VIVEK TUTORIALS

X (English)

(Special Test)

Mathematics Part - II-(3)

DATE: 21-02-19

TIME: 1 Hr

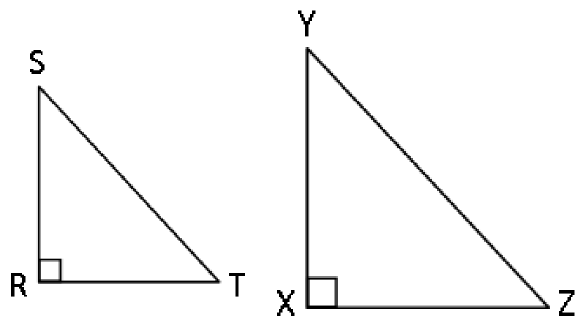
MARKS: 40

SEAT NO:

Q.1 Solve the following (IX) 2

1 Assume that, $\Delta RST \sim \Delta XYZ$. Complete the following statements.

$\frac{RT}{XZ} = \frac{.....}{YZ}, \frac{RS}{XY} = \frac{ST}{.....}, \frac{XY}{.....} = \frac{YZ}{ST}$



Ans $\frac{RT}{XZ} = \frac{ST}{YZ}, \frac{RS}{XY} = \frac{ST}{YZ}, \frac{XY}{RS} = \frac{YZ}{ST}$

2 If P is the centre of the circle with radius 6.7 cm, d(P, Q) = 7.6 cm, d(P, R) = 5.7 cm, find the positions of the points R and Q.

Ans Radius of the circle is 6.7 cm.

d(P, Q) = 7.6 cm

$\therefore$ d(P, Q) > radius

$\therefore$ Point Q lies in the exterior of the circle.

d(P, R) = 5.7 cm

$\therefore$ d(P, R) < radius

$\therefore$ Point R lies in the interior of the circle.

Q.2 Attempt the following (IX) 4

1 Radius of circle is 34 cm. And distance of chord from center is 24 cm. Find distance of chord from its center

Ans .

2 In right angled triangle XYZ if $\angle Z = \theta$, $\angle y = 90^{o}$, $\cos \theta = \frac{24}{25}$. Find $\sin \theta$ and $\tan \theta$.

Ans .

Q.3 Multiple Choice Questions 2

1 Points A, B, C are on a circle, such that m(arc AB) = m(arc BC) = 120°. No point, except point B, is common to the arcs. Which is the type of $\angle ABC$?

a. Equilateral triangle

b. Scalene triangle
c. Right angled triangle
d. Isosceles triangle

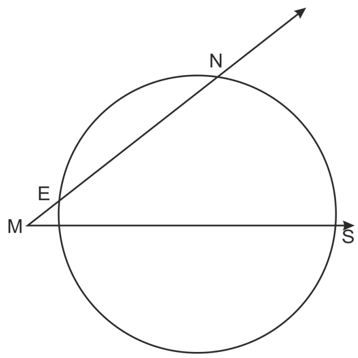
Ans Option a

2 Two circles of radii 5.5 cm and 3.3 cm respectively touch each other. What is the distance between their centers ?
a. 4.4 cm b. 8.8 cm c. 2.2 cm d. 8.8 or 2.2 cm

Ans Option d

Q.4 Solve the following 4

1



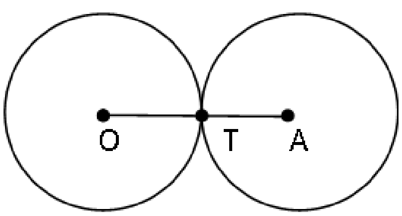
In the adjoining figure, m(arc NS) = 125º , m(arc EF) = 37º, find the measure of ∠NMS.

Ans

	Chords EN and FS intersect externally at point M.
∴	$m\angle NMS = \frac{1}{2}\left[m\left(\text{arc NS}\right) - m\left(\text{arc EF}\right)\right]$
	$= \frac{1}{2}\left[125^o - 37^o\right]$
	$= \frac{1}{2} \times 88°$
∴	m∠NMS = 44º

2 Two circles of radii 5.5 cm and 4.2 cm touch each other externally. Find the distance between their centres.

Ans



O - T - A ... [If two circles are touching circles then the common point lies on the line joining their centres]

OT = 5.5 cm, TA = 4.2 cm.

∴ OA = OT + TA ... (O - T - A)

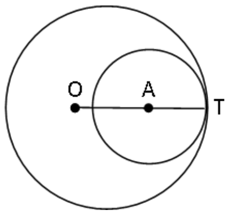
OA = 5.5 + 4.2

$\boxed{OA = 9.7 \text{ cm}}$

∴ The distance between centres is 9.7 cm

Q.5 Attempt the following 4

1 Two circles having radii 3.5 cm and 4.8 cm touch each other internally. Find the distance between their centres.



Let two circles with centres O and A touch each other internally at point T

∴ O - A - T ... [If two circles are touching circles then the common point lies on the line joining their centres]

∴ OT = _____ + _____ ... [O - A - T]

∴ OA = _____ ... [given]

OT = 4.8 cm, AT = 3.5 cm.

∴ OA = _____

OA = _____ cm

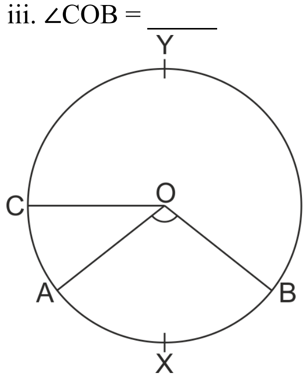
∴ The distance between the centres is _____ cm

Ans 1) OA 2) AT 3) OT - AT 4) 4.8 - 3.5 5) 1.3 6) 1.3

2 In the following figure 'O' is the centre of the circle. $\angle AOB = 110°$, m (arc AC) = 45°.
Use the information and fill in the boxes with proper numbers.

i. m (arc AXB) = _____ ii. m (arc CAB) = _____

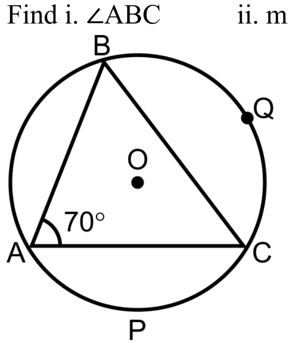
iii. $\angle COB$ = _____ iv. m (arc AYB) = _____



Ans 1) 110° 2) 155° 3) 155° 4) 250°

Q.6 Answer the following 4

1 In the figure, m (arc APC) = 100° and $\angle BAC = 70°$.
Find i. $\angle ABC$ ii. m (arc BQC).



Ans i. By inscribed angle theorem,

$$\angle ABC = \frac{1}{2} \text{ m (arc APC)}$$

$$= \frac{1}{2} \times 100° = 50°$$

$\therefore$ $\angle ABC = 50°$

ii. By inscribed angle theorem,

$\angle BAC = \frac{1}{2}$ m (arc BQC)

$\therefore$ $70° = \frac{1}{2}$ m (arc BQC)

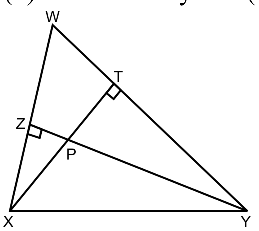
$\therefore$ $70° \times 2 =$ m (arc BQC)

$\therefore$ m (arc BQC) = 140°

i. $\angle ABC = 50°$

ii. m (arc BQC) = 140°

2 In altitudes YZ and XT of ΔWXY intersect at P. Prove that,
(1) □WZPT is cyclic. (2) Points X, Z, T, Y are concyclic.



Ans Given:

YZ ⊥ XW

XT ⊥ WY

$\therefore$ $\angle WTX = 90°$

$\angle WTP = 90°$ ... (T- P- X) I

i.e $\angle WZP = 90°$ ... II

In □WZPT,

$\angle WZP + \angle WTP = 180°$ ... [from I and II]

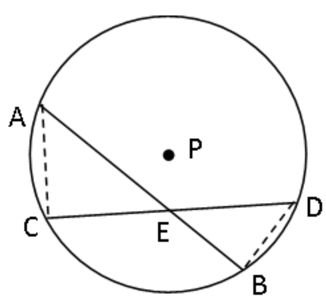
$\therefore$ □WZPT is a cyclic quadrilateral [If opposite angles of quadrilateral ale supplementary, than the quadrilateral is a cyclic quadrilateral]

Since □WZPT is a cyclic quadrilateral points W,Z,P,T are concylic i.e lie on the some circle

Q.7 Solve the following 6

1 Prove: Theorem of internal division of chords.

Ans



Given : Chords AB and CD of a circle with centre P intersect at point E.

To prove : AE × EB = CE × ED

Construction : Draw seg AC and seg DB.

Proof : In ΔCAE and ΔBDE,

$\angle AEC \cong \angle DEB$ ... opposite angles

$\angle CAE \cong \angle BDE$ ... angles inscribed in the same arc

$\therefore$ ΔCAE ~ ΔBDE ... AA test

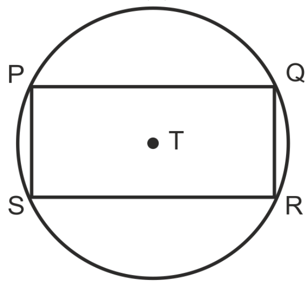
$\therefore$ $\frac{AE}{DE} = \frac{CE}{BE}$ ... corresponding sides of similar triangles

$\therefore$ AE × EB = CE × ED

2 In the figure, a rectangle PQRS is inscribed in a circle with centre T.

Prove that, (i) arc PQ ≅ arc SR

(ii) arc SPQ ≅ PQR



Ans (i) □ PQRS in a rectangle

∴ chord PQ ≅ chord SR ..... opposites sides of a rectangle

∴ arc PQ ≅ arc SR ..... arcs corresponding to congruent chords.

(ii) chord PS ≅ chord QR ..... Opposite sides of a rectangles

∴ arc SP ≅ chord QR ..... arcs corresponding to congruent chords.

∴ measures of arcs SP and QR are equal

Now, m(arc SP) + m(arc PQ) = m(arc PQ) + m(arc QR)

∴ m(arc SPQ) = m(arc PQR)

∴ arc SPQ ≅ arc PQR

Q.8 Answer the following 8

1 In line PR touches the circle at point Q. Answer the following questions with the help of the figure.

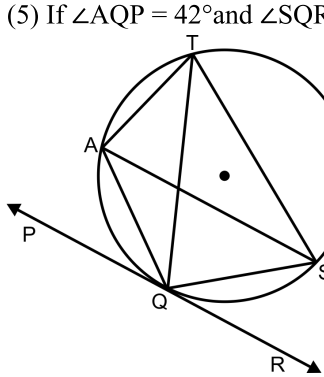
(1) What is the sum of ∠TAQ and ∠TSQ ?

(2) Find the angles which are congruent to ∠AQP.

(3) Which angles are congruent to ∠QTS ?

(4) ∠TAS = 65°, find the measure of ∠TQS and arc TS.

(5) If ∠AQP = 42°and ∠SQR = 58° find measure of ∠ATS.



Ans Point T, A, Q, S are con cyclic.

∴ □TAQS is cyclic quadrilateral.

∴ ∠TAQ + ∠TSQ = 180° ... [opposite angles of cyclic quadrilateral are supplementary]

∠AQP ≅ ∠ASQ ≅ ∠ATQ ... [angles in alternate segments]

∠QTS = ∠SQR = ∠SAQ ... [Angles in alternate segment]

∠TAS = ∠TQS = 65° ... [angles subtend same arc ∴ they are congruent]

∠TQS = $\frac{1}{2}$× m (arc TS) ... [inscribed angle theorem]

∴ m (arc TS) = 2 × ∠TQS

= 2 × 65°

$\boxed{\text{m(arc TS)} = 130°}$

∠AQP = $\frac{1}{2}$× m (arc AQ) ... [Tangent secant theorem]

$\angle SQR = \frac{1}{2} \times$ m (arc SQ)

m (arc AQ) = 2 × ∠AQP

= 2 × 42

$\boxed{m(\text{arc AQ}) = 84°}$

m (arc SQ) = 2 × ∠SQR

= 2 × 58

$\boxed{m(\text{arc QS}) = 116°}$

m (arc AQS) = m (arc AQ) + m (arc QS)

= 84° + 116°

m (arc AQS) = 200°

$\angle ATS = \frac{1}{2} \times$ m (arc AQS) ... [inscribed angle theorem]

$\angle ATS = \frac{1}{2} \times 200$

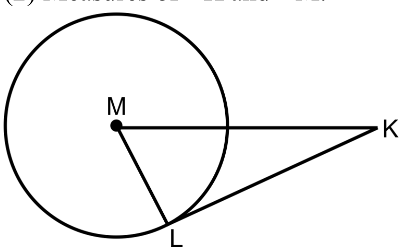
$\boxed{\angle ATS = 100°}$

2 In M is the centre of the circle and seg KL is a tangent segment.

If MK = 12, KL = $6\sqrt{3}$ then find -

(1) Radius of the circle.

(2) Measures of ∠K and ∠M.



Ans Given: MK = 12

KL = $6\sqrt{3}$

∴ To find: Radius of circle

∠K = ?

∠M = ?

Solution:

ML ⊥ KL ... [Radius perpendicular to tangent]

∴ ∠MLK = 90°

In ΔKLM, ∠MLK = 90°

∴ $ML^2 + KL^2 = MK^2$

$ML^2 + (6\sqrt{3})^2 = 122$

$ML^2 + 108 = 144$

$ML^2 = 144 - 108$

$ML^2 = 36$

∴ $\boxed{ML = 6 \text{ units}}$

∴ Radius of circle = 6 units

We can see that

$ML = \frac{1}{2} \times KM$

∴ $\boxed{\angle K = 30}$ ... [side opposite is half if hypotenuse]

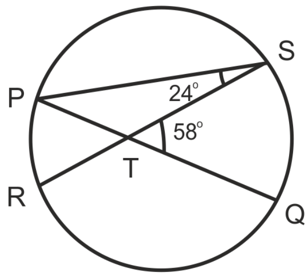
∠K + ∠L + ∠M = 180° ... [sum of all angles of triangles is 180°]

90° + 30° + ∠M = 180°

∴ $\boxed{\angle M = 60°}$

Q.9 Answer the following 6

1 In figure, chords PQ and RS intersect at T.



(i) Find m(arc SQ) if m$\angle$ STQ = 58°, m$\angle$ PSR = 24°.

(ii) Verify, $\angle$ STQ $=\frac{1}{2}$ [m(arc PR) + m(arc SQ)]

(iii) Prove that : $\angle$STQ = $\frac{1}{2}$ [m(arc PR) + m(arc SQ)] for any measure of $\frac{1}{2}$ STQ.

(iv) Write in words the property in (iii).

Ans i. $\angle$SPQ = $\angle$SPT = 58° − 24° = 34° .... exterior angle theorem.

m(arc QS) = 2 $\angle$SPQ = 2 × 34° = 68°

ii. m(arc PR) = 2 $\angle$ PSR = 2 × 24° = 48°

Now, $\frac{1}{2}$ [m(arc PR) + m(arc SQ)] = $\frac{1}{2}$ [48 + 68]

$=\frac{1}{2} \times 116 = 58°$

= $\angle$ STQ

iii. Fill in the blanks and complete the proof of the above property.

$\angle$ STQ = $\angle$ SPQ + $\angle$ TSP .... exterior angle theorem of a triangle

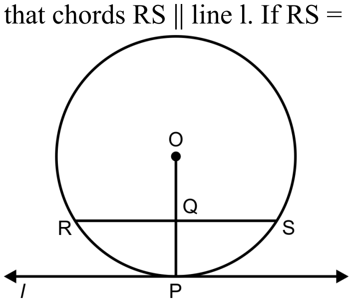
$= \frac{1}{2}$ m(arc SQ) + $\frac{1}{2}$ m(arc PR) .... inscribed angle theorem

$= \frac{1}{2}$ [m(arc SQ) + m(arc PR)]

If two chords of a circle intersect each other in the interior of a circle then

iv. the measure of the angle between them is half the sum of measures of arcs intercepted by the angle and its opposite angle.

2 In line l touches the circle with centre O at point P. Q is the mid point of radius OP. RS is a chord through Q such that chords RS || line l. If RS = 12 find the radius of the circle.



Ans Given: Q is mid point of OP.

RS = 12

RS || line l

To find: radius of circle

solution: OP = radius of circle

OQ = QP = $\frac{OP}{2}$ ... [given]

$\boxed{OQ=\frac{r}{2}}$

$\angle$OQS = 90° ... [perpendicular drawn from the centre to the chord bisects the word]

$\therefore$ $RQ = QS = \frac{RS}{2} = \frac{12}{2} = 6cm$

In ΔOQS, $\angle OQS = 90°$

$\therefore$ $OQ^2 + QS^2 = OS^2$ ... [Pythagoras theorem]

$\therefore$ $\left(\frac{r}{2}\right)^2 + 6^2 = r^2$

$\frac{r^2}{4} + 36 = r^2$

$36 = r^2 - \frac{r^2}{4}$

$36 = \frac{3r^2}{4}$

$\frac{3r^2}{4} = 36$

$\therefore$ $r^2 = 12 \times 4$

$\therefore$ $r^2 = 48$

$\therefore$ $r = 4\sqrt{3}cm$