

CIRCLES- PRACTICE WORKSHEET

VERY SHORT ANSWER TYPE QUESTIONS(2marks)

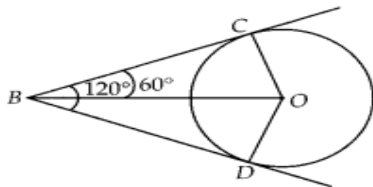
Q1. O is the Centre of a circle of radius 8 cm. The tangent at a point A on the circle cuts a line through O at B such that $AB = 15$ cm. Find the radius of the circle.

Q2. If PT is a tangent at T to a circle whose center is O and $OP = 17$ cm, $OT = 8$ cm, Find the length of the tangent segment PT.

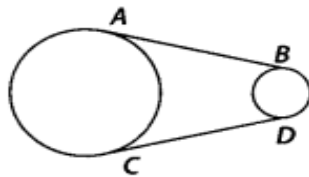
Q3. If TP and TQ are two tangents to a circle with center O so that $\angle POQ = 110^\circ$, then, what is the value of $\angle PTQ$?

Q4. From a point Q, the length of the tangent to a circle is 24cm and the distance of Q from the Centre is 26cm. Find the radius of the circle.

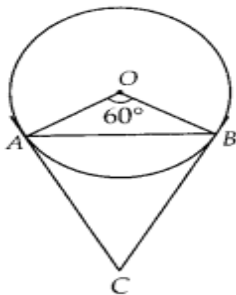
Q5. If from an external point B of a circle with Centre O, two tangents BC and BD are drawn such that $\angle DBC = 120^\circ$, prove that $BC + BD = BO$.



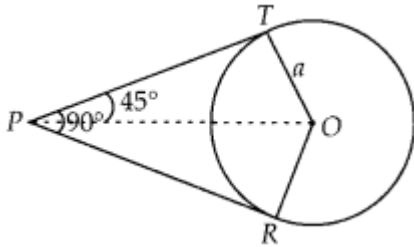
Q6. In figure, AB and CD are common tangents to two circles of unequal radii. Prove that $AB = CD$.



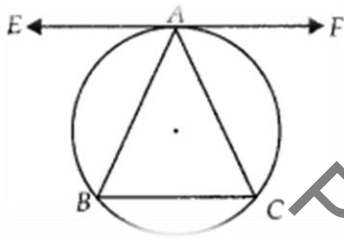
Q7. If a chord AB subtends an angle of 60° at the Centre of a circle, then find angle between the tangents at A and B.



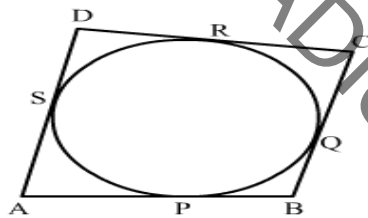
Q8. If angle between two tangents drawn from a point 'P' to a circle of radius 'a' and Centre O is 90° , then find OP.



Q9. Show that the tangent to the circumcircle of an isosceles triangle ABC at A , in which $AB = AC$, is parallel to BC .

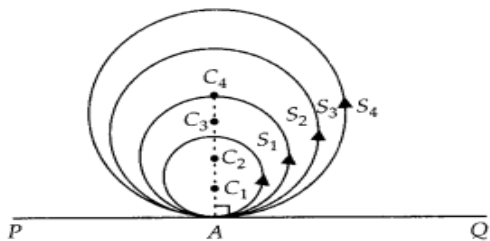


Q10. A quadrilateral $ABCD$ is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$

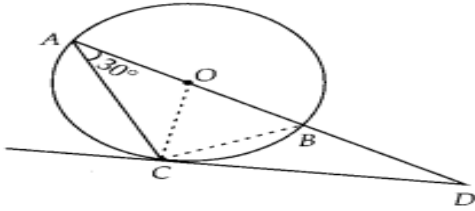


SHORT ANSWER TYPE QUESTION- (3marks)

Q1. If a number of circles touch a given line segment PQ at a point A , then where will the centers of all circle lie?

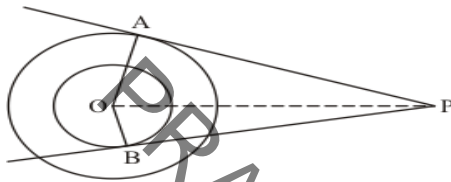


Q2. AB is a diameter of a circle and AC is its chord such that $\angle BAC = 30^\circ$. If the tangent at C intersect AB extended at D , then show that $BC = BD$.

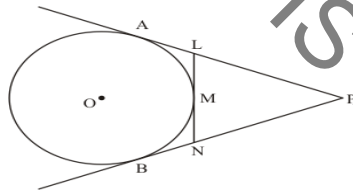


Q3. What is the length of the tangent PQ at a point P of a circle of radius 12cm meets a line through the Centre O at a point Q so that $OQ = 20$ cm.?

Q4. There are two concentric circle with center O of radii 5cm and 3cm. From an external point P, tangent PA and PB are drawn to these circles. If $AP = 12$ cm, Find the length of BP.

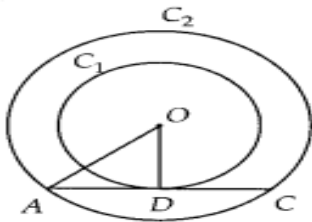


Q5. If PA and PB are tangents from an external point P to a circle with center O. LN touches the circle at M. Prove that $PL + LM = PN + MN$.

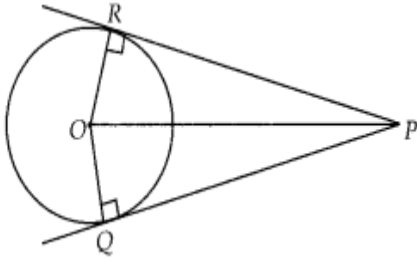


Q6. From an external point P, tangents $PA = PB$ are drawn to a circle with Centre O. If $\angle PAB = 50^\circ$, then find $\angle AOB$.

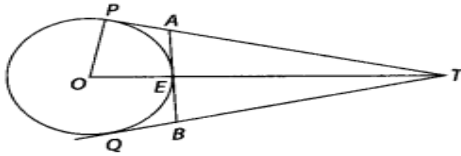
Q7. Out of the two concentric circles, the radius of the outer circle is 10 cm and the chord AC of length 16 cm is a tangent to the inner circle. Find the radius of the inner circle.



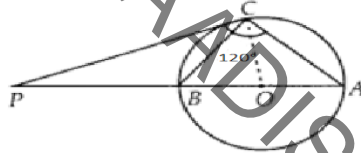
Q8. Two tangents PQ and PR are drawn from an external point to a circle with Centre O. Prove that QORP is a cyclic quadrilateral.



Q9. In figure, O is the Centre of a circle of radius 8 cm, T is a point such that $OT = 17$ cm and OT intersects the circle at E. If AB is the tangent to the circle at E, find the length of AB.

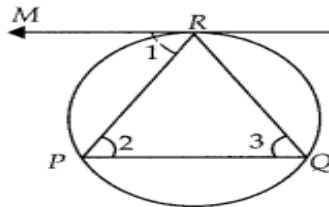


Q10. The tangent at a point C of a circle and a diameter AB when extended intersect at P. If $\angle PCA = 120^\circ$, Find $\angle CBA$.

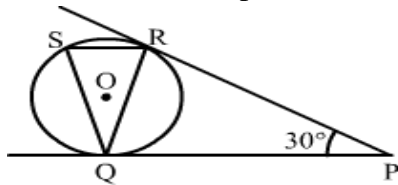


LONG ANSWER TYPE QUESTIONS : (4marks)

Q1. A chord PQ of a circle is parallel to the tangent drawn at a point R of the circle. Prove that R bisects the arc PRQ.

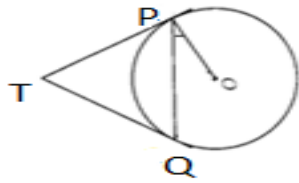


Q2. If tangent PQ and PR are drawn from an external point P to a circle with Centre O, such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ. Find $\angle RQS$.



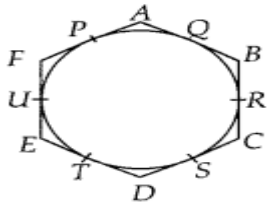
Q3. If tangents PA and PB from a point P to a circle with Centre O are inclined to each other at an angle of 60° , then find $\angle POA$.

Q4. Two tangents TP and TQ are drawn to a circle with Centre O from an external point T. Prove that $\angle PTQ = 2 \angle OPQ$.

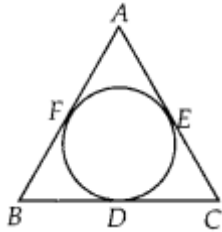


Q5 Prove that the parallelogram circumscribing a circle is a rhombus.

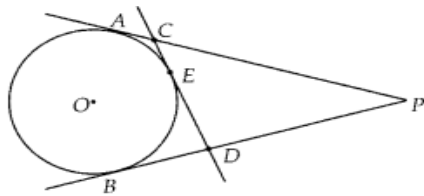
Q6. If a hexagon ABCDEF circumscribes a circle, prove that $AB + CD + EF = BC + DE + FA$.



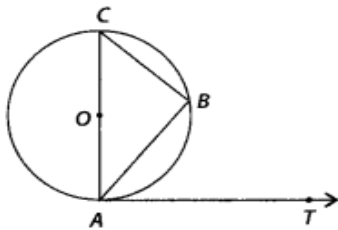
Q7. Let s denote the semi-perimeter of a triangle ABC in which $BC = a$, $CA = b$, $AB = c$. If a circle touches the sides BC, CA, AB at D, E, F respectively, prove that $BD = s - b$.



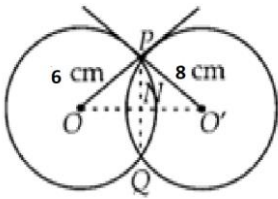
Q8. From an external point P, two tangents, PA and PB are drawn to a circle with Centre O. At one point E on the circle tangent is drawn which intersects PA and PB at C and D, respectively. If $PA = 20$ cm, find the perimeter of the triangle PCD.



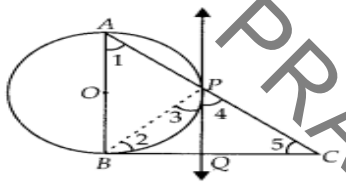
Q9. If AB is a chord of a circle with Centre O, AOC is a diameter and AT is the tangent at A as shown in figure. Prove that $\angle BAT = \angle ACB$



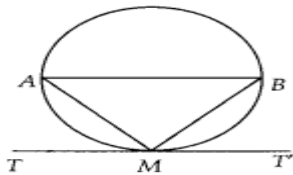
Q10. Two circles with centers O and O' of radii 6 cm and 8 cm , respectively intersect at two points P and Q such that OP and $O'P$ are tangents to the two circles. Find the length of the common chord PQ .



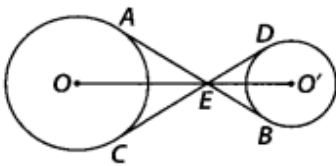
Q11. In a right triangle ABC in which $\angle B = 90^\circ$, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P . Prove that the tangent to the circle at P bisects BC .



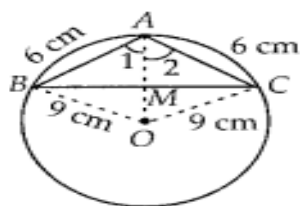
Q12. Prove that the tangent drawn at the mid-point of an arc of a circle is parallel to the chord joining the end points of the arc.



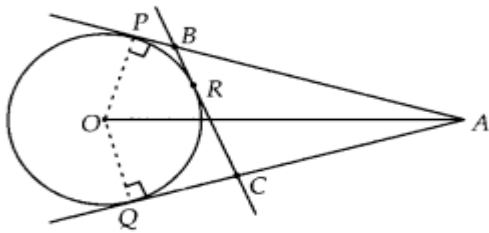
Q13. In figure, the common tangent, AB and CD to two circles with centers O and O' intersect at E . Prove that the points O , E , O' are collinear.



Q14. If an isosceles triangle ABC , in which $AB = AC = 6\text{ cm}$, is inscribed in a circle of radius 9 cm , find the area of the triangle.



Q15 A is a point at a distance 13 cm from the Centre O of a circle of radius 5 cm. AP and AQ are the tangents to the circle at P and Q. If a tangent BC is drawn at a point R lying on the minor arc PQ to intersect AP at B and AQ at C, find the perimeter of the ΔABC .

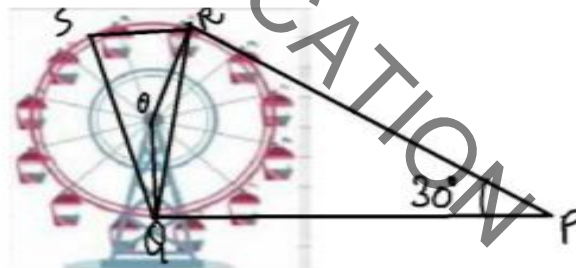
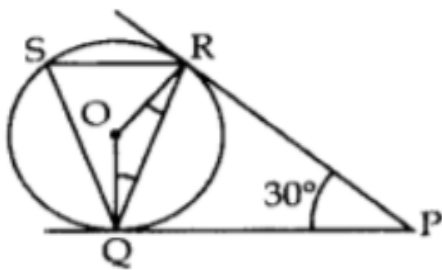


CASE STUDY BASED QUESTIONS

CASE STUDY 1:

A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity.

After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.



1. In the given figure

find $\angle ROQ$

- a) 60°
- b) 100°
- c) 150°
- d) 90°

2. Find $\angle RQP$

- a) 75°
- b) 60°
- c) 30°
- d) 90°

3. Find $\angle RSQ$

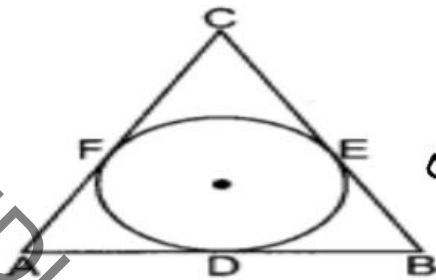
- a) 60°
- b) 75°
- c) 100°
- d) 30°

4. Find $\angle ORP$

- a) 90°
- b) 70°
- c) 100°
- d) 60°

CASE STUDY 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 center 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 4cm, Find the area of ΔOAB

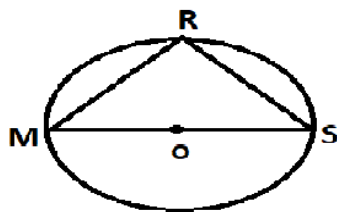
- a) 20
- b) 36
- c) 24
- d) 48

5. Find area of ΔABC

- a) 50
- b) 60
- c) 100
- d) 90

CASE STUDY 3:

Three girls Reshma, Salma, Mandeeep are playing a game by standing on a circle. Reshma throws a ball to Salma, Salma to Mandeeep, Mandeeep to Reshma. The distance between Reshma and Mandeeep is 6m, and between Reshma and Salma is 8m if O is the center of the circle, then



1. Find diameter of the circle

- a) 6m
- b) 8m
- c) 10m
- d) 12m

2. Measure of $\angle MRS$

- a) 180°
- b) 90°
- c) 100°
- d) 80°

3. Area of the ΔRMS is

- a) 10 m^2
- b) 20 cm^2
- c) 24 cm^2
- d) 40 cm^2

4. length of the longest chord of the circle.

- a) 6m
- b) 8m
- c) 10m
- d) 12m

5. The radius of the circle is

- a) 6m
- b) 3m
- c) 4m
- d) 5m

.....

Circles (Answer key)

SHORT ANSWER TYPE QUESTIONS(2marks)

1. 17cm
2. 15cm
3. 70°
4. 7cm
7. 120°
8. $a\sqrt{2}$

SHORT ANSWERTYPE QUESTIONS (3 marks)

1. Perpendicular line of PQ True
3. 16cm
4. $4\sqrt{10} \text{ cm}$
6. 100°
7. DO=6cm
9. $48/5\text{cm}$
10. 60°

LONG ANSWER TYPE QUESTION (4 marks)

2. $\angle RQS=75^\circ$
3. $\angle POA =60^\circ$
8. 40cm
10. $pq= 9.6\text{cm}$
14. $8\sqrt{2} \text{ cm}^2$
15. 24cm

CASE BASED QUESTIONS

CASE STUDY 1:

1. c) 150°
2. a) 75°
3. b) 75°
4. a) 90°

CASE STUDY 2:

1. a) 7
2. b) 5
3. d) 3
4. c) 24
5. b) 60

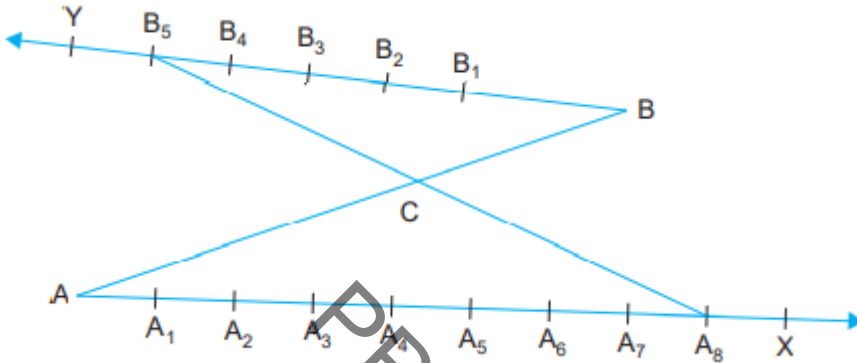
CASE STUDY 3:

- 1: - c) 10m
- 2: -b) 90°
- 3: -c) 24 cm^2
- 4: -d) 10m
- 5: - 5m

4.TOPIC- CONSTRUCTIONS

SHORT ANSWER TYPE QUESTION (2 MARKS)

Q.1. In the given figure, $A_1, A_2, A_3 \dots$ and B_1, B_2, B_3, \dots are marked at equal distances. Answer the following questions.



(i) In what ratio point C divides AB?

[Ans: 8:5]

(ii) If $AB = 13\text{cm}$ then find the length of AC.

[Ans: 8cm]

Q.2, In the given figure, A_1, A_2, A_3, A_4, A_5 are marked at equal distances. Answer the following questions.



(i) In what ratio point C divides AB?

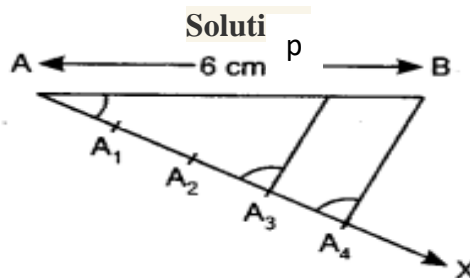
[Ans: 3:2]

(ii) If $AB = 5\text{cm}$ then find the length of AC.

[Ans: 3cm]

LONG ANSWER TYPE QUESTION (3 MARKS)

Q.1. Draw a line segment of length 6 cm. Using compasses and ruler, find a point P on it which divides it in the ratio 3:1.



Steps of Construction : 1. Draw $AB = 6\text{ cm}$ with the help of scale.

2. Draw any ray AX , making an acute angle with AB .

3. Locate 4 ($= 3 + 1$) points A_1, A_2, A_3 and A_4 on AX so that $AA_1 = A_1A_2 = A_2A_3 = A_3A_4$.

4. Join BA_4 .

5. Through the point A_3 ($m = 3$), draw a line parallel to A_3P (by making an angle equal to $\angle AA_4B$) at

A_3 intersecting AB at the point P . Then, $AP:PB = 3 : 1$

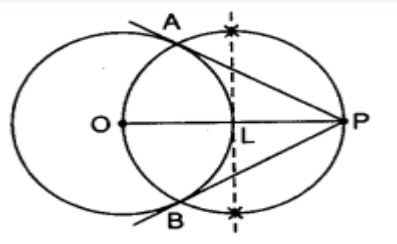
Q.2. Draw a line segment of length 8 cm and divide it in the ratio 3 : 5. Measure the two parts.

Q.3. Draw a line segment of length 5 cm and divide it in the ratio 2:3. Measure the two parts.

Q.4. Draw a pair of tangents to a circle of radius 3 cm, which are inclined to each other at an angle of 60° .

Q.5. Draw a circle of radius 4 cm. From a point P, 9 cm away from the centre of the circle, draw two tangents to the circle. Also, measure the angle between two radii through point of contacts of two tangents.

Solution:



Steps of construction:

1. A circle, with centre O and radius 4 cm is drawn.
2. A point P is taken, outside the circle at a distance of 9 cm from O.
3. Perpendicular bisector of OP is drawn, meeting OP at L.
4. With L as centre and OL as radius a circle is drawn meeting the given circle at A and B.
5. PA and PB are joined.
6. Then PA and PB are the required tangents to the circle and $PA = PB = 6.7$ cm (approx.)

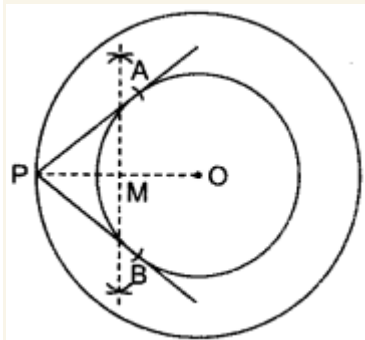
Q.6. Draw a circle of radius 3 cm. From a point P, 7 cm away from the centre of the circle, draw two tangents to the circle. Also, measure the lengths of the tangents.

Q.7. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent to smaller circle from a point on the larger circle. Also measure its length.

Q.8. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60° . Measure the length of the two tangents also.

Q.9. Draw a circle of radius 4cm. Mark a point P on it .Draw a tangents passing through it. Measure the angle between two tangents at P.

Solution:



Now after measuring, PA and PB comes out to be 4 cm.

Steps of construction of tangents:

1. Take point O. Draw 2 concentric circles of radii 3 cm and 5 cm respectively.
2. Locate point P on the circumference of larger circle.
3. Join OP and bisect it. Let M be mid-point of OP.
4. Taking M as centre and MP as radius, draw an arc intersecting smaller circle at A and B.
5. Join PA and PB. Thus, PA, PB are required tangents

LONG ANSWER TYPE QUESTION (4-MARKS)

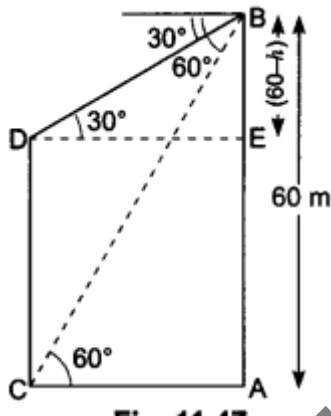
- Q.1. Draw two tangents to a circle of radius 4 cm from a point P at a distance of 6 cm from its centre. Measure the angle between two tangents.
- Q.2. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.
- Q.3. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.
- Q.4. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.
- Q.5. Draw a pair of tangents to a circle of radius 6cm which are inclined to each other at an angle of 60° . Also find the length of the tangent.
- Q.6. Construct two concentric circles of radii 3cm and 7cm. Draw two tangents to the smaller circle from a point P which lies on the bigger circle.
- Q7. Let ABC be a right triangle in which $AB = 6$ cm, $BC = 8$ cm and $\angle B = 90^\circ$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.
- Q8. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 45° . Measure the angle between two radii through point of contact at centre of the circle.

10. The angle of elevation of the top of a tower from two points distant a and b from its foot are complementary. Prove that the height of the tower is \sqrt{ab}
11. The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30° . If the tower is 50 m high, what is the height of the hill?
12. Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60° . Find the distance between the two men
13. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string.
14. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45° respectively. If the bridge is at a height of 3 m from the banks, find the width of the river.
15. A man standing on the deck of a ship, which is 10 m above the water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Calculate the height of the hill.

Long answer question (4 marks)

1. The angles of elevation and depression of the top and bottom of a lighthouse from the top of a building, 60 m high, are 30° and 60° respectively. Find
 (i) the difference between the heights of the lighthouse and the building.
 (ii) distance between the lighthouse and the building.
2. A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5 m. From a point on the ground the angles of elevation of the top and bottom of the flagstaff are 60° and 30° respectively. Find
 (1). The height of the tower .
 (2) The distance of the point from the tower. (Take $\sqrt{3} = 1.732$)
3. The angles of depression of the top and the bottom of a 8 m tall building from the top of a multi-storied building are 30° and 45° , respectively. Find
 (1)The height of the multi-storied building
 (2) The distance between the two buildings.
4. In Figure , from the top of a building AB, 60 meters high, the angles of depression of the top and bottom of a vertical lamp post CD height h meter are observed to be 30° and 60° , respectively. Find

- (i) the horizontal distance between AB and CD.
(ii) the height of the lamp post.



5. The angle of elevation of an aeroplane from a point on the ground is 60° . After a flight of 30 seconds the angle of elevation becomes 30° . If the aeroplane is flying at a constant height of $3000\sqrt{3}$ m, find the speed of the aeroplane.

6. A TV tower stands vertically on bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of tower is 60° . From another point 20m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the tower is 30° .

Find

1. The height of the tower
2. The width of the canal.

7. A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h . At a point on the plane, the angles of elevation of the bottom and top of the flagstaff are α and β respectively. Prove that the height of the tower is $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$

8. A spherical balloon of radius r subtends an angle α at the eye of an observer. If the angle of elevation of its center is β find the height of centre of the balloon.

9. A man on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a cliff as 60° and the angle of depression of the base of the cliff as 30° . Calculate

1. The distance of the cliff from the ship
2. The height of the cliff.

10. At a point, the angle of elevation of a tower is such that its tangent is $5/12$ On walking 240 m to the tower, the tangent of the angle of elevation becomes $3/4$. Find the height of the tower.

11. A group of students of class X visited India gate on an education trip the teacher and students had interested in history as well. the narrate the India gate. Official name Delhi Memorial originally called All- India War Memorial, monumental sand stone arch in new Delhi dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that india gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway) is about 138 feet (42 metres) in height.

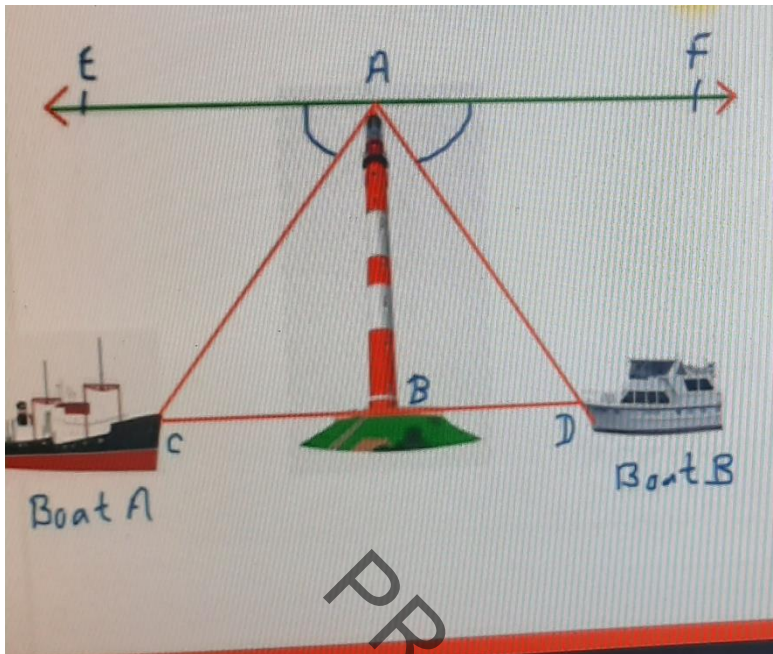


(i) if the altitude of the sun is at 60° . then the height of the vertical tower that will cast a shadow of length 20 m is?

(ii) The ratio of the length of a Rod and its shadow is 1:1. The angle of elevation of the sun is?

12. Mr. Ram observing from the top of light house finds that Boat A and Boat B are approaching to light house from opposite direction he finds that the angle of depression of boat A is 45° and angle

of depression of Boat B is 30° . He also is aware of the height of the light house is 100m

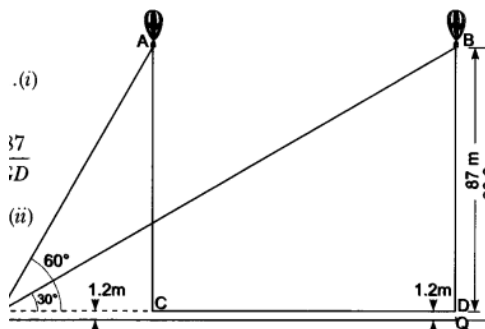


Answer the following question.

1 find length of BC

2 Find length BD

Q 13. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60° . After some time, the angle of elevation reduces to 30° (given Fig.). Find the distance travelled by the balloon during the interval.



Q 14. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 50 m high, find the height of the building.

Q. 15. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $h(\tan\beta - \tan\alpha) / (\tan\beta - \tan\alpha)$

Answers

(3 MARKS)

Que (1.) 4m,

Que (2.) 1:3,

Que (3.) 273m,

Que (4) 6m ,

Que (5) 30m ,

Que (6) 60^0

Que (8) $8\sqrt{3}$ m

Que (9) $30\sqrt{3}$,

Que (10) \sqrt{ab} ,

Que (11) 150m ,

Que (12) 155.7m

Que (13) $40\sqrt{3}$ m

Que (14) $3(\sqrt{3}+1)$ m ,

Que (15) 40m

(4 MARKS)

Ans1. (i) difference between two light house = 20m

(ii) distance between light house and building = 34.64 m

Ans 2. (i) Height of the tower = 2.5 m

(ii) Distance of point of the tower = 4.33 m

Ans 3. (i) The height of the building = $4(3 + \sqrt{3})$ m

(ii) Distance between two building $4\sqrt{3}(3 + \sqrt{3})$

Ans 4. (i) Horizontal between AB and CD = $20\sqrt{3}$ m = 34.64m

(ii) Height of lamppost = 40m

Ans 5. 200m/s OR 720km/h

Ans 6. (i) Height of the tower = $10\sqrt{3}$ m

(ii) width of the river = 10m

Ans 7. $H = \frac{h \tan \alpha}{\tan \beta - \tan \alpha}$

Ans 8 height $h = r \sin \beta \cdot \operatorname{cosec} \alpha / 2$

Ans 9. (i) Distance of the cliff from the ship = 17.32 m

Ans 10 Height of the tower = 225 m

Ans 11. (i) $20\sqrt{3}$ m (ii) 45^0

Ans 12. (i) 100m (ii) $100\sqrt{3}$ m

Ans 13. Balloon travel $58\sqrt{3}$ m

Ans 14. Height of the building = $50/3$ m

Ans 15 Height of the cloud is $h(\tan \beta - \tan \alpha) / \tan \beta - \tan \alpha$