SHIKSHA CLASSES

Subject : Geometry **ANSWERS PAPER** **Total Marks** : 20

Class : X **3. Circle**

Q. 1 A) Choose the correct alternative from Objectives given below. (2)

1) Two circles of radii 5.5 cm and 3.3cm respectively touch each other. what is the distance between their centers?

Ans. : d) 8.8cm or 2.2cm

2) $\angle ACB$ is inscribed in arc ACB of a circle with centre O. If $\angle ACB = 65^0$, find m(arc ACB).

Ans. : d) 230^0

B) Solve Any ONE of the following. (1)

1) What is the distance between two parallel tangents of a circle having radius, 4.5cm? Justify your answer.

Ans. : 4.5 + 4.5 = 9 cm

Justification : Tangents are perpendicular to radii at point of contact.

2) O is the centre of a circle. TA is the tangent to the circle at the point T. What is the measure of $\angle OTA$?

Ans. : Tangent is perpendicular to radius at point of contact

$\therefore \angle OTA = 90^0$

Q. 2 : A) Attempt Any ONE of the following.(2)

1) The distance between the centers of two circles touching internally is 5cm and touching externally is 19cm. Find the radii of the circles.

Ans. : Let r_1 and r_2 be the radii of circles.

Distance, between centre of internally touching circles is equal to difference of radii

$\therefore r_1 - r_2 = 5cm$

$\therefore r_1 = 5 + \boxed{r_2}$ _____ (1)

Distance between centres of enternally touching circles is equal to sum of radii.

$\therefore r_1 + r_2 = \boxed{19}$ _____ (2)

From (1) and (2)

$5 + r_2 + r_2 = 19$

$2r_2 = 19 - \boxed{5} = 14$

$r_2 = \frac{14}{\boxed{2}} = 7$

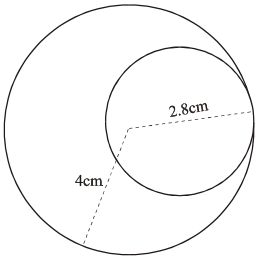
$r_2 = 7cm$

$r_1 = 5 + r_2 = 5 + 7 = \boxed{12}$ cm

$\therefore$ radii of circles are $\boxed{7}$ cm and $\boxed{12}$ cm

2) If radii of two circles are 4cm and 2.8cm. Draw figure of these circles touching each other internally.

Ans. :



Q. 2 : B) Attempt Any ONE of the following. (2)

1) $\square MRPN$ is Cyclic, $\angle R = (5x - 13)^0$, $\angle N = (4x + 4)^0$. Find measures of $\angle R$ and $\angle N$.

Ans. : $\square MRPN$ is cyclic

$\therefore$ Opposite angles of cyclic quadrilateral are supplementary

$\therefore \angle R + \angle N = 180$

$5x - 13 + 4x + 4 = 180$

$9x - 9 = 180$

$9x = 180 + 9$

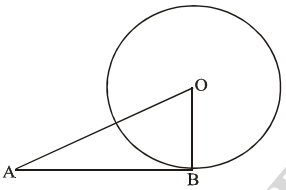
$9x = 189$

$x = \frac{189}{9} = 21$

$\therefore \angle R = (5x - 13)^0 = 5 \times 21 - 13 = 10\ 5 - 13 = 92^0$

$\angle N = (4x + 4)^0 = 4 \times 21 + 4 = 84 + 4 = 88^0$

2) In the adjoining figure O is the centre of the Circle.
OA = 8.5cm Line AB is a tangent to the circle at the point B. If AB = 7.5cm, find the radius of the circle.



Ans. : Tangent is perpendicular to radius at point of contact

$\therefore \angle OBA = 90^0$

$\therefore \Delta OAB$ is right angled triangle

$\therefore$ By pythagorus theorem

$OB^2 = OA^2 - AB^2$

$= (8.5)^2 - (7.5)^2$

$= 75.25 - 56.25$

$= 16$

$OB = \sqrt{16} = 4cm$

radius of a circle is 4cm.

Q. 3 A) : Attempt Any ONE of the following.(3)

1) If secants containing chords AB and CD of a circle intersect outside the circle in point E, then AE x EB = CE x ED.

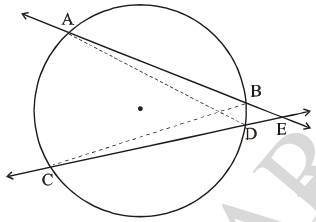
Ans. : Construction : Draw seg AD and Seg. BC

Proof : In ΔADE and ΔCBE

$\angle AED \cong \angle CEB$ (Common angle)

$\angle DAE \cong \angle BCE$ ____

(Angles inscribed in same arc)



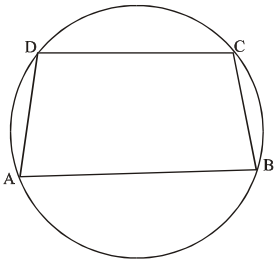
$\therefore \boxed{\Delta ADE} \sim \boxed{\Delta CBE}$ ____ (AA test)

$\therefore \frac{\boxed{AE}}{\boxed{CE}} = \frac{\boxed{ED}}{\boxed{EB}} =$ .....

(corresponding sides of similar triangles)

$\boxed{AE} \times \boxed{EB} = \boxed{CE} \times \boxed{ED}$

2) $\square ABCD$ is a cyclic quadrilateral in which side AB|| side DC prove that AD = BC



Ans. : $\square ABCD$ is a cyclic quadrilateral opposite angles of cyclic quadrilateral are supplementary.

$\therefore \angle A + \angle C = 180$ _____ (1)

and $\angle B + \angle D = 180$ ____ (2)

Also, side AB || side DC, seg AD and seg BC are transversals.

$\therefore$ Interior angles on same side of a transversals are supplementary.

$\therefore \angle A + \angle D = 180$ ____ (3)

and $\angle B + \angle C = 180$ ____ (4)

$\therefore$ From equation (1) and (4)

$\angle A = \angle B$

From equation (1) and (3)

$\angle C = \angle D$

$\therefore$ Base angles of $\square ABCD$ are equal

$\square ABCD$ is an isoscales trapezium

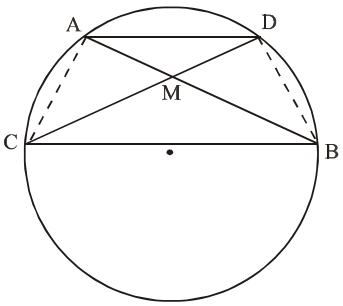
Hence non - parallel sides are congruent

$\therefore AD = BC$

Q. 3 : B) Attempt Any ONE of the following.(3)

1) Point M, in the interior of the circle, is the point of intersection of two chords AB and CD of the same circle. show that CM x BD = BM x AC.

Ans. : Solution :



Construction : Draw seg AC and seg BD

Proof : In ΔAMC and ΔDMB,

$\angle AMC \cong \angle DMB$ [vertically opposite angles]

$\angle MAC \cong \angle MDB$ [Angles inscribed in the same arc]

$\therefore \Delta AMC \sim \Delta DMB$ ___ [AA test for similarity]

$\therefore \frac{CM}{BM} = \frac{AC}{DB}$ _____ [C.S.S.t]

$\therefore CM \times DB = AC \times BM$

i.e. CM x BD = BM x AC

2) Prove that opposite angles of a cyclic quadrilateral are supplementary.

Ans. : Given : $\square ABCD$ is cyclic

To prove : $\angle A + \angle C = 180^0$

and $\angle B + \angle D = 180^0$

Proof : Arc ABC is intercepted by the inscribed angle $\angle ADC$.

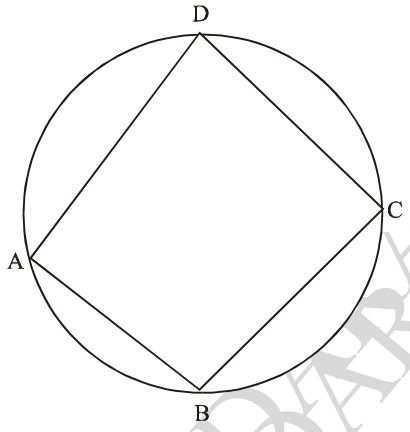
$\therefore \angle ADC = \frac{1}{2} m(\text{arc } ABC)$ ____ (1)

Similarly, $\angle ABC$ is an inscribed angle. It intercepts are ADC

$\therefore \angle ABC = \frac{1}{2} m(\text{arc } ADC)$ _____ (2)

$\therefore m\angle ADC + m\angle ABC =$

$\frac{1}{2} m(\text{arc } ABC) + \frac{1}{2} m(\text{are } ADC)$



$\therefore (\text{From (1) and (2)})$

$= \frac{1}{2}[m(\text{arc} \Delta BC) + m(\text{arc } ADC)]$

$= \frac{1}{2} \times 360^0$ [Measure of complete circle]

$= 180^0$

similarly $\angle A + \angle C = 180^0$

Q. 4 : Attempt Any ONE of the following. (4)

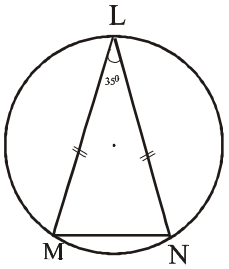
1) In the adjoining figure

Chord LM ≅ Chord LN,

$\angle L = 35^0$

Find (i) m (arc MN)

(ii) m (arc LN)



Ans. : i)

$\angle L = \frac{1}{2} m(\text{arc MN})$ ___ inscribed angle theorem

$\therefore 35 = \frac{1}{2} m(\text{arc MN})$

$\therefore 2x35 = m(\text{arc MN}) = 70^0$

ii) m (arc MLN) = 360^0 - m (arc MN) ---

--- (definition of measure of arc)

= 360 - 70

= 290^0

Now, chord LM ≅ Chord LN

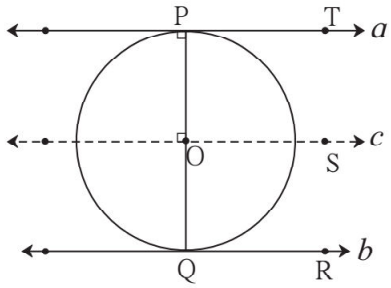
$\therefore$ arc LM ≅ arc LN

but m (arc LM) + m(arc LN) = m (arc MLN) = 290^0 (arc addition property)

$$m(\text{arc LM}) = m(\text{arc LN}) = \frac{290}{2} = 145^0$$

2) Point O is the centre of a circle. Line 'a' & line 'b' are parallel tangents to the circle are P and Q. Prove that segment PQ is a diameter of the circle.

Ans. :



Draw a line C through O

Which is parallel to line a.

Draw radii OQ and OP.

Now, $\angle OPT = 90^0$ (Tangent th^m)

$\therefore \angle SOP = 90^0$ (Int angle property) ___ I

line a || line C (Construction)

line a || line b (Given)

$\therefore$ line b || line c

$\therefore \angle SOQ = 90^0$ (Int angle property) __ II

$\therefore$ From I and II

$\angle SOP + \angle SOQ = 90^0 + 90^0 = 180^0$

$\therefore$ ray OP and ray OQ are opposite rays.

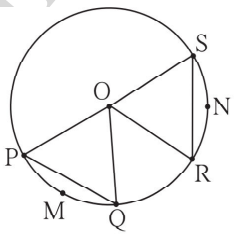
$\therefore$ P, O, Q are collinear points.

$\therefore$ Seg PQ is a diameter of the circle.

Q. 5 : Attempt Any ONE of the following. (3)

1) Prove that corresponding arcs of congruent chords of a circle (or congruent circles) are congruent.

Ans. : Given : 'O' is center of circle.



Chord PQ $\cong$ Chord RS.

To Prove : arc PMQ $\cong$ arc RNS

Proof : Two arcs are congruent if their measures and radii are equal.

Arc PMQ and arc RNS are, arcs of same circle. Hence have equal radii.

Their measures are same as measure of their central angles. Draw radii OP, OQ & OR, OS.

As arc (PMQ) and arc (RNS) are in the same circle

$\therefore$ The radius of the circle is same

In ΔOPQ and ΔORS

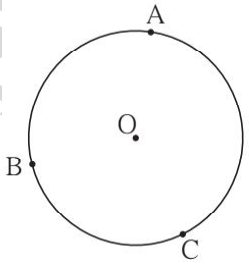
$\therefore$ seg PQ $\cong$ seg OS } radius of
seg OQ $\cong$ seg OR } the circle

seg PQ $\cong$ seg RS --- Chords are congruent

$\Delta OPQ \cong ORS$ ---- (sss test)

$\therefore$ arc (PMQ) $\cong$ arc (RNS).

2) A, B, C are any points on the circle with center 'O'



i) Write the names of all arcs formed due to these points.

ii) If m (arc BC) = 110^0 and m (arc AB) = 125^0 find measures of all remaining arcs.

Ans. : i) Names of arcs

arc AB, arc BC, arc AC, arc ABC, arc ACB, arc BAC.

ii) m(arc ABC) = m (arc AB) + m (arc BC)
= $125^0 + 110^0$
= 235^0

m (arc AC) = 360^0 – m (arc ABC)
= $360^0 - 235^0$
= 125^0

similarly, m (arc ACB) = $360^0 - 125^0$
= 235^0

and m(arc BAC) = $360^0 - 110^0 = 250^0$.

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