

# Mathematics Class 10 Board Sample paper-3

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Time allowed: 3 hours Maximum Marks: 80

**General Instructions:**

- All questions are compulsory.
- The question paper consists of 30 questions divided into four sections – A, B, C and D.
- Section A contains 6 questions of 1 mark each which are multiple choice questions, Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each.
- There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You must attempt only one of the alternatives in all such questions
- Use of calculator is not permitted.

**Section A**

- The  $n$ th term of an A. P. is  $2n + 9$ . Find the common difference?
- Three solid of diameters 6 cm, 8 cm and 10 cm are melted to form a single solid sphere. The diameter of the new sphere is
  - 6cm
  - 4.5cm
  - 3cm
  - 12cm
- Which of the following cannot be the probability of an event?
  - $1/4$
  - 0.6
  - 5 %
  - $20/19$
- The areas of two similar triangles ABC and PQR are in the ratio 9 : 16. If  $BC = 4.5$  cm, find the length of QR.
- Write whether the rational number  $7/20$  will have a terminating decimal expansion or a non-terminating repeating decimal expansion.
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Find x and y

$$2x - y = 2, 3y - 4x + 2 = 0$$

### Section B

7. By the method of completion of squares show that the equation  $4x^2 + 3x + 5 = 0$  has no real roots
8. In an A.P, the sum of the first n terms is  $(3n^2 + 5n)/2$ . Find the 24<sup>th</sup> term?
9. If a number K is chosen from set A  $(-3, -2, -1, 0, 1, 2, 3)$ . What is the probability that  $k^2 < 4$ ?
10. Two circles touch externally. The sum of their areas is  $130\pi \text{ cm}^2$  and the distance between their centers is 14cm. Find the radii of the circles
11. Prove that  $\sqrt{2} + \sqrt{5}$  is an irrational number

12. Prove the identity

$$(\sin A - \operatorname{cosec} A)^2 + (\cos A - \sec A)^2 = \tan^2 A + \cot^2 A - 1$$

### Section C

13. Solve for x:  $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$
14. Prove that one and only one out of n, n + 2 and n + 4 is divisible by 3, where n is any positive integer
15. Find the area of ABCD quadrilaterals whose coordinates are A (-3,2) B (5,4) C (7, -6) and D (-5, -4)
16. A man on the deck on a ship 14m above water level, observes that the angle of elevation of the top of a cliff is  $60^\circ$  and the angle of depression of the base of the cliff is  $30^\circ$ . Calculate the distance of the cliff from the ship and the height of the cliff.
17. In an AP, if  $S_n = 3n^2 + 5n$  and  $a_k = 164$ , find the value of k.
18. If the coordinates of points A and B are  $(-2, -2)$  and  $(2, -4)$  respectively, find the coordinates of P such that  $AP = (3/7) AB$ , where P lies on the line segment AB.  
Or  
The opposite angular points of a square is  $(3,4)$  and  $(1,-1)$ . Find the coordinates of the other angular points

19. If A, B, C are interior angles of  $\Delta ABC$ , show that

$$\operatorname{cosec}^2\left(\frac{B+C}{2}\right) - \tan^2\frac{A}{2} = 1.$$

Or

If  $x = a \sec \theta + b \tan \theta$  and  $y = a \tan \theta + b \sec \theta$ , prove that  $x^2 - y^2 = a^2 - b^2$ .

20. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Or

Draw a line segment AB of length 11 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

21. 504 cones, each of diameter 3.5 cm and height 3 cm, are melted and recast into a metallic sphere. Find the diameter of the sphere and hence find its surface area. [Use  $\pi = 22/7$ ]

22. Construct a triangle similar to a given triangle with sides 7 cm, 9 cm and 10 cm and whose sides are  $5/7$  of the corresponding sides of the given triangle.

#### Section D

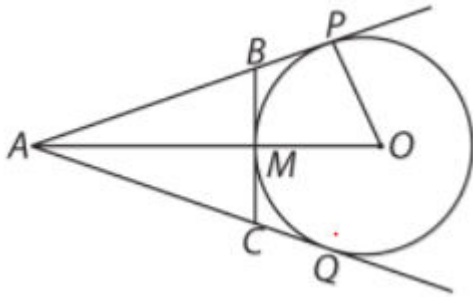
23. The time taken by a person to cover 150 km was  $2\frac{1}{2}$  hours more than the time taken in the return journey. If he returned at a speed of 10 km/hour more than the speed while going, find the speed per hour in each direction.

Or

If  $x = -2$  is a root of the equation  $3x^2 + 7x + p = 0$ , find the values of k so that the roots of the equation  $x^2 + k(4x + k - 1) + p = 0$  are equal.

24. The sum of three numbers in A.P. is 12 and sum of their cubes is 288. Find the numbers.

25. From the figure given, A is a point 10 cm from centre O of the circle of radius 6 cm. AP & AQ are the tangents to the circle. BC is another tangent at M. Find the perimeter of  $\Delta ABC$



26. Find the median class of the following data:

Marks Obtained	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	8	10	12	22	30	18

OR

If the mean of the following distribution is 27, find the value of k:

Marks Obtained	0-10	10-20	20-30	30-40	40-50
Frequency	8	k	12	13	10

27. Prove that the length of tangents drawn from an external point to a circle are equal. Hence, find BC, if a circle is inscribed in a  $\triangle ABC$  touching AB, BC & CA at P, Q & R respectively, having  $AB=10\text{cm}$ ,  $AR=7\text{cm}$  &  $RC=5\text{cm}$

Or

Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Using the above result, find the length of PQ, if a tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that  $OQ = 12\text{ cm}$ .

28.

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the article. (Use  $= 3.14 \pi$ )

**29.** The angle of elevation of the top of tower from point A due south of tower is  $\alpha$  and from point B due east of tower is  $\beta$ . What is the height of the tower?

**30.** A Urn contains 3 white balls, 6 red balls, 7 green balls and 3 blue balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is:

- (i) Green
- (ii) not blue
- (iii) neither white nor blue
- (iv) red or white