BANGALORE SAHODAYA SCHOOLS COMPLEX ASSOCIATION
PRE-BOARD EXAMINATION (2024-2025)
Grade X

DATE: 12.12.2024 **MAX MARKS: 80**
Subject: MATHEMATICS – STANDARD (041) **TIME : 3 hours**
SET - 1

General Instructions : Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take π =22/7 wherever required if not stated.

Section A
(Section A consists of 20 questions of 1 mark each)

1. The value of k such that the pair of equations $kx + 3y = k - 3$ and $12x + ky = 6$ has no solution.

   (a) 6 only (b) -6 only (c) 6 or -6 (d) 0 only

2. The values of x and y in $2x + y + 1 = 0$ and $2x - 3y + 8 = 0$ are

   (a) $(1,2)$ (b) $\left(\frac{-11}{8}, \frac{7}{4}\right)$ (c) $\left(\frac{11}{8}, \frac{7}{4}\right)$ (d) $(2,3)$

3. Values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is

   (a) 0 only (b) 4 (c) 8 only (d) 0,8

4. If the numbers n-2, 4n-1 and 5n+2 are in AP, then the value of n is

   (a) 1 (b) 5 (c) 10 (d) 0

5. If the 7^{th} term of an AP is $\frac{1}{9}$ and the 9^{th} term is $\frac{1}{7}$, then the common difference is _____.

   (a) 0 (b) 1 (c) 1/63 (d) 63

6. From the distribution table given:

Marks	Below10	Below20	Below30	Below40	Below50	Below60
No. of students	3	12	27	57	75	80

The median class is

(a) 10-20 (b) 20-30 (c) 30-40 (d) 50-60

7. If $\sin\theta = \frac{1}{3}$, then find the value of ($2\cot^2\theta + 2$)

(a) 9 (b) 12 (c) 15 (d) 18

8. The perimeter (in cm) of a square circumscribing a circle of radius "a" cm, is

(a) 8 a (b) 4 a (c) 2 a (d) 16 a

9. If two solid hemispheres of the same base radius "r" are joined together along their bases, then curved surface area of this new solid is

(a) $4\pi r^2$ (b) $6\pi r^2$ (c) $3\pi r^2$ (d) $8\pi r^2$

10. The circumference of two circles are in the ratio 4 : 9. The ratio of their areas is ___

(a) 9 : 4 (b) 4 : 9 (c) 16 : 81 (d) 21 : 81

11. $9\sec^2 A - 9\tan^2 A =$ _____

(a) 1 (b) 9 (c) 8 (d) 0

12. The LCM of smallest prime and smallest odd composite natural number is ___

(a) 6 (b) 12 (c) 18 (d) 24

13. The distance between the points ($\cos\theta$, $\sin\theta$) and ($\sin\theta$, $-\cos\theta$) is

(a) $\sqrt{3}$ (b) $\sqrt{2}$ (c) 2 (d) 1

14. In which quadrant the point P that divides the line segment joining the points A(2, -5) and B(5,2) in the ratio 2 : 3. Lies in ?

(a) 1st Quadrant (b) 2nd Quadrant (c) 3rd Quadrant (d) 4th Quadrant

15. In Δ ABC and Δ DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when ___

(a) ∠B = ∠E (b) ∠A = ∠D (c) ∠B = ∠D (d) ∠A = ∠F

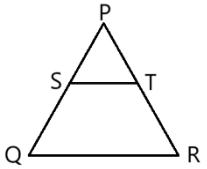
16. If tangents TP and TQ from a point T to a circle with centre O subtend an angle of 110°, then ∠PTQ is equal to _____

(a) 60° (b) 70 ° (c) 80° (d) 90 °

17. Two dice are thrown at the same time. The probability of getting different number on the dice is _____

(a) $\frac{1}{6}$ (b) $\frac{1}{4}$ (c) $\frac{5}{6}$ (d) $\frac{1}{2}$

18. In the given figure, ST || QR, $\frac{PQ}{SQ} = \frac{7}{3}$ and PR = 6.3 cm. Find the value of TR.



(Note: The figure is not to scale.)

(a) 2.7 cm (b) 3.6 cm (c) 9 cm (d) 4.5 cm

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

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.

19. **Assertion**: If the zeroes of the quadratic polynomial $ax^2 + bx + c$, where $c \neq 0$ are equal, then c and a have the same sign.

Reason: A polynomial with α and β as its zeros is $k[x^2 + (\alpha + \beta)x + \alpha\beta]$.

20. **Assertion:** Seven face cards are removed from a deck of cards and the cards are well shuffled. Then the probability of drawing a face card is $\frac{5}{52}$

Reason: King, Queen and Jack are known as face cards. So, there are 12 face cards in total.

Section B

(Section B consists of 5 questions of 2 marks each)

21. If α and β are the zeros of a quadratic polynomial such that $\alpha + \beta = 24$ and $\alpha - \beta = 8$, find a quadratic polynomial having α and βas its zeroes.

22. If sec θ + tan θ = *m* and sec θ – tan θ = *n*, find the value of $\sqrt{mn}$.

23 (A) 144 cartons of Coke Cans and 90 cartons of Pepsi Cans are to be stacked in a canteen. If each stack is of the same height and is to contain cartons of the same drink, what would be the greatest number of cartons each stack would have ?

(OR)

(B) If HCF of 144 and 180 is expressed in the form 13m – 3, find the value of "m"

24. A street light bulb is fixed on a pole 6 m above the level of the street. If a woman of height 1.5 m casts a shadow of 3 m, find how far she is away from the base of the pole?

25 (A) If PA and PB are tangents from an outside point P such that PA = 10 cm and ∠APB = 60˚. Find the length of the chord AB.

(OR)

(B) Out of the two concentric circles with centre O, the radius of the outer circle is 5 cm and the chord AB of length 8 cm is tangent to the inner circle. Find the radius of the inner circle.

Section C

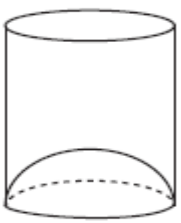
(Section C consists of 6 questions of 3 marks each)

26 (A) Find the solution $y + 2 = 0$ and $x + 2y = 4$ graphically. Find the area the triangle formed by these lines and y-axis.

(OR)

(B) Check if the pair of equations, $y - 2x = 1$ and $5y - x = 14$, is consistent. If yes, find a solution of it graphically.

27. A juice seller serves his customers using a glass as shown in figure. The inner diameter of the cylindrical glass is 5 cm, but the bottom of the glass has a hemispherical portion raised which reduces the capacity of the glass. If the height of the glass is 10 cm, find the apparent capacity of the glass and its actual capacity. [π = 3.14]



28. Prove that $2 + \sqrt{5}$ is an irrational number

29. 17 cards numbered 1,2,3,……,17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is :

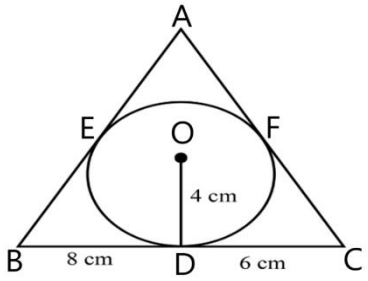
(i) a prime (ii) odd (iii) divisible by 3 and 2 both

30. (A) Prove that : $\sin\theta\,(1+\tan\theta)+\cos\theta\,(1+\cot\theta)=\sec\theta+\operatorname{cosec}\theta$

(OR)

(B) Prove that: $\sin^8\theta-\cos^8\theta=(\sin^2\theta-\cos^2\theta)(1-2\sin^2\theta\cos^2\theta)$

31. A ΔABC is drawn to circumscribe a circle of radius 4cm such that the segments BD and DC are of lengths 8 cm and 6 cm respectively. Find the lengths of sides AB and AC, when area of ΔABC is 84 cm^2.



Section D

(Section D consists of 4 questions of 5 marks each)

32. (A) In a stream running at 2 km per hour, a motor boat goes 10 km upstream and back again to the starting point in 55 minutes. Find the speed of the motor boat in still water.

(OR)

(B) At present, Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

33. The median of the distribution given below is 15.75.

Class interval	0-6	6-12	12-18	18-24	24-30	30-36	36-42
frequency	4	x	8	y	4	2	1

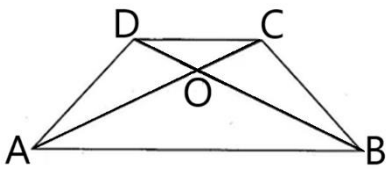
(i) Find the values of x and y, if the total frequency is 30.

(ii) Then, find the mode of the data.

34. (A) Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then other two sides are divided in the same ratio.

(OR)

(B) Prove that the diagonals of a trapezium divide each other proportionally. Using this result, find the value of x, if in the given figure, it is given that $AB \parallel DC$, $OA = 3x-19$, $OC = x-5$; OD = 3 and $OB = x-3$.



35. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this, will the car reach the tower? Give your answer to the nearest second.

Section E

(Section E consists of 3 case study based questions of 4 marks each)

36. Subba Rao started to work in a company in 1995 and his annual salary in the n^{th} year is calculated by the expression $200(29+n)$. He worked in that company for 35 years with an increment of Rs. 200 each year. Answer the following questions based on the above information.

(i) Write the first four terms of the AP representing his annual salaries in first four years. Write its common difference. (1)

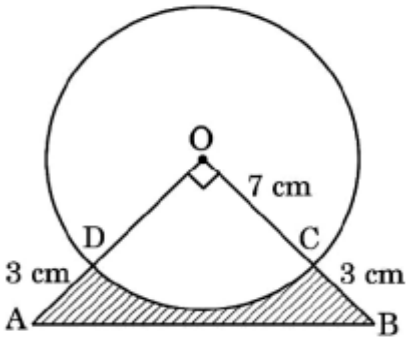
(ii) In which year, his annual salary becomes 9000 rupees? (1)

(iii) Find the total amount Subba Rao received in the form of salary in these 35 years. (2)

(OR)

(iii) How many two-digit numbers are divisible by 7? Find their sum. (2)

37. In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is 20 per cm^2 .Based on the above, answer the following questions:



(i) What is the area of the quadrant ODCO? (1)

(ii) Find the area of ΔAOB. (1)

(iii) What is the total cost of silver plating the shaded part ABCD? (2)

(OR)

(iii) What is the length of arc CD? (2)

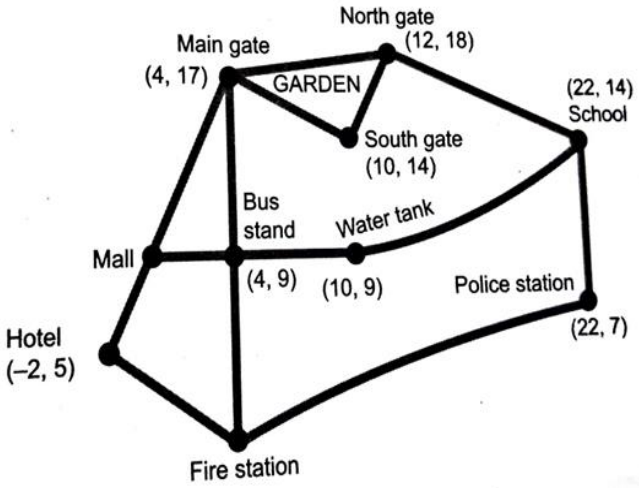
38. Answer the questions based on the information given. Shown below is a map of Giri's neighborhood. Giri did a survey of his neighborhood and collected the following information:

* The hotel, mall and the main gate of the garden lie in a straight line.

* The distance between the hotel and the mall is half the distance between the mall and the main gate of the garden

* The bus stand is exactly midway between the main gate of the garden and the fire station

* The mall, bus stand and the water tank lies in a straight line



(i) What is the x-coordinate of the mall's location? (1)

(ii) What are the coordinates of the fire station? (1)

(iii) What is the shortest distance between the water tank and the school? (2)

(OR)

How much more is the shortest distance of the school from the water tank than the distance of the school from the police station? (2)

****