Previous Year Questions 2024

Q1: The maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is: (CBSE 2024)

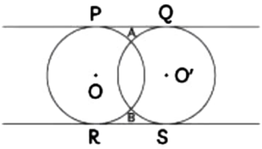
(a) 4

(b) 3

(c) 2

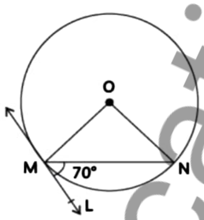
(d) 1

Ans: (c)



Here, circle with centre O and O' are intersecting at two distinct points A and B. So, in this situation PQ, RS are the tangents which can be drawn.

Q2: In the given figure, O is the centre of the circle. MN is the chord and the tangent ML at point M makes an angle of 70° with MN. The measure of ∠MON is: (CBSE 2024)



(a) 120°

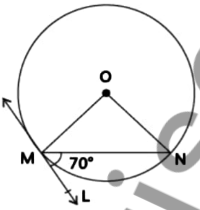
(b) 140°

(c) 70°

(d) 90°

Ans: (b)

OM ⊥ ML [as tangent from centre is ⊥ at point of contact]



$\angle OML = 90°$

and $\angle NML = 70°$

$\Rightarrow \angle OMN = 90° - 70° = 20°$

$\because OM = ON$ = Radii of same circle

$\therefore \angle OMN = \angle ONM = 20°$

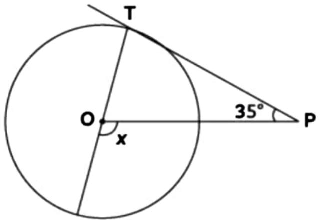
In ΔMON,

$\angle OMN + \angle ONM + \angle MON = 180°$

$\Rightarrow 20° + 20° + \angle MON = 180°$

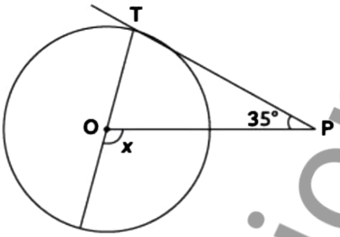
$\Rightarrow \angle MON = 140°$

Q3: In the given figure, if PT is tangent to a circle with centre O and ∠TPO = 35°, then the measure of ∠x is (CBSE 2024)



(a) 110°
(b) 115°
(c) 120°
(d) 125°

Ans: (d)



∠OTP = 90° [Line from centre is ⊥ to tangent at point of contact]
∠x = ∠TPO + ∠OTP [Exterior Angle Prop.]
x = 35° + 90° = 125°

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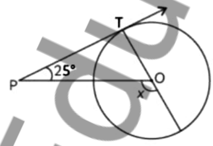
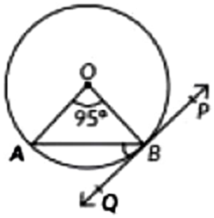
Q4: In the given figure, PT is a tangent at T to the circle with centre O. If ∠TPO = 25°, then x is equal to:



(a) 25°
(b) 65°
(c) 90°
(d)115° (CBSE 2023)

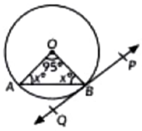
Ans: (d)
Since tangent is perpendicular to radius at the point of contact.
∴ ∠PTO = 90°
Hence, by the exterior angle formula, in ΔOTP, we get x = 90° + 25°
= 115°

Q5: In the given figure, PQ is tangent to the circle centred at O. If ∠AOB = 95°, then the measure of ∠ABQ will be (2023)



(a) 47.5°
(b) 42.5°
(c) 85°
(d) 95°

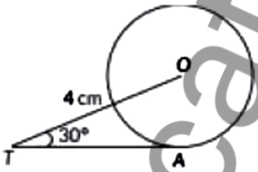
Ans: (a)
We have ∠AOB = 95°
In ΔAOB, ∠OAB = ∠OBA
Now, ∠OAB + 95° + ∠OBA =180° (Angle sum property of a triangle)



$\Rightarrow \quad \angle OAB = \frac{85°}{2} = 42.5°$

∴ ∠OAB = ∠OBA = 42.5° [From (i)]
Now, OB is perpendicular to the tangent line PQ
∠OBQ = 90°
OA = OB (Radius of circle)
So ∠OAB = ∠OBA
95 + 2x = 180 (Sum of angles of a triangle is 180)
2x = 85
=> x = 42.5
∠ABQ = 90 - 42.5
= 47.5

Q6: In the given figure. TA is a tangent to the circle with centre O such that OT = 4 cm, ∠OTA= 30°, then length of TA is (2023)



(a) 2√3 cm
(b) 2cm
(c) 2√2 cm
(d) √3 cm

Ans: (a)
Draw OA ⊥ TA.

In ΔOTA ∠OAT = 90° [∵ Tangent to a circle is perpendicular to the radius passing through the point of contact]
and ∠OTA = 30°

$\therefore \quad \frac{TA}{OT} = \cos 30° \Rightarrow TA = 4\cos 30° = 4 \times \frac{\sqrt{3}}{2}$

$TA = 2\sqrt{3}$ cm

Q7: In figure, from an external point P, two tangents PQ and PR are drawn to a circle of radius 4 cm with centre O. If ∠QPR= 90°. then length of PQ is (2023)
(a) 3 cm
(b) 4 cm
(c) 2 cm
(d) 2√2 cm

Ans: (b)
Join OR.
We know that tangent to a circle is ⊥ to radius at the point of contact. So, QQ⊥PQ and QR ⊥ PR.
Also, ∠QPR = 90°
Now, in quadrilateral OQPR,
∠QQR - 360o - (90° + 90° + 90°)

= 90°

Also, PQ - PR [∵ Tangents drawn from an external point are equal)

∴ PQQR is a square.

Hence, PQ = OQ = 4 cm

Q8: The length of tangent drawn to a circle of radius 9 cm from a point 41 cm from the centre is (2023)

(a) 40 cm

(b) 9 cm

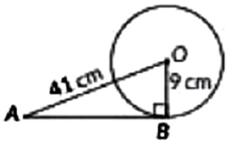
(c) 41 cm

(d) 50 cm

Ans: (a)

OB ⊥ AB [∵As tangent to a circle is perpendicular to the radius through the point of the contact]

In ΔOAB,



$OA^2 = OB^2 + AB^2$ [By Pythagoras theorem]

$\Rightarrow (41)^2 = 9^2 + AB^2$

$\Rightarrow AB^2 = 41^2 - 9^2$

= (41 - 9)(41 + 9)

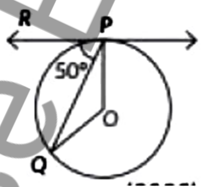
= (32)(50)

= 1600

$\Rightarrow AB = \sqrt{1600}$

= 40 cm

Q9: In the given figure. O is the centre of the circle and PQ is the chord. If the tangent PR at P makes an angle of 50° with PQ, then the measure of ∠POQ is (2023)



(a) 50°

(b) 40°

(c) 100°

(d) 130°

Ans: (c)

PR is tangent which touches circle at point P.

So, ∠OPR = 90°

∠OPQ = 90° - ∠RPQ = 90° - 50° = 40°

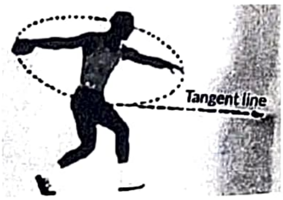
In, ΔPOQ,

OP = OQ (Radii of circle)

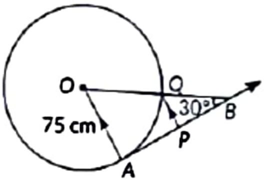
So, ∠OQP = ∠OPQ=40°

⇒ ∠POQ = 180° - 40° - 40° = 100°

Q10: Case Study: The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.



In the given figure, AB is one such tangent to a circle of radius 75cm. Point O is the centre of the circle and ∠ABO = 30°. PQ is parallel to OA.



Based on above information

(a) Find the length of AB.

(b) Find the length of OB.

(c) Find the length of AP.

OR

Find the value of PQ. (2023)

Ans:

(a): Given, $\angle ABO = 30°$, $OA = 75$ cm

In ΔOAB, $\tan 30° = \frac{OA}{AB}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{75}{AB} \Rightarrow AB = 75\sqrt{3}$ cm

(b) In ΔOAB, $\sin 30° = \frac{OA}{OB}$

$\Rightarrow \frac{1}{2} = \frac{75}{OB} \Rightarrow OB = 150$ cm

(c) In ΔOAB, $PQ \| OA$

$\frac{QB}{QO} = \frac{BP}{AP}$

$\Rightarrow \frac{150-75}{75} = \frac{AB}{AP} - 1 \Rightarrow 2 = \frac{AB}{AP} = \frac{75\sqrt{3}}{AP}$

$\Rightarrow AP = 75 \times \frac{\sqrt{3}}{2} \Rightarrow AP = \frac{75\sqrt{3}}{2}$ cm

OR

$OA = OQ = 75$ cm (∵ Radius)

In ΔOAB,

We have, $PQ \| OA$

In ΔBQP and ΔBOA

$\angle BQP = \angle BOA$ (corresponding angles)

$\angle B = \angle B$ (common)

$\therefore$ $\Delta BQP \sim \Delta BOA$ (By AA similarity)

$\therefore \frac{BQ}{BO} = \frac{QP}{OA} = \frac{BP}{BA}$

$\Rightarrow \frac{PQ}{75} = \frac{AB - AP}{AB}$

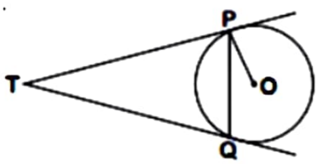
$\Rightarrow \frac{PQ}{75} = 1 - \frac{AP}{AB}$

$\Rightarrow \frac{PQ}{75} = 1 - \frac{75\sqrt{3}}{2 \times 75\sqrt{3}}$

$\Rightarrow \frac{PQ}{75} = \frac{1}{2} \quad \therefore PQ = \frac{75}{2} = 37.5$

$\Rightarrow PQ = 37.5$ cm

Q11: Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ. (2023)



Ans:

We know that the lengths of tangents drawn from an external point to a circle are equal.

∴ TP = TQ ... (1)

∴ ∠TQP = ∠TPQ (angles of equal sides are equal) ... (2)

Now, PT is tangent, and OP is the radius.

∴ OP ⊥ TP (Tangent at any point of a circle is perpendicular to the radius through the point of contact)

∴ ∠OPT = 90°

or, ∠OPQ + ∠TPQ = 90°

or, ∠TPQ = 90° - ∠OPQ ... (3)

In ΔTPQ,

∠TPQ + ∠PQT + ∠QTP = 180° (Sum of angles of a triangle is 180°)

or, 90° - ∠OPQ + ∠TPQ + ∠QTP = 180°

or, ∠(90° - ∠OPQ) + ∠TPQ + ∠QTP = 180° [from (2) and (3)]

or, 180° - 2∠OPQ + ∠TPQ = 180°

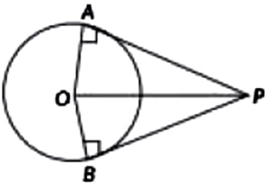
or, 2∠OPQ = ∠TPQ - proved

Q12: In the given figure, a circle is inscribed in a quadrilateral ABCD in which ∠B = 90°. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle. (2023)

Ans: Given, ∠B = 90°, AD = 17 cm, AB = 20cm, DS = 3 cm
Now, DS = DR and AR = AQ [∵ Tangents drawn from an externa! point to the circle are equal]
∴ DR = 3 cm
AR = AD - DR = 17 - 3 = 14 cm
∴ AQ = 14 cm
Now, BQ = AB - AQ = 20 - 14 = 6 cm
OQ ⊥ BQ, OP ⊥ BP (∵ Tangent at any point of a circle is perpendicular to the radius through the point of contact)
∴ Quadrilateral BQOP is a square
∴ BQ = OQ = r = 6 cm
Hence, the radius of the circle = 6 cm.

Q13: From an external point, two tangents are drawn to a circle. Prove that the line joining the external point to the centre of the circle bisects the angle between the two tangents. (CBSE 2023)

Ans: Let P lie an external point, O be the centre of the circle and PA and PB are two tangents to the circle as shown in figure.



In ΔQAP and ΔOBP.

OA = OB [Radius of the circle]

OP = OP [common]

PA = PB

[∵ Tangents drawn from an external point to a circle are equal]

So, ΔOAP = ΔOPB

So, ∠APO = ∠BPO

Hence. OP bisects ∠APB

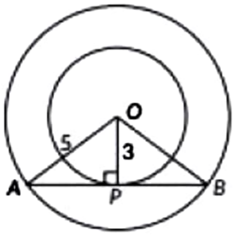
Q14: Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. (CBSE 2023)

Ans: Let the centre of the two concentric circlet is O and AB be the chord of the larger circle which touches the smaller circle at point P as shown in figure.

∴ AB is a tangent to the smaller circle at point P

⇒ OP ⊥ AB

By Pythagoras theorem, in ΔOPA



$OA^2 = AP^2 + OP^2$

⇒ $5^2 = AP^2 + 3^2$

⇒ $AP^2 = 5^2 - 3^2 = 25 - 9$

⇒ $AP^2 = 16$ ⇒ AP = 4cm

∴ AB = 2AP = 8cm

In ΔOPB Since, OP ⊥ AB

AP = PB [∵ Perpendicular drawn from the centre of the circle bisects the chord]

∴ AS = 2AP = 2 x 4 = 8 cm

∴ The length of the chord of the larger circle is 8 cm.

Q15: Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. (2023)

Ans: Let PA and PB are two tangents on a circle from point P as shown in the figure.

Let is known that tangent to a circle is perpendicular to the radius through the point of contact.

∠OAP =∠OBP = 90°

In quadrilateral AOBP,

∠OAP + ∠APB + ∠PBO + ∠BOA = 360°

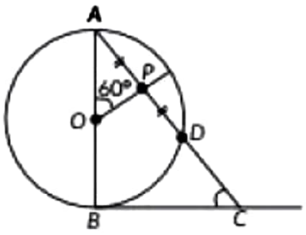
90° + ∠APB + 90° + ∠BOA = 360° [Using (i)]

∠APB + ∠BOA = 360° - 180°

∴ ∠APB + ∠BOA = 180°

Previous Year Questions 2022

Q16: In Fig, AB is the diameter of a circle centered at O. BC is tangent to the circle at B. If OP bisects the chord AD and ∠AOP= 60°, then find m∠C. (2022)



Ans: Since, OP bisects the chord AD, therefore ∠OPA = 90° ....[∵ The line drawn through the centre of a circle to bisect a chord is perpendicular to the chord]

Now, In ΔAOP,

∠A = 180° – 60° – 90°

= 120° – 90°

= 30°

Also, we know that the tangent at any point of a circle is perpendicular to the radius through the point of contact

∴ ∠ABC = 90°

Now, In ΔABC,

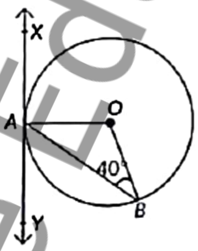
∠C = 180° – ∠A – ∠B

= 180° – 30° – 90°

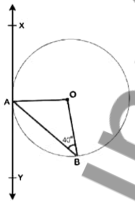
= 150° – 90°

= 60°

Q17: In Fig. XAY is a tangent to the circle centred at 0. If ∠ABO = 40°. Then find ∠BAY and ∠AOB (2022)



Ans:



Given, ∠ABO = 40°

∠XAO = 90° ...(Angle between radius and tangent)

OA = OB ...(Radii of same circle)

⇒ ∠OAB = ∠OBA

∴ ∠OAB = 40°

Now, applying the linear pair of angles property,

we get

∠BAY + ∠OAB + ∠XAO = 180°

⇒ ∠BAY + 40° + 90° = 180°

⇒ ∠BAY + 130° = 180°

⇒ ∠BAY = 180° – 130°

⇒ ∠BAY = 50°

Now, In ΔAOB,

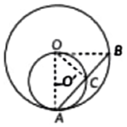
∠AOB + ∠OAB + ∠OBA = 180°

or, ∠AOB + 40° + 40° = 180°

or, ∠AOB = 180° – 80° = 100°

Hence proved.

Q18: In Figure, two circles with centres at O and O' of radii 2r and r, respectively, touch each other internally at A. A chord AB of the bigger circle meets the smaller circle at C. Show that C bisects AB. (2022)



Ans: Given: Two circles with centres O and O' of radii 2r and r respectively, touch each other internally at A, AB is the chord of bigger circle touches the smaller circle at C.

To prove: C bisects AB i.e. AC = CB

Here, for smaller circle (O' r)

∠ACO = 90° (Angle in a semicircle is 90°)

∴ OC ⊥ AC

Now, in bigger circle (O, 2r)

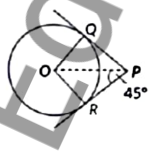
Since. AB is a chord and OC ⊥ AB.

AB = CB

[∵ Perpendicular drawn from centre of the circle to a chord bisects the chord]

Hence, C bisects the chord AB.

Q19: In Figure, PQ and PR are tangents to the circle centred at O. If ∠OPR = 45°, then prove that ORPQ is a square. (2022)



Ans: It is given that ∠QPR = 90°

We know that the lengths of the tangents drawn from the outer point to the circle are equal.

PQ = PR ... (1)

The radius is Perpendicular to the tangent line at the point of contact.

∴ ∠PQO = 90°

and

∠ORP = 90°

In quadrilateral OQPR:

∠QPR + ∠PQO + ∠QOR + ∠ORP = 360°

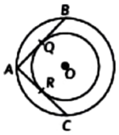
⇒ 90° + 90° + ∠QOR + 90° = 360°

⇒ ∠QOR = 360° - 270° = 90°

∴ QPR = ∠PQO = ∠QOR = ∠ORP = 90°

It can be concluded that PQOR is a square.

Q20: In Fig., there are two concentric circles with centre O. If ARC and AQB are tangents to the smaller circle from point A lying on the larger circle, find the length of AC if AO = 5 cm. (2022)



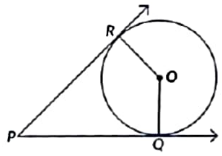
Ans: Given, AQ = 5 cm

AQ = AR = 5 cm {v Tangents drawn from an external point to the circle are equal)

Now, AC = AR + RC (∵ OR is a perpendicular bisector of AC AR = RC)

AC = 10 cm

Q21: In Figure, O is the centre of the circle. PQ and PR are tangent segments. Show that the quadrilateral PQOR is cyclic. (2022)



Ans: Given: PQ and PR are tangents from an external point P.

To prove: PQOR is a cyclic quadri lateral.

Proof OR and OQ are tlie radius of circle centred at O, and PR a ltd PQ are tangents.

$\angle ORP = 90°$ and $\angle OQP = 90°$

In quadrilateral PQOR, we have

$\angle OQP + \angle QOR + \angle ORP + \angle RPQ = 360°$

$90° + \angle QOR + 90° + \angle RPQ = 360°$

$180° + \angle QOR + \angle RPQ = 360°$

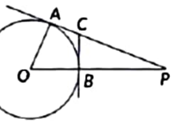
$\angle QOR + \angle RPQ = 360° - 180°$

So, $\angle O + \angle P = 180°$

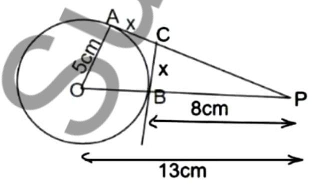
$\angle P$ and $\angle O$ are opposite angles of quadrilateral which are supplementary.

∴ PQOR is a cyclic quadrilateral.

Q22: In Figure O is centre of a circle of radius 5 cm. PA and BC are tangents to the circle at A and B respectively. If OP = 13 cm. then find the length of tangents PA and BC. (2022)



Ans:



Given, radius of circle =5cm

PA and BC are two tangent at point A and B

OP = 13 cm

Step1: OA is perpendicular on tangent AP (OA is radius of the circle)

In right angle triangle AOAP

$(OP)^2 = (OA)^2 + (AP)^2$

$\Rightarrow (AP)^2 = (OP)^2 - (OA)^2$

$\Rightarrow (AP)^2 = (13)^2 - (5)^2 = 169 - 25 = 144$

AP = √144 = 12

AP = PA = 12 cm

Step 2: Let length of BC be x

But AC = BC= x (tangent from an external point)

So length of PC = 12 - x and PB = OP - OB = 13 - 58cm

(OB is the radius and length of OP is given)

OB is perpendicular on tangent CB , so ∠OBC = ∠CBP = 90 °

In right angle triangle ΔCBP

$(CP)^2 = (BP)^2 + (BC)^2$

$\Rightarrow (12 - x)^2 = (8)^2 + (x)^2$

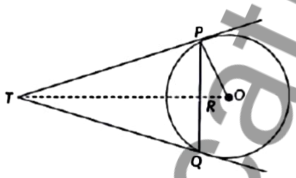
$\Rightarrow 144 - 2x + x^2 = 64 + x^2$

$\Rightarrow 144 - 24x - 64 = 0$

$\Rightarrow 80 - 24x = 0 \Rightarrow x = 80/24 = 3.33$cm

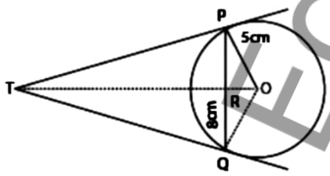
Hence, the length of BC is 3.33 cm and PA is 12 cm

Q23: In fig. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q meet at a point T. Find the length of TP. (2022)



Ans: In the given figure,

PQ = 8 cm and OP = 5 cm



OR ⊥ PQ and so, OR bisects PQ. [∵ Perpendicular drawn from the center to the chord bisects the chord]

$\Rightarrow$ PR = RQ = 4 cm

In Δ POR ,

$OP^2 = OR^2 + PR^2$

$\Rightarrow 5^2 = OR^2 + 4^2$

$\Rightarrow$ OR = 3 cm

In ΔTPO and ΔPRO,

∠ TOP = ∠ ROP [common]

and ∠ TPO = ∠ PRO [each 90°]

∴ Δ TPO and Δ PRO are similar. [by AAA Similarity]

$\Rightarrow \frac{TP}{PO} = \frac{RP}{RO}$

$\Rightarrow \frac{TP}{5} = \frac{4}{3}$

$\therefore TP = \frac{20}{3}$cm

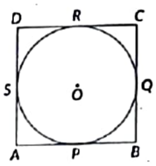
[∵Tangents drawn from an external point to a circle are equal in length]

Q24: Prove that a parallelogram circumscribing a circle is a rhombus. (2022)

Ans: Given : A parallelogram ABCD circumscribing a circle with centre O.

To prove : ABCD is a rhombus.

Proof: We know that the tangents drawn to a circle from an external Doint are eaual in length.



⇒ AP = AS [Tangents drawn from A] ...(i)

⇒ BP = BQ [Tangents drawn from B] ...(ii)

⇒ CR= CQ [Tangents drawn from C] ...(iii)

⇒ DR = DS [Tangents drawn from D] ...(iv)

Adding (i), (ii), (iii) and (iv) we get

AP + BP + CR + DR = AS + BQ + CQ + DS

= (AP + BP) + (CR + DR) = (AS + DS) + (BQ + CQ)

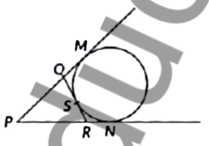
⇒ AB + CD = AD + BC

⇒ 2AB = 2BC [Opposite sides of the given parallelogram are equal ∴ AB = DC and AD = BC)

AB = BC = DC = AD

Hence, ABCD is a rhombus.

Q25: In fig, if a circle touches the side QR of ΔPQR at S and extended sides PQ and PR at M and N, respectively, then



Prove that $PM=\frac{1}{2}(PQ+QR+PR)$ **(2022)**

Ans: Given: A circle is touching a side QR of ΔPQR at point S.

PQ and PR are produced at M and N respectively.

To prove: $PM = \frac{1}{2}(PQ + QR + PR)$

Proof: PM = PN ...(i) (Tangents drawn from an external point P to a circle are equal)

QM = QS ...(ii) (Tangents drawn from an external point Q to a circle are equal)

RS = RN ...(iii) (Tangents drawn from an external point R to a circle are equal)

Now, 2PM = PM + PM

= PM + PN ...[From equation (i)]

= (PQ + QM) + (PR + RN)

= PQ + QS + PR + RS ...[From equations (i) and (ii)]

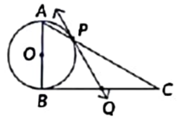
= PQ + (QS + SR) + PR

= PQ + QR + PR

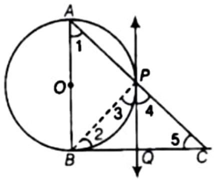
$\therefore PM = \frac{1}{2}(PQ + QR + PR)$

Hence proved.

Q26: In figure, a triangle ABC with ∠B = 90° is shown. Taking AB as diameter, a circle has been drawn intersecting AC at point P. Prove that the tangent drawn at point P bisects BC. (2022)



Ans:



According to the question,

In a right angle ΔABC is which ∠B = 90°, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P.

Also PQ is a tangent at P

To Prove: PQ bisects BC i.e. BQ = QC

Proof: ∠APB = 90° ...[Angle in a semicircle is a right-angle]

∠BPC = 90° ...[Linear Pair]

∠3 + ∠4 = 90° ...[1]

Now, ∠ABC = 90°

So in ΔABC

∠ABC + ∠BAC + ∠ACB = 180°

90° + ∠1 + ∠5 = 180°

∠1 + ∠5 = 90° ...[2]

Now, ∠1 = ∠3 ...[Angle between tangent and the chord equals angle made by the chord in alternate segment]

Using this in [2] we have

∠3 + ∠5 = 90° ...[3]

From [1] and [3] we have

∠3 + ∠4 = ∠3 + ∠5

∠4 = ∠5

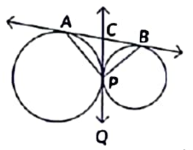
QC = PQ ...[Sides opposite to equal angles are equal]

But also, PQ = BQ ...[Tangents drawn from an external point to a circle are equal]

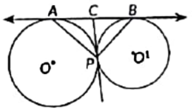
So, BQ = QC

i.e. PQ bisects BC.

Q27: In the figure, two circles touch externally at P. A common tangent touches them at A and B, and another common tangent is at P, which meets the common tangent AB at C. Prove that ∠APB = 90°. (2022)



Ans: Let common tangent at P meets the tangent AB at C. Since, tangents drawn from an external point to a circle are equal



∴ AC = CP

and BC = CP

⇒ ∠CAP = ∠CPA = x (say) ...(i)

and ∠CBP = ∠CPB = y (say) ...(ii)

Now, ∠ACP+ ∠BCP = 180° [Linear pair] ...(*)

In ΔACP, ∠ACP + ∠CPA + ∠CAP = 180° ...(iii)

and in ΔBCP, ∠BCP+ ∠CPB + ∠CBP = 180°...(iv)

Adding (iii) and (iv), we get

∠ACP + x + x + ∠BCP + y + y = 360°

∠ACP + ∠BCP + 2x + 2y = 360° [Using (i) & (ii)]

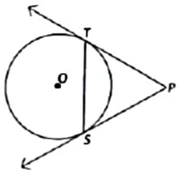
= 2(x + y) = 360° - 180° = 180°[Using ('))

⇒ x + y = 90°

i.e., ∠CPA + ∠CPB = 90° => ∠APB = 90°

Previous Year Questions 2021

Q28: In the given figure, PT and PS are tangents to a circle with centre O, from a point P such that PT = 4 cm and ∠TPS = 60°. Find the length of the chord TS. (2021)



Ans: Given TP and SP are tangents from an external point P.

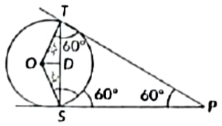
PT = PS = 4 cm (v Tangents drawn from an external point to the circle are equal)

∠PTS = ∠PST

(∵ Angles opposite to equal sides are equal) In A TPS, by angle sum property

∠TPS = ∠PTS =∠PST = 60°

⇒ ΔTPS is an equilateral triangle.



∴ TP = PS = TS = 4 cm

∠OSP = 90° and ∠TSP = 60°

∴ ∠OSD = 30°

Now, $\frac{DS}{OS} = \cos 30° \Rightarrow \frac{2}{OS} = \frac{\sqrt{3}}{2} \Rightarrow OS = \frac{4\sqrt{3}}{3}$ cm

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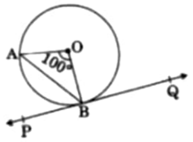
Previous Year Questions 2020

Q29: In figure, PQ is tangent to the circle with centre at O, at the point B. If ∠AOB = 100°, then ∠ABP is equal to (2020)



(a) 50°

(b) 40°

(c) 60°

(d) 80°

Ans: (a)

Given that

$\angle AOB = 100°$

Since OA = OB

So $\angle OAB = \angle OBA = 40°$

Since PQ is tangent on the circle. So OB is perpendicular to PQ.

So,

$\angle OBP = 90°$

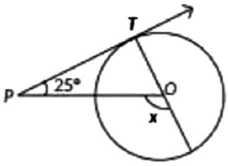
$\angle OBA + \angle ABP = 90°$

$\angle ABP = 90 - \angle OBA$

$\therefore \angle ABP = 90° - 40°$

$\therefore \angle ABP = 50°$

Q30: In the given figure, PT is a tangent at T to the circle with centre O. If ∠TPO = 25°, then x is equal to (2020)



(a) 25°

(b) 65°

(c) 90°

(d) 115°

Ans: (d)

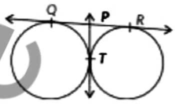
Since $\angle TPO = 25°$ and $\angle OTP = 90°$

$x = \angle OTP + \angle TPO$

$= 90° + 25° = 115°$

[∵ Radius is perpendicular to the tangent T]

Q31: In the given figure, QR is a common tangent to the given circles, touching externally at the point T. The tangent at T meets QR at P If PT = 3.8 cm, then the length of QR(in cm] is (2020)



(a) 3.8

(b) 7.6

(c) 5.7

(d) 1.9

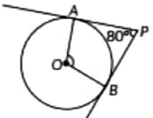
Ans: (b)

It is known that the length of the tangents drawn from an external point to a circle are equal.

∴ QP = PT= 3.8 cm and PR = PT = 3.8 cm

Now, QR = QP + PR = 3.8cm + 3.8cm = 7.6 cm

Q32: In Figure, if tangents PA and PB from an external paint P to a circle with centre O are inclined to each other at an angle of 80° then ∠POA is equal to (2020)



(a) 50°
(b) 60°
(c) 80°
(d) 100°

Ans: (a)

A tangent at any point of a circle is perpendicular to the radius at the point of contact.

In ΔOAP and in ΔOBP:

- OA = OB (radii of the circle are always equal)
- AP = BP (length of the tangents)
- OP = OP (common)

Therefore, by SSS congruency ΔOAP ≅ ΔOBP.

SSS congruence rule: If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent.

If two triangles are congruent, then their corresponding parts are equal.

Hence:

- ∠POA = ∠POB
- ∠OPA = ∠OPB

Therefore, OP is the angle bisector of ∠APB and ∠AOB.

Hence, ∠OPA = ∠OPB = 1/2 (∠APB)
= 1/2 × 80°
= 40°

By the angle sum property of a triangle, in ΔOAP:
∠A + ∠POA + ∠OPA = 180°

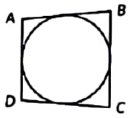
OA ⊥ AP (Theorem 10.1: The tangent at any point of a circle is perpendicular to the radius through the point of contact.)

Therefore, ∠A = 90°

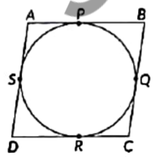
90° + ∠POA + 40° = 180°
130° + ∠POA = 180°
∠POA = 180° - 130°
∠POA = 50°

Thus, option (A) 50° is the correct answer.

Q33: In figure, a quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = BC + AD. (2020)



Ans: Let the circle touches the sides AB, BC, CD and DA of quadrilateral ABCD at P, Q, R and S respectively Since, lengths of tangents drawn from an external point to the circle are equal.



AP = AS ...(1) (Tangents drawn from A)
BP = BQ ...(2) (Tangents drawn from B)

CR = CQ ...(3) (Tangents drawn from C)

DR = DS ...(4) (Tangents drawn from D)

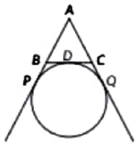
Adding (1), (2), (3) and (4), we get

AP + BP + CR + DR = AS + BQ + CQ + DS

⇒ (AP + PB) + (CR + RD) = (AS + SD) + (BQ + QC)

⇒ AB + CD = AD + BC

Q34: In figure, find the perimeter of ΔABC if AP =12 cm. (2020)



Ans:

Step 1: Identify the Tangents

From the problem, we know that AP and AQ are tangents to the circle from point A, and BC is also a tangent. According to the properties of tangents from an external point, the lengths of the tangents drawn from the same external point to a circle are equal.

Step 2: Set Up the Equations

Since AP = 12 cm, we can conclude that:

- AP = AQ = 12 cm (Equation 1)

Step 3: Identify Other Tangents

From point B, the tangents BD and BP are equal:

- BD = BP (Equation 2)

From point C, the tangents CD and CQ are equal:

- CD = CQ (Equation 3)

Step 4: Express Perimeter of Triangle ABC

The perimeter of triangle ABC can be expressed as:

Perimeter = AB + BC + AC

Step 5: Substitute for BC

Since BC is composed of the tangents from B and C:

BC = BD + CD

Thus, we can rewrite the perimeter as:

Perimeter = AB + (BD + CD) + AC

Step 6: Express AB and AC in Terms of Tangents

From the properties of tangents:

- AP = AB + BP
- AQ = AC + CQ

Substituting BP and CQ with BD and CD respectively, we have:

- AP = AB + BD (Equation 4)
  AQ = AC + CD (Equation 5)

Step 7: Substitute Equations into Perimeter Now, substituting the expressions from Equations 4 and 5 into the perimeter equation:Perimeter = (AP - BD) + (BD + CD) + (AQ - CD)

Step 8: Simplify the Expression

Since AP = AQ and both are equal to 12 cm:

Perimeter = (12 - BD) + (BD + CD) + (12 - CD)

This simplifies to:

Perimeter = 12 + 12 = 24 cm