Very-Very Short Answer Type Questions (1 mark)

Fill in the blank :- (Ques 1 to 5)

1. If the sum of a pair of apposite angles of a quadrilateral is 180°, then the quadrilateral is _____

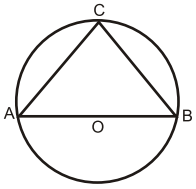
2. Diameter is the _____ chord of a circle.

3. Circles having the same centre are different radii are called _____.

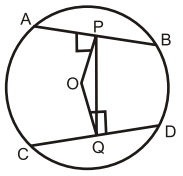
4. Angle in a semicircle is _____

5. If two chords of a circle are equal then corresponding arcs are_____

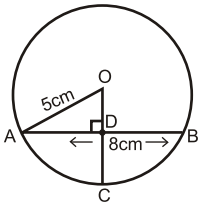
6. In fig, AOB is a diameter of the circle and AC = BC, find ∠CAB



7. In fig, AB and CD are two equal chords of a circle with centre O. OP and OQ are perpendiculars on chords AB and CD respectively. If ∠POQ = 150°, find ∠APQ

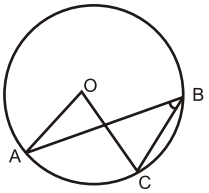


8. In fig, if OA = 5cm, AB = 8cm and OD ⊥ AB then find CD.



9. The radius of a circle is 13cm and the length of one of its chords is 10cm. Find the perpendicular distance of the chord from the centre.

10. In fig, ∠ABC=20°, find ∠AOC.

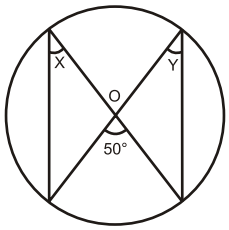


11. If in a ΔABC, AB = 12cm, BC=16cm and AB ⊥ BC, then find the radius of the circle passing through A,B and C

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12. In figure, find the values of x and y. Where O is the centre of the circle.

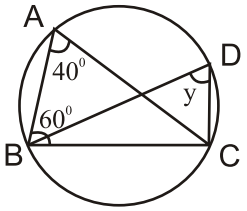


13. A round pizza is cut into 4 equal pieces. What does each piece represent?

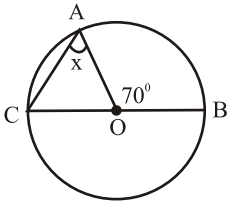
14. AD is a diameter of a circle and AB is a chord if AD = 34cm, AB=30 cm then find the distance of AB from the centre of circle.

15. Given two concentric circles with centre O. A line cut the circles at A, B, C and D respectively. If AB = 10cm, then find the length of CD.

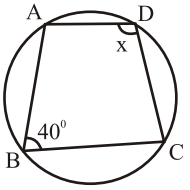
16. Find y in given figure



17. Find x

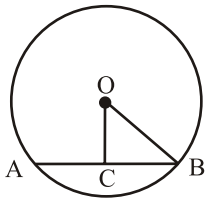


18. Find x



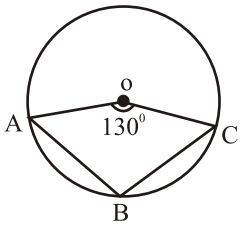
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19. In given figure OC is perpendicular segment drawn from centre O on chord AB. If OB = 5cm, and OC = 3cm then find length of AB.

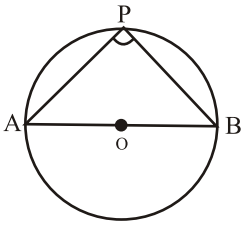


20. In given figure O is centre of circle.

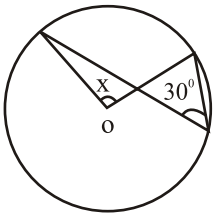
If $\angle AOC = 130^0$ then find $\angle ABC$



21. In given figure AOB is diameter of circle & P is any point on the circle. Find $\angle APB$.



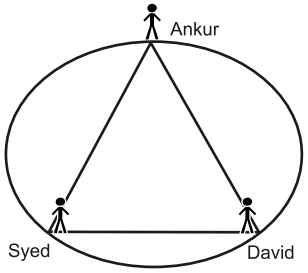
22. Find the value of x in given figure.

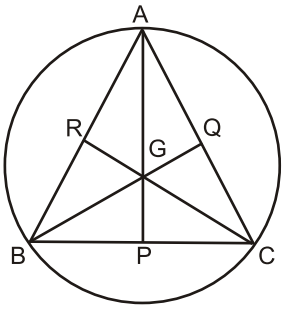


Case Study Based Problems

23. A circular park of radius 20m is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in hand to talk to each other as shown in figure. AP, BQ and CR are the medians of triangle ABC.

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(A) The length of AG is :

a) 20m b) 10m c) 22m d) 25m

(B) The length of AP is :

a) 20m b) 30m c) 40m d) $20\sqrt{2}$m

(C) The measure of angle BGC is :

a) 60° b) 90° c) 120° d) 150°

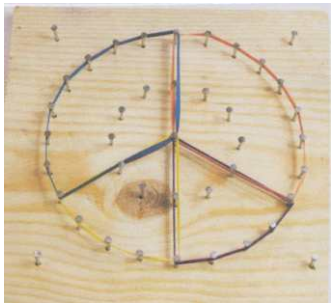
(D) The measure of angle ABQ is :

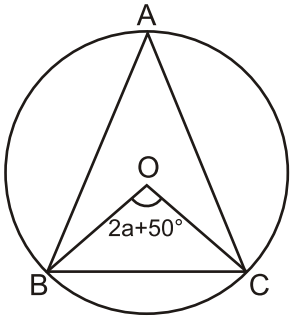
a) 20° b) 30° c) 45° d) 60°

(E) The length of AB is :

a) 30m b) $10\sqrt{3}$m c) $20\sqrt{3}$m d) $30\sqrt{3}$m

24. During a practical activity in mathematics Lab, students were using circular geoboard. The angle subtended by $\overline{BC}$ at the centre is (2a + 50°)





(A) $\angle$BAC is equals :

a) a b) 25 c) 2a d) a + 25°

(B) If a=30°, then $\angle$BAC is

a) 110° b) 55° c) 50° d) 60°

(C) If a=15° then reflex BOC is

a) 100° b) 55° c) 280° d) 90°

(D) If a=5° and radius of circle is 10cm then BC is

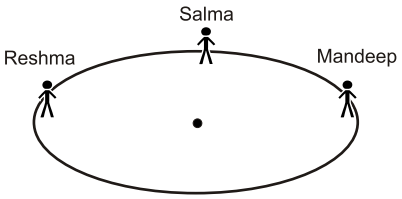
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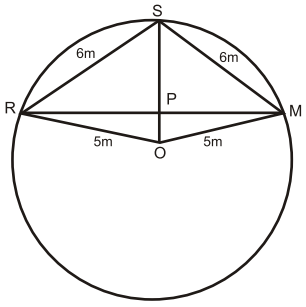
a) 5cm b) 8cm c) 10cm d) 15cm

(E) If diameter of circle is 20cm and BC=12cm then the perpendicular distance of BC from O is

a) 6cm b) 8cm c) 10cm d) 12cm

25. Three girls Reshma, Salma and Mandeep are playing a game by standing on a circle of radius 5m at R, S and M respectively as shown in figure. Reshma throws a ball to Salma, Salma to Mandeep, Mandeep to Reshma. The distance betweem Reshma and Salma and between Salma and Mandeep is 6m. 0 is the centre of the circle.





(A) The ratio of $\angle MOS : \angle MRS$ is :

a) 1 : 1 b) 1 : 2 c) 2 : 1 d) 3 : 2

(B) The quadrilateral RSMO is a :

a) Parallelogram

b) Rhombus

c) Square

d) Kite

(C) Length of perpendicular from O to the chord SM is :

a) 5m b) 6m c) 4m d) 3.6m

(D) Length of OP is :

a) 1.4m b) 4m c) 36m d) 3m

(E) Distance Reshma and Mandeep is :

a) 4.8m b) 3.6m c) 9.6m d) 7.2m

Very Short Answer questions (2 marks)

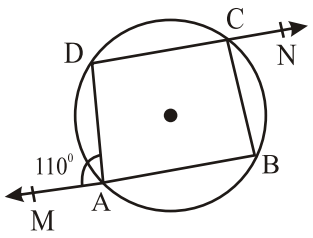
26. Prove that cyclic parallelogram is a rectangle.

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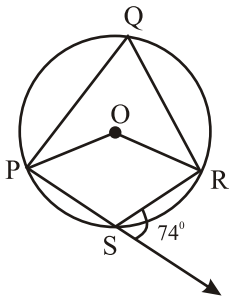
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27. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

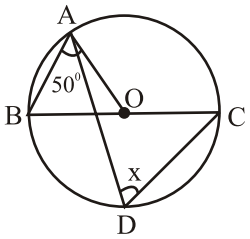
28. In the following figure. Find the value of $\angle BCN$.



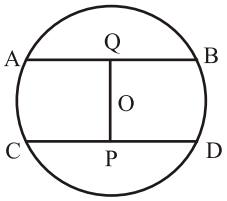
29. In the given figure. Find the value of reflex angle POR.



30. Find the value of x in figure if O is centre of circle and $\angle OAB = 50^0$.

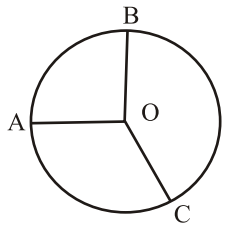


31. In the given figure, O is centre of the circle with radius 5 cm, $OP \perp CD$, $OQ \perp AB$, $AB \parallel CD$, AB = 6 cm and CD = 8 cm. Determine PQ.

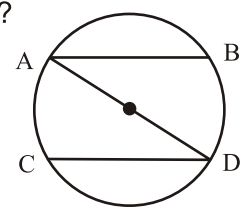


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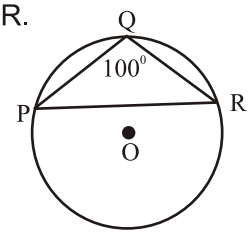
32. In the given figure, O is the centre of a circle, $\angle AOB = 90^0$, $\angle BOC = 120^0$, what is measure of $\angle ABC$?



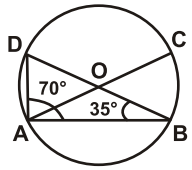
33. In the given figure AB and CD are parallel chords if the length of arc AC = 14 cm. What is length of BD?



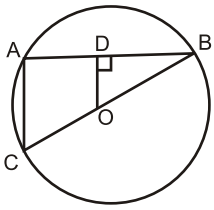
34. In given figure $\angle PQR = 100^0$ where P, Q & R are points on the circle with centre O. Find $\angle OPR$.



35. In the given figure O is centre of circle. If $\angle ABD = 35^0$ and $\angle BAD = 70^0$, find $\angle ACB$.

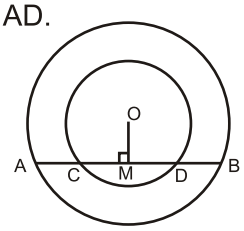


36. In fig, OD is perpendicular to the chord AB of a circle whose centre is O. If BC is a diameter. Show that CA=20D.

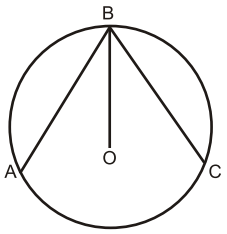


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37. Two concentric circles with Centre O where AB is a chord of outer circle which intersects the inner circle at C and D are shown in figure. If AB = 12cm and CD=8cm find AD.

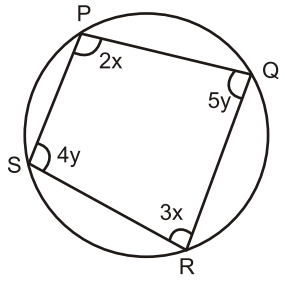


38. In figure, AB=BC and O is the centre is the circle. Prove that BO bisects ∠ABC.



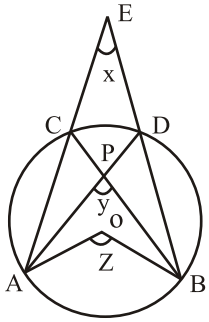
39. Prove that the diameter is the greatest chord of a circle.

40. In figure, PQRS is a cyclic quadrilateral. Find the value of x and y.



Short Answer Type Questions (3 marks)

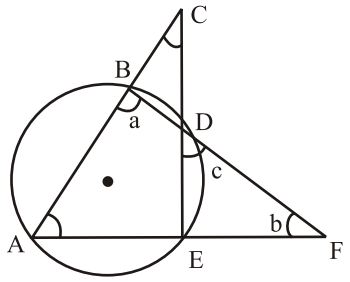
41. In the given figure, O is the centre of a circle prove that ∠x + ∠y = ∠z.



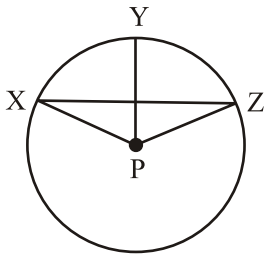
42. If two non parallel sides of a trapezium are equal prove that it is cyclic quadrilateral.

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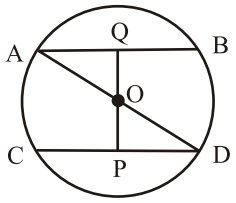
43. In the given figure, determine a, b & c if $\angle BCD = 43^0$, $\angle BAF = 62^0$.



44. In the figure, P is the centre prove that $\angle XPZ = 2(\angle XZP + \angle YXZ)$

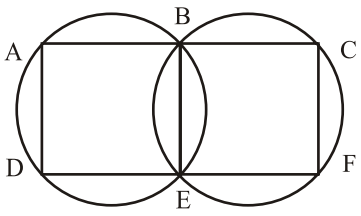


45. In the given figure AD is diameter of the circle whose centre is O and AB || CD prove that AB = CD.



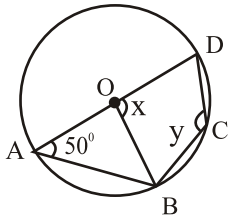
46. In an equilateral triangle, prove that the centroid and the circum centre coincide.

47. In the given figure A, B, C and D, E, F are two sets of collinear points. Prove that AD || CF.



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48. In given figure, O is centre of circle and $\angle DAB = 50^0$, calculate the value of x and y.



49. If two equal chords of a circle intersect within the circle prove that the segment of one chord is equal to corresponding segment of other chord.

50. Prove that if a pair of opposite angles of a quadrilateral are supplementary, then the quadrilateral is cyclic.

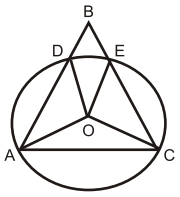
51. Bisector of angle A, B and C of a ΔABC intersect its circum circle at D, E and F respectively, prove that the angles of a triangle DEF are

$90^0 - \frac{1}{2} A,\ 90^0 - \frac{1}{2} B,\ 90^0 - \frac{1}{2} C$

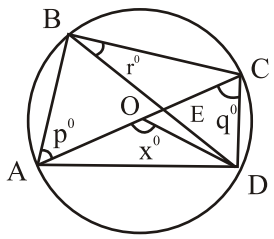
52. Find the sum of the angles in the four segments exterior to a cyclic quadrilateral.

53. Let the vertex B of a triangle ABC be located outside a circle and let the sides of the angle intersect equal chords AD and CE with the circle. Prove that $\angle ABC$ is equal to half the difference of the angles subtended by the chords AC and DE at the centre.

$$\angle ABC = \frac{1}{2} [\angle DOE - \angle AOC]$$



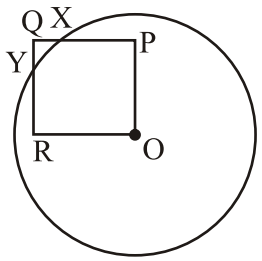
54. In the adjoining figure AC is diameter of a circle with centre O and chord BD $\perp$ AC, intersecting each other at E. Find out the values of p, q, r in terms of x if $\angle AOD = x^0$, $\angle BAC = p^0$, $\angle ACD = q^0$.



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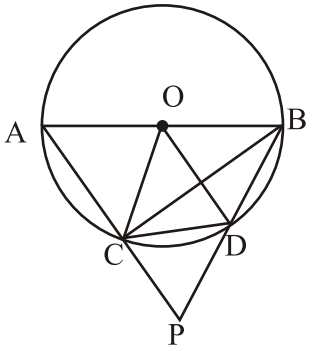
55. Prove that there is one and only one circle can pass through three non-collinear points.

56. In the given figure OPQR is a square. A circle drawn with centre O cuts the square in X and Y. Prove that QX = QY.

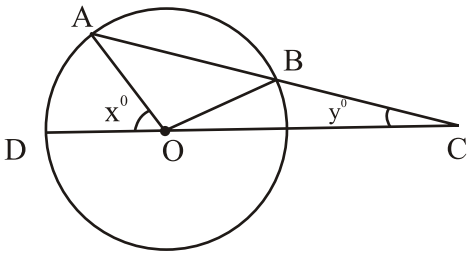


57. Prove that the opposite angles of a cyclic quadrilateral are supplementary.

58. In the given figure, AB is a diameter of a circle (O, r) and chord CD = radius OC. If AC and BD when produced meet at P. Prove that $\angle APB$ is constant.

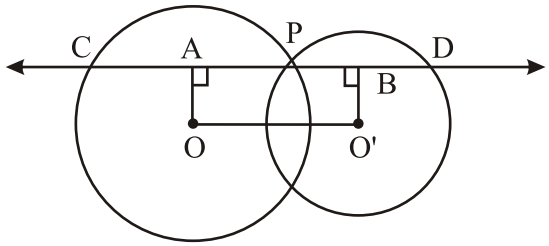


59. In the given figure, AB is a chord of a circle with centre O and AB is produced to C such that BC = OB. Also, CO is joined and produced to meet the circle in D. If $\angle ACD = y^0$ and $\angle AOD = x^0$. Prove that x = 3y.

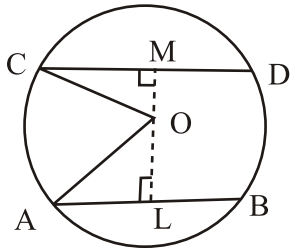


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60. Two circles whose centres are O and O' intersect at P. Through P, a line l parallel to OO', intersecting the circle at C and D is drawn. Prove that CD = 2OO'.



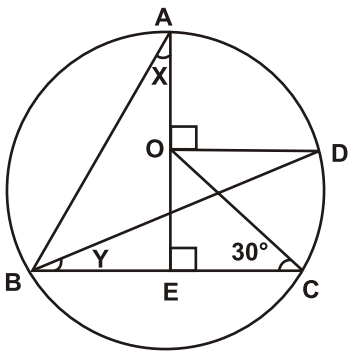
61. AB and CD are two parallel chords of a circle which are on opposite sides of the centre O such that AB = 10cm, CD = 24cm and the distance between AB and CD is 17 cm. Find the radius of the circle.



Long Answer type Questions (5 Marks)

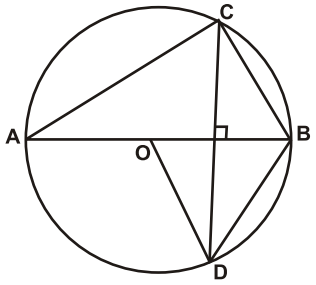
62. AB and AC are two chords of a circle of radius r such that AB = 2 AC. If p and q are the distance of AB and AC from the centre, Prove that $4q^2 = p^2 + 3r^2$

63. In figure, O is the centre of the circle, $\angle BCO = 30°$, $AE \perp BC$ and $DO \perp AE$. Find x and y.



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64. In figure, O is the centre of the circle, BD = OD and CD $\perp$ AB, Find $\angle$CAB.



65. Prove that the angle subtended by an arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.
66. Show that if two chords of a circle bisect one another they must be diameters.
67. The quadrilateral formed by angle bisectors of a cyclic quadrilateral is also cyclic.

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CHAPTER-10

CIRCLES

ANSWERS

1. Cyclic
2. longest
3. Concentric Circles
4. Right angles or 90°
5. Congruent
6. 45°
7. 105°
8. 2cm
9. 12cm
10. 40°
11. 10cm
12. x=35°, y=35°
13. Sector
14. 8cm
15. 10cm
16. y=40°
17. 35°
18. x+40°=180°
    x = 140°
19. CB = 4cm
    ∴ AB = 8cm
20. ∠ABC = 115°
21. ∠APB = 90°
22. x = 60°
23. (A) (a) 20m
    (B) (b) 30m
    (C) (c) 120°
    (D) (b) 30°
    (E) (c) $20\sqrt{3}$
24. (A) (d) a+25
    (B) (b) 55°
    (C) (c) 280°
    (D) (c) 10cm
    (E) (b) 8cm
25. (A) (c) 2 : 1
    (B) (d) Kite
    (C) (c) 4m
    (D) (a) 1.4m
    (E) (c) 9.6m
27. 30°, 150°
28. ∠DAM + ∠DAB = 180°
    ∠DAB = 70°
    ∠DAB + ∠DCB = 180°
    ∠DCB = 110°
    ∠BCN +∠DCB = 180°
    ∠BCN = 70°
29. ∠PSR + ∠RST = 180°
    ∠PSR= 106°
    reflex ∠POR = 2 ∠PSR
    = 212°
30. ∠AOB = 80°
    ∠AOB + ∠AOC = 180°
    ∠AOC = 100°
    $\angle ADC = \frac{1}{2}\angle AOC$

    ∠ADC = 50
31. $AQ = \frac{1}{2}AB$

    AQ = 3cm
    $(OA)^2 = (AQ)^2+(OQ)^2$
    OQ = 4cm
    slly OP = 3cm
    PQ = 7cm
32. ∠AOB + ∠BOC + ∠AOC = 360°
    ∠AOC = 150°
    $\angle ABC = \frac{1}{2}\angle AOC = 75°$
33. BD = 14cm
34. ∠OPR = 10°
35. ∠ABD + 70° + 35° = 180°
    ∠ADB = 75°
    ACB = ADB = 75°
36. OD || AC
    $OD = \frac{1}{2}CA$

    CA = 2 OD

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37. AM = 6cm
MD = 4cm
AD = (6+4)cm
= 10cm

38. Δ's AOB $\cong \Delta$COB by sss
$\Rightarrow \angle OBA = \angle OBC$
$\Rightarrow$ OB bisects $\angle ABC$

40. $2x + 3x = 180°$
$x = 36°$
$4y + 5y = 180°$
$y = 20°$

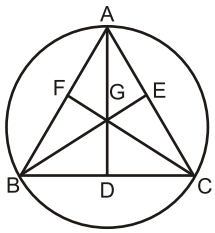
41. $\angle ACB = \angle ADB$
$\angle z = 2\ \angle ACB$
$\angle z = \angle ACB + \angle ADB$
$\angle y = \angle ACB + \angle CAD$
$\angle z = \angle y - \angle DAC + \angle ADB$
$\angle ADB - \angle DAC = \angle X$
$\angle x + \angle y = \angle z$

43. $a = 105°, b = 13°, c = 62°$

44. $\angle XPY = 2\ \angle XZY$
$\angle YPZ = \angle YXZ$
$\angle XPZ = 2\ (\angle XZY + \angle YXZ)$

45. $\Delta AOQ \cong \Delta POD$
$\Rightarrow$ OQ = OP by CPCT
$\Rightarrow$ AB = CD

46. $\Delta BEC \cong \Delta BFC$
$\Rightarrow$ BE = CF
slly $\Delta CAF \cong \Delta CAD$
$\Rightarrow$ CF = AD
AD = BE = CF
$\frac{2}{3}AD = \frac{2}{3}BE = \frac{2}{3}CF$



GA = GB = GC
Hence centroid and circumcentre are coincident

47. $\angle DAB + \angle BED = 180°$
$\angle BED = \angle BCF$
$\Rightarrow\ \angle DAB + \angle BCF = 180°$
Hence AD || CF

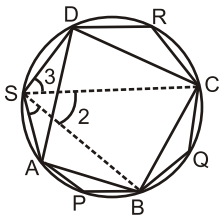
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48. $\angle AOB = 80°$

$x = 100°$

$y = 130°$

52.



$\angle 1 + \angle P = 180°$

$\angle 2 + \angle Q = 180°$

$\angle 3 + \angle R = 180°$

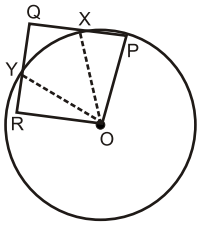
$\angle 1 + \angle P + \angle 2 + \angle Q + \angle 3 + \angle R = 3 \times 180° \Rightarrow \angle P + \angle Q + \angle R + \angle S = 6 \times 90°$

54. $p = 90$

$q = \frac{1}{2} x$

$r = 90 - \frac{1}{2} x$

56.



$QR = QP$

$\Delta ORY \cong \Delta OPX$

$\therefore RY = PX$

$QR - RY = QP - PX$

$QY = QX$

59. $\angle BOC = y$

$\angle ABO = 2y$, $\angle OAB = 2y$

$(2y) + (2y) + (180 - x - y) = 180°$

$x = 3y$

60. $CA = AP$

$\Rightarrow CP = 2AP$

$BP = BD$

$\Rightarrow PD = 2\ PB$

$CD = 2\ AP + 2PB$

$CD = 200$

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61. $OA^2 = OL^2 + AL^2$

$r^2 = x^2 + 5^2$ ——————— 1

$OC^2 = OM^2 + CM^2$

$r^2 = (17-x)^2 + (12)^2$ ——————— 2

from 1 & 2

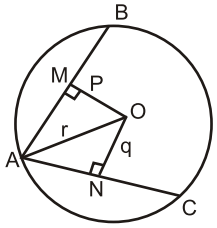
$34x = 408$

$x = 12cm$

$\therefore r = 13cm$

[Where OL = x, OM = 17-x]

62.



$\left(\frac{AB}{2}\right)^2 = r^2 - P^2$

$AB^2 = 4r^2 - 4p^2$

slly $AC^2 = 4r^2 - 4q^2$

As AB = 2AC

$AB^2 = 4AC^2$

$4r^2 - 4p^2 = 4\,[4r^2 - 4q^2]^2$

$4q^2 = p^2 + 3r^2$

63. $\angle EOC = 180° - 30° - 90°$

$= 60$

$\angle COD = 180° - 60° - 90°$

$= 30°$

$2y = 30°$

$y = 15°$

64. $\angle ABD = \frac{1}{2} x\ 90°$

$= 45°$

$\angle ABC = 60$

In ΔABE,

$60° + x + 90° = 180°$

$x = 30°$

$x = 30°, y = 15°$

64. Since OB = OD = BD

$\therefore \angle BOD = 60° \Rightarrow \angle AOD = 120°$

Now $\angle ACD = 60° \Rightarrow \angle CBA = 60°$

Hence CAB = 30 (Angle sum property)

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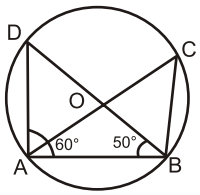
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PRACTICE TEST

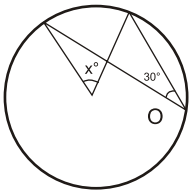
Circles

Time : 1 hr M.M.: 25

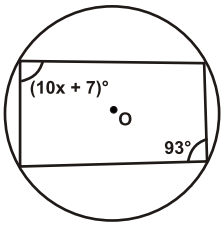
1. In fig, $\angle DAB = 60^\circ$ and $\angle ABD = 50^\circ$. Find $\angle ACB$. **1**



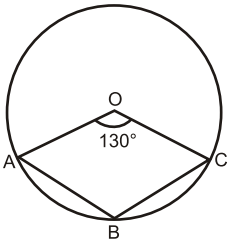
2. The chord of a circle is equal to its radius. What is the angle subtended by this chord at the minor arc of the circle. **1**
3. Find the value of x in given figure if O is the centre of the circle. **1**



4. Prove that equal chords of a circle subtend equal angles at the centre. **2**
5. A circle passes through A, B, C and D as shown in figure. If $\angle BAD = 93^\circ$ Find x. **2**



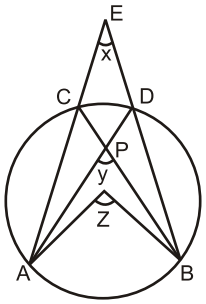
6. In figure O is the centre of a circle. If $\angle AOC = 130^\circ$ then find $\angle ABC$. **2**



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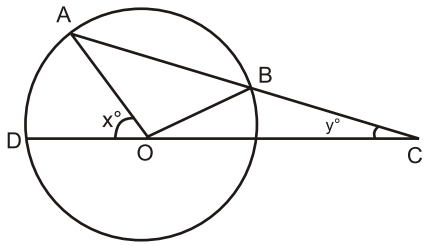
7. Prove that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°. **3**

8. In fig, O is the centre of a circle prove that $\angle x + \angle y = \angle z$ **3**



.9. Prove that the angle subtended by an arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle. 5

10. In figure, AB is a chard of a circle with centre O and AB is produced to C. Such that BC=OB. Also, CO is joined and produced to meet the circle in D. If $\angle ACD = y$ and $\angle AOD = x°$. Prove that $x = 3y$ 5



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