

Class : X
Subject : MATHEMATICS

Max Marks:80
Time Allotted: 3 hrs

Instructions:

1. All questions are compulsory.
2. The question paper consists of 30 questions. Section – A comprises of 6 questions of 1 mark each, Section – B comprises of 6 questions of 2 marks each, Section – C comprises of 10 questions of 3 marks each and Section – D comprises of 8 questions of 4 marks each.
3. Use of calculator is not permitted.

Section – A

1. Express 3825 as a product of its prime factors.
2. Find a quadratic polynomial with zeroes $2\sqrt{7}$ and $-2\sqrt{7}$.
3. Write the next term of the A.P. $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$
4. From a point P, the length of the tangent to a circle is 15 cm and distance of P from the centre of the circle is 17 cm. Then what is the radius of the circle?
5. The median of the following observation given in order 16, 18, 20, $24 - x$, $22 + 2x$, 28, 30, 32 is 24. Find the value of x.
6. A bag contains 5 red and 4 black balls. A ball is drawn at random from the bag. What is the probability of getting a black ball?

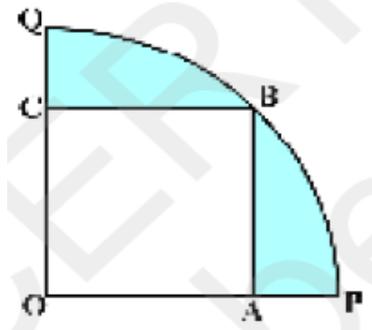
Section – B

7. Show that the square of any odd integer is of the form $4q + 1$, for some integer q.
8. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the co-efficient.
9. Six years hence a man's age will be three times his son's age and three years ago, he was nine times as old as his son. Find their present ages.
10. If the points A(4,3) and B(x,5) are on the circle with centre O(2,3), find the value of x.
11. Prove that: $\frac{1+\cos A}{\sin A} + \frac{\sin A}{1+\cos A} = 2\operatorname{cosec} A$
12. The mean of 1, 7, 5, 3, 4 and 4 is m. The numbers 3, 2, 4, 2, 3, 3 and p have mean $m - 1$ and median q. Find p and q.

Section – C

13. Prove that $\sqrt{5} - \sqrt{2}$ is irrational.
14. Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46, find the integers.
15. The 10th term of an AP with positive terms is three times its 3rd term and the product of 3rd and 10th term is 147. Find the AP.
16. State and Prove the Pythagoras Theorem.
17. 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.
18. Prove that: $\frac{1+\sin A}{1-\sin A} = (\sec A + \tan A)^2$

19. From a point P on the ground, the angles of elevation of a 10 m tall building and of helicopter, hovering at some height over the top of the building, are 30° and 60° , respectively. Find the height of the helicopter above the ground.
20. Two dices are thrown at the same time. Find the probability of getting:
- A same number on both the dices.
 - A sum of 7.
 - A product less than 10.
21. 150 spherical marbles, each of diameter 1.4 cm, are dropped into a cylindrical vessel of diameter 7 cm containing some water, which are completely immersed in water. Find the rise in the level of water in the vessel.
22. In the figure, a square OABC is inscribed in a quadrant OPBQ. If $OA = 20$ cm, find the area of the shaded region.



Section – D

23. Solve the following system of linear equation graphically:
 $x + 2y = 5$; $2x - 3y = -4$
 Also find the points where the lines meet the x-axis.
24. A passenger train takes one hour less when its speed is increased by 15 km/hr than its usual speed for a journey of 300 km. Find the usual speed of the train.
25. If $A(4, -8)$, $B(-9, 7)$ and $C(18, 13)$ are the vertices of a triangle ABC, find the length of the median through A and coordinates of centroid of the triangle.
26. In $\triangle ABC$, right angled at B, the points D and E trisect BC. Prove that $8AE^2 = 3AC^2 + 5AD^2$.
27. 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.
28. Two pillars of equal height stand on either side of a roadway which is 150 m wide. From a point on the roadway between the pillars, the elevation of the top of the pillars is 60° and 30° . Find the height of the pillars and the distance of the point from the pillars.
29. Find the arithmetic mean of the following distribution by step-deviation method:

Class	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59
Frequency	14	22	16	6	5	3	4

30. A wooden article was made by scooping out a hemisphere from one end of a cylinder and a cone from the other end. If the height of the cylinder is 40 cm, radius of the cylinder is 7 cm and height of the cone is 24 cm, then find the volume and total surface area of the article.