



## Octahedral classes, kharadi

2nd floor, yashwant plaza, near bank of India,

### Class 10 - Mathematics maths prelim 3

Maximum Marks: 80

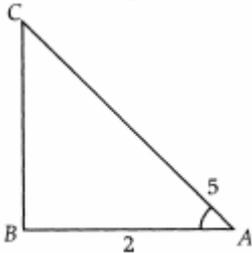
Time Allowed: 3 hours

#### Section A

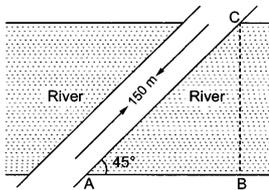
1. Answer the following

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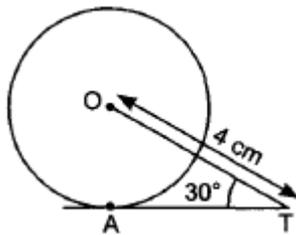
- Find the discriminant of equation:  $3x^2 - 2x + 8 = 0$
- Find the values of  $p$  for which the quadratic equation  $4x^2 + px + 3 = 0$  has equal roots.
- If 1 is a root of the equation  $2y^2 + ay + 3 = 0$  and  $y^2 + y + b = 0$  then find the value of  $ab$ .
- Find the value (s) of  $k$  if the quadratic equation  $3x^2 - k\sqrt{3}x + 4 = 0$  has real roots.
- State whether the following equation is quadratic equation or not ?  
 $x^2 - x + 3 = 0$
- If  $\cos A = \frac{2}{5}$ , find the value of  $4 + 4\tan^2 A$ .



- g) A bridge across a river makes an angle of  $45^\circ$  with the river bank as shown in Fig. If the length of the bridge across the river is 150 m, what is the width of the river?



- h) A kite is flying at a height of 30 m from the ground. The length of the string from kite to the ground is 60 m. Assuming that there is no slack in the string, find the angle of elevation of the kite at the ground.
- i) In figure, AT is a tangent to the circle with centre O such that  $OT = 4$  cm and  $\angle OTA = 30^\circ$ . Find AT.

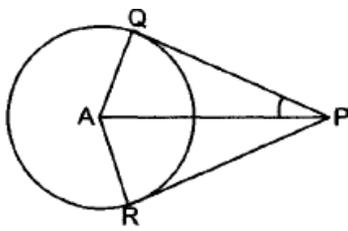


- j) A ladder 15 m long leans against a wall making an angle of  $60^\circ$  with the wall. Find the height of the wall from the point the ladder touches the wall.

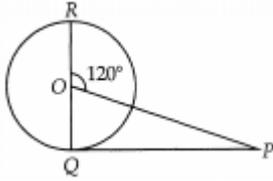
2. Answer the following

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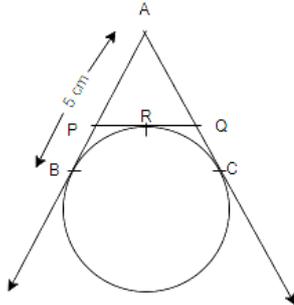
- a) In figure, PQ and PR are tangents to circle with centre A. If  $\angle QPA = 27^\circ$ , then find  $\angle QAR$ .



- b) PQ is a tangent drawn from an external point P to a circle with centre O, QOR is the diameter of the circle. If  $\angle POR = 120^\circ$ , What is the measure of  $\angle OPQ$ ?



- c) In the given figure, AB, AC and PQ are tangents. If AB = 5 cm, then find the perimeter of  $\triangle APQ$ .



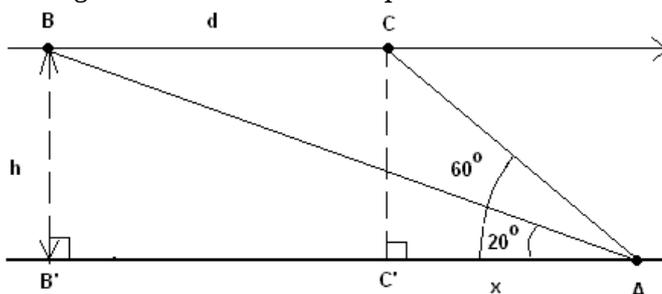
- d) A quadrilateral ABCD is drawn to circumscribe a circle. If AB = 12 cm, BC = 15 cm and CD = 14 cm, find AD.
- e) A cylinder with base radius 8 cm and height 2 cm is melted to form a cone of height 6 cm. Calculate the radius of the base of the cone.
- f) Two cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.
- g) Each side of an equilateral triangle is 10 cm. Find (i) the area of the triangle and (ii) the height of the triangle.
- h) A teak wood log is cut first in the form of a cuboid of length 2.3 m, width 0.75 m and of a certain thickness. Its volume is  $1.104 \text{ m}^3$ . How many rectangular planks of size  $2.3 \text{ m} \times 0.75 \text{ m} \times 0.04 \text{ m}$  can be cut from the cuboid?
- i) A letter is chosen at random from the letters of the word 'ASSASSINATION' Find the probability that the letter chosen is a vowel?
- j) In a simultaneous throw of a pair of dice, find the probability of getting a sum more than 7.

### Section B

3. Answer any 6

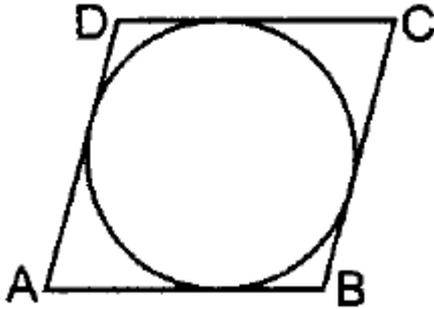
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- a) Find the roots of given quadratic equation:  $4x^2 + 4\sqrt{3}x + 3 = 0$ , by the method of completing the square.
- b) Solve the quadratic equations by the method of completing square  $3x^2 - 8x - 3 = 0$ .
- c) An airplane is approaching point A along a straight line and at a constant altitude  $h$ . At 10:00 am, the angle of elevation of the airplane is  $20^\circ$  and at 10:01 am, it is  $60^\circ$ .



- i. What is the distance 'd' is covered by airplane from 10:00 am to 10:01 am if the speed of the airplane is constant and equal to 600 miles/hour?
- ii. What is the altitude 'h' of the airplane? (round answer to 2 decimal places).

- d) A pole casts a shadow of length  $2\sqrt{3}$  m on the ground, when the Sun's elevation is  $60^\circ$ . Find the height of the pole.
- e) Prove that the tangents drawn at the end of a chord of a circle make equal angles with the chord.
- f) Prove that the lengths of tangents drawn from an external point to a circle are equal. Using the above prove the following: A quadrilateral ABCD is drawn to circumscribe a circle. Prove that  $AB + CD = AD + BC$ .



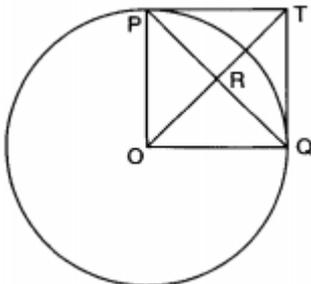
- g) The radii of circular ends of a solid frustum of a cone are 33 cm and 27 cm and its slant height is 10 cm. Find its total surface area.
- h) All kings and queens are removed from a pack of 52 cards. The remaining cards are well-shuffled and then a card is randomly drawn from it. Find the probability that this card is
- a red face card
  - a black card.

### Section C

4. Answer any 8

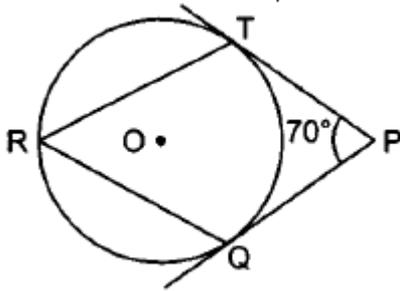
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- a) A group consists of 12 persons, of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability of selecting a person who is
- extremely patient,
  - extremely kind or honest.
- which of the above values you prefer more?
- b) A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.
- c) A tent is in the shape of a right-circular cylinder upto a height of 3 m and conical above it. The total height of the tent is 13.5 m above the ground. Calculate the cost of painting the inner side of the tent at the rate of 2 Rs/m<sup>2</sup>, if the radius of the base is 14 m.
- d) Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre of the circle.
- e) In figure  $PO \perp QO$ . The tangents to the circle at P and Q intersect at a point T. Prove that PQ and OT are right bisectors of each other.



- f) The difference of squares of two numbers is 88. If the larger number is 5 less than twice the smaller number, then find the two numbers.
- g) Determine whether the given quadratic equations have real roots and if so, find the roots  
 $\sqrt{3}x^2 + 10x - 8\sqrt{3} = 0$
- h) A moving boat observed from the top of a 150 m high cliff, moving away from the cliff. The angle of depression of the boat changes from  $60^\circ$  to  $45^\circ$  in 2 minutes. Find the speed of the boat.

- i) 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  $\angle TRQ$ .

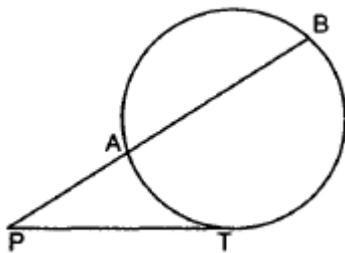


### Section D

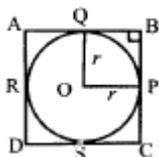
5. Answer the following any 6

24

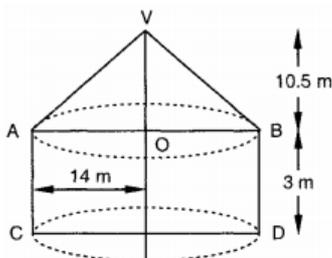
- Check whether the equation  $5x^2 - 6x - 2 = 0$  has real roots and if it has, find them by the method of completing the square. Also, verify that roots obtained satisfy the given equation.
- Solve for  $y$ :  $4y^2 + 4qy - (p^2 - q^2) = 0$
- The angles of elevation and depression of the top and bottom of a light-house from the top of a 60 m high building are  $30^\circ$  and  $60^\circ$  respectively. Find
  - the difference between the heights of the light-house and the building.
  - the distance between the light-house and the building.
- A man sitting at a height of 20 m on a tall tree on a small island in the middle of a river observes two poles directly opposite to each other on the two banks of the river and in line with the foot of tree. If the angles of depression of the feet of the poles from a point at which the man is sitting on the tree on either side of the river are  $60^\circ$  and  $30^\circ$  respectively. Find the width of the river.
- In the given figure, PT is tangent to the circle at T. If  $PA = 4$  cm and  $AB = 5$  cm, find PT.



- f) In the adjoining figure, a circle is inscribed in a quadrilateral ABCD in which  $\angle B = 90^\circ$ . If  $AD = 23$  cm,  $AB = 29$  cm, and  $DS = 5$  cm, find the radius ( $r$ ) of the circle.



- g) A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs 2 per square metre, if the radius of the base is 14 metres.



- h) A wooden toy rocket is in the shape of a cone mounted on a cylinder as shown in given below figure. The height of the entire rocket is 26 cm, while the height of the conical part is 6 cm. The base of the conical portion has a diameter of 5 cm, while the base diameter of the cylindrical portion is 3 cm. If the conical portion is to be painted orange and the cylindrical portion yellow, find the area of

the rocket painted with each of these colours. (Take  $\pi = 3.14$ )

