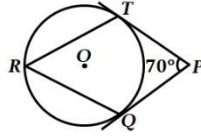
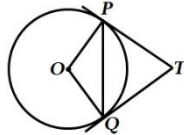


15. From a point T outside a circle of centre O , tangents TP and TQ are drawn to the circle. Prove that OT is the right bisector of line segment PQ .
CBSE 2015, Delhi (30/1/1)
16. Two concentric circles of radii a and b ($a > b$) are given. Find the length of the chord of the larger circle which touches the smaller circle.
CBSE 2015, Foreign (30/2/1)
17. In Figure, O is the centre of a circle. PT and PQ are tangents to the circle from an external point P . If $\angle TPQ = 70^\circ$, find $\angle TRQ$.



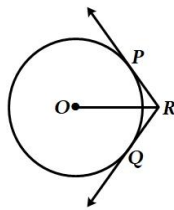
CBSE 2015, Foreign (30/2/1)

18. In figure, 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 lengths of TP and TQ .



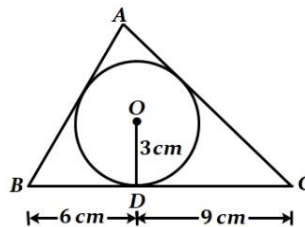
CBSE 2015, Foreign (30/2/1)

19. In figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O . If $\angle PRQ = 120^\circ$, then prove that $OR = PR + RQ$.



CBSE 2015, Outside Delhi (30/1)

20. In figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm , such that the segments BD and DC are respectively of lengths 6 cm and 9 cm . If the area of ΔABC is 54 cm^2 , then find the lengths of sides AB and AC .

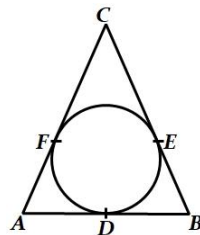


CBSE 2015, Outside Delhi (30/1)

21. The incircle of an isosceles triangle ABC , in which $AB = AC$, touches the sides BC , CA and AB at D , E and F respectively. Prove that $BD = DC$.
CBSE 2014, Foreign (30/2), (30/3)

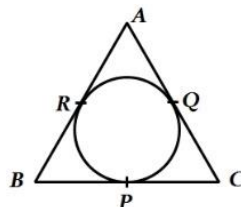
22. Prove that the parallelogram circumscribing a circle is a rhombus.
CBSE 2013, Delhi (30/1/1)

23. In figure, a circle inscribed in triangle ABC touches sides AB , BC and AC at points D , E and F respectively. If $AB = 12\text{ cm}$, $BC = 8\text{ cm}$ and $AC = 10\text{ cm}$, then find the lengths of AD , BE and CF .



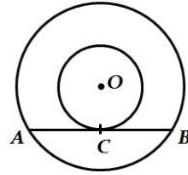
CBSE 2013, Delhi (30/1/1)

24. In figure, an isosceles triangle ABC , with $AB = AC$, circumscribes a circle. Prove that the point of contact P bisects the base BC .



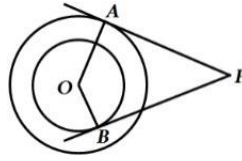
CBSE 2012, Delhi (30/1/1)

25. In figure, the chord AB of the larger of the two concentric circles, with centre O , touches the smaller circle at C . Prove that $AC = CB$.



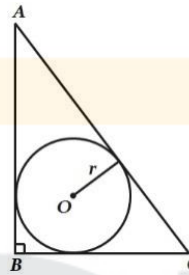
CBSE 2012, Delhi (30/1/1)

26. Tangents PA and PB are drawn from an external point P to two concentric circles with centre O and radii 8 cm and 5 cm respectively, as shown in figure. If $AP = 15\text{ cm}$, then find the length of BP .



CBSE 2012, Delhi (30/1/1)

27. In figure, a right triangle ABC , circumscribes a circle of radius r . If AB and BC are of lengths 8 cm and 6 cm respectively, find the value of r .



CBSE 2012, Outside Delhi (30/1)

28. The incircle of an isosceles triangle ABC , with $AB = AC$, touches the sides AB , BC and CA at D , E and F respectively. Prove that E bisects BC .

CBSE 2012, Foreign (30/2/1)

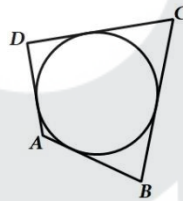
29. Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

CBSE 2012, Foreign (30/2/1)

30. Two concentric circles are of radii 7 cm and $r\text{ cm}$ respectively, where $r > 7$. A chord of the larger circle, of length 48 cm , touches the smaller circle. Find the value of r .

CBSE 2011, Delhi (30/1/1)

31. In figure, a circle touches all the four sides of a quadrilateral $ABCD$ whose sides are $AB = 6\text{ cm}$, $BC = 9\text{ cm}$ and $CD = 8\text{ cm}$. Find the length of side AD .

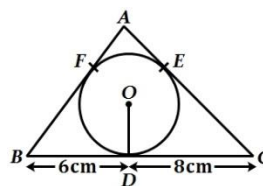


CBSE 2011, Outside Delhi (30/1)

32. If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus

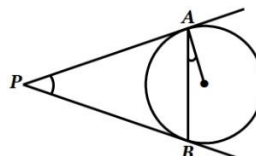
CBSE 2010, Delhi (30/1/1)

33. In Figure a triangle ABC is drawn to circumscribe a circle of radius 3 cm , such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 6 cm and 8 cm respectively. Find the side AB if the area of $\Delta ABC = 63\text{ cm}^2$.



CBSE 2010, Foreign (30/2/1)

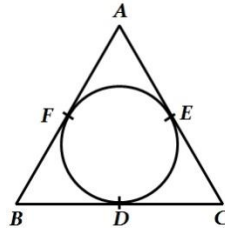
34. Two tangents PA and PB are drawn to a circle with centre O from an external point P . Prove that $\angle APB = 2\angle OAB$.



CBSE 2009, Delhi (30/1/1)

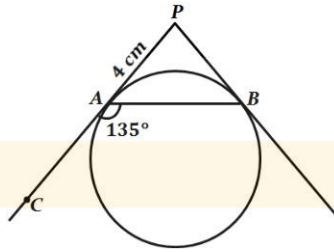
3 Marks:

1. The incircle of $\triangle ABC$ touches the sides BC , CA and AB at D , E , and F respectively. If $AB = AC$, prove that $BD = CD$.



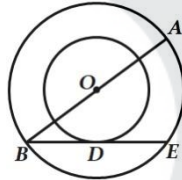
CBSE Sample Paper II 2008

2. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre of the circle.
CBSE Sample Paper I 2008
3. In the given figure, PA and PB are tangents to a circle from an external point P such that $PA = 4\text{ cm}$ and $\angle BAC = 135^\circ$. Find the length of chord AB .



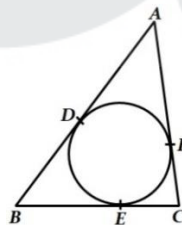
CBSE 2017, Foreign (30/2/1)

4. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.
CBSE 2017, Foreign (30/2/1)
5. Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that $\angle PTQ = 2\angle OPQ$.
CBSE 2017, Delhi (30/1/1)
6. In the given figure, the radii of two concentric circles are 13 cm and 8 cm . AB is diameter of the bigger circle. BD is the tangent to the smaller circle touching it at D . Find the length AD .



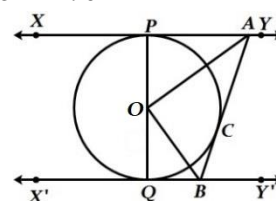
CBSE Sample Paper 2016

7. P & Q are centres of circles of radii 9 cm and 2 cm respectively. $PQ = 17\text{ cm}$. R is the centre of the circle of radius $x\text{ cm}$ which touches the above circle externally. Given that angle PRQ is 90° . Write an equation in x and solve it.
CBSE Sample Paper 2016
8. In Figure, a circle is inscribed in $\triangle ABC$ having sides $BC = 8\text{ cm}$, $AC = 10\text{ cm}$ and $AB = 12\text{ cm}$ as shown in figure. Find AD , BE and CF .



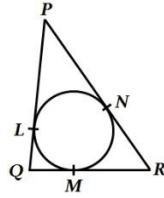
CBSE 2009, Foreign (30/2/1)

9. Two tangents TP and TQ are drawn to a circle with centre O from an external point T . Prove that $\angle PTQ = 2\angle OPQ$.
CBSE 2012, Foreign (30/2/1)
10. In figure, XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersects XY at A and $X'Y'$ at B . Prove that $\angle AOB = 90^\circ$.



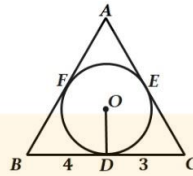
CBSE 2012, Foreign (30/2/1)

11. In figure, a circle is inscribed in a triangle PQR with $PQ = 10\text{ cm}$, $QR = 8\text{ cm}$ and $PR = 12\text{ cm}$. Find the lengths QM , RN and PL .



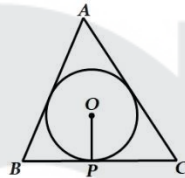
CBSE 2012, Outside Delhi (30/1)

12. Prove that the parallelogram circumscribing a circle is a rhombus. CBSE 2012, Delhi (30/1/1)
13. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. CBSE 2012, Delhi (30/1/1)
14. In figure, a triangle ABC is drawn to circumscribe a circle of radius 2 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 4 cm and 3 cm respectively. If area of $\Delta ABC = 21\text{ cm}^2$, then find the lengths of sides AB and AC .



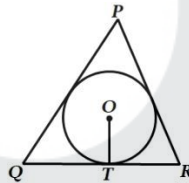
CBSE 2011, Delhi (30/1/1)

15. In figure, a triangle ABC is drawn to circumscribe a circle of radius 10 cm such that the segments BP and PC into which BC is divided by the point of contact P , are of lengths 15 cm and 20 cm respectively. If the area of $\Delta ABC = 525\text{ cm}^2$, then find the lengths of sides AB and AC .



CBSE 2011, Foreign (30/2/1)

16. In figure, a triangle PQR is drawn to circumscribe a circle of radius 6 cm such that the segments QT and TR into which QR is divided by the point of contact T , are of lengths 12 cm and 9 cm respectively. If the area of $\Delta PQR = 189\text{ cm}^2$, then find the lengths of sides PQ and PR .

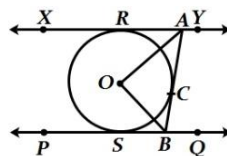


CBSE 2011, Outside Delhi (30/1)

17. Prove that a parallelogram circumscribing a circle is a rhombus. CBSE 2008, Foreign (30/2/1), (30/2/2), (30/2/3)
18. A circle touches the side BC of ΔABC at a point P and touches AB and AC when produced at Q and R respectively. Show that
 $AQ = \frac{1}{2}(\text{Perimeter of } \Delta ABC)$ CBSE Sample Paper III 2008

4 Marks:

1. Prove that the lengths of two tangents drawn from an external point to a circle are equal. CBSE 2017, Outside Delhi (30/1)
CBSE 2017, Delhi (30/1/1), Foreign (30/2/1)
CBSE 2016, Foreign (30/2/1), Delhi (30/1/1), Outside Delhi (30/1)
2. In given figure, XY and PQ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and PQ at B . Prove that $\angle AOB = 90^\circ$.



CBSE Sample Paper 2017
CBSE 2017, Outside Delhi (30/1)

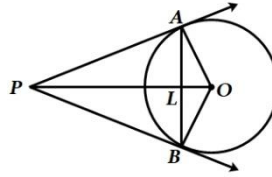
3. The radii of two concentric circles are 13 cm and 8 cm . AB is a diameter of the bigger circle and BD is tangent to the smaller circle touching it at D and intersecting the larger circle at P , on producing. Find the length of AP .

CBSE Sample Paper 2017

4. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2014, Outside Delhi (30/1), (30/2), (30/3)

5. In figure, AB is a chord of a circle, with centre O , such that $AB = 16\text{ cm}$ and radius of circle is 10 cm . Tangents at A and B intersect each other at P . Find the length of PA .

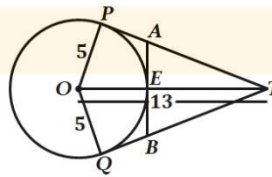


CBSE 2016, Foreign (30/2/1)

6. Prove that the lengths of the tangents drawn from an external point to a circle are equal. Using the above theorem, prove that $AB + CD = AD + BC$, if a quadrilateral $ABCD$ is drawn to circumscribe a circle.

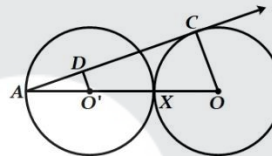
CBSE Sample Paper 2016

7. In figure, O is the centre of a circle of radius 5 cm . T is a point such that $OT = 13\text{ cm}$ and OT intersects circle at E . If AB is a tangent to the circle at E , find the length of AB , where TP and TQ are two tangents to the circle.



CBSE 2016, Delhi (30/1/1)

8. In figure, two equal circles, with centres O and O' , touch each other at X . OO' produced meets the circle with centre O' at A . AC is tangent to the circle with centre O , at the point C . $O'D$ is perpendicular to AC . Find the value of $\frac{DO'}{CO}$.

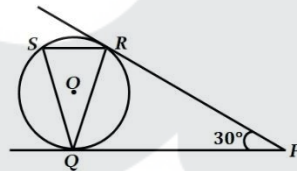


CBSE 2016, Outside Delhi (30/1)

9. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2015, Delhi (30/1/1)

10. In figure, tangents PQ and PR are drawn from an external point P to a circle with centre O , such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ . Find $\angle RQS$.



CBSE 2015, Delhi (30/1/1)

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

CBSE 2015, Outside Delhi (30/1)

12. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.

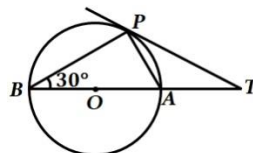
CBSE 2015, Outside Delhi (30/1)

13. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2015, Foreign (30/2/1)

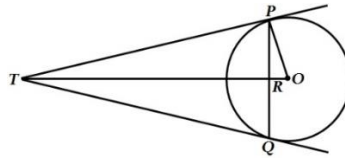
CBSE 2014, Outside Delhi (30/1), (30/2), (30/3)

14. In figure, O is the centre of the circle and TP is the tangent to the circle from an external point T . If $\angle PBT = 30^\circ$, prove that $BA : AT = 2 : 1$.



CBSE 2015, Foreign (30/2/1)

15. In Figure, PQ is a chord of length 16 cm , of a circle of radius 10 cm . The tangents at P and Q intersect at a point T . Find the length of TP .

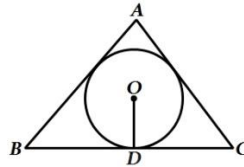


CBSE 2014, Outside Delhi (30/1)

16. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

CBSE 2014, Outside Delhi (30/2)

17. In Figure a triangle ABC is drawn to circumscribe a circle of radius 4 cm , such that the segments BD and DC are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC .

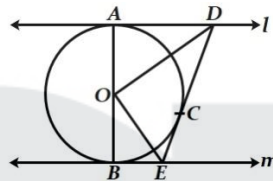


CBSE 2014, Outside Delhi (30/3)

18. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2013, Delhi (30/1/1)

19. If figure, l and m are two parallel tangents to a circle with centre O , touching the circle at A and B respectively. Another tangent at C intersects the line l at D and m at E . Prove that $\angle DOE = 90^\circ$.



CBSE 2013, Delhi (30/1/1)

20. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2012, Delhi (30/1/1)

21. A quadrilateral $ABCD$ is drawn to circumscribe a circle. Prove that $AB + DC = AD + BC$.

CBSE 2012, Delhi (30/1/1)

22. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2012, Foreign (30/2/1)

23. Prove that the length of tangents drawn from an external point to a circle are equal. CBSE 2012, Outside Delhi (30/1)

24. Prove that the lengths of tangents drawn from an external point to a circle are equal. CBSE 2011, Foreign (30/2/1)

25. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

CBSE 2011, Outside Delhi (30/1)

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

Using the above theorem prove that:

If quadrilateral $ABCD$ is circumscribing a circle, then

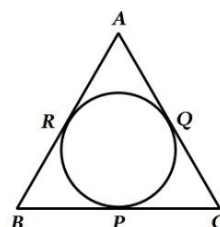
$$AB + CD = AD + BC.$$

CBSE 2009, Outside Delhi (30/1)

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

Using the above, prove the following:

ABC is an isosceles triangle in which $AB = AC$, circumscribed about a circle, as shown in Fig. Prove that the base is bisected by the point of contact.



CBSE 2008, Foreign (30/2/1), (30/2/2), (30/2/3)