

## Math Computing

### NCERT 9.7.1.6

This question is from class 9 NCERT chapter 7.triangles

1.  $AC = AE$  ,  $AB = AD$  and  $\angle BAD = \angle EAC$ . Show that  $BC = DE$ .

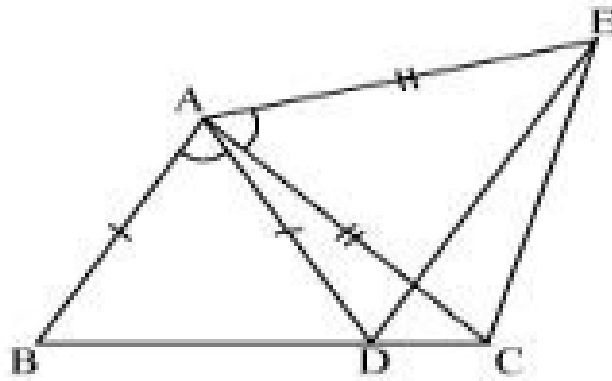


Figure 1:  $\triangle ABC$  and  $\triangle ADE$

**Construction steps:**

(i) Let assume, the input parameters are,

Parameter	Value	Description
$\theta$	$60^\circ$	$\angle BAD = \angle CAE$
<b>B</b>	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$	Reference point at origin
<b>D</b>	$\begin{pmatrix} 6 \\ 0 \end{pmatrix}$	point <b>D</b> on the same axis of <b>B</b>
<b>C</b>	$\begin{pmatrix} 8 \\ 0 \end{pmatrix}$	point <b>C</b> on the same axis of <b>B</b>

Table 1: Input Parameters

$\therefore$  the output can be calculated as,

Parameter	Value	Description
$BD$	$\ \mathbf{B} - \mathbf{D}\ $	Length of $BD$
$CD$	$\ \mathbf{C} - \mathbf{D}\ $	Length of $CD$
$\alpha$	$\left(\frac{180-\theta}{2}\right)$	$\angle ABD$
$AB$	$BD \left(\frac{\sin \alpha}{\sin \theta}\right)$	Length of $AB$
<b>A</b>	$\mathbf{B} + \begin{pmatrix} AB \cos \alpha \\ AB \sin \alpha \end{pmatrix}$	point <b>B</b> makes an angle $\alpha$ with line $(AB, BD)$
$AD$	$\ \mathbf{A} - \mathbf{D}\ $	Length of $AD$
$AC$	$\ \mathbf{A} - \mathbf{C}\ $	Length of $AC$
$\beta_1$	$\cos^{-1} \left( \frac{AC^2 + CD^2 - AD^2}{2ACAD} \right)$	$\angle ACD$
$CE$	$AC \left( \frac{\sin \theta}{\sin \alpha} \right)$	Length of $CE$
$\beta$	$\alpha + \beta_1$	$\angle ECB$
<b>E</b>	$\mathbf{C} + \begin{pmatrix} -CE \cos \beta \\ CE \sin \beta \end{pmatrix}$	point <b>C</b> makes an angle $\beta$ with line $(BC, CE)$

Table 2: Output Parameters

$\therefore$  By, joining these points the required figure will be formed.

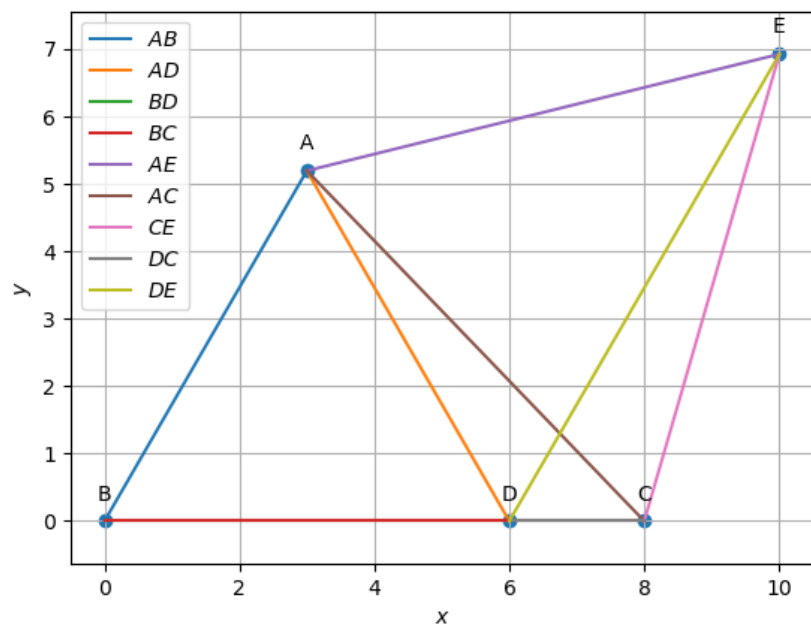


Figure 2:  $\triangle ABC$  and  $\triangle ADE$