Probability and random variables assignment

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1 Q8 c)

1.1. Using ruler and compass only, construct a $\triangle ABC$ such that BC = 5 cm and AB = 6.5 cm and $\angle ABC = 120°$
(i) Construct a circum-circle of $\triangle ABC$
(ii) Construct a cyclic quadrilateral ABCD, such that D is equidistant from AB and BC.

Solution: The parameters for constructing the figure are given in the table below:

TABLE 1.1.1

Symbol	Value	Description
a	5	BC
c	6.5	AB
α	$\cot^{-1} \frac{11*\sqrt{3}}{13}$	$\angle ACB$
θ	$\frac{\pi}{3}$	$\pi - \angle ABC$
l	$\frac{6.5*\sqrt{3}}{2*\sin\alpha}$	AD
A	$\begin{pmatrix} 0 \\ 0 \end{pmatrix}$	origin
B	$\begin{pmatrix} c \\ 0 \end{pmatrix}$	point of triangle
C	$\begin{pmatrix} 6.5 + a*\cos\theta \\ a*\sin\theta \end{pmatrix}$	point of triangle
E	$\begin{pmatrix} c/2 \\ (c/2)*\cot\theta \end{pmatrix}$	centre of circumcircle of $\triangle ABC$.
r	$\frac{c}{2\operatorname{cosec}\theta}$	radius of circumcircle of $\triangle ABC$.
D	$l * \begin{pmatrix} \cos(2\theta - \alpha) \\ \sin(2\theta - \alpha) \end{pmatrix}$	intersection point of angle bisector of AB and BC and circumcircle

Steps of construction:
1. The point A is taken as origin and a line segment AB = 6.5 cm is drawn along positive x-axis.

2. Draw a line segment emerging from B at $\angle 120°$ in anticlockwise direction from BA of length 5 cm.

3. Name the other endpoint of the line segment as C.

4. Join AC. This completes the $\triangle ABC$.

5. Now take the perpendicular bisector of any two sides, mark their point of intersection as E(centre of circumcircle).

6. Taking E as centre and EA=EB=EC as radius draw a circle(circumcircle).

7. Take internal angle bisector of AB and BC, let its point of intersection with the circumcircle be D.

8. Join AD and CD.

(i)1.1.1
center of the circumcircle is the point of intersection of the perpendicular bisectors of AB and BC.
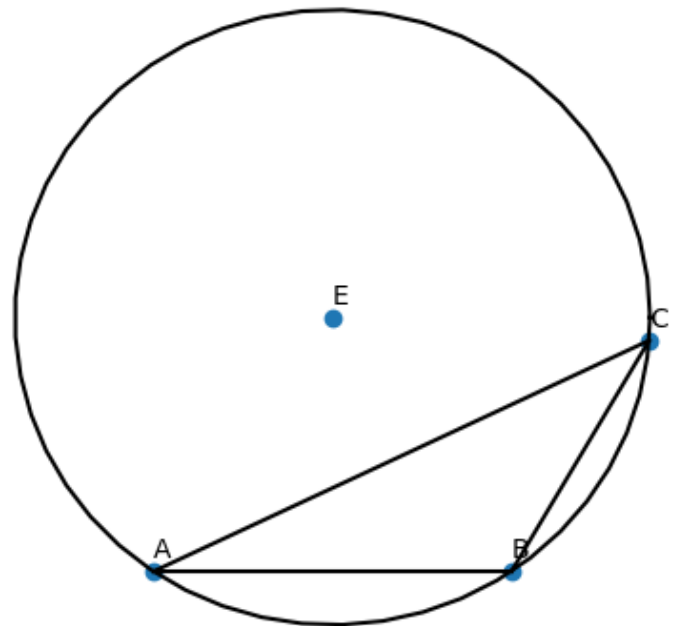

Fig. 1.1.1.

(ii)1.1.2
the point D of the cyclic quadrilateral ABCD
is the point of intersection of the angle
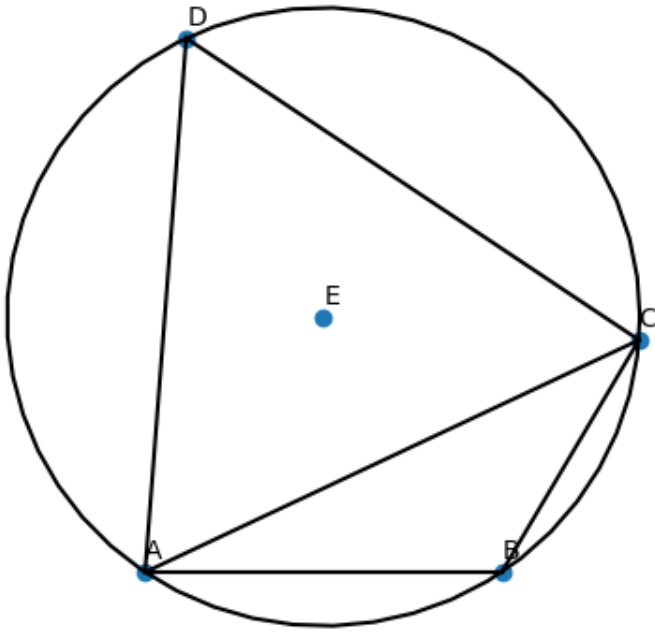bisectors of AB and BC and the circumcircle.

Fig. 1.1.2.