

Class 10 - Mathematics

Circles

CBSE NOTES

Circles Mixed Practice Worksheet

Strengthen your foundation with key concepts and basic applications.



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Solve the following questions. Write your answers in the space provided.

1. Classify a line that has no common point with a circle.

Hint: Count common points.

2. How many common points does a secant have with a circle?

Hint: A secant cuts the circle.



Solve the following questions. Write your answers in the space provided.

3. Define the point of contact of a tangent.

Hint: It is the only common point.

4. Can a tangent be vertical? Give a reason.

Hint: Orientation does not define tangency.



Solve the following questions. Write your answers in the space provided.

5. State Theorem 10.1.

Hint: It links tangent and radius.

6. A circle has radius 5 cm. From an external point Q, $OQ = 13$ cm and QP is tangent at P. Find QP.

Hint: Triangle OPQ is right-angled at P.



Solve the following questions. Write your answers in the space provided.

7. If OP is radius to tangent XY at P , what is angle OPY ?

Hint: Use Theorem 10.1.

8. How many tangents can be drawn from a point inside a circle?

Hint: A tangent must touch the circle only once.



Solve the following questions. Write your answers in the space provided.

9. How many tangents can be drawn from a point on a circle?

Hint: Use uniqueness at the point of contact.

10. How many tangents can be drawn from a point outside a circle?

Hint: Draw both possible touching lines.



Solve the following questions. Write your answers in the space provided.

11. State Theorem 10.2.

Hint: It compares two tangents from one point.

12. From point P, tangents PA and PB touch a circle at A and B. If $PA = 7$ cm, find PB.

Hint: Use Theorem 10.2.



Solve the following questions. Write your answers in the space provided.

13. In the proof of Theorem 10.2, which congruence rule is used?

Hint: Two right triangles have equal hypotenuse and one equal side.

14. Why are the radii to two contact points equal?

Hint: They belong to the same circle.



Solve the following questions. Write your answers in the space provided.

15. Why is CPCT used in Theorem 10.2?

Hint: First prove triangles congruent.

16. If tangents PA and PB make angle $APB = 70$ degrees, find angle AOB.

Hint: Angles at A and B are right angles.



Solve the following questions. Write your answers in the space provided.

17. Tangents at the endpoints of a diameter are parallel. Explain.

Hint: Both are perpendicular to the same diameter line.

18. A chord of a larger concentric circle touches a smaller circle of radius 6 cm. If the larger radius is 10 cm, find the chord length.

Hint: The perpendicular from centre bisects the chord.



Solve the following questions. Write your answers in the space provided.

19. In a circumscribed quadrilateral ABCD, prove $AB + CD = AD + BC$.

Hint: Name tangent pairs from each vertex.

20. If a tangent and radius are not drawn through the point of contact, can Theorem 10.1 be applied directly?

Hint: Check the exact radius.



Solve the following questions. Write your answers in the space provided.

21. Why is measuring a diagram not a proof of Theorem 10.1?

Hint: A proof must work for every case.

22. What does length of tangent mean from an external point?

Hint: It is not the infinite line.



Solve the following questions. Write your answers in the space provided.

23. If $OP = 8$ cm and tangent length $PQ = 15$ cm, find OQ .

Hint: Use Pythagoras in right triangle OPQ .

24. If $OQ = 25$ cm and radius $OP = 7$ cm, find tangent length PQ .

Hint: Subtract squares.



Solve the following questions. Write your answers in the space provided.

25. Explain why any two tangent segments to the same circle are not always equal.

Hint: Check their external point.

26. What is the angle between a radius and tangent at the contact point?

Hint: Use Theorem 10.1.



Solve the following questions. Write your answers in the space provided.

27. From an external point P, PA and PB are tangents. What can be said about line OP?

Hint: Use congruent right triangles.

28. A point P is 3 cm from the centre of a circle of radius 5 cm. How many tangents can be drawn from P?

Hint: Compare OP with radius.



Solve the following questions. Write your answers in the space provided.

**29. A point P is 5 cm from the centre of a circle of radius 5 cm.
How many tangents can be drawn from P?**

Hint: P lies on the circle.

**30. A point P is 9 cm from the centre of a circle of radius 5 cm.
How many tangents can be drawn from P?**

Hint: P is outside the circle.



Solve the following questions. Write your answers in the space provided.

31. Which theorem helps solve tangent length using a right triangle?

Hint: First use Theorem 10.1.

32. Write the proof order for Theorem 10.2 in one line.

Hint: Right angles, equal radii, common hypotenuse, congruence, CPCT.



Check your answers with the solutions below.

1. Classify a line that has no common point with a circle.

Solution: It is a non-intersecting line because it has zero common points with the circle.

2. How many common points does a secant have with a circle?

Solution: A secant has two common points with a circle.

3. Define the point of contact of a tangent.

Solution: The point of contact is the single common point between the tangent and the circle.

4. Can a tangent be vertical? Give a reason.

Solution: Yes. A tangent can have any orientation; it is identified by exactly one common point with the circle.

5. State Theorem 10.1.

Solution: The tangent at any point of a circle is perpendicular to the radius through the point of contact.

6. A circle has radius 5 cm. From an external point Q, $OQ = 13$ cm and QP is tangent at P. Find QP.

Solution: OP is perpendicular to QP. So $QP^2 = OQ^2 - OP^2 = 13^2 - 5^2 = 144$. Hence $QP = 12$ cm.



Check your answers with the solutions below.

7. If OP is radius to tangent XY at P , what is angle OPY ?

Solution: Angle OPY is 90 degrees because the radius through the point of contact is perpendicular to the tangent.

8. How many tangents can be drawn from a point inside a circle?

Solution: Zero tangents can be drawn from a point inside a circle.

9. How many tangents can be drawn from a point on a circle?

Solution: Exactly one tangent can be drawn from a point on a circle.

10. How many tangents can be drawn from a point outside a circle?

Solution: Exactly two tangents can be drawn from an external point.

11. State Theorem 10.2.

Solution: Tangents drawn from the same external point to a circle have equal lengths.

12. From point P , tangents PA and PB touch a circle at A and B . If $PA = 7$ cm, find PB .

Solution: $PB = PA = 7$ cm because tangents from the same external point are equal.



Check your answers with the solutions below.

13. In the proof of Theorem 10.2, which congruence rule is used?

Solution: RHS congruence is used.

14. Why are the radii to two contact points equal?

Solution: All radii of the same circle are equal.

15. Why is CPCT used in Theorem 10.2?

Solution: After proving the two right triangles congruent by RHS, CPCT gives equality of the tangent segments.

16. If tangents PA and PB make angle APB = 70 degrees, find angle AOB.

Solution: In quadrilateral AOBP, angles A and B are 90 degrees. So angle AOB = $360 - 90 - 90 - 70 = 110$ degrees.

17. Tangents at the endpoints of a diameter are parallel. Explain.

Solution: Each tangent is perpendicular to the radius at its endpoint. The two radii lie on the same diameter line, so both tangents are perpendicular to the same line and hence parallel.

18. A chord of a larger concentric circle touches a smaller circle of radius 6 cm. If the larger radius is 10 cm, find the chord length.

Solution: Distance from centre to chord is 6 cm. Half chord squared = $10^2 - 6^2$ = 64. half chord = 8 cm. Chord length = 16 cm.



Check your answers with the solutions below.

19. In a circumscribed quadrilateral ABCD, prove $AB + CD = AD + BC$.

Solution: Tangents from A are equal, from B are equal, from C are equal and from D are equal. Adding paired segments gives $AB + CD = AD + BC$.

20. If a tangent and radius are not drawn through the point of contact, can Theorem 10.1 be applied directly?

Solution: No. The theorem applies to the radius through the point of contact.

21. Why is measuring a diagram not a proof of Theorem 10.1?

Solution: A measurement verifies only a drawing. A theorem proof must use general reasoning valid for every circle and tangent.

22. What does length of tangent mean from an external point?

Solution: It is the length of the tangent segment from the external point to the point of contact.

23. If $OP = 8$ cm and tangent length $PQ = 15$ cm, find OQ .

Solution: $OQ^2 = 8^2 + 15^2 = 289$. Hence $OQ = 17$ cm.

24. If $OQ = 25$ cm and radius $OP = 7$ cm, find tangent length PQ .

Solution: $PQ^2 = 25^2 - 7^2 = 576$. Hence $PQ = 24$ cm.



Check your answers with the solutions below.

25. Explain why any two tangent segments to the same circle are not always equal.

Solution: Theorem 10.2 applies only to tangents drawn from the same external point.

26. What is the angle between a radius and tangent at the contact point?

Solution: The angle is 90 degrees.

27. From an external point P, PA and PB are tangents. What can be said about line OP?

Solution: OP bisects the angle between the tangents, so angle APO equals angle OPB.

28. A point P is 3 cm from the centre of a circle of radius 5 cm. How many tangents can be drawn from P?

Solution: P is inside the circle because $OP < \text{radius}$. Hence no tangent can be drawn.

29. A point P is 5 cm from the centre of a circle of radius 5 cm. How many tangents can be drawn from P?

Solution: Exactly one tangent can be drawn.



Check your answers with the solutions below.

30. A point P is 9 cm from the centre of a circle of radius 5 cm. How many tangents can be drawn from P?

Solution: Exactly two tangents can be drawn.

31. Which theorem helps solve tangent length using a right triangle?

Solution: Theorem 10.1 creates the right angle, then the Pythagorean theorem gives the length relation.

32. Write the proof order for Theorem 10.2 in one line.

Solution: Join radii to contact points, use right angles by Theorem 10.1, equal radii and common hypotenuse to prove RHS congruence, then CPCT gives equal tangents.



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