

3.2.17

EE24BTECH11008 - Aslin Garvasis

Question:

Construct a triangle whose sides are 3.6cm , 3.0cm and 4.8cm . Bisect the smallest angle and measure each part.

Solution:

\therefore The smallest angle is associated with the opposite smallest side.

Variable	value	Description
A	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$	coordinates of first point
B	$\begin{pmatrix} 4.8 \\ 0 \end{pmatrix}$	coordinates of second point
C	$\begin{pmatrix} 2.81 \\ 2.24 \end{pmatrix}$	coordinates of third point
D	-	intersection of angle bisector of A in BC

TABLE 0: Input parameters

The angle bisector of a triangle of a triangle divides the opposite side into two parts proportional to the other two sides of the triangle.

$$\therefore \|AC\| = 3.6 \quad (1)$$

$$\therefore \|AB\| = 4.8 \quad (2)$$

$$\therefore \|BC\| = 3.0 \quad (3)$$

$$\cos \angle BAC = \left\| \frac{\mathbf{AC}^T \mathbf{AB}}{\|AC\| \|AB\|} \right\| = 0.78 \quad (4)$$

$$\angle BAC = 38.73^\circ \quad (5)$$

$$\cos \angle ABC = \left\| \frac{\mathbf{BC}^T \mathbf{BA}}{\|BC\| \|BA\|} \right\| = 0.66 \quad (6)$$

$$\angle ABC = 48.70^\circ \quad (7)$$

$$\cos \angle ACB = \left\| \frac{\mathbf{CA}^T \mathbf{CB}}{\|CA\| \|CB\|} \right\| = 0.05 \quad (8)$$

$$\angle ACB = 87.13^\circ \quad (9)$$

$$\therefore \mathbf{D} = \frac{\|AC\| \cdot \mathbf{B} + \|AB\| \cdot \mathbf{C}}{\|AC\| + \|BC\|} \quad (10)$$

$$\Rightarrow \mathbf{D} = 3.6 \begin{pmatrix} 4.8 \\ 0 \end{pmatrix} + 4.8 \begin{pmatrix} 2.81 \\ 2.24 \end{pmatrix} = \begin{pmatrix} 3.66 \\ 1.28 \end{pmatrix} \quad (11)$$

$$\cos \angle BAD = \left\| \frac{\mathbf{AB}^T \mathbf{AD}}{\|AB\| \|AD\|} \right\| = 0.94 \quad (12)$$

$$\angle BAD = 19.28^\circ \quad (13)$$

$$\Rightarrow \|BD\| = \frac{\|BC\| \|AB\|}{\|AB\| + \|AC\|} = 1.71 \quad (14)$$

$$\Rightarrow \|CD\| = \frac{\|BC\| \|AC\|}{\|AB\| + \|AC\|} = 1.28 \quad (15)$$

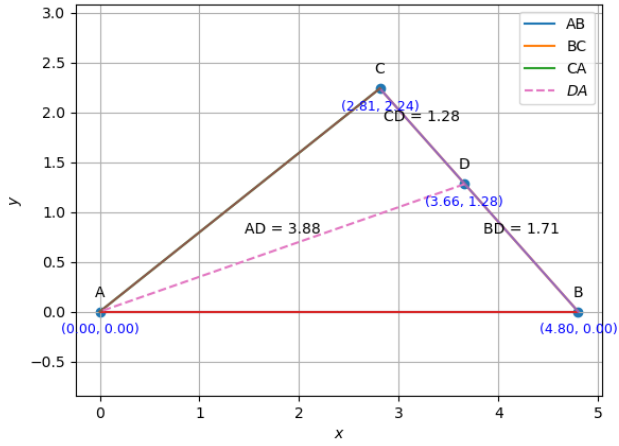


Fig. 0: Plot of points A, B, C and D