



## MATHS

### BOOKS - CALCUTTA BOOK HOUSE MATHS (BENGALI ENGLISH)

### THEOREMS RELATED TO TANGENT IN A CIRCLE

#### Examples

1. The perpendicular drawn on radius at the end point of radius of a circle will be a tangent to the circle at the end point of radius.



Watch Video Solution

2. Manas has drawn a circle with centre O of which AB is a chord. A tangent is drawn at the point B which intersects extended AO at the point T. If  $\angle BAT = 21^\circ$ , find the value of  $\angle BTA$ .

 [Watch Video Solution](#)

3. XY is a diameter of a circle. PAQ is a tangent to the circle at the point A lying on the circumference. The perpendicular drawn on the tangent to the circle from X intersects PAQ at Z. Prove that XA is a bisector of  $\angle YXZ$ . [GP – X]

 [Watch Video Solution](#)

4. PR is a diameter of a circle. A tangent is drawn at the point P and a point S is taken on the tangent of the circle in such a way that  $PR=PS$ . If RS intersects the circle at the point T, prove that  $ST =PT$ .



[Watch Video Solution](#)

5. Two radii OA and OB of a circle with centre O are perpendicular to each other. If two tangents are drawn at the point A and B intersect each other at the point T, prove that  $AB = OT$  and they bisect each other at a right angle.



[Watch Video Solution](#)

6. X is a point on the tangent at the point A lies on a circle with centre O. A secant drawn from a point X intersects the circle at the points Y and Z. If P is the mid-point of YZ, prove that XAPO or XAOP is a cyclic quadrilateral. .



[Watch Video Solution](#)

7. P is any point on diameter of a circle with centre O. A perpendicular drawn on diameter at the point O intersects the circle at the point Q. Extended QP intersects the circle at the point R. A tangent drawn at the point R intersects extended OP at the point S. Prove that  $SP = SR$ . [GP - X]



[Watch Video Solution](#)

8. QR is a chord of the circle with centre O. Two tangents drawn at the points Q and R intersect each other at the point P.

If QM is a diameter, prove that  $\angle QPR = 2\angle RQM$  [GP - X]



Watch Video Solution

9. Two chords AC and BD of a circle intersect each other at the point O. If two tangents drawn at the points A and B intersect each other at the point P and two tangents drawn at the points C and D intersect at the point Q, prove that  $\angle P + \angle Q = 2\angle BOC$ . [GP - X]



Watch Video Solution

10. Prove that if a quadrilateral is circumscribed about a circle, then the angles subtended at the centre by any two opposite sides are supplementary.



[Watch Video Solution](#)

11.  $PQ$  is a diameter of the circle with centre  $O$ . The tangent drawn at any point  $R$  on the circle intersects the tangents drawn at  $P$  and  $Q$  at two points  $A$  and  $B$  respectively. Prove that  $\angle AOB = 1$  right angle.



[Watch Video Solution](#)

12. The length of radii of two circles are  $r_1$  unit and  $r_2$  unit respectively, where  $r_1 > r_2$ . If the distance between the centres

of the circles be  $p$  unit, then prove that the length of the direct common tangent to the circles  $PQ = \sqrt{p^2 - (r_1 - r_2)^2}$  unit.



[View Text Solution](#)

**13.** In a circle with centre  $O$ , a tangent is drawn from an external point  $A$  to the circle which touches the circle at  $B$ . If  $OB = 5$  cm,  $OA = 13$  cm, then the length of  $AB =$

- A. 12 cm
- B. 13 CM
- C.  $6.5\text{cm}$
- D. 6 cm

**Answer:**



[Watch Video Solution](#)

14. Two circles touch each other externally at the point C. AB is a common tangent to both the circles and touches the circle at the points A and B. Then the value of  $\angle ABC$  is [GP-X]

A.  $60^\circ$

B.  $45^\circ$

C.  $30^\circ$

D.  $90^\circ$

**Answer:**



[Watch Video Solution](#)



15. The length of radius of a circle with centre O is 5 cm. P is a point at a distance of 13 cm from the point O. PQ and PR are two tangents from the point P to the circle, the area of the quadrilateral PQOR is

- A. 60 sq-cm
- B. 30 sq-cm
- C. 120 sq-cm
- D. 150 sq-cm

**Answer:**



**Watch Video Solution**

16. The lengths of radii of two circles are 5 cm and 3 cm. The two circles touch externally. Then the distance between the centres of the circles is

A. 2 cm

B. 2.5 cm

C. 1.5 cm

D. 8 cm

**Answer:**



[Watch Video Solution](#)

17. The lengths of radii of two circles are  $3.5\text{cm}$  and  $2\text{cm}$ .

They touch each other internally. The distance between the

centres of the circles is

A. 5.5 cm

B. 1 cm

C. 1.5 cm

D. None of these

**Answer:**



[Watch Video Solution](#)

**18.** P is a point inside a circle: NO tangent of the circle will pass through P.



[Watch Video Solution](#)

**19.** IN a circle more than two tangents can be drawn which are parallel to a fixed straight lines.



[Watch Video Solution](#)

**20.** If the straight line intersects the circle at two points, then the straight line is called a \_\_\_\_\_ to the circle.



[Watch Video Solution](#)

**21.** If two circles do not intersect or touch each other, then the maximum number of common tangents can be drawn is \_\_\_\_\_



[Watch Video Solution](#)

**22.** Two circles touch each other externally at the point A. A common tangent drawn to two circles at the point A is a \_\_\_\_\_ common tangent. (direct/ transverse)

 [Watch Video Solution](#)

**23.** In the figure, O is the centre and BOA is a diameter of the circle. A tangent drawn to the circle at the point P intersects the extended BA at the point T. If  $\angle PBO = 30^\circ$ , find the value of  $\angle PAT$ .

 [Watch Video Solution](#)

**24.** In the adjoining figure,  $\triangle ABC$  circumscribes a circle and touched the circle at the points P, Q, R. If

$AP = 4\text{cm}$ ,  $BP = 6\text{cm}$ ,  $AC = 12\text{cm}$  and  $BC = x$  cm, then

determine the value of  $x$ .

 [Watch Video Solution](#)

**25.** In the adjoining figure, three circles with centres A,B,C touch one another externally. If  $AB = 5\text{cm}$ ,  $BC = 7$  cm and  $CA = 6$  cm, then length of radius of circle with centre A.

 [Watch Video Solution](#)

**26.** In the adjoining figure, two tangents drawn from external point C to a circle with centre O touches the circle at the point P and Q respectively. A tangent drawn at another point R of the circle intersects CP and CQ at the points A and B

respectively. If  $CP = 7$  cm and  $BC = 11$  cm, then determine the length of  $BR$ .



[Watch Video Solution](#)

**27.** The length of radii of two circles are 8 cm and 3 cm and distance between two centres is 13 cm. Find the length of a direct common tangent of two circles.



[Watch Video Solution](#)

**28.** An external point is situated at a distance of 17 cm from the centre of a circle having 16 cm diameter. Determine the length of the tangent drawn to the circle from the external point.



[Watch Video Solution](#)

**29.** The tangent drawn at points P and Q on the circumference of a circle intersect at A. If  $\angle PAQ = 60^\circ$ , find the value of  $\angle APQ$ .

 [Watch Video Solution](#)

**30.** AP and AQ are two tangents drawn from an external point A to a circle with centre O, P and Q are points of contact. If PR is a diameter, prove that  $OA \parallel RQ$ .

 [Watch Video Solution](#)

**31.** Prove that for a quadrilateral circumscribed about a circle, the angles subtended by any two opposite sides at the centres



are supplementary to each other.



Watch Video Solution

**32.** Prove that a parallelogram circumscribing by a circle is always a rhombus.



Watch Video Solution

**33.** Two circles drawn with centres A and B touch each other externally at C, O is a point on the tangent drawn at C, OD and OE are tangents drawn to the circles of centre A and B respectively.

If

$\angle COD = 56^\circ$ ,  $\angle COE = 40^\circ$ ,  $\angle ACD = x^\circ$  and  $\angle BCE = y^\circ$ ,

then prove that  $OC = OD = OE$  and  $x - y = 8$ .



Watch Video Solution

**34.** Two circles with centres A and B touch each other internally. Another circle touches the larger circle internally at the point X and the smaller circle externally at the point Y. If O be the centre of that circle, prove that  $(OA + BO)$  is constant.

 [Watch Video Solution](#)

**35.** Two circles have been drawn with centres A and B which touch each other externally at the point O. A straight line is drawn passing through the point O and intersects the two circles at P and Q respectively. Prove that  $AP \parallel BQ$ .

 [Watch Video Solution](#)

**36.** Three equal circles touch one another externally. Prove that the centres of the three circles form an equilateral triangle.



[Watch Video Solution](#)

**37.** Two tangents  $AB$  and  $AC$  drawn from an external point  $A$  of a circle touch the circle at the point  $B$  and  $C$ . A tangent drawn from a point  $X$  lies on minor arc  $BC$  intersects  $AB$  and  $AC$  at the points  $D$  and  $E$  respectively. Prove that perimeter of  $\triangle ADE = 2AB$ .



[Watch Video Solution](#)

38. PQ is a diameter. The tangent drawn at the point R, intersects the two tangents drawn at the points P and Q at the points A and B respectively. Prove that  $\angle AOB$  is a right angle.



Watch Video Solution

### Exercise 4 1

1. PR and PS are two tangents drawn from an external point P of the Circle with centre at O. If  $PR = 8\text{cm}$  and  $\angle RPO = 60^\circ$ , then the length of PS=

A. 9 cm

B. 8 cm

C. 10 cm

D. 4 cm

**Answer: B**



[Watch Video Solution](#)

2. PQ is a diameter of the circle with centre at O. The tangent drawn at A on the circle intersect the extended PQ at R. If  $\angle PRA = 45^\circ$ , then  $\angle OAP =$

A.  $90^\circ$

B.  $50^\circ$

C.  $22\frac{1}{2}^\circ$

D.  $135^\circ$

**Answer: C**



**Watch Video Solution**

**3.** PQ is a chord of the circle with centre at C and of radius 4 cm. The tangents drawn at P and Q to the circle intersect at R at a distance of  $2\sqrt{7}$  from the centre of the circle. Then the length of the chord PQ is

A. 3 cm

B. 4 cm

C. 5 cm

D. 6 cm

**Answer: D**



**View Text Solution**

4. The tangent drawn from an external point A of the circle with centre C touches the circle at B. If  $BC = 5\text{cm}$ ,  $AC = 13\text{cm}$ , then the length of AB=

- A. 10 cm
- B. 12 cm
- C. 13 cm
- D. 15 cm

**Answer: B**



[Watch Video Solution](#)

5. If two circles touch internally, then the distance between the centres of the circles is equal to the sum of their radii.



[Watch Video Solution](#)

6. The tangent to a circle at any point on it is perpendicular to the radius passes through the point of contact.



[Watch Video Solution](#)

7. Only \_\_\_\_\_ tangent can be drawn at any point on the circumference of a circle.



[Watch Video Solution](#)



8. The perpendicular drawn on radius at the end point of radius of a circle will be a \_\_\_\_\_ to the circle at the end point of radius.



[Watch Video Solution](#)

9. The radii of two circles are 10 cm and 5 cm and the distance between their centres is 13 cm. Find the length of the direct common tangent to the two circles.



[Watch Video Solution](#)

10. PQ is a diameter of the circle with centre at O. The tangent drawn at C on the circle intersects extended PQ at R. If  $\angle CPO = 30^\circ$ , then find the value of  $\angle QCR$ .



[Watch Video Solution](#)

**11.** The lengths of two radii of two circles are respectively 3 cm and 2 cm. If the distance between the centres of the circles be 13 cm, then find the length of common tangent to the circles.



[Watch Video Solution](#)

**12.** Prove that the centres of three equal circles touching each other are the vertices of an equilateral triangle.



[Watch Video Solution](#)

**13.** AB and AC are two tangents to the circle with centre at O. Prove that AO bisects the chord passing through point of

contact at right angle.



[Watch Video Solution](#)

14. Two equal circles touches each other externally at a point  $C$  and a line segment  $ACB$  has drawn through  $C$  upto the circumference of the circle. Prove that  $AC = BC$ .



[Watch Video Solution](#)

15. The quadrilateral  $ABCD$  is circumscribed about a circle. Prove that  $AB + CD = BC + DA$ .



[Watch Video Solution](#)

**16.** Two circles touch each other externally at a point A and a straight line touches the circles at the points B and C. Prove that  $\angle BAC$  is a right angle.



[Watch Video Solution](#)

**17.** Prove that the parallelogram circumscribed about a circle is only a rhombus.



[Watch Video Solution](#)

**18.** Draw a circle with radius 3.4cm and draw a tangent at one side of the diameter .



[Watch Video Solution](#)

19. Draw a circle of radius  $4\text{cm}$ . From a point  $8\text{cm}$  away its centre, construct the pair of tangents to the circle .



Watch Video Solution

20. Draw a circle of radius  $5\text{cm}$ . From a point  $11\text{cm}$  away its centre, construct the pair of tangents to the circle .



Watch Video Solution

## Exercise 4 2

1. The distance of the point from the centre of a circle with diameter of  $16\text{ cm}$  is  $17\text{ cm}$ . Then the length of the tangent from the point to the circle is

A. 10 cm

B. 15 cm

C. 20 cm

D. 25 cm

**Answer: B**



**Watch Video Solution**

2. Two circles touch each other at the point R. PQ is a common tangent to both the circle which touches the circle at the points P and Q. Then  $\angle PRQ =$

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: D**



**Watch Video Solution**

3. Two tangents drawn at the point A and B on a circle intersect each other at the point P. If  $\angle APB = 60^\circ$ , then  $\angle PAB =$

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: C**



**Watch Video Solution**

4. The centre of a circle with radius of 6 cm is O. The length of the tangent drawn to the circle from a point which is at a distance of 10 cm from O is

A. 6 cm

B. 8 cm

C. 10 cm

D. 12 cm

**Answer: B**



**Watch Video Solution**



5. If the radius of a circle be zero, then the circle is called a point circle.



[Watch Video Solution](#)

6. Only three tangents can be drawn from an external point of a circle.



[Watch Video Solution](#)

7. The tangent to a circle and the radius passing through the point of contact are perpendicular to each other.



[Watch Video Solution](#)

8. The number of direct common tangents to two intersecting circles is \_\_\_\_\_

 [Watch Video Solution](#)

9. The straight line PAB intersects the circle with centre O at the points A and B. The straight line PAB will be a tangent to that circle if  $AB =$  \_\_\_\_\_

 [Watch Video Solution](#)

10. Two circles touch each other internally. The radius of the larger circle is 6 cm and if the distance between the two centres is 2 cm, then find the radius of the other circle.

 [Watch Video Solution](#)

**11.** Two circles touch each other externally. The distance between two centres is 7 cm. If the radius of one of the circles be 4 cm, then find the radius of the other circle.

 [Watch Video Solution](#)

**12.** The radius of a circle with centre O is 5 cm. The length of the tangent to the circle from the external point is 12 cm. Find the distance of that point from the centre.

 [Watch Video Solution](#)

**13.** AB is a diameter of the circle with centre O. The tangent, drawn at a point P on the circle intersect the two tangents,

drawn at the points, A and B, at the points Q and R. Find the value of  $\angle QPR$ .



[Watch Video Solution](#)

14. Prove that from any external point two tangents can be drawn to circle.



[Watch Video Solution](#)

15. Two tangents are drawn from an external point A of the circle with centre at O which touches the circle at the points B and C. Prove that AO is the perpendicular bisector of BC.



[Watch Video Solution](#)

**16.** Prove that the internal bisector of the angle between two tangents drawn from an external point of a circle will pass through the centre of the circle.



[Watch Video Solution](#)

**17.** Prove that the internal angle between two tangents drawn from an external point is bisected by the straight line obtained by joining that point and the centre of the circle.



[Watch Video Solution](#)

**18.** The incircle of  $\triangle ABC$  touches the sides  $AB$ ,  $BC$  and  $CA$  of the triangle at the points  $D$ ,  $E$  and  $F$ . Prove that  $AD + BE + CF = AF + CE + BD = \frac{1}{2}$  (The perimeter of  $\triangle ABC$ )



[Watch Video Solution](#)

19. If the quadrilateral ABCD circumscribed about the circle , then prove that  $AB + CD = BC + DA$ .



[Watch Video Solution](#)

20. Puja has drawn a circle with centre of O of which AB is a diameter. Two parallel tangents drawn at A and B, two end-points of the diameter AB, is a diameter. Two parallel tangents drawn at A and B, two end-points of the diameter AB, intersects another tangent to the circle at another point T at the points P and Q. Prove that  $\angle POQ = 90^\circ$ .



[Watch Video Solution](#)

**21.** Laxmi has drawn two circles which intersect each other at O externally. If PQ and RS be two parallel diameters of the circles, then prove that the points P, O and S are collinear.

 [Watch Video Solution](#)

**22.** Length of radius of two circles are 5cm and 3cm . If two circles touch externally. Find the distance between two centre.

 [Watch Video Solution](#)

**23.** The radii of two circles are R and r unit ( $R > r$ ). If the distance between the two centres of the circles be d unit, then prove that the length of their transversal common tangent

$$= \sqrt{d^2 - (R + r)^2} \text{ unit.}$$



**Watch Video Solution**