

Preboard

Time: 3Hour
M.Marks : 80

BVP/X/Mathematics/2023-24

General Instructions:

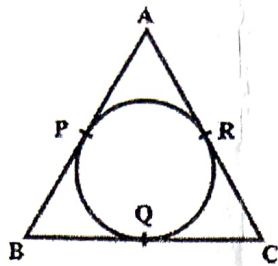
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 01 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section A

Section A consists of 20 questions of 1 mark each.

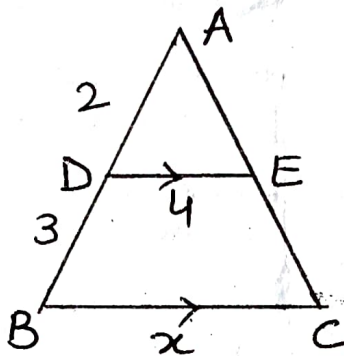
1. If LCM of x and 18 is 36 and HCF of x and 18 is 2, then find the value of x .
(a) 2 (b) 4 (c) 18 (d) 3
2. The number of polynomials having zeroes -5 and 3 is:
(a) Only one (b) infinite (c) exactly two (d) at most two
3. The values of k for which the equation $4x^2 + kx + 9 = 0$ has real and equal roots are:
(a) ± 11 (b) ± 3 (c) ± 6 (d) ± 12
4. The condition for which the pair of equations $ax + 2y = 9$ and $3x + by = 18$ represent parallel lines, where a, b are integers, if:
(a) $a = b$ (b) $3a = 2b$ (c) $2a = 3b$ (d) $ab = 6$
5. The common difference of the A.P. whose n^{th} term is given by $a_n = 3n + 7$, is:
(a) 7 (b) 3 (c) $3n$ (d) 1
6. The distance of the point (4,7) from the x - axis is:
(a) 7 units (b) 5 units (c) 4 units (d) 10 units
7. The point on the x -axis which is equidistant from the points (-1,0) and (5,0) is:
(a) (2, 0) (b) (3, 0) (c) (0, 3) (d) (0, 2)

8. In the given figure, $AB = BC = 10$ cm. If $AC = 7$ cm, then the length of BP is:



- (a) 3.5 cm (b) 7 cm (c) 6.5 cm (d) 5 cm

9. In the given figure, $DE \parallel BC$. The value of x is:



- (a) 6 (b) 12.5 (c) 10 (d) 8

10. If $\sec \alpha = \frac{3}{2}$, then find the value of $\tan^2 \alpha$.

- (a) $\frac{4}{5}$ (b) $\frac{5}{4}$ (c) $\frac{2}{3}$ (d) 1

11. $\cot^2 \theta - \frac{1}{\sin^2 \theta}$ is equal to:

- (a) 1 (b) -2 (c) 2 (d) -1

12. AB is a tangent to the circle centered at O . If $OA = 6$ cm and $\angle OAB = 30^\circ$, then radius OB of the circle is:

- (a) 3 cm (b) $3\sqrt{3}$ cm (c) 2 cm (d) $\sqrt{3}$ cm

13. Lali tosses two different coins simultaneously. The probability that she gets at most one head is:

- (a) $\frac{3}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{7}$ (d) 1

14. $\left(\frac{1 - \tan^2 30^\circ}{1 + \tan^2 30^\circ} \right)$ is equal to:

- (a) $\sin 60^\circ$ (b) $\cos 60^\circ$ (c) $\tan 60^\circ$ (d) $\cos 30^\circ$

15. If a marble of radius 2.1 cm is put into a cylindrical cup full of water of radius 5 cm and height 6 cm, then the volume of water which flows out of cylindrical cup is:

- (a) 38.808 cm^3 (b) 55.4 cm^3 (c) 19.4 cm^3 (d) 471.4 cm^3

16. Length of an arc of a circle with radius 10 cm and central angle 45° is:
 (a) $110/7$ cm (b) $55/7$ cm² (c) $55/7$ cm (d) $550/7$ cm
17. The length of shadow of a vertical pole of height 12 m, when altitude of sun is 30° , is:
 (a) $12\sqrt{3}$ m (b) $4\sqrt{3}$ m (c) 12 m (d) $6\sqrt{3}$ m
18. Which one of the following is the correct relationship between Mean, Median and Mode?
 (a) Mode = 2 Median - 3 Mean (b) Mode = Median - 2 Mean
 (c) Mode = 2 Median - Mean (d) Mode = 3 Median - 2 Mean
19. DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option.

Statement A (Assertion): A right circular cylinder of radius r cm and height h cm just encloses a sphere of diameter $2r$ cm.

Statement R (Reason): If r is the radius of a sphere, then the volume of the sphere is $\frac{4}{3}\pi r^3$ and surface area is $4\pi r^2$

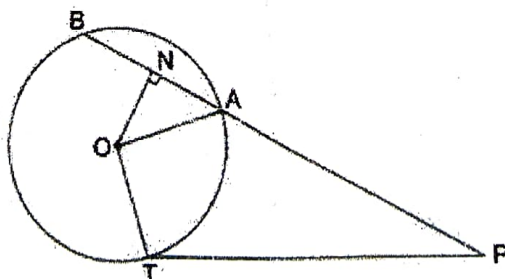
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.
20. Statement A (Assertion): If 6th term of an A.P. is -10 and 10th term is -26, then 15th term of the given A.P. is -46.

Statement R (Reason): If a is the first term, l is the last term and n is the number of terms of an A.P., then $S_n = \frac{n}{2}(a + l)$

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).
 (c) Assertion (A) is true but reason (R) is false.
 (d) Assertion (A) is false but reason (R) is true.

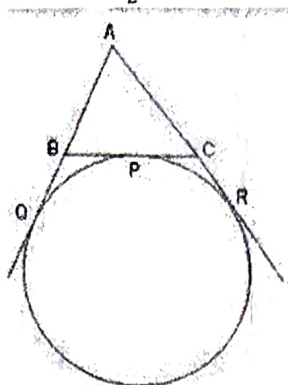
Section B

21. Check whether 6^n can end with the digit 0 for any natural number n .
22. Find the area of minor segment of a circle of radius 5 cm and corresponding angle is 60° .
23. In the given figure, PT is tangent to the circle centered at O. ON is perpendicular to chord AB. Prove that $PA \cdot PB = PN^2 - AN^2$



OR

A circle is touching the side BC of a ΔABC at the point P and touching AB and AC produced at points Q and R respectively. Prove that $AQ = \frac{1}{2}$ (Perimeter of ΔABC)

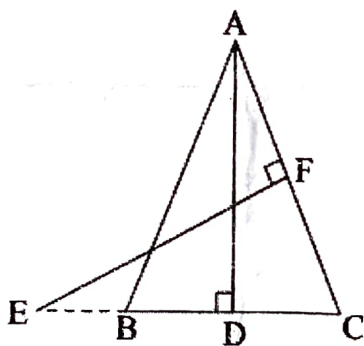


24. Prove that: $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$

OR

Find the value of $2(\cos^4 60^\circ + \sin^4 30^\circ) + (\tan^2 60^\circ + \cot^2 30^\circ)$

25. In the given figure, E is a point on side CB produced of an isosceles ΔABC with $AB = AC$. If $AD \perp BC$ and $EF \perp AC$. Prove that $\Delta ABD \sim \Delta ECF$



Section C

26. Prove that $5 - 2\sqrt{2}$ is an irrational number.
27. If p^{th} term of an A.P. is q and q^{th} term is p , then prove that its n^{th} term is $(p + q - n)$.
28. Draw the graph of following equations: $x + y = 5$, $x - y = 5$
- (i) Find the solution of the equations from the graph.
- (ii) Shade the triangular region formed by the lines and the y-axis.

OR

Two people are 16 km apart on a straight road. They start walking at the same time. If they walk towards each other with different speeds, they will meet in 2 hours. They had walked in the same direction with same speeds as before, they would have met in 8 hours. Find their walking speeds.

29. Find a quadratic polynomial whose zeroes are the reciprocal of the zeroes of $4x^2 - 3x - 1$. Also find the sum and product of zeroes of new polynomial.

30. State and prove Basic Proportionality Theorem.

OR

Sides AB and BC and median AD of a ΔABC are respectively proportional to sides PQ and QR and median PM of another triangle PQR. Show that $\Delta ABC \sim \Delta PQR$.

31. The angle of elevation of a cloud from a point 60 m above a lake is 30° and the angle of depression of the reflection of cloud in the lake is 60° . Find the height of the cloud.

Section D

32. A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed?

OR

Find the roots of the quadratic equation: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $x \neq 0, -(a+b)$.

33. Find the median and mode of the following data:

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70	Less than 80
Frequency	0	10	25	43	65	88	96	100

34. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m^2 , find the amount shared by each school to set up the tents.

OR

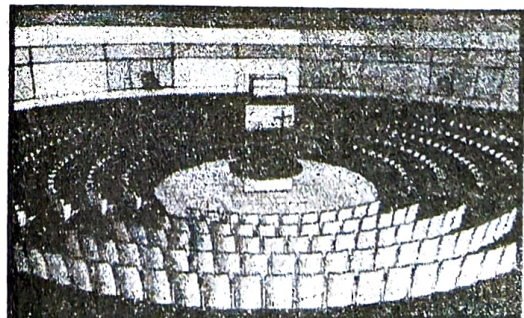
There are two identical solid cubical boxes of side 7 cm. From the top face of the first cube a hemisphere of diameter equal to the side of the cube is scooped out. This hemisphere is inverted and placed on the top of the second cube's surface to form a dome. Find

- (i) The ratio of the total surface area of the two new solids formed.
- (ii) Volume of each new solid formed.

35. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents P and Q intersect at a point T. Find the length TP.

Section E

36. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.

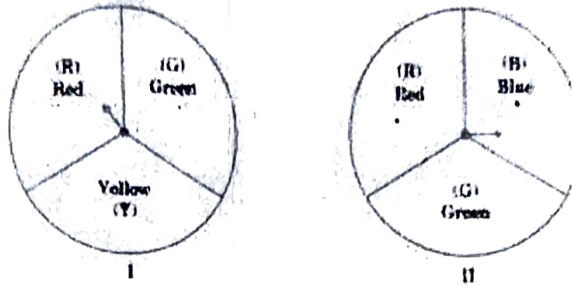


- (i) If the first circular row has 30 seats, how many seats will be there in 10th row?
 (ii) For 1500 seats in the auditorium, how many rows need to be there?

OR

- If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?
 (iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

37. A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival



Making Purple: Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

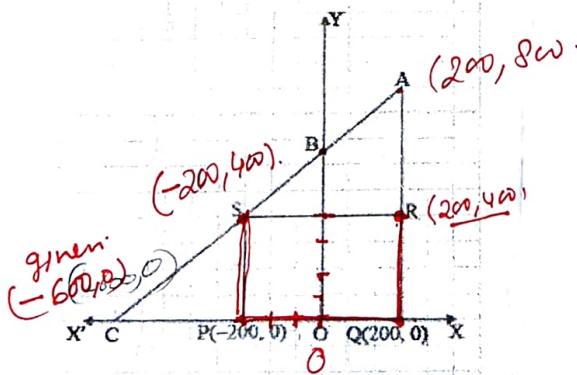
Based on the above, answer the following questions:

- (i) List all possible outcomes of the game.
 (ii) Find the probability of 'Making Purple'
 (iii) a) For each win, a participant gets ₹10, but if he/she loses, he/she has to pay ₹ 5 to the school, If 99 participants played, calculate how much fund could the school have collected.

OR

- (b) If the same amount of ₹ 5 has been decided for winning or losing the game, then how much fund had been collected by school? (Number of participants = 99)

38. Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O.



Based on the above information, answer the following questions:

- (i) Taking O as origin, coordinates of P are (-200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?
 (ii) (a) What is the length of diagonal SQ in square PQRS?

OR

- (b) What is the length of diagonal PR in square PQRS?
 (iii) If S divides CA in the ratio K : 1, what is the value of K, where point A is (200, 300)?