

OCTAHEDRAL CLASSES

2nd floor, yashwant plaza, yashwant nagar, PUNE

Class 10 - Mathematics

Maths paper 1

Maximum Marks: 80

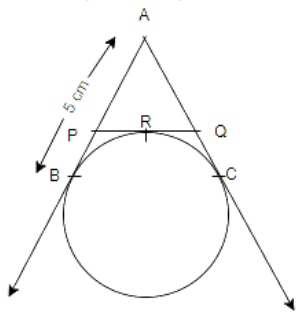
Time Allowed: 3 hours

Section A

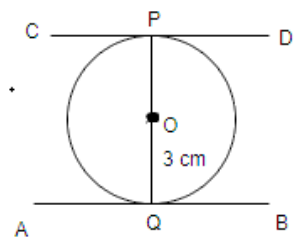
1. ANSWER THE FOLLOWING

10

- If $am = bl$, then find whether the pair of linear equations $ax + by = c$ and $lx + my = n$ has no solution, unique solution or infinitely many solutions.
- Write whether the following pair of linear equations is consistent or not.
 $x + y = 14$
 $x - y = 4$
- The equation $ax^n + by^n + c = 0$ represents a straight line if
- If $x = a$, $y = b$ is the solution of the pair of equations $x - y = 2$ and $x + y = 4$, find the values of a and b .
- If a line intersects a circle in two distinct points, what is it called?
- In the given figure, AB , AC and PQ are tangents. If $AB = 5$ cm, then find the perimeter of $\triangle APQ$.



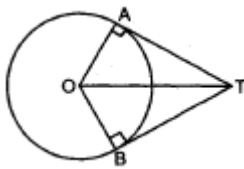
- A line touches a circle of radius 4 cm. Another line is drawn which is tangent to the circle. If the two lines are Parallel find the distance between them.
- At which point a tangent is perpendicular to the radius?
- A quadrilateral ABCD is drawn to circumscribe a circle. If $AB = 12$ cm, $BC = 15$ cm and $CD = 14$ cm, find AD .
- Find the distance between two parallel tangents of a circle of radius 3 cm.



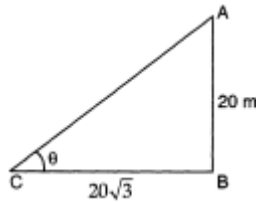
2. ANSWER THE FOLLOWING

10

- Find the value of x , if $2 \sin 3x = \sqrt{3}$.
- Evaluate $\sec 70^\circ \sin 20^\circ - \cos 20^\circ \operatorname{cosec} 70^\circ$.
- Find the value of $\cos 30^\circ \cos 60^\circ \cos 90^\circ$.
- Prove : $\frac{\cos 30^\circ + \sin 60^\circ}{1 + \cos 60^\circ + \sin 30^\circ} = \frac{\sqrt{3}}{2}$.
- Solve $2 \cos \theta = 1$ when $0^\circ < \theta < 90^\circ$.
- A ladder, leaning against a wall, makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5 m away from the wall, then find the length of the ladder.
- In figure if $\angle ATO = 40^\circ$, find $\angle AOB$.



- h) If the height and length of shadow of a man are the same, then find the angle of elevation of the Sun.
- i) In figure, a tower AB is 20 m high and BC, its shadow on the ground, is $20\sqrt{3}$ m long Find the Sun's altitude.



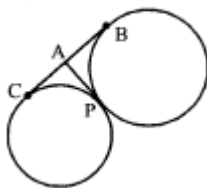
- j) A ladder 15 m long leans against a wall making an angle of 60° with the wall. Find the height of the wall from the point the ladder touches the wall.

Section B

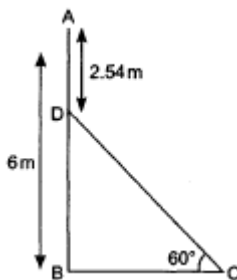
3. ANSWER THE FOLLOWING ANY 6

12

- a) The sum of the digits of a two digit number is 8 and the difference between the number and that formed by reversing the digits is 18. Find the number.
- b) Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.
- c) In the adjoining figure, BC is a common tangent to the given circles which touch externally at P. Tangent at P meets BC at A. If BA = 2.8 cm, then what is the length of BC?



- d) In fig. AB is 6 m high pole and CD is a ladder inclined at an angle of 60° to the horizontal and reaches up to a point of pole. If AD = 2.54 m, find the length of the ladder, (use $\sqrt{3} = 1.73$)



- e) A bird sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45° . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Find the speed of flying of the bird.
- f) Prove the trigonometric identity:

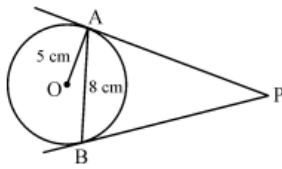
$$\frac{\tan^2 A}{1+\tan^2 A} + \frac{\cot^2 A}{1+\cot^2 A} = 1$$
- g) If $3\tan\theta = 4$, evaluate $\frac{3\sin\theta+2\cos\theta}{3\sin\theta-2\cos\theta}$.

Section C

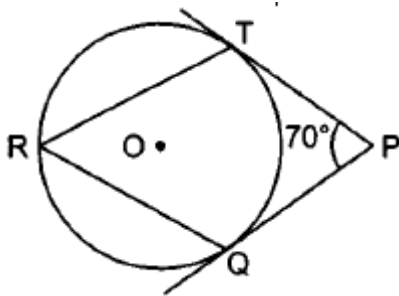
4. ANSWER THE FOLLOWING ANY 8

24

- a) In a given figure, AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P. Find the length of AP.



- b) PQR is a right angled triangle right angled at Q. PQ = 5 cm, QR = 12 cm. A circle with centre O is inscribed in $\triangle PQR$, touching its all sides. Find the radius of the circle.
- c) The cost of two kg of apples and 1 kg of grapes on a day was found to be Rs.160. After a month the cost of 4 kg apples and 2 kg grapes is Rs.300. Represent the situation algebraically and graphically.
- d) A jeweller has bars of 18-carat gold and 12-carat gold. How much of each must be melted together to obtain a bar of 16-carat gold, weighing 120 g? (Given: Pure gold is 24-carat).
- e) The angle of elevation of the top of a tower from a point A on the ground is 30° . On moving a distance of 20 metre towards the foot of the tower to a point B the angle of elevation increases to 60° . Find the height of the tower and the distance of the tower from the point A.
- f) If a 1.5-m-tall girl stands at a distance of 3m from a lamp-post and casts a shadow of length 4.5m on the ground then find the height of the lamp-post.
- g) 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 $\angle TRQ$.



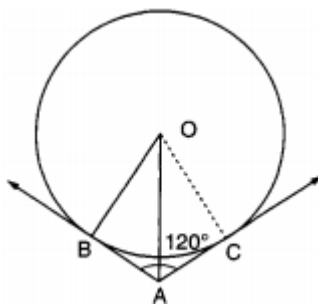
- h) Prove the trigonometric identity:
If $\sin\theta + 2 \cos\theta = 1$ prove that $2 \sin\theta - \cos\theta = 2$.
- i) If $\operatorname{cosec} A = \sqrt{10}$ find other five trigonometric ratios.

Section D

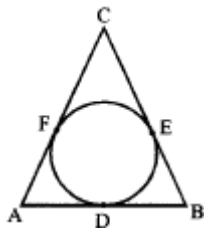
5. ANSWER THE FOLLOWING ANY 6

24

- a) If $\sec \theta + \tan \theta = p$, show that $\sec \theta - \tan \theta = \frac{1}{p}$. Hence, find the values of $\cos \theta$ and $\sin \theta$.
- b) Prove that: $\frac{1+\tan^2 A}{1+\cot^2 A} = \left(\frac{1-\tan A}{1-\cot A} \right)^2 = \tan^2 A$
- c) The angle of elevation of the top of a tower as observed from a point in a horizontal plane through the foot of the tower is 30° . When the observer moves towards the tower a distance of 100 m, he finds the angle of elevation of the top to be 60° . Find the height of the tower and the distance of first position from the tower.
- d) From a point 100 m above a lake, the angle of elevation of a stationary helicopter is 30° and the angle of depression of reflection of the helicopter in the lake is 60° . Find the height of the helicopter.
- e) In fig., two tangents AB and AC are drawn to a circle with centre O such that $\angle BAC = 120^\circ$. Prove that $OA = 2AB$.



- f) In the adjoining figure, a circle inscribed in triangle ABC touches its sides AB, BC and AC at points D, E and F respectively. If AB = 12 cm, BC = 8 cm and AC = 10 cm, find the lengths of AD, BE and CF.



- g) In figure, O is the centre of the circle, PQ is a tangent to the circle at A. If $\angle PAB = 58^\circ$, find $\angle ABQ$ and $\angle AQB$.

