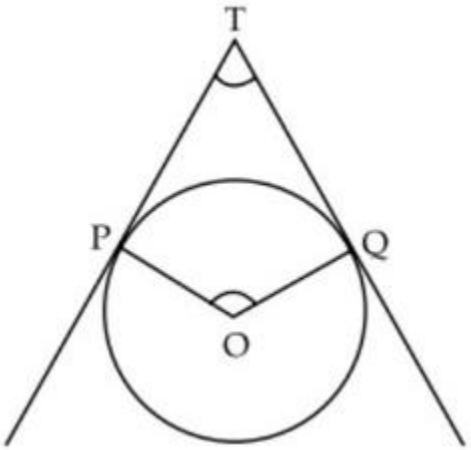
Circles

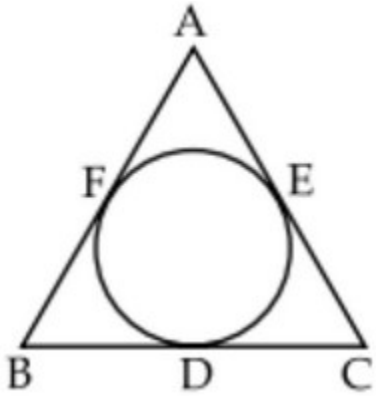
MULTIPLE CHOICE QUESTIONS

Q.1 In Fig. if from an external point T, TP and TQ are two tangents to a circle with centre O so that $< POQ = 110O$, then $< PTQ$ is:



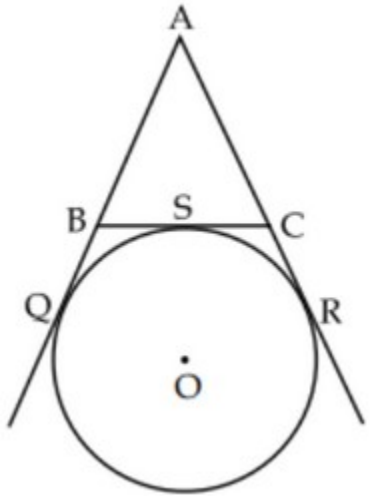
A. 60 degree
B. 70 degree
C. 80 degree
D. 90 degree

Q.2. In the fig. if the semi perimeter of $\Delta ABC = 23cm$, then $AF + BD + CE$ is:



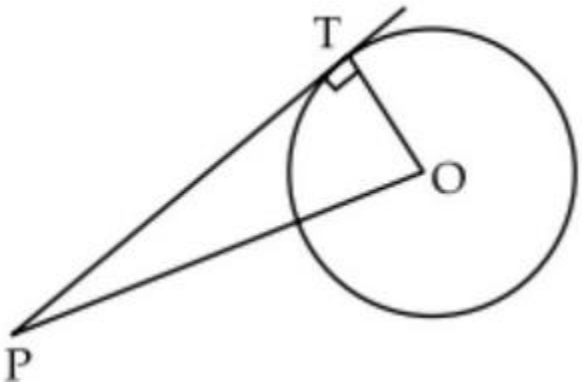
A. 46cm
B. 11.5cm
C. 23cm
D. 34.5cm

Q.3. In fig. AQ, AR and BC are tangents to a circle with centre O, If AB = 7cm, BC = 5cm AC = 5cm, then the length of tangent AQ is:



A. 5cm
B. 7cm
C. 8.5cm
D. 17cm

Q.4. In the fig. PT is a tangent to a circle with centre O. If PT = 30 cm and diameter of circle is 32cm, then the length of the line segment OP will be:



A. 68cm
B. 34cm
C. 17cm
D. 34.8cm

Q.5 If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to

A. $3/2\ (\sqrt{3})$ cm

B. 6 cm
C. 3 cm
D. $3\sqrt{3}$ cm

Q.6 The distance between two parallel tangents to a circle of radius 5cm is:

A. 10cm
B. 11cm
C. 12cm
D. 14cm

Q.7. If the circumference of a circle increases from 4π to 8π, then its area will become

A. half
B. 2 times
C. 4 times
D. does not change

Q.8. If two tangents inclined to each other at an angle 600 are drawn to a circle of radius 3cm, then the length of tangent is equal to:

A. $\sqrt{3}$ cm
B. $2\sqrt{3}$ cm
C. $2/\sqrt{3}$ cm
D. $3\sqrt{3}$ cm

Q.9. A line which is perpendicular to the radius of the circle through the point of contact is:

A. Tangent
B. Chord
C. segment
D. normal

Q.10. Number of tangents to a circle which are parallel to a secant is:

A. 1
B. 2
C. 3
D. Infinite

Q.11. Maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is:

A. 1
B. 2
C. 3
D. 4

Q.12. From a point P which is at a distance of 13cm from the centre O of a circle of radius 5cm, the pair of tangents PQ and PR to the circle are drawn. What are the lengths (in cm) of tangents PQ and PR?

A. 13,12
B. 13, 13
C. 12,12
D. 12,18

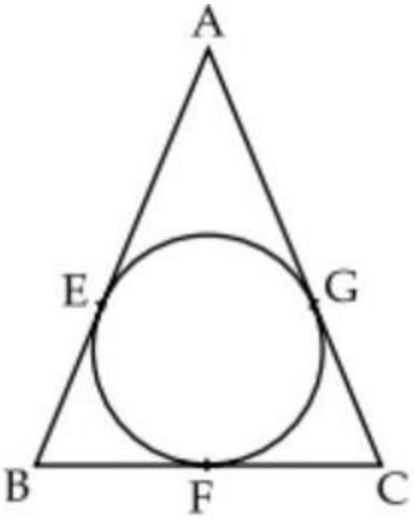
VERY SHORT ANSWER QUESTIONS

1. Prove that the line segments joining the points of contact of two parallel tangents is a diameter of the circle.

2. Two concentric circles have centre O, OP= 4cm, OB = 5cm. AB is a chord of the outer circle and tangent to the inner circle at P. Find the length of AB.

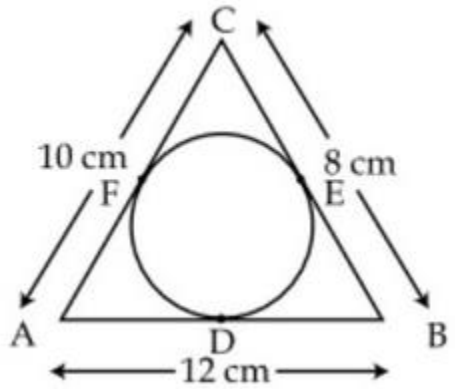
3. In the isosceles triangle ABC in fig. AB = AC, show that BF = FC

Two tangents PA and PB are drawn to a circle with centre O such that < APB = 1200. Prove that OP=2AP

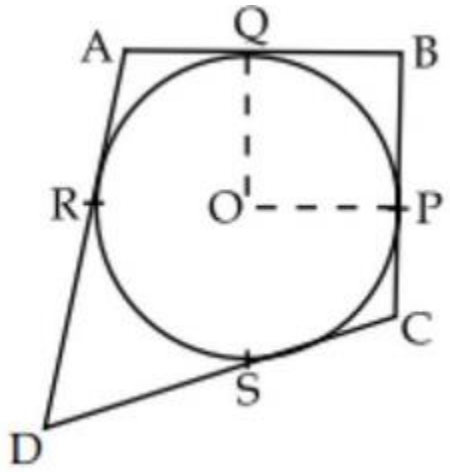


4. In the fig. a circle is inscribed in a ΔABC with sides AB = 12cm, BC = 8 cm and AC = 10cm. Find the lengths of AD, BE and CF

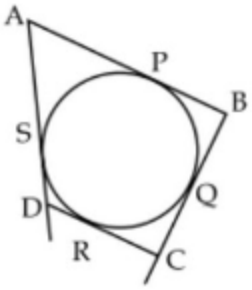
5. In fig. circle is inscribed in a quadrilateral ABCD in which $< B = 900$. If AD = 23cm, AB = 29cm, and DS = 5cm, find the radius 'r' of the circle



6. Two tangents PR and PQ are drawn from external point P to a circle with centre O. Prove that PROQ is a cyclic quadrilateral.



4. Prove that tangents drawn at the ends of a chord make equal angles with the chord
5. Two concentric circles are of radii 7 cm and r cm respectively, where $r > 7$. A chord of the larger circle, of length 48 cm, touches the smaller circle. Find the value of r
6. In the given figure, AP and BP are tangents to a circle with centre O, such that AP = 5cm, APB = 60O. Find the length of chord AB.
7. In the figure quadrilateral ABCD is drawn to circumscribe a circle.



Prove that AD + BC = AB + CD

SHORT ANSWER QUESTIONS

1. If an angle between two tangents drawn from a point P to a circle of radius 'a' and centre O is 60°, then prove that AP = a√3.

2. If all the sides of a parallelogram touch a circle, then prove that the parallelogram is a rhombus.

3. XY and X1Y1 are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, intersecting XY at A and X1Y1 at B, is drawn. Prove that ∠AOB = 90°.

4. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that

∠PTQ=2 * ∠OPQ.

5. Prove that the parallelogram circumscribing a circle is a rhombus.

LONG ANSWER QUESTIONS

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

2. The radius of the in-circle of a triangle is 4 cm and the segments into which one side is divided by the point of contact are 6 cm and 8 cm. Determine the other two sides of the triangle.

CASE STUDY BASED QUESTIONS

1. People of the village want to construct a road nearest to the circular village Parli. The road cannot pass through the village. But the people want the road to be at the shortest distance from the centre of the village. Suppose the road starts from point O which is outside the circular village and touches the boundary of the circular village at point A such that OA = 20 m. And also, the straight distance of the point O from the center C of the village is 25 m.

1. Find the shortest distance of the road from the centre of the village

a) 15m

b) 14m

c) 13m

d) 12m

2. Which method should be applied to find the shortest distance?

a) Concept of tangent to a circle

b) Pythagoras theorem

c)Both a and b

d) None of these

3. If a point is inside the circle, how many tangents can be drawn from that point

a) 0

b) 1

c) 2

d) 3

4. Number of common tangents can be drawn to two circles which do not intersect

a) 2

b) 3

c) 4

d) 1

5. If we draw two tangents at the end of the diameter, these tangents are always

a) Parallel

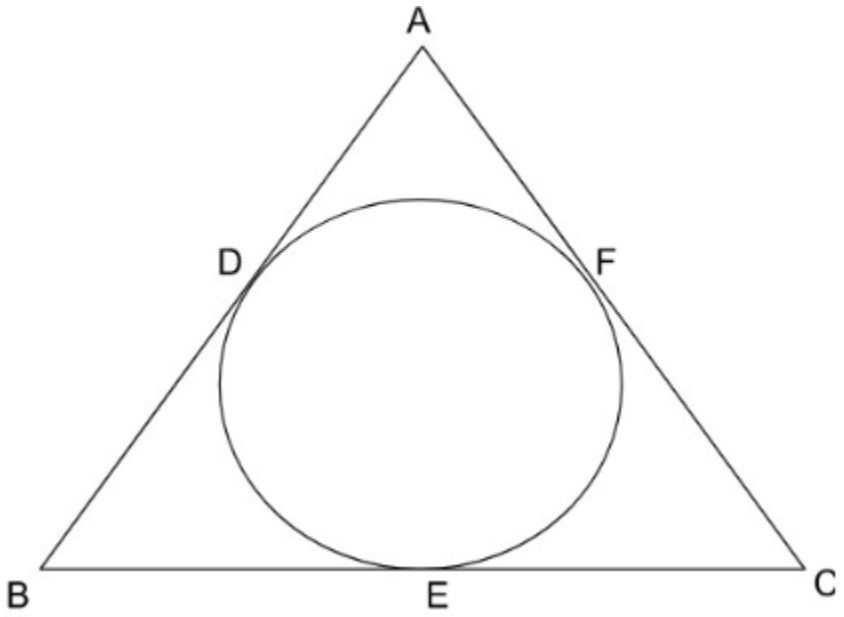
b) perpendicular

c) coincident

d) None of these

2. Varun has been selected by his School to design logo for Sports Day T-shirts for students and staff. The logo design is as given in the figure and he is working on the

fonts and different colours according to the theme. In given figure, a circle with centre O is inscribed in a ΔABC, such that it touches the sides AB, BC and CA at points D, E and F respectively. The lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively.



1. Find the length of AD

a) 7

b) 8

c) 5

d) 9

2. Find the Length of BE

a) 8

b) 5

c) 2

d) 9

3. Find the length of CF

a) 9

b) 5

c) 2

d) 3

4. If radius of the circle is 4 cm, Find the area of ΔOAB

a) 20

b) 36

c) 24

d) 48

5. Find area of ΔABC

a) 50

b) 60

c) 100

d) 90

CBSE Class 10 Maths Chapter 10 Important Questions with Answers: **CIRCLES**

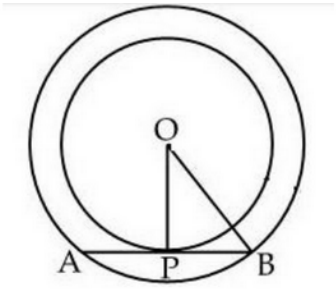
MULTIPLE CHOICE QUESTIONS

1	B
2	C
3	C
4	B
5	D
6	A
7	C
8	D
9	A
10	B
11	B
12	C

VERY SHORT ANSWER QUESTIONS

1. Consider the circle with centre at O
PQ & RS are two parallel tangents to it touching at A and B respectively.
Join OA and OB
Now OA perpendicular to PQ (∴ radius is perpendicular to tangent)
and OB perpendicular to RS
∴OA // OB
But OA and OB pass through O
∴AB is straight line through centre
∴AB is a diameter

2.



OP = 4 cm, OB = 5 cm

We know that the radius is perpendicular to the tangent at the point of contact.

$\therefore \angle OPB = 90^\circ$

In right triangle OPB,

$OB^2 = OP^2 + PB^2$

$(5)^2 = (4)^2 + PB^2$

$PB^2 = 25 - 16 = 9$

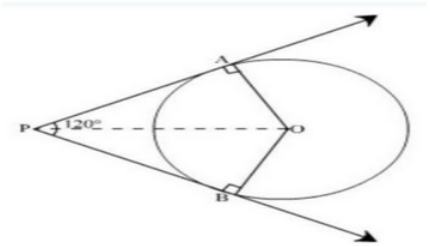
$PB = 3$ cm

We know that perpendicular from the centre to the chord bisect the chord.

$\therefore \quad AB = 2PB = 6$ cm

3 AB= AC (given)
ie AE +BE = AG + GC
BE = GC (Length of tangents drawn from an external point to a circle are equal)
BF = CF (∵ BE = BF and GC = CF)

4



In ΔOAP and ΔOBP,

OP = OP (Common)

∠OAP = ∠OBP (90°) (Radius is perpendicular to the tangent at the point of contact)

OA = OB (Radius of the circle)

∴ ΔOAP is congruent to ΔOBP (RHS criterion)

∠OPA = ∠OPB = 120°/2 = 60° (CPCT)

In ΔOAP,

Cos ∠OPA = cos 60° = AP/OP

Therefore, 1/2 =AP/OP

.

Thus, OP = 2AP

Hence, proved.

5. Let AD= x cm

BD = 12 – x

BE = 12 – x

CE = 8 – (12 – x)

CE = x – 4 ..... (i)

AF = x

CF = 10 – x --------(ii)

From (i) and (ii) , we get

x- 4 = 10-x

x = 7 cm

AD = 7 cm

BE = 5cm

CF = 3cm

6. OPBQ is a square

Let AQ = x

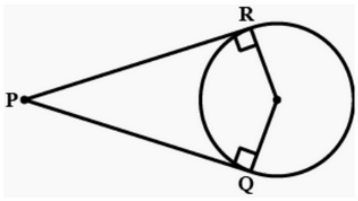
So BQ = 29 -x , BP = 29 – x

AQ = AR = x , DR = DS = 23-x

i.e. 23-x = 5 gives x = 18 units

Radius of the circle = 29-x = 29-18 = 11cm

7.



Given : Tangents PR and PQ from an external point P to a circle with centre O.

To prove : Quadrilateral QORP is cyclic.

Proof : RO and RP are the radius and tangent respectively at contact point R.

$\therefore \angle PRO=90^\circ$

Similarly $\angle PQO=90^\circ$

In quadrilateral OQPR, we have

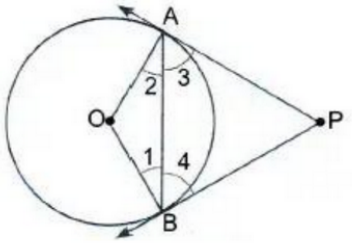
$\angle P+\angle R+\angle O+\angle Q=360^0$

$\Rightarrow \angle P+\angle 90^0+\angle O+\angle 90^0=360^0$

$\Rightarrow \angle P+\angle O=360^0-180^0=180^0$

These are opposite angles of quadrilateral QORP and are supplementary.
∴ Quadrilateral QORP is cyclic, hence, proved.

8.



Given: - A circle with centre O, PA and PB are tangents drawn at ends A and B on chord AB.

To prove: - **$\angle PAB=\angle PBA$**

Construction: - Join OA and OB

Proof: - In $\triangle AOB$, we have

OA=OB	(Radii of the same circle)
$\angle OAB=\angle OBA$	(Angles opposite to equal sides)
$\angle OAP=\angle OBP=90$	(∵Radius ⊥Tangent)

$\Rightarrow \angle PAB=\angle PBA$

Hence proved.

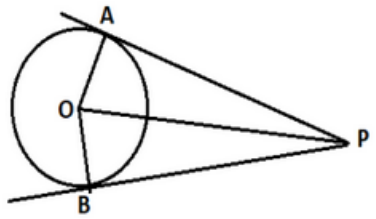
9. R = √(72+242)
=√(49+576)
=√625 =25cm

10. PA = PB
∴ ∆PAB is an equilateral triangle.
Hence AB = PA = 5cm

SHORT ANSWER QUESTIONS

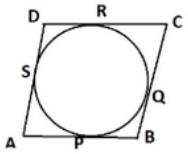
1

$\Delta AOP \cong \Delta BOP$, $\angle APO = 30°$, use tan 30 in ΔAOP



2

AP=AS , BP=BQ, RC=CQ , DR=DS

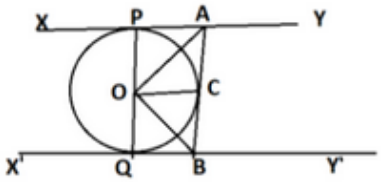


AB+DC=AP+PB+DR+RC=AS+BQ+DS+CQ =(AS+DS)+(BQ+CQ)=AD+BC

AB+AB=AD+AD

2AB=2AD ⇒ AB=AD ⇒ ABCD is a rhombus

3

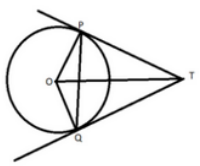


$\Delta APO \cong \Delta ACO$ and $\Delta OBC \cong \Delta OBQ$

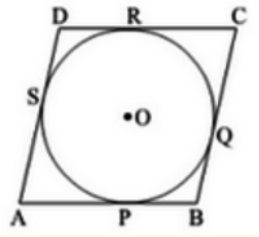
$\angle AOP = \angle AOC$ and $\angle BOC = \angle BOQ$, use POQ as straight angle.

4

$\angle PTQ = 180 - \angle POQ = 180 - (180 - 2\angle OPQ) = 2\angle OPQ$



5 Given: ABCD be a parallelogram circumscribing a circle with centre O.
To Prove: ABCD is a rhombus.



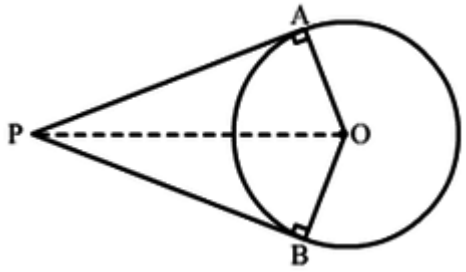
We know that the tangents drawn to a circle from an exterior point are equal in length.
∴ AP = AS, BP = BQ, CR = CQ and DR = DS.
AP+BP+CR+DR = AS+BQ+CQ+DS
(AP+BP) + (CR+DR) = (AS+DS) + (BQ+CQ)
∴ AB+CD=AD+BC
or 2AB=2AD (since AB=DC and AD=BC of parallelogram ABCD)
∴ AB=BC=DC=AD
Therefore, ABCD is a rhombus.

LONG ANSWER QUESTIONS

1.

Let AP and BP be the two tangents to the circle with centre O.

To Prove : AP = BP



Proof :

In ΔAOP and ΔBOP

OA = OB (radii of the same circle)

∠OAP=∠OBP=90◦ (since tangent at any point of a circle is perpendicular to the radius through the point of contact)

OP = OP (common)

∴ΔAOP≅ΔBOP (by R.H.S. congruence criterion)

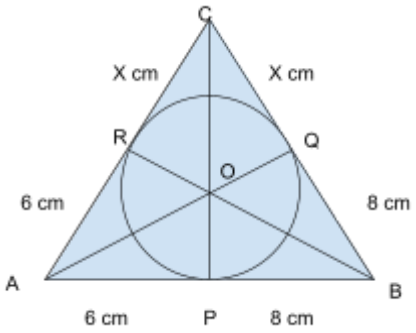
∴ AP = BP (corresponding parts of congruent triangles)

Hence the length of the tangents drawn from an external point to a circle are equal.

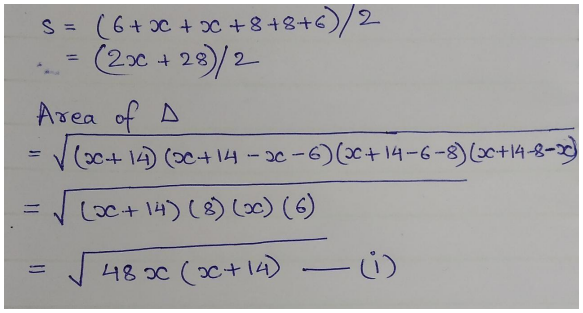
2.

Given: The radius of the in circle of a triangle is 4 cm and the segments into which one side is divided by the point of contact are 6 cm and 8 cm.

To find: AC and BC.



Proof:



Area of triangle = 2 area of Δ AOP + 2 area of Δ COR + 2 area of Δ PBO

= 2 × ½ × 4 × 6 + 2 × ½× 4 × 8 + 2 × ½× 4 × x

= 24 + 32 + 4x

= 56 + 4x ……..(ii)

Equating (i) and (ii)

$48x(x + 14) = (56 + 4x)^2$

$48x(x + 14) = 16(x + 14)^2$

$48x = 16(x + 14)$ or $x + 14 = 0$

$48x = 16x + 224$

$32x = 224$

$x = 7$ or $x = -14$(which we ignore)

AC = 6 + 7 = 13 cm

BC = 8 + 7 = 15 cm

The other two sides of the triangles are 13 cm and 15 cm.

CASE STUDY BASED QUESTIONS

1. People of the village want to construct a road nearest to the circular village Parli. The road cannot pass through the village. But the people want the road to be at the shortest distance from the centre of the village. Suppose the road starts from point O which is outside the circular village and touches the boundary of the circular village at point A such that OA = 20 m. And also, the straight distance of the point O from the center C of the village is 25 m.

i. Find the shortest distance of the road from the centre of the village
a) 15m
b) 14m
c) 13m
d) 12m

ii. Which method should be applied to find the shortest distance?
a) Concept of tangent to a circle
b) Pythagoras theorem
c)Both a and b
d) None of these

iii. If a point is inside the circle, how many tangents can be drawn from that point
a) 0
b) 1
c) 2
d) 3

iv. Number of common tangents can be drawn to two circles which do not intersect
a) 2
b) 3
c) 4
d) 1

v. If we draw two tangents at the end of the diameter, these tangents are always
a) Parallel
b) perpendicular
c) coincident
d) None of these

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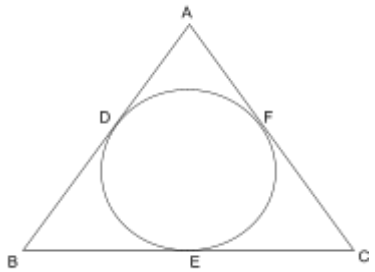

1. Find the length of AD
a) 7
b) 8
c) 5
d) 9

2. Find the Length of BE
a) 8
b) 5
c) 2
d) 9

3. Find the length of CF
a) 9
b) 5
c) 2
d) 3

4. If radius of the circle is 4 cm, Find the area of ΔOAB
a) 20
b) 36
c) 24
d) 48

5. Find area of ΔABC
a) 50
b) 60
c) 100
d) 90