Assignment
TRIANGLES

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EE22BTECH11042

Consider a triangle with vertices

$$\mathbf{A} = \begin{pmatrix} -3 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$$

I. Vectors

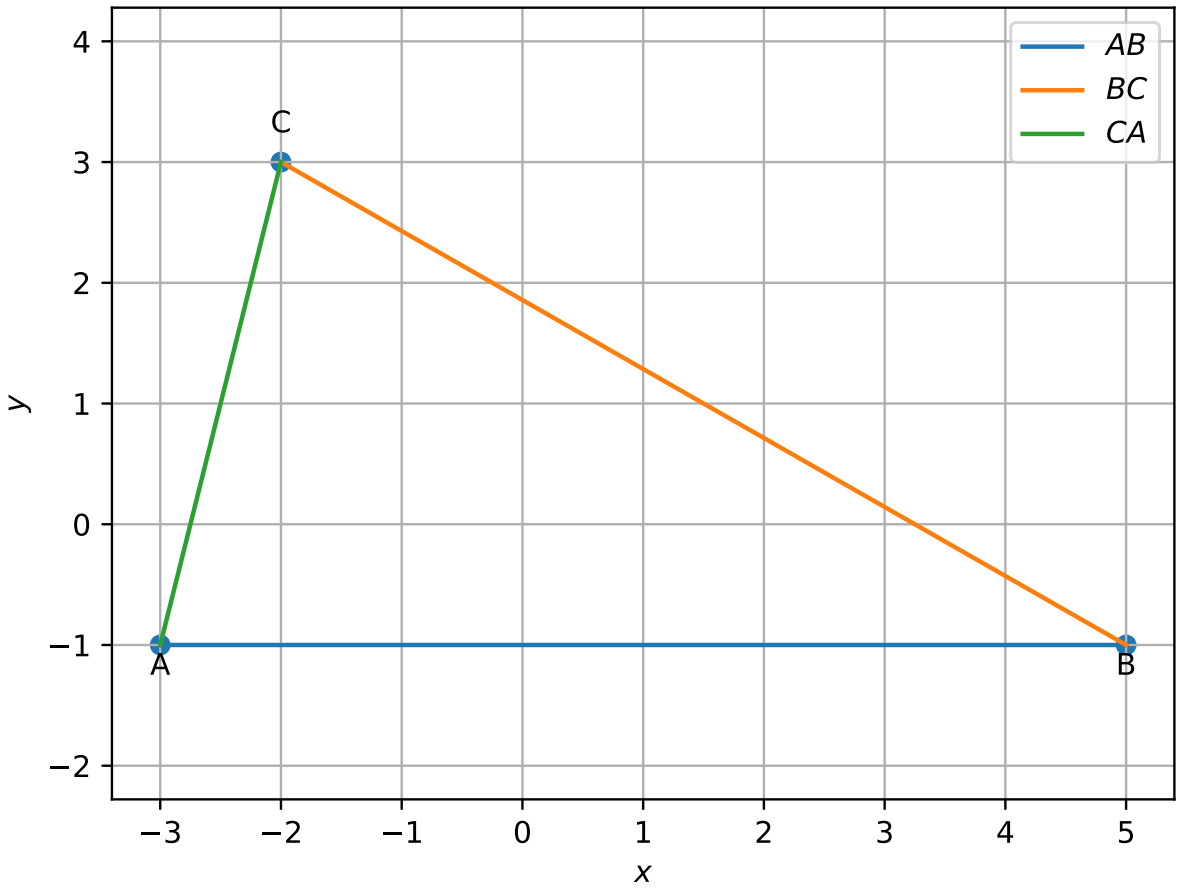

Fig. 1: Vectors

Parameter	Values	Description
$\mathbf{m_1}$	$\begin{pmatrix}8\\0\end{pmatrix}$	Direction vector of $\mathbf{B}-\mathbf{A}$
$\mathbf{m_2}$	$\begin{pmatrix}-7\\4\end{pmatrix}$	Direction vector of $\mathbf{C}-\mathbf{B}$
$\mathbf{m_3}$	$\begin{pmatrix}-1\\-4\end{pmatrix}$	Direction vector of $\mathbf{A}-\mathbf{C}$
$\|\mathbf{C}-\mathbf{B}\|$	8.06	lenght of $\mathbf{C}-\mathbf{B}$
rank of the matrix $= \begin{pmatrix}1,1,1\\-3,5,-2\\-1,-1,3\end{pmatrix}$	3	non collinear
$\mathbf{n_1}$	$\begin{pmatrix}0\\-8\end{pmatrix}$	normal to $\mathbf{B}-\mathbf{A}$
c_1	8	
$\mathbf{n_2}$	$\begin{pmatrix}4\\7\end{pmatrix}$	normal to $\mathbf{C}-\mathbf{B}$
c_2	13	
$\mathbf{n_3}$	$\begin{pmatrix}-4\\1\end{pmatrix}$	normal to $\mathbf{A}-\mathbf{C}$
c_3	-5	
Area	16 cm^2	Area of triangle
$\angle A$	75.96°	Angles
$\angle B$	29.74°	
$\angle C$	74.29°	

TABLE 1: Vectors

II. Median

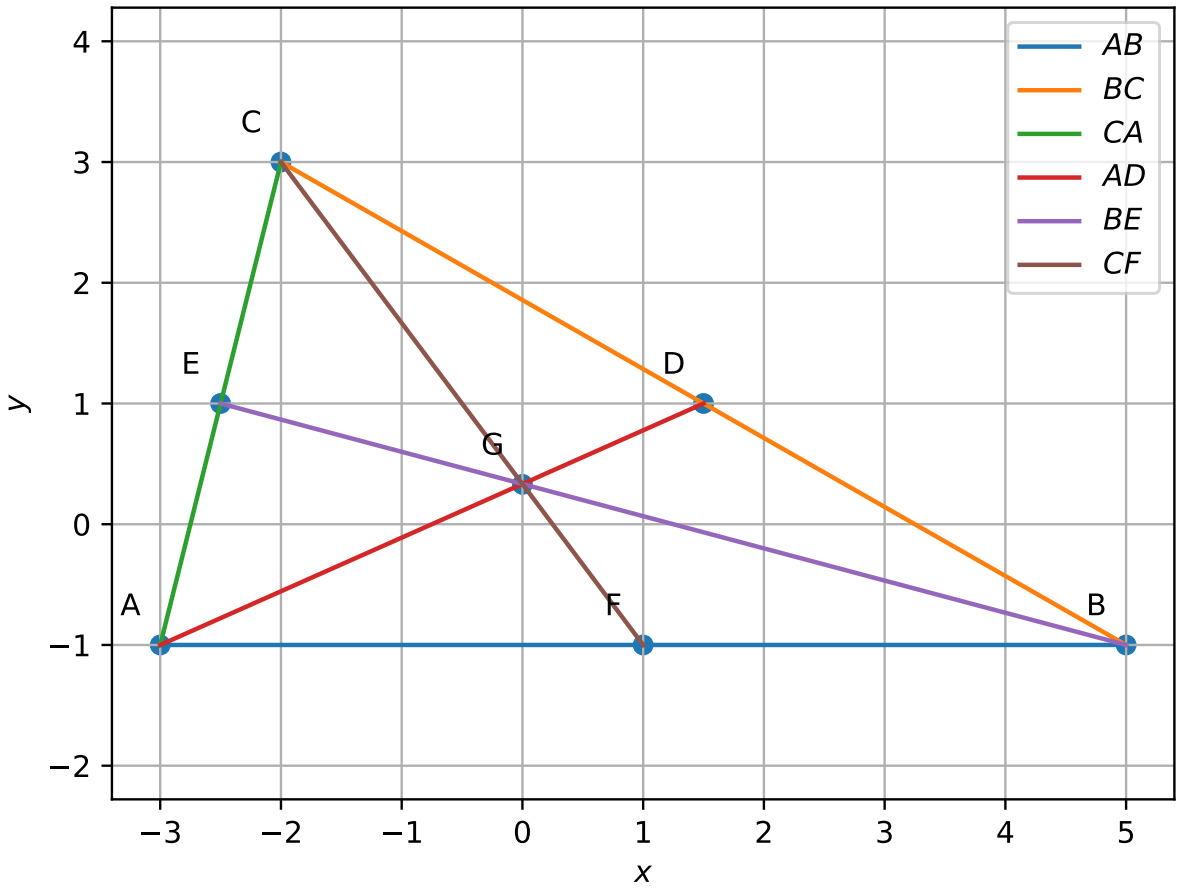

Fig. 2: Median

Parameter	Values	Description
D	$\begin{pmatrix} 1.5 \\ 1 \end{pmatrix}$	mid-point of **C** – **B**
E	$\begin{pmatrix} -2.5 \\ 1 \end{pmatrix}$	mid-point of **A** – **C**
F	$\begin{pmatrix} 1 \\ -1 \end{pmatrix}$	mid-point of **B** – **A**
G	$\begin{pmatrix} 0 \\ 0.33 \end{pmatrix}$	Intersection point of all medians

TABLE 2: Median

III. Altitude

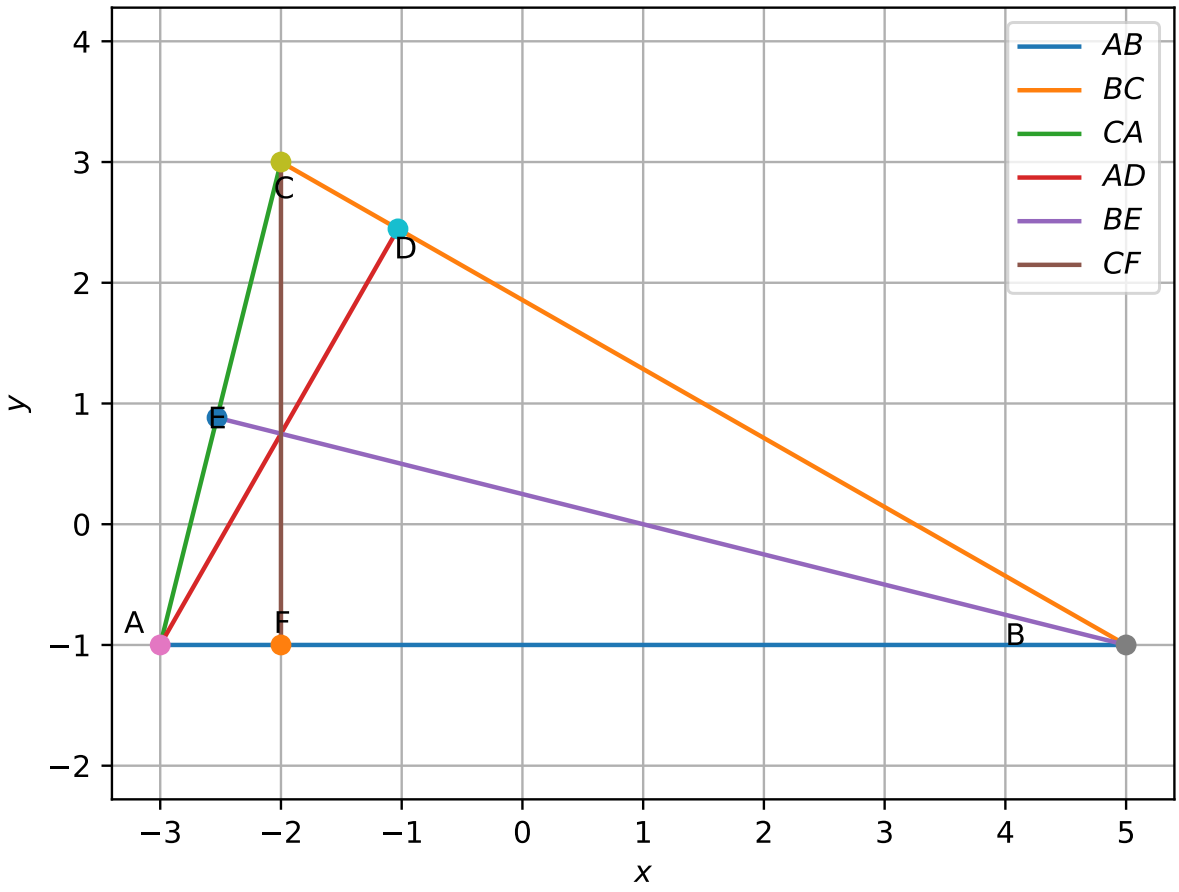

Fig. 3: Altitude

Parameters	Values	Description
A – D	$\begin{pmatrix} 7 \\ -4 \end{pmatrix}$	Altitude
B – E	$\begin{pmatrix} -1.88 \\ -7.53 \end{pmatrix}$	
C – F	$\begin{pmatrix} 4 \\ 0 \end{pmatrix}$	

TABLE 3: Altitude

IV. Perpendicular Bisector

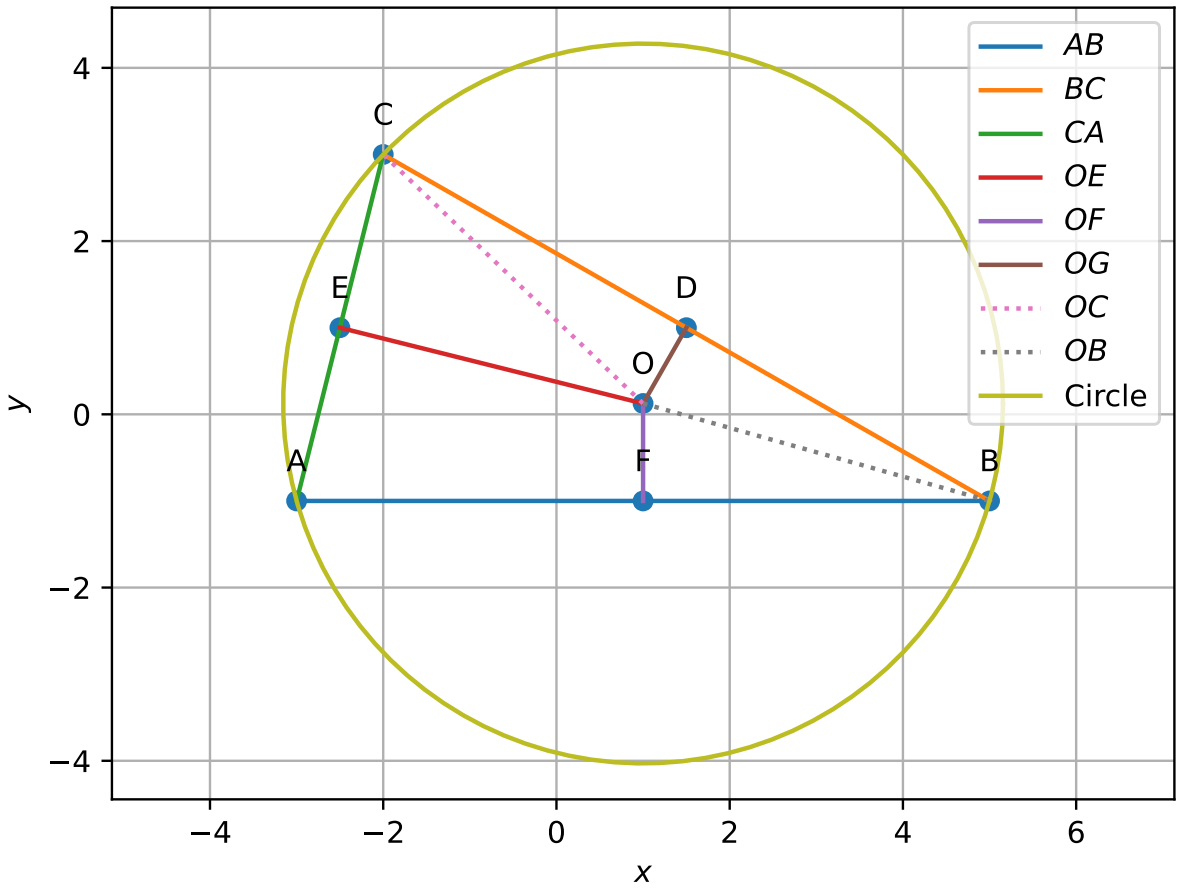

Fig. 4: Perpendiculat Bisectors

Parameters	Values	Description
O – D	$\begin{pmatrix} -0.5 \\ -0.88 \end{pmatrix}$	Perpendicular bisector of **C – B**
O – E	$\begin{pmatrix} 3.5 \\ -0.88 \end{pmatrix}$	Perpendicular bisector of **A – C**
O – F	$\begin{pmatrix} 0 \\ 1.12 \end{pmatrix}$	Perpendicular bisector of **B – A**
O	$\begin{pmatrix} 1 \\ 0.12 \end{pmatrix}$	Circumcentre
O – B	4.155	Radius of circumcircle
$\angle BAC$	75.964°	Angle subtened to circle from chord **C – B**
$\angle BOC$	151.928°	Angle subtended to centre from chord **C – B**

TABLE 4: Perpendicular Bisector

V. Angle Bisector

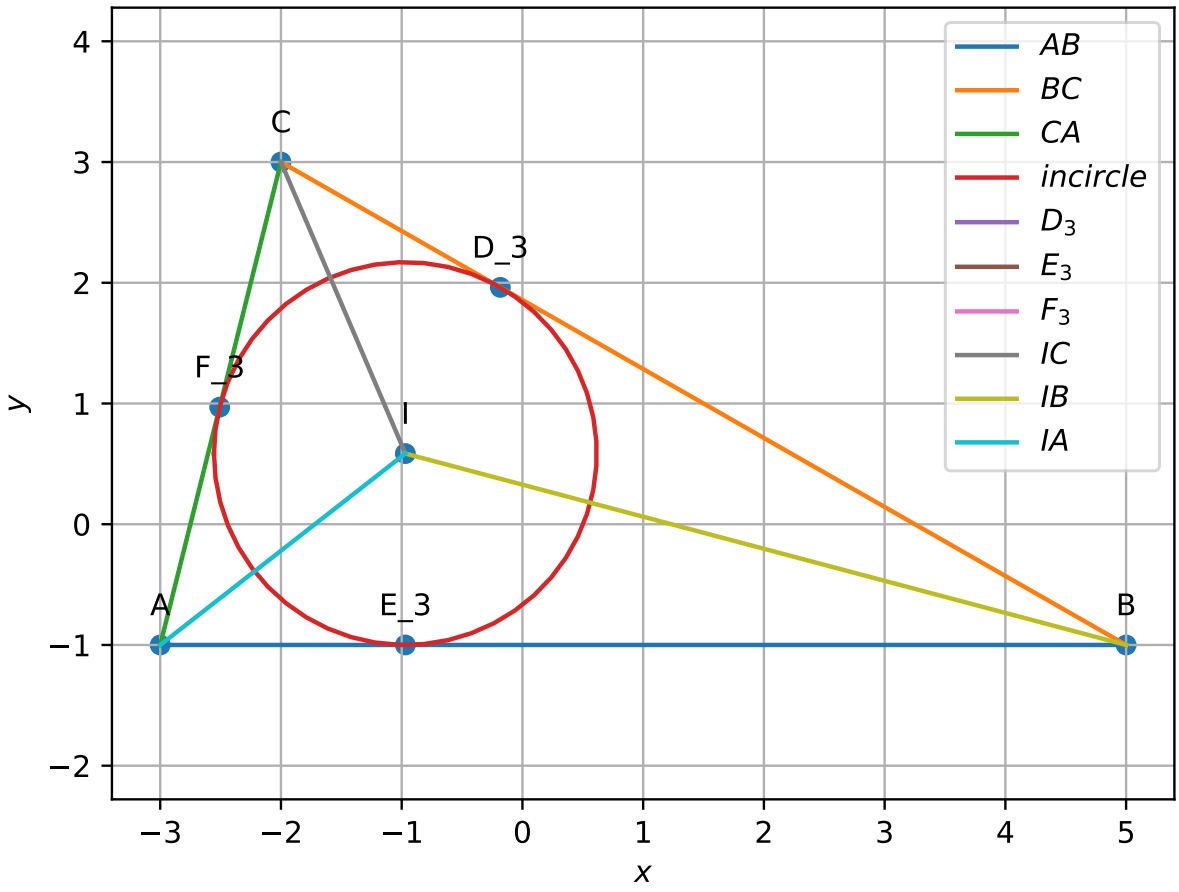

Fig. 5: Angle Bisector

Parameters	Values	Description
I – A	$\begin{pmatrix}2.03\\1.59\end{pmatrix}$	Angle Bisector of **A**
I – A	$\begin{pmatrix}-5.97\\1.59\end{pmatrix}$	Angle Bisector of **B**
I – A	$\begin{pmatrix}1.03\\-2.41\end{pmatrix}$	Angle Bisector of **C**
I	$\begin{pmatrix}-0.97\\0.59\end{pmatrix}$	Incenter
$\angle BAI$, $\angle CAI$	37.98°	Angle made by Angle bisector AI
$\angle ABI$, $\angle CBI$	14.87°	Angle made by Angle bisector BI
$\angle ACI$, $\angle BCI$	37.15°	Angle made by Angle bisector CI
D_3	$\begin{pmatrix}-0.18\\1.95\end{pmatrix}$	Point of intesection of triangle and incircle
E_3	$\begin{pmatrix}-0.96\\-1\end{pmatrix}$	
F_3	$\begin{pmatrix}-0.45\\096\end{pmatrix}$	

TABLE 5: Angle Bisector