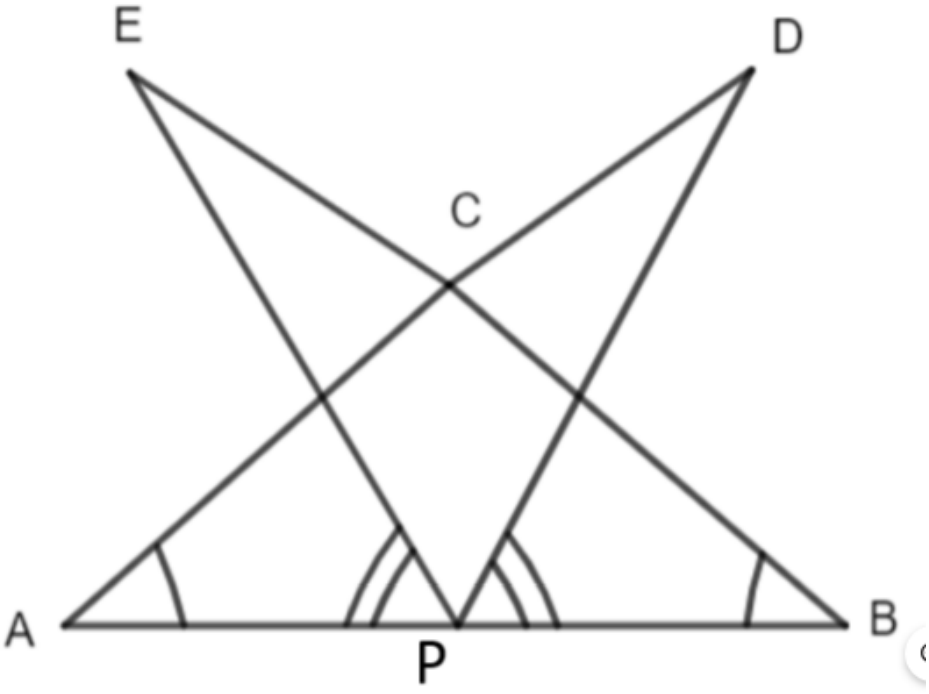

Figure 1: $\triangle$**DAP** *and* $\triangle$**EBP**

Construction steps:

(i) Let assume, the input parameters are,

Parameter	Value	Description
θ_1	$30°$	$\angle BAD = \angle ABE$
θ_2	$60°$	$\angle EPA = \angle DPB$
A	$\begin{pmatrix}0\\0\end{pmatrix}$	Reference point at origin
B	$\begin{pmatrix}5\\0\end{pmatrix}$	point **B** on the same axis of **A**

Table 1: Input Parameters

$\therefore$ the output can be calculated as,

Parameter	Value	Description
r	$\|A - B\|$	Length of **AB**
P	$\frac{\mathbf{A}+\mathbf{B}}{2}$	Mid-point of **AB**
D	$\mathbf{A} + \begin{pmatrix}r\cos\theta_1\\r\sin\theta_1\end{pmatrix}$	From point **A** makes an angle θ_1 in anticlock-wise with line $(\mathbf{AB}, \mathbf{AD})$
E	$\mathbf{B} + \begin{pmatrix}-r\cos\theta_1\\r\sin\theta_1\end{pmatrix}$	From point **B** makes an angle θ_1 in clock-wise with line $(\mathbf{AB}, \mathbf{BE})$
D	$\mathbf{P} + \begin{pmatrix}r\cos\theta_2\\r\sin\theta_2\end{pmatrix}$	From point **P** makes an angle θ_2 in anticlock-wise with line $(\mathbf{BP}, \mathbf{DP})$
E	$\mathbf{P} + \begin{pmatrix}-r\cos\theta_2\\r\sin\theta_2\end{pmatrix}$	From point **P** makes an angle θ_2 in anticlock-wise with line $(\mathbf{AP}, \mathbf{EP})$

Table 2: Output Parameters

$\therefore$ By, joining these points forms the required figure

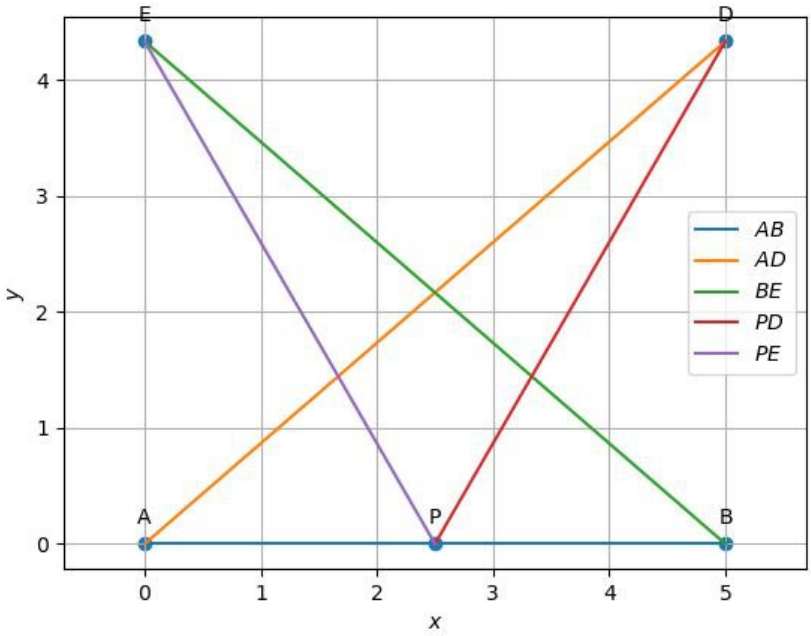

Figure 2: $\triangle$**DAP** *and* $\triangle$**EBP**