CH-8: INTRODUCTION TO TRIGONOMETRY

CH-10: CIRCLE

Assertion and Reason Based MCQs

Directions: In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as,

   (A) Both A and R are true but R is the correct explanation of A

   (B) Both A and R are true but R is NOT the correct explanation of A

   (C) A is true but R is false

   (D) A is false and R is True

1. Assertion: The value of $\sin60^0 \cos30^0 + \sin30^0 \cos60^0$ is 1
   Reason: $\sin90^0=1$ and $\cos90^0=0$

2. Assertion: The value of $2\tan^2 45^0+\cos^2 30^0-\sin^2 60^0$ is 2.
   Reason: value of $\tan45^0=1$, $\cos30^0=\sqrt{3}/2$ and $\sin60^0=\sqrt{3}/2$.

3. Assertion: If $x=2 \sin^2\theta$ and $y=2\cos^2\theta+1$ then the value of $x+y=3$.
   Reason: For any value of θ, $\sin^2\theta+\cos^2\theta=1$

4. Assertion: sinA is the product of sin A.
   Reason: The value of $\sin\theta$ increases as θ increases.

5. Assertion: In a right ΔABC, right angled at B, if tanA=1, then 2sinA.cosA=1
   Reason: cosecA is the abbreviation used for cosecant of angle A.

6. Assertion: If $x\sin^3\theta+y \cos^3\theta = \sin\theta \cos\theta$ and $x \sin\theta = y\cos\theta$, then $x^2+y^2=1$.
   Reason: For any value of θ, $\sin^2\theta+\cos^2\theta=1$

7. Assertion (A) : If two tangents are drawn to a circle from an external point, they subtend equal angles at the centre.
   Reason (R) : A parallelogram circumscribing a circle is a rhombus.

8. Assertion: AB and CD are two parallel chords of a circle whose diameter is AC Then AB $\neq$ CD.
   Reason : Perpendicular from the centre of a circle does not bisects the chord.

9. Assertion: Angles in the same segment of a circle are equal.
   Reason: In cyclic quadrilateral, opposite angles are supplementary.

10. Assertion: Perpendicular bisectors of two chords of a circle intersect at its centre.
    Reason: : A line drawn through the centre of a circle to bisect a chord is perpendicular
    to the chord.

11. Assertion: If the circumference of a circle is 88 cm, then its radius is 14 cm.
    Reason: $2\pi r$ is circumference of a circle.

MCQ QUESTIONS

1. A circle has a number of tangents equal to

   (a) 0   (b) 1   (c) 2   (d) Infinite

2. A tangent intersects the circle at:

   (a) One point   (b) Two distinct point   (c) At the circle   (d) None of the above

3. A circle can have _____parallel tangents at a single time.

   (a) One   (b) Two   (c) Three   (d) Four

4. If the angle between two radii of a circle is 110º, then the angle between the tangents at the ends of the radii is:
   (a) 90º   (b) 50º   (c) 70º   (c) 40º
5. The length of the tangent from an external point A on a circle with centre O is
   (a) always greater than OA   (b) equal to OA
   (c) always less than OA   (d) cannot be estimated
6. AB is a chord of the circle and AOC is its diameter such that angle ACB = 50°. If AT is the tangent to the circle at the point A, then BAT is equal to
   (a) 65°   (b) 60°   (c) 50°   (d) 40°
7. If TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to
   (a) 60°   (b) 70°   (c) 80°   (d) 90°
8. In Δ ABC, right-angled at B, AB = 24 cm, BC = 7 cm. The value of tan C is:
   (a) 12/7   (b) 24/7   (c) 20/7   (d) 7/24
9. (Sin 30°+cos 60°)-(sin 60° + cos 30°) is equal to:
   (a) 0   (b) $1+2\sqrt3$ (c) $1-\sqrt3$ (d) $1+\sqrt3$
10. The value of tan 60°/cot 30° is equal to:
    (a) 0   (b) 1   (c) 2   (d) 3
11. $1 - \cos^2A$ is equal to:
    (a) $\sin^2A$ (b) $\tan^2A$ (c) $1 - \sin^2A$ (d) $\sec^2A$
12. If cos x = ⅔ then tan X is equal to:
    (a) 5/2   (b) $\sqrt{(5/2)}$ (c) $\sqrt5/2$ (d) $2/\sqrt5$
13. If cos x = a/b, then sin X is equal to:
    (a) $(b^2-a^2)/b$ (b) (b-a)/b   (c) $\sqrt{(b^2-a^2)}/b$ (d) $\sqrt{(b-a)}/b$
14. The value of sin 60° cos 30° + sin 30° cos 60° is:
    (a) 0   (b) 1   (c) 2   (d) 4

TWO MARKS QUESTIONS
1. Evaluate $2\tan^2 45° + \cos^2 30° - \sin^2 60°$.
2. If tan (A + B) =$\sqrt3$ and tan (A – B) =$1/\sqrt3$, 0° < A + B ≤ 90°; A > B, find A and B.
3. Prove the identities:
   (i) $\sqrt{[1 + \sin A/1 - \sin A]} = \sec A + \tan A$
   (ii) $(1 + \tan^2A/1 + \cot^2A) = (1 - \tan A/1 - \cot A)^2 = \tan^2A$
4. If sin θ + cos θ = $\sqrt3$, then prove that tan θ + cot θ = 1.
5. In the following figure, two circle touch each other externally at C. Prove that the common tangent at C bisects the other two common tangents.
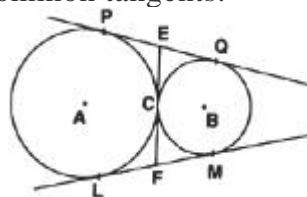
6. In the figure, if Ab = AC, prove that BE = CE.


7.
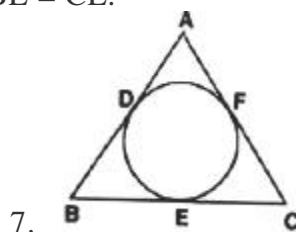
8. A point P is 13 cm from the centre of the circle. The length of the tangent drawn from P to the circle is 12 cm. Find the radius of the circle.
9. Show that the tangents drawn at the end points of a diameter of a circle are parallel.

THREE MARKS QUESTIONS

1. Prove that $(\sin A - 2\sin^3 A)/(2\cos^3 A - \cos A) = \tan A$.
2. If $\cos A = 2/5$, find the value of $4 + 4\tan^2 A$
3. **If $7\sin^2\theta + 3\cos^2\theta = 4$, then find the value of tan 0.**
4. Write the other trigonometric ratios of $\angle A$ in the terms of sec A.
5. Express the trigonometric ratios of sin A, sec A and tan A in terms of cotA
6. when A, B and C are interior angles of the triangle ABC, then show that
   sin (B+C/2) = cos A/2
7. ABC is an isosceles triangle, in which AB = AC, circumscribed about a circle. Show that BC is bisected at the point of contact.
8. Prove that the lengths of tangents drawn from an external point to a circle are equal**.**
9. Two tangents PA and PB are drawn from an external point P to a circle with centre O. Prove that AOBP is a cyclic quadrilateral.

FIVE MARKS QUESTIONS

1. when sec 4A = cosec (A – 20°), here 4A is an acute angle, findout the value of A.
2. If $\sin\theta + \sin^2\theta = 1$ then prove that $\cos^2\theta + \cos^4\theta = 1$.
3. If $\tan\theta + \cot\theta = 5$, find the value of $\tan^2\theta + \cot\theta$.
4. Prove that: $\sin A - 2\sin^3 A/2\cos^3 A - \cos A = \tan A$
5. Show that $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$ PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of TP.
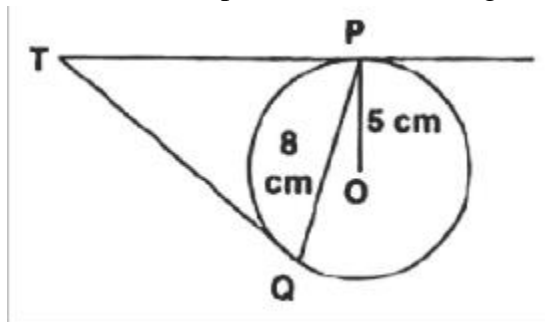
6. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the endpoints of the arc**.**

CASESTUDY QUESTIONS

1. In an online test, Ishita comes across the statement - If a tangent is drawn to a circle from an external point, then the square of length of tangent drawn is equal to difference of squares of distance of the tangent from the centre of circle and radius of the circle.
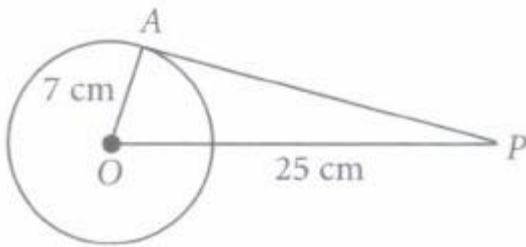   Help Ishita, in answering the following questions based on the above statement.

(i) If AB is a tangent to a circle with centre O at B such that AB = 10 cm and OB = 5 cm, then OA =
   a) $5\sqrt{3}$ cm   b) $3\sqrt{5}$ cm   c) $4\sqrt{3}$ cm   d) $5\sqrt{4}$ cm

(ii) In the adjoining figure, radius of the circle is
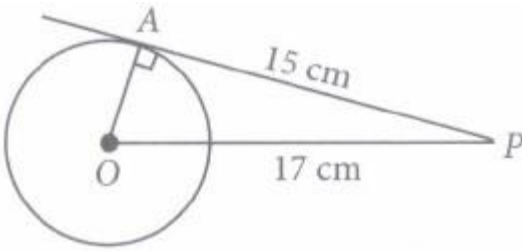
a) 7 cm   b) 8 cm   c) 9 cm   d) 10 cm
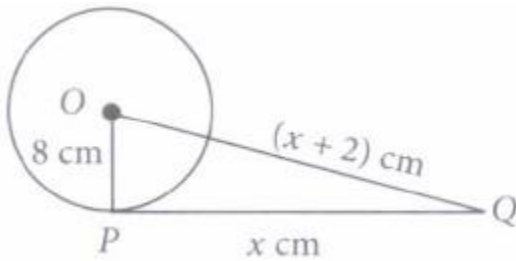
(iii) In the adjoining figure, length of tangent AP is

a) 12 cm   b) 24 cm   c) 30 cm   d) none of these

(iv) PT is a tangent to a circle with centre 0 and diameter = 40 cm. If PT = 21 cm, then OP =

a) 33 cm   b) 29 cm   c) 37 cm   d) none of these

(v) In the adjoining figure, the length of the tangent is

a) 15 cm   b) 9 cm   c) 8 cm   d) 10 cm

2. Three friends - Anshu, Vijay and Vishal are playing hide and seek in a park. Anshu and Vijay hide in the shrubs and Vishal have to find both of them. If the positions of three friends are at A, Band C respectively as shown in the figure and forms a right angled triangle such that AB = 9 m, BC = $3\sqrt{3}$ m and B = 90°, then answer the following questions.
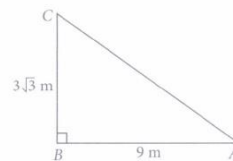
i)   The measure of ∠A is
    a) 30°   b) 45°   c) 60°   d) none of these

ii)   The measure of ∠C is
    (a) 30°   (b) 45°   (c) 60°   (d) None of these

iii)   Find Cos2A