# MATHS

## BOOKS - SELINA MATHS (ENGLISH)

## CIRCLES

**Questions**

**1.** In the adjoining figure , $\angle AOC = 110^\circ$, Calculate :

$\angle ADC$

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**2.** In the adjoining figure , $\angle AOC = 110^\circ$, Calculate :

$\angle ABC$

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**3.** In the adjoining figure , $\angle AOC = 110^\circ$, Calculate :

$\angle OAC$

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**4.** In the adjoining figure PQ = PR and $\angle PRQ = 70^\circ$ Find $\angle QPR$.

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**5.** The given figure shows a circle through the points A,B,C and D . If $\angle BAC = 67^\circ$ , find : $\angle DBC + \angle DCB$.

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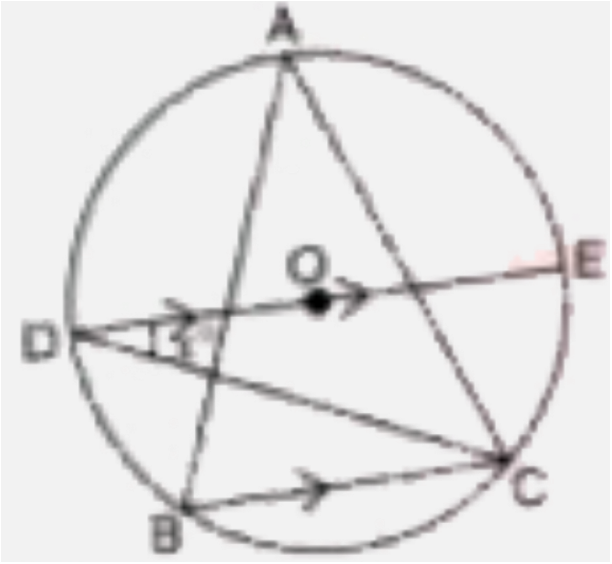
**6.** In the given figure BC//DE and O is the centre of the circle . If $\angle CDE = x^\circ$ , find in terms of $x^\circ$ the value of $\angle BAC$.

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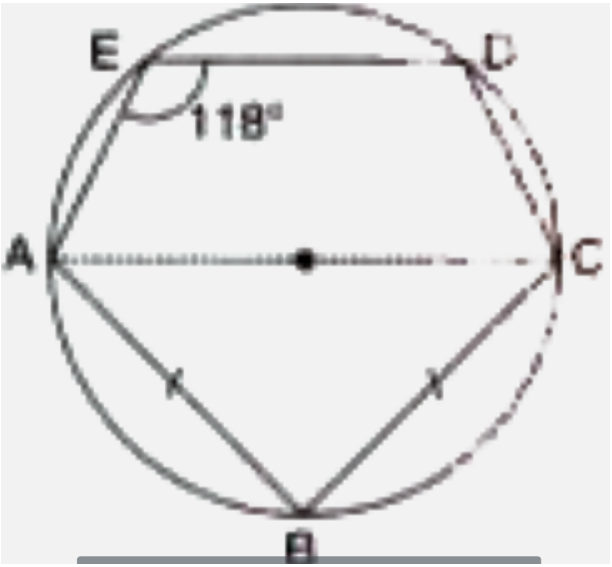
**7.** In the adjoining figure, AC is diameter of the circle AB = BC and $\angle AED = 118^\circ$. Calculate :

$\angle DEC$

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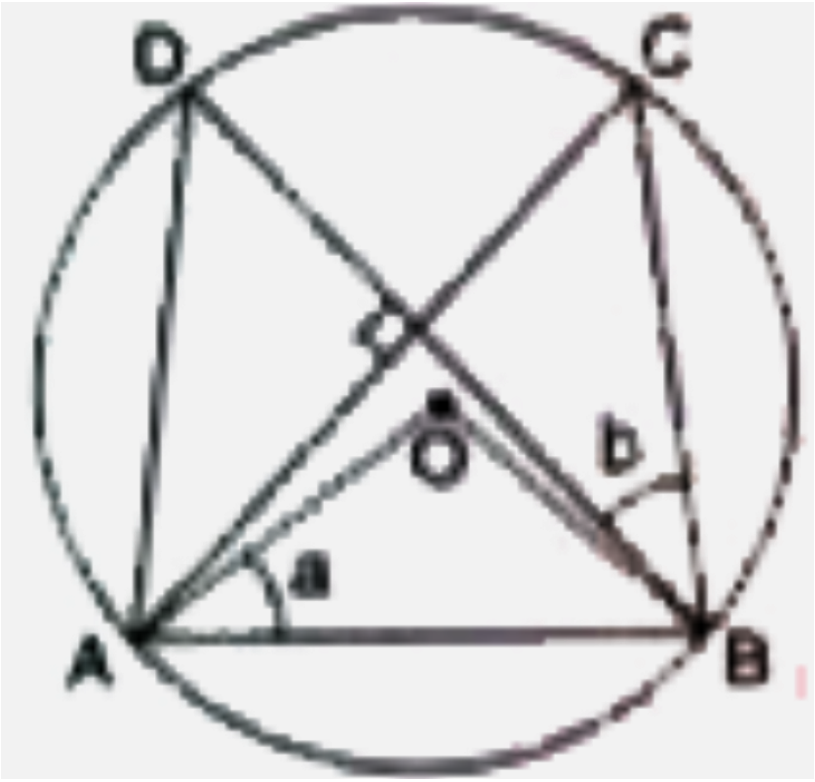
**8.** In the adjoining figure, O is centre of the circle chords AC and BD are perpendicular to each other, $\angle OAB = a$ and $\angle DBC = b$. Show that

a= b

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**9.** In the adjoining figure , ABCD is a cyclic quadrilateral , $\angle CBQ = 48^\circ$ and $a = 2b$ Calculate the numerical value of b.

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**10.** In the given figure $\angle BAD = 80^\circ$

$\angle ABD = 55^\circ$ and $\angle BDC = 45^\circ$, . Find

(i) $\angle BCD$

(ii) $\angle ADB$

Hence , show that AC is a diameter.

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**11.** In a circle, with centre O ,a diameter AB and a chord AD are drawn .

Another circle is drawn with AO as diameter to cut AD at C. Prove that :

BD = $2 \times OC$

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**12.** In the figure given bellow , O is the centre of the circle and $\angle AOC = 160^\circ$, Prove that : $3\angle y - 2\angle x = 140^\circ$

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**13.** Two unequal circles with centres A and B intersect each other at points C and D. The centre B of the smaller circles lies on the circumference of the bigger circle with centre A. If $\angle CMD = x^\circ$, find in terms of x, the measure of angle DAC .

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**14.** The given figure shows a triangle ABC with $\angle BAC = 56^\circ$ and $\angle ABC = 64^\circ$, Bisectors of angles A,B and C meet the circumcircle of the $\Delta ABC$ at points P,Q and R respectively .

Find the measure of $\angle QPR$.


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**15.** In the given figure ,I is the incentre of triangle ABC . AI produced meets the circumcircle of the triangle ABC at point D. if $\angle BAC = 50^\circ$ and $\angle ABC = 70^\circ$, find :

(i) $\angle BCD (ii) \angle ICD (iii) \angle BIC$

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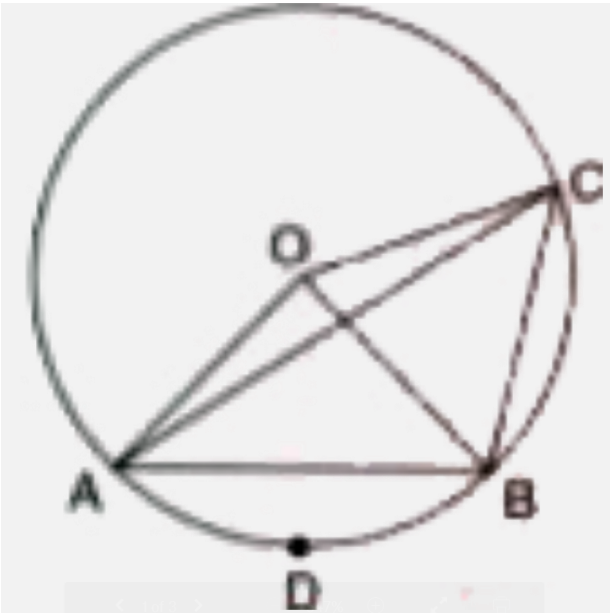
**16.** In the given figure , the lengths of arc AB and are BC arc in the ratio 3: 2 if $\angle AOB = 96^\circ$, find

$(i) \angle CAB (ii) \angle ADB$

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**17.** If two sides of a cyclic quadrilateral are parallel , prove that the other two sides are equal

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## Exercise 17 A

**1.** In the given figure. O is the centre of the circle. $\angle OAB$ and $\angle OCB$ are $30^\circ$ and $40^\circ$ respectively . Find $\angle AOC$ . Show your steps of working.

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**2.** In the given figure $\angle BAD = 60^\circ$, $\angle ABD = 70^\circ$ $\angle BDC = 45^\circ$

(i) prove that AC is a diameter of the circle

(ii) Find $\angle ACB$

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**3.** Given O is the centre of the circle and $\angle AOB = 70^\circ$ , Calculate the value of

(i) $\angle OCA$.

(ii) $\angle OAC$.

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**4.** In each of the following figure. O is the centre of the circle. Find the values of a,b and c.

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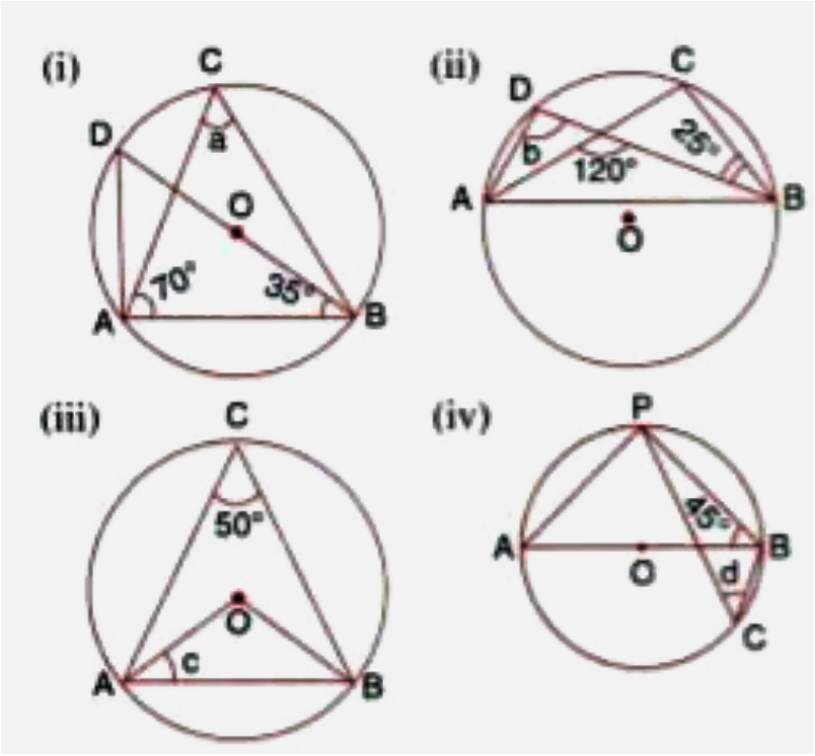
**5.** In each of the following figure. O is the centre of the circle . Find the values of a,b c. and d

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**6.** In the figure , AB is common chord of the two circles. If AC and AD are diameter. Prove that D,B and C are in a straight line. $O_1$ and $O_2$ are the

centres of two circles.

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**7.** In the figure , given below. Find

(i) $\angle BCD$

(ii) $\angle ADC$

(iii) $\angle ABC$.

Show steps of your working.

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**8.** In the given figure O is the centre of the circle If $\angle AOB = 140^\circ$ and $\angle OAC = 50^\circ$ , find :

(i) $\angle ACB$

(ii) $\angle OBC$

(iii) $\angle OAB$

(iv) $\angle CBA$

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**9.** Calculate :

(i) $\angle CDB$

(ii) $\angle ABC$

(iii) $\angle ACB$

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**10.** In the figure , given below .ABCD is a cyclic quadrilateral in which $\angle BAD = 75^\circ, \angle ABD = 58^\circ$ and $\angle ADC = 77^\circ$, Find :

(i) $\angle BDC$,

(ii) $\angle BCD$.

(iii) $\angle BCA$.

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**11.** In the following figure , O is centre of the circle and $\Delta ABC$ is equilateral Find :

(i)$\angle ADB$

(ii) $\angle AEB$

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**12.** Given : $\angle CAB = 75^\circ$

and $\angle CBA = 50^\circ$ Find the value of

$\angle DAB + \angle ABD$.

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**13.** ABCD is a cyclic quadrilateral in a circle with centre O.

If $\angle ADC = 130^\circ$ , find ` angle BAC ?

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**14.** In the figure , given alongside , AOB is a diameter of the circle and

$\angle AOC = 110^\circ$ Find $\angle BDC$.

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**15.** In the following figure. O is the centre of the circle .

$\angle AOB = 60^\circ$ and

$\angle BDC = 100^\circ$

Find $\angle OBC$.

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**16.** In cyclic quadrilateral ABCD , $\angle DAC = 27^\circ$

$\angle ADB = 33^\circ$

Calculate :

(i) $\angle DBC$

(ii)$\angle DCB$

(iii)$\angle CAB.$

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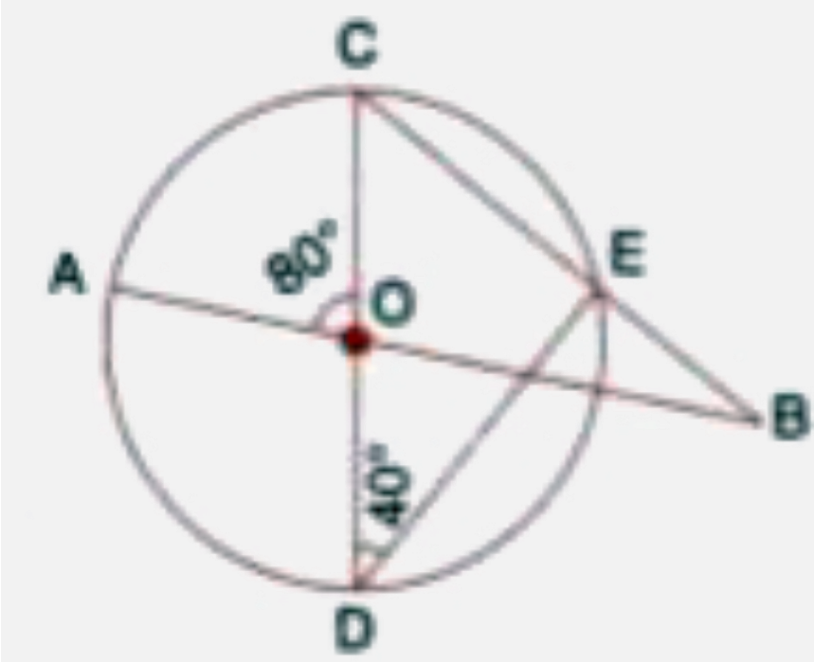
**17.** In the figure given alongside ,AB and CD are straight lines thorugh the centre O of a circle. If $\angle AOC = 80^\circ$ and $\angle CDE = 40^\circ$ , find

$\angle DCE$

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**18.** In the given figure AC is a diemeter of a circle O, A circle is described on AO as diameter AE, a chord of the larger circle , intersects the smaller circle at B .

Prove that : AB = BE

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**19.** In the following figure .

(i) if $\angle BAD = 96^\circ$, find $\angle BCD$ and $\angle BFE$.

(ii) Prove that AD is parallel to PE.

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(b) ABCD is a parallelogram. A circle through vertices A and B meets side BC at point P and side AD at point Q . Show that quadrilateral PCDQ is cyclic.

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**20.** Prove that :

the parallelogram , inscirbed in a circle , is a rectangle.

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**21.** Prove that :

the rhombus , inscribed in a circle is a square.

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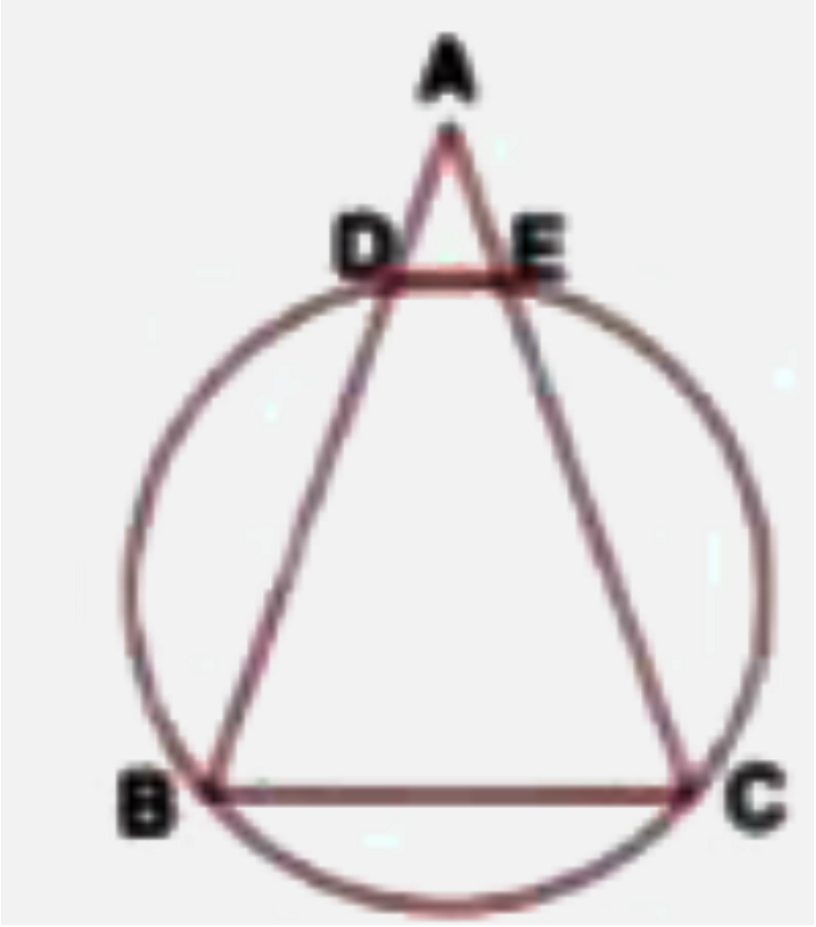
**22.** In the given figure AB = AC . Prove that DECB is an isoseles traqezium.

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**23.** Two cirlces intersect at P and Q . Through P diameter PA and PB of the two circles are drawn. Show that the points A,Q and B are collinear.

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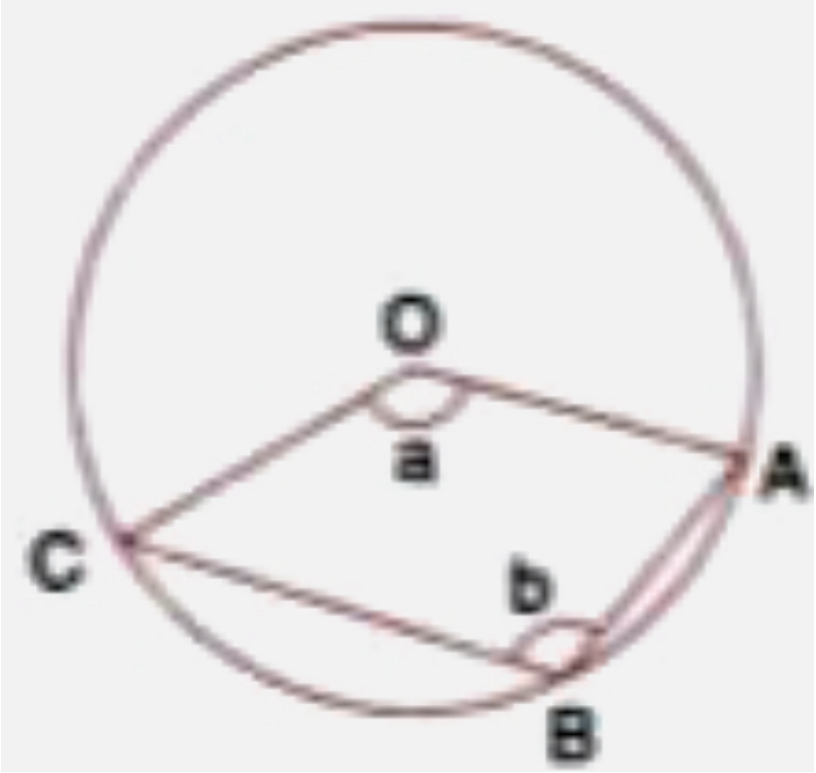
**24.** The figure given below, shows a circle with centre O.

Given : $\angle AOC = a$ and $\angle ABC = b$

Find the relationship between a and b.

(ii) Find the measure of angle OAB ,if OABC is a parallelogram

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**25.** Two chords AB and CD intersect at P inside the circle . Prove that the sum of the angles substended by the arcs AC and BD at the centre O is equal to twice the angle APC.

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**26.** In the given figure ,RS is a diameter of the circle NM is parallel to RS and $\angle MRS = 29^\circ$ Calculate :

(i) $\angle RNM.$

(ii) $\angle NRM$

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**27.** In the figure , given alongside. AB //CD and O is the centre of the circle. If $\angle ADC = 25^\circ$ find the angle AEB Give reasons in support of

your answer.

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**28.** Two circles intersects at P and Q. through P, a straight line APB is drawn to meet the circles in A and B. Through Q,a straight line is drawn to meet the circles at C and D . Prove that AC is parallel to BD.

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**29.** ABCD is a cyclic quadrilateral in which AB and DC on being produced , meet at P such that PA = PD. Prove that AD is parallel to BC .

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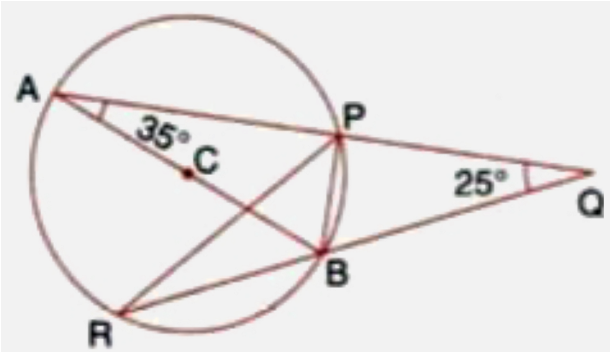
**30.** AB is a diameter of the circle APBR at shown in the figure. APQ and RBQ are straight lines

Find :

(i) $\angle PRB$

(ii) $\angle PBR$

(iii) $\angle BPR.$

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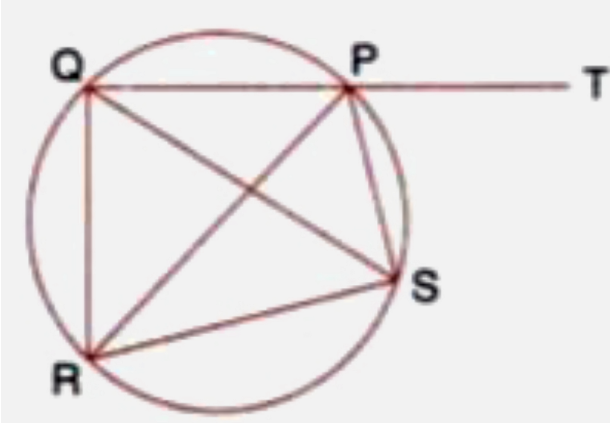
**31.** In the given figure . SP is bisector of $\angle RPT$ and PQRS is a cyclic quadrilateral . Prove that SQ = SR

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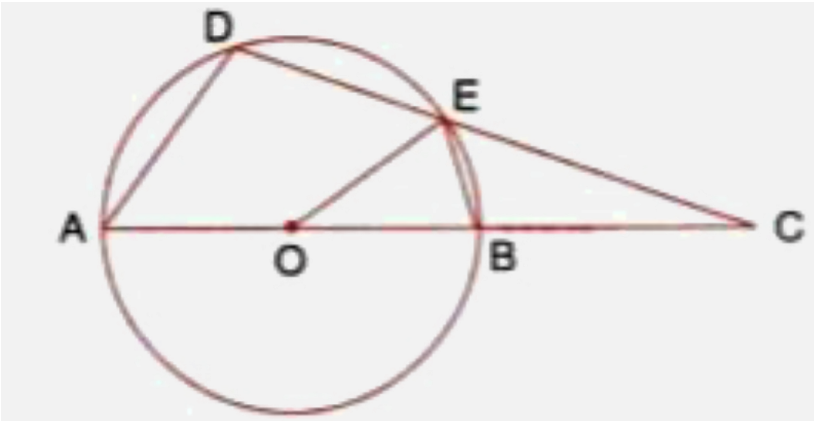
**32.** In the figure O is the centre of the circle $\angle AOE = 150^\circ, \angle DAO = 51^\circ$. Calculate the sizes of the angles CEB and OCE.

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**33.** In the figure , given below P and Q are the centres of two circles intersecting at B and C . ACD is a straight line. Calculate the numerical value of x.

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**34.** The figure shows two circles which intersects at A and B . The centre of the smaller circle is O and lies on the circumference of the Calculate. In terms of $a^\circ$ , the value of

(i) abtuse $\angle AOB$

(ii) $\angle ADB$

Give reassons for your answers clearly.

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**35.** In the given figure ,O is the centre of the circle and $\angle DAB = 50^\circ$

Calculate the values of x and y.

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**36.** In the given figure. A is the centre of the circle , ABCD is a parallelogram and CDE is a straight line.

Prove that : $\angle BCD = 2\angle ABE$

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**37.** ABCD is a cyclic quadrilateral in which AB is parallel to DC and AB is a diameter of the circle. Given $\angle BED = 65^\circ$ , Calculate

(i) $\angle DAB$

(ii) $\angle BDC$

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**38.** In the given figure AB is a diameter of the circle. Chord ED is parallel to AB and $\angle EAB = 63^\circ$ Calculate

$(i) \angle EBA$

(ii) $\angle BCD$

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**39.** In the given figure AB is a diameter of the circle with centre O. DO is parallel to CB and $\angle DCB = 120^\circ$ Calculate :

(i) $\angle DAB$

(ii) $\angle DBA$

(iii) $\angle DBC$,

(iv) $\angle DBC$

Also , show that the $\Delta$ AOD is an equilateral triangle.

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**40.** In the given figure, I is the incentre of $\Delta ABC$ BI when produced meets the circumcircle of $\Delta ABC$ at D. Given $\angle BAC = 55^\circ$ and $\angle ACB = 65^\circ$, Calculate:

(i) $\angle DCA$.

(ii) $\angle DAC$

(iii) $\angle DCI$.

$\angle AIC$.

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**41.** A triangle ABC is inscribed in a circle. The bisector of angles BAC, ABC and ACB meet the circumcircle of the triangle at points P,Q and R respectively . Prove that :

(i) $\angle ABC = 2\angle APQ$.

(ii) $\angle ACB = 2\angle APR$.

(iii) $\angle QPR = 90^\circ - \frac{1}{2}\angle BAC.$

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**42.** Calculate the angles x,y and z if

$$\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$$

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**43.** In the given figure , AB = AC = CD and $\angle ADC = 38^\circ$ . Calculate :

(i) $\angle ABC$

(ii) $\angle BEC$

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**44.** In the given figure ,AC is the diameter of circle , centre O. Chord BD is perpendicular to AC. Write down angles p,q and r in terms of x.

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**45.** In the given figure ,AC is the diameter of the circle with centre O,CD and BE are parallel Angle $\angle AOB = 80^\circ$ and $\angle ACE = 10^\circ$ Calculate

(i) Angle BEC

(ii) Angle BCD,

(iii) Angle CED

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**46.** In the given figure . AE is the diamter of the circle . Write down the numerical value of $\angle ABC + \angle CDE$. Give reasons for your answers.

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**47.** In the given figure. AOC is a diameter and AC is parallel to ED . If $\angle CBE = 64^\circ$ calculate $\angle DEC$.

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**48.** Use in the given figure to find :

(i) $\angle BAD$.

(ii) $\angle DQB$

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**49.** In the given figure , AOB is a diameter and DC is parallel to AB . If $\angle CAB = x^\circ$, find (in terms of x) the values of :

(i) $\angle COB$

(ii) $\angle DOC$

(iii) $\angle DAC$

(iv) $\angle ADC$.

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**50.** In the given figure ,AB is the diameter of a circle with centre O. $\angle BCD = 130^\circ$ Find :

(i) $\angle DAB$

(ii) $\angle DBA$

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**51.** In the given figure, PQ is the diameter of the circle whose centre is O. Given $\angle ROS = 42^\circ$ Calculate $\angle RTS$.

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**52.** In the given figure, PQ is a diameter Chord SR is parallel to PQ . Given that $\angle PQR = 58^\circ$ Calculate:

(i) $\angle RPQ$

(ii) $\angle STP$

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**53.** AB is the diameter of the circle with centre O. OD is parallel to BC and $\angle AOD = 60^\circ$

Calculate the numerical values of :

(i) $\angle ABD$

(ii) $\angle DBC$

(iii) $\angle ADC$.

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**54.** In the given figures , the centre O of the small circle lies on the circumference of the bigger circle. If $\angle APB = 75^\circ$ and $\angle BCD = 40^\circ$ find :

(i) $\angle AOB$

(ii) $\angle ACB$.

(iii) $\angle ABD$.

(iv) $\angle ADB$.

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**55.** In the given figures ,

$\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$ and $\angle BDC = 45^\circ$, Find :

(i) $\angle BCD$

(ii) $\angle ACB$

Hence , show that AC is a diameter

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**56.** In a cyclic quadrilateral ABCD $\angle A : \angle C = 3:1$ and angle B : angle D = 1 : 5 ` find each angle of the quadrilateral

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**57.** The given figures shows a circle with centre O and $\angle ABP = 42^\circ$

Calculate the measure of :

(i) $\angle PQB$

(ii) $\angle QPB + \angle PBQ$

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**58.** In the given figure, M is the centre of the circle Chords AB and CD are perpendicular to each other. If ` angle (i) express $\angle AMD$ in terms of x.

(ii) express $\angle ABD$ in terms of y .

(iii) Prove that : x=y

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## Exercise 17 B

**1.** Prove in a cylic - trapezium the non - parallel sides are equal and the diagonals are also equal .

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**2.** In the followoing figure , AD is the diameter of the circle with centre O. Chords AB,BC and CD are equal .If $\angle DEF = 110^\circ$, Calculate :

(i) $\angle AEF$.

(ii) $\angle FAB$

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**3.** If the sides of a cyclic- quadrilateral are parallel : prove that :

(i) its other two sides are equal

(ii) its diagonals are equal.

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**4.** The given figures shows a circle with centre O. Also , PQ = QR = RS and $\angle PTS = 75^\circ$ Calculate:

(i) $agn \leq POS$

(ii) $\angle QOR$

(iii) $\angle PQR$

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**5.** In the given figure. AB is a side of a regular six- sided polygon and AC is a side of a regular eight - sided polygon inscribed in the circle with centre O. Calculate the sizes of :

(i) $\angle AOB$

(ii) $\angle ACB.$

(iii) $\angle ABC.$

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**6.** In a regular pentagon ABCDE inscribed in a circle . Find the ratio between angle ADE and angle ADC.

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**7.** In the given figure AB $= BC = CD$ and $\angle ABC = 132^\circ$ Calculate :

(i) $\angle AEB$

(ii) $\angle AED$

(iii) $\angle COD$.

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**8.** In the figure , O is the centre of the circle and the length of are AB is twice the length of are BC. If angle AOB = $108^\circ$, find :

(i) $\angle CAB$

(ii) $\angle ADB$

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**9.** The figure shows a circle with centre O.AB is the side of regular pentagon and AC is the side of regular hexagon.

Find the angles of triangle ABC.

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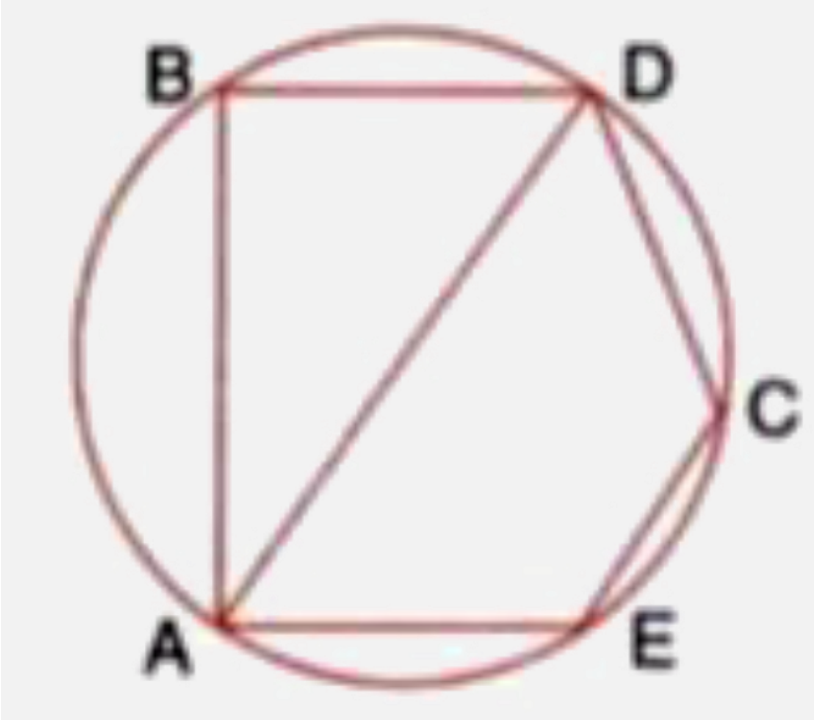
**10.** In the given figure , BD is a side of a regular hexagon. DC is a side of a regular pentagon and AD is a diameter , Calculate:

(i) $\angle ADC$,

(ii) $\angle BDA$

(iii) $\angle ABC$

(iv)$\angle AEC$

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## Exercise 17 C

**1.** In the given circle with diameter AB, find the value of x.

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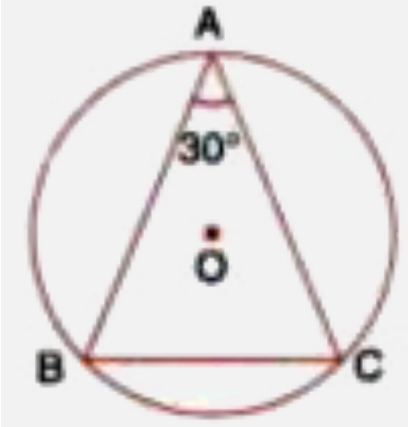
**2.** In the given figure , ABC is a triangle in which $\angle BAC = 30^\circ$ . Show that BC is equal to the radius of the circumcircle of the traiangle ABC , whose centre is O.

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**3.** Prove that the circle drawn on any one of the equal sides of an isosceles triangle as diameter bisects the base.

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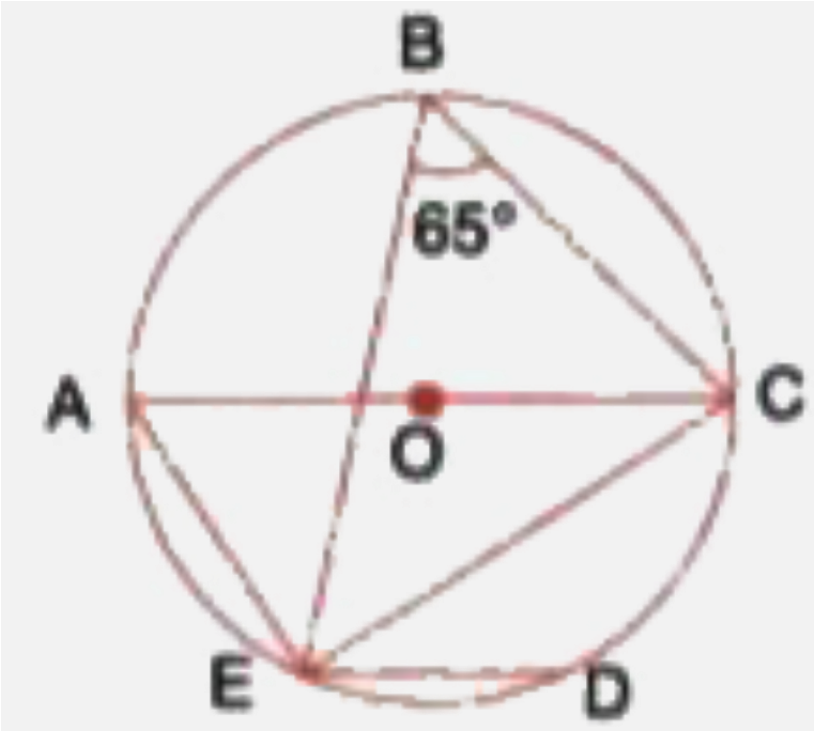
**4.** In the given figures, chord ED is parallel to diameter AC of the circle .

Given $\angle CBE = 65^\circ$ calculate $\angle DEC$

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**5.** The quadrilateral formed by angle bisectors of a cyclic quadrilateral is also cyclic.

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**6.** In the figure $\angle DBC = 58^\circ$, $BD$ is a diameter of the circle . Calculate :

(i) $\angle BDC$

(ii) $\angle BEC$

(iii) $\angle BAC$

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**7.** $D$ and $E$ are points on equal sides $AB$ and $AC$ of an isosceles triangle $ABC$ such that $AD = AE$ . Prove that $B, C, D, E$ are concylic.

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**8.** In the given figure ,ABCD is a cyclic quadrilateral .AF is drawn parallel to CB and DA is produced to point E. If $\angle ADC = 92^\circ \angle FAE = 20^\circ$,

determine $\angle BCD$. Give reason in support of your answer.

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**9.** If I is the incentre of triangle ABC and AI when produced meets the circumcircle of triangle ABC in point D. If $\angle BAC = 66^\circ$ and $\angle ABC = 80^\circ$ Calculate :

(i) $\angle DBC$

(ii) $\angle IBC$

(iii) $\angle BIC$

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**10.** In the given figure ,AB = AD = DC = PB and $\angle DBC = x^\circ$ Determine in terms of x:

(i) $\angle ABD$

(ii) $\angle APB$

Hence or otherwise , prove that AP is parallel to DB.

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**11.** In the given figure , ABC , AEQ and CEP are straight lines . Show that $\angle APE$ and $\angle CQE$ are supplementrary.

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**12.** In the given figure. AB is the diameter of the circle with centre O.

$(\#\#SEL_RKB_ICSE_MAT_X\_C17_E04_{012}\_Q01.png \text{ width=80 \%} > If$

angle ADC = 32 ^(@) , ` find angle BOC.

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**13.** In a cyclic -quadrilateral PQRS angle PQR $= 135^\circ$ , Sides SP and RQ produced meet at point A whereas sides PQ and SR produced meet at point B. If $\angle A : \angle B = 2 : 1$. find angles A and B

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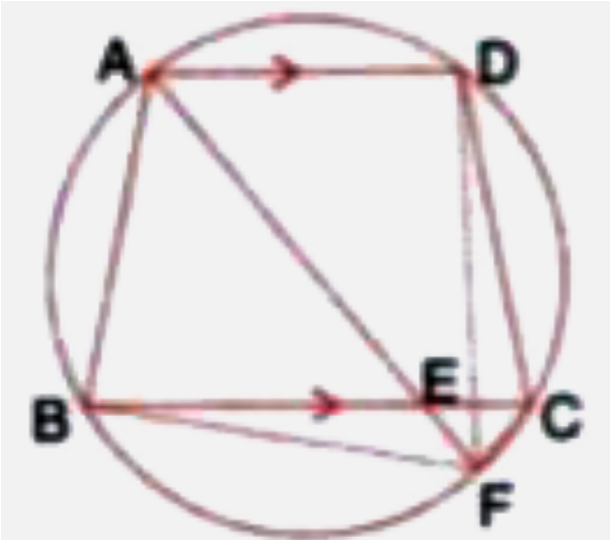
**14.** In the following figure , ABCD is a cyclic quadrilateral in which AD is parallel to BC .




If the bisector of angle A meets BC at point E and given circle at point F, prove that :

(i) EF =FC

(ii) BF = DF

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**15.** ABCD is a cyclic quadrilateral , Sides AB and DC produced meet at point E , whereas sides BC and AD produced meet at point F.

If $\angle DCF : \angle F : \angle E = 3 : 5 : 4$ find the angles of the cyclic quadrilateral ABCD.

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**16.** The following figure shows a circle with PR as its diameter.

If PQ= 7 cm and QR = 3RS = 6 cm . Find the perimeter of the cyclic quadrilateral PQRS.

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**17.** In the given figure AB is the diameter of a circle with centre O . If chord AC = chord AD, prove that :

(i) are $BC = areDB$

(ii) AB is bisector of $\angle CAD$.

Further, if the length of are AC is twice the length of are BC , find :

(i) $\angle BAC$

(ii) $\angle ABC$

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**18.** In cyclic quadrilateral ABCD , AD = BC , $\angle BAC = 30^\circ$ and $\angle CBD = 70^\circ$ , find :

$\angle BCD$

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**19.** In cyclic quadrilateral ABCD , AD = BC , $\angle BAC = 30^\circ$ and $\angle CBD = 70^\circ$ , find :

$\angle BCA$

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**20.** In cyclic quadrilateral ABCD , AD = BC , $\angle BAC = 30^\circ$ and $\angle CBD = 70^\circ$ , find :

$\angle ABC$

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**21.** In cyclic quadrilateral ABCD , AD = BC, $\angle BAC = 30^\circ$ and $\angle CBD = 70^\circ$ , find : angle ADC .

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**22.** In the given figure , $\angle ACE = 43^\circ$ and $\angle CAF = 62^\circ$, find the values of a,b and c.

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**23.** In the given figure,AB is parallel to DC. $\angle BCE = 80^\circ$ and $\angle BAC = 25^\circ$. $F \in d : (i)$ angle CAD $(ii)$ angle CBD $(iii)$ angle ADC `

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**24.** ABCD is a cyclic quadrilateral of a circle with centre O such that AB is a diameter of this circle and the length of the chord CD is equal to the radius of the circle. If AD and BC produced meet at P, show that $APB = 60^\circ$ .

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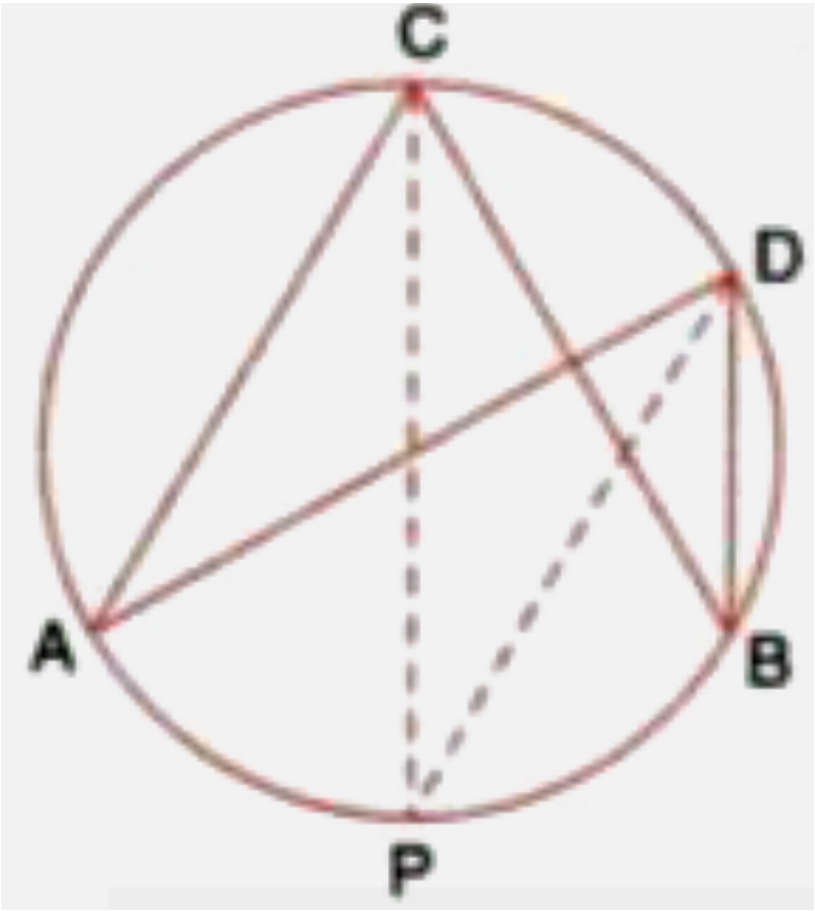
**25.** In the figure , given below , CP bisects angle ACB.

Show that DP bisect angle ADB .

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**26.** In cyclic quadrilateral ABCD , AD = BC , $\angle BAC = 30^\circ$ and $\angle CBD = 70^\circ$ , find :

$\angle BCD$

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**27.** In the given figure , AD is a diameter O is the centre of the circle AD is parallel to BC and $\angle CBD = 32^\circ$

(i) $\angle OBD$

(ii )$\angle AOB$

(iii) $\angle BED$

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**28.** In the figure given , O is the centre of the circle . $\angle DAE = 70^\circ$ , Find the giving suitable reasons , the measure of

(i) $\angle BCD$

(ii) $\angle BOD$

(iii) $\angle OBD$

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