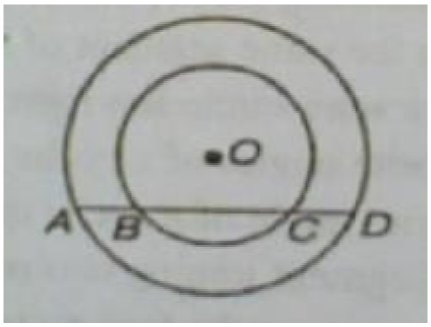
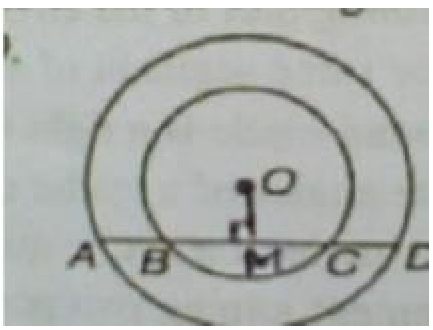
Important Questions ICSE Class 10th : Maths Year 2009
(Circle)

Question 1. In the figure given below, there are two concentric circles and AD is a chord of larger circle. Prove that AB = CD?



Solution : OM perpendicular to AD is drawn. We know that perpendicular from centre to the chord of a circle bisect the chord.



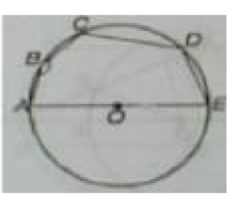
Therefore, AM = MD (for bigger circle) -----------(i)

and BM = MC (for smaller circle) ------------(ii)

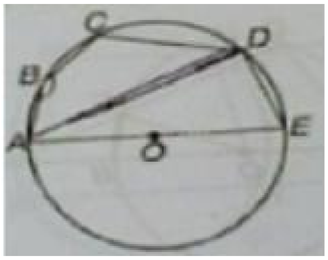
On subtracting (ii) from (i) we get

AM – BM = MD – MC , Or, AB = CD. [Proved.]

Question 2. In the figure given below,AOE is a diameter of a circle, write down the measure of sum of angles ABC and CDE. Give reasons of your answer?



Solution :



AD is joined.

ADE is a right angle, being angle in a semi-circle.

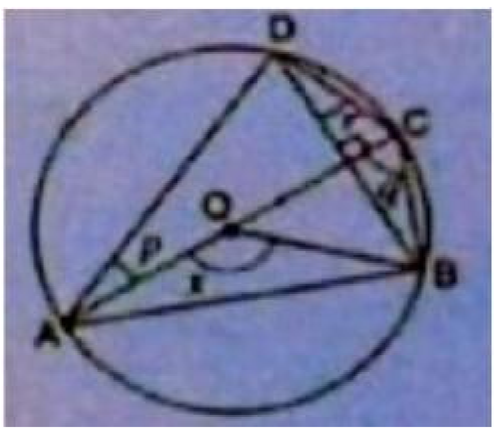
L ABC + L ADC = 180º [opp. angles of a cyclic quad.]

L ADE = 90º [angle in the semi-circle]

Hence, L ABC + L ADE + L ADC = 270º

Or, L ABC + L CDE = 270º. [Proved]

Question 3. In the figure given below, AC is a diameter of a circle withcentre O. Chord BD is perpendicular to AC. Write down the angles p, q, r in terms of x?



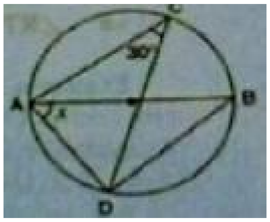
Solution : LAOB = 2×LADB, Or, LADB = x/2.

Now, LADB + LDAC + 90º = 180º, Or, p = 90º– x/2.

q = LADB = x/2.

r = LCAB = 1/2×LCOB = 1/2×(180º– x) = 90º– x/2.

Question 4. In the given circle below, find the value of x?



Solution : LABD = LACD [angles in the same segment are equal]

= 30º[LACD = 30º given]

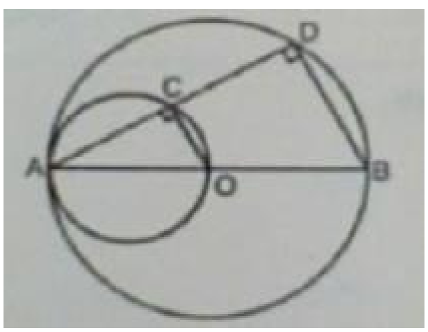
AB is a diameter of the circle, LADB = 90º [angle in a semi-circle is 90º]

In ∆ ABD, LDAB + LABD + LADB = 180º

[sum of all the three angles of a triangle is 180º]

Or,x + 30º + 90º = 180ºOr,x = 180º – 90º – 30º = 60º. [Ans.]

Question 5. A circle with centre O, diameter AB and a chord AD is drawn. Another circle is drawn with AO as diameter to cut AD at C. Prove that BD = 2OC?
Solution : The following figure is drawn according to the question:-



C to O and D to B are joined.

L ADB = 90º[angle in a semi-circle is 90º, AB is diameter]

L ACO = 90º[same reason, OA is diameter]

In ∆s ACO and ADB, L ACO = L ADB = 90º

L CAO = L DAB[common]

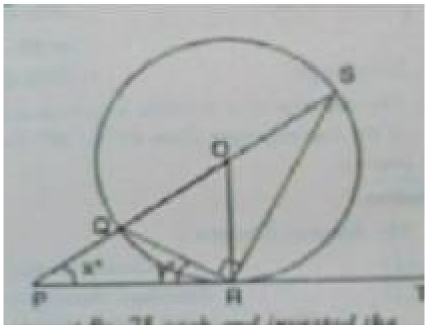
Hence, ∆ ACO ~ ∆ ADB[A A similarity rule]

Therefore, OA/AB = OC/BD

Or,OA/2OA = OC/BD[AB = 2OC, given]

Or,BD = 2OC. [Proved.]

Question 6. In the figure given below, PT touches a circle withcentre O at R. Diameter SQ when produced meets PT at P. If L SPR = x^o and L QRP = y^o, show that $x^o + 2y^o = 90^o$?



Solution : PRT is tangent at R and RQ is a chord from the contact point,

Therefore, L PRQ = L QSR = y^o[Angle in the alternate segment]

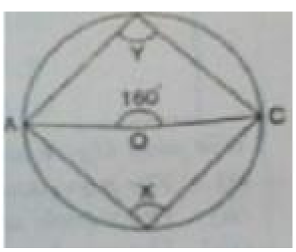
andL QRS = 90^o [angle in semi-circle is 90^o as, QS is a diameter.]

In Δ PRS, L SPR +L PRS + LRSP = 180^o[sum of angles of a Δ = 180^o]

Or,$x^o + y^o + 90^o + y^o = 180^o$

Or,$x^o + 2y^o = 180^o – 90^o = 90^o$. [Ans].

Question 7. In the figure given below, O is thecentre of the circle and L AOC = 160^o. Prove that 3Ly – 2Lx = 140^o ?



Solution : By arc property of the circle, Lx = 1/2(LAOC) = 1/2(160^o) = 80^o

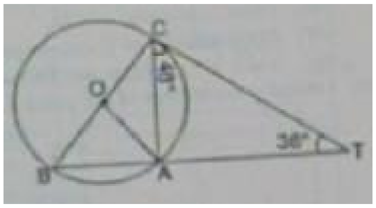
The vertices of the quadrilateral lie on the circle, so it is a cyclic quadrilateral.

Therefore, Lx + Ly = 180^oOr, 80^o + Ly = 180^oOr, Ly = 100^o

Hence, 3Ly – 2Lx = 3×100^o – 2×80^o = 140^o. [Proved.]

Question 8. A, B and C are three points on a circle. The tangent at C meets BA produced at T.

Given that L ATC = 36º and that the L ACT = 48º. Calculate the angle subtended by AB at the centre of the circle ?
Solution :



Let O be the centre of the circle. OA is joined.

In Δ TAC, L TAC = 180º– (48º + 36º)= 96º,

L CAB = 48º + 36º = 84º,

Now OC is perpendicular to TC, [C being point of contact]

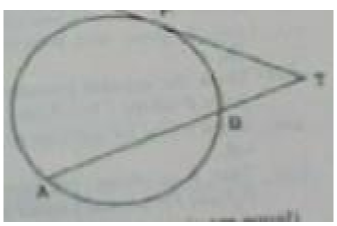
L OAC = L OCA = 90º – 48º= 42º [OA = OC, being radii]

L OAB = L CAB – L OAC = 84º – 42º = 42º,

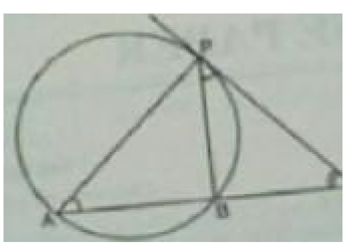
Again Δ AOB is isosceles, L OBA = L OAB = 42º

Therefore, L AOB = 180º – (42º + 42º) = 180º – 84º = 96º. [Ans.]

Question 9. In the given figure below, findTP if AT = 16 cm and AB = 12 cm ?



Solution :



In Δs PAT and PBT, L TPB = L PAT [angles in the alternate segment are equal]

L ATP is common

Therefore, Δ PAT ~ ΔPBT[AA similarity rule]

Hence, PT/AT = BT/PT Or, PT2 = AT×BT = AT×(AT - AB) = 16(16 – 12) = 64

Or, PT = √64 = 8 cm. [Ans.]