

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 $BC = DE$.

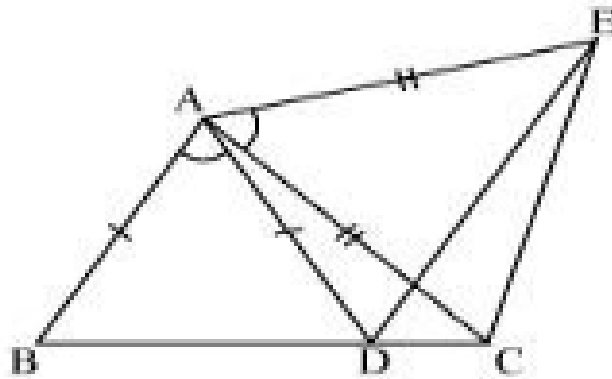


Figure 1: $\triangle ABC$ and $\triangle ADE$

Construction steps:

(i) Let assume, the input parameters are,

Parameter	Value	Description
θ	60°	$\angle BAD = \angle CAE$
B	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$	Reference point at origin
D	$\begin{pmatrix} 6 \\ 0 \end{pmatrix}$	point D on the same axis of B
C	$\begin{pmatrix} 8 \\ 0 \end{pmatrix}$	point C on the same axis of 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
α	$\left(\frac{180-\theta}{2}\right)$	$\angle ABD$
AB	$BD \left(\frac{\sin \alpha}{\sin \theta}\right)$	Length of AB
A	$\mathbf{B} + \begin{pmatrix} AB \cos \alpha \\ AB \sin \alpha \end{pmatrix}$	point B makes an angle α with line (AB, BD)
AD	$\ \mathbf{A} - \mathbf{D}\ $	Length of AD
AC	$\ \mathbf{A} - \mathbf{C}\ $	Length of AC
β_1	$\cos^{-1} \left(\frac{AC^2 + CD^2 - AD^2}{2ACCD} \right)$	$\angle ACD$
CE	$AC \left(\frac{\sin \theta}{\sin \alpha} \right)$	Length of CE
β	$\alpha + \beta_1$	$\angle ECB$
E	$\mathbf{C} + \begin{pmatrix} -CE \cos \beta \\ CE \sin \beta \end{pmatrix}$	point C makes an angle β with line (BC, CE)

Table 2: Output Parameters

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

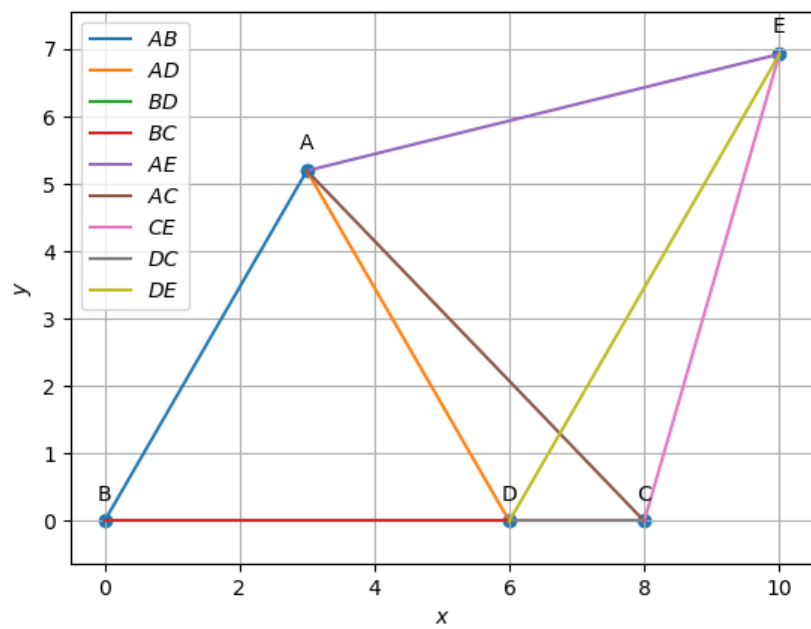


Figure 2: $\triangle ABC$ and $\triangle ADE$