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 - 2

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 Question 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. Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers, is ____

   (a)2 (b) 3 (c) 4 (d) 5

2. If A (4,2), B (6,5) and C (1,4) be the vertices of ΔABC and AD is the median, then the coordinates of D are

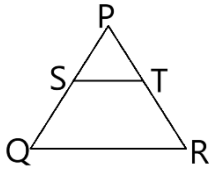
   (a) $\left(\frac{5}{2}, 3\right)$ (b)$\left(5, \frac{7}{2}\right)$ (c) $\left(\frac{7}{2}, \frac{9}{2}\right)$ (d) None of these

3. 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

4. In the following figure, ST || QR, point S divides PQ in the ratio 4: 5. If ST = 1.6 cm, what is the length of QR?
   (Note: The figure is not to scale.)

   (a) 0.71 cm (b) 2 cm (c) 36 cm (d) 3.6 cm



5. The perimeters of two similar triangles are 15 cm and 25 cm respectively. If one side of first triangle is 9 cm, what is the corresponding side of the other triangle?
   (a) 4.5 cm (b) 9cm (c) 12.5 cm (d) 15 cm

6. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80˚, then ∠POA is equal to _____
   (a)50˚ (b) 60˚ (c) 70˚ (d) 80˚

7. In a non-leap year, the probability of 53 Mondays is ____.
   (a) $\frac{2}{7}$ (b) $\frac{3}{7}$ (c)$\frac{1}{7}$ (d) $\frac{4}{7}$

8. The values of x and y in $2x - 3y = 1$ and $3x - 4y = 1$ are
   (a) $(1, -1)$ (b) $(-1, 1)$ (c) $(1, 1)$ (d) $(-1, -1)$

9. The value of k, if $kx + 3y = k - 3$ and $12x + ky = k$ has infinitely many solutions is
   (a) Only 0 (b) $6, -6$ (c) only 6 (d) only -6

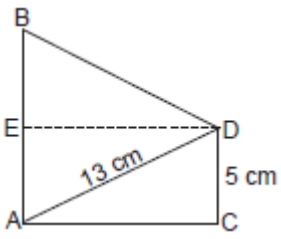
10. If $2x^2 - 4x + k = 0$ has no real roots, then the value of k is
    (a) 2 (b) any real no. less than 2 (c) any real no. more than 2 (d) 0

11. If 3 $times$ $a_3 = 7$ $times$ a_7, then the value of a_{10} is
    (a) 0 (b) 1 (c) 10 (d) 21

12. If the 9th term of an AP is zero, then
    (a) $a_{29} = 2 \times a_{19}$ (b) $a_{29} = 3 \times a_9$ (c) $a_{29} = a_9 + a_{19}$ (d) $a_{29} = \frac{1}{2} \times a_{39}$

13. If mode and median of a data are 20 and 19, then mean of the data is
    (a) 18.5 (b) 39 (c) 1 (d) 19.5

14. In the figure given besides, if AB = 14 cm, then the value of tan B is
    (a) $\frac{4}{3}$ (b) $\frac{14}{3}$ (c) $\frac{5}{3}$ (d) $\frac{13}{3}$

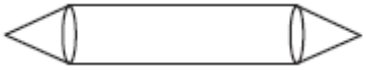


15. If ΔABC is right angled at C, then the value of cos (A + B) is
    (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$

16. The ratio of the areas of the incircle and circumcircle of a square is
    (a) 1 : 2 (b) 1 : 3 (c) 1 : 4 (d) 1:$\sqrt{2}$

17. A sphere and a cube have equal surface areas. The ratio of the volume of the sphere to that of cube is
    (a) $\sqrt{\pi} : \sqrt{6}$ (b) $\sqrt{6} : \sqrt{\pi}$ (c) $\sqrt{\pi} : \sqrt{3}$ (d) $\sqrt{3} : \sqrt{\pi}$

18. The shape of a gilli, in the gilli-danda game (see Fig.), is a combination of



(a) two cylinders
(b) a cone and a cylinder
(c) two cones and a cylinder
(d) two cylinders and a cone

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(A): If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other, then it has no linear term and the constant term is negative.

Reason(R): A quadratic polynomial in one variable has at most 2 real numbers as its zeros.

20. Assertion(A): If the probability of Jhanvi winning a lottery is 0.005, then the probability of her losing the lottery is 0.995.

Reason(R):For any Event E, $P(E) + P(Not\ E) = 1$

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

21. Show that 12^n cannot end with the digit 0 or 5 for any natural number n.

(OR)

Determine the values of p and q so that the prime factorization of 2520 is expressible as $2^3 \times 3^p \times q \times 7$.

22. A girl of height 100 cm is walking away from the base of a lamp-post at a speed of 1.9 m/s. If the lamp is 5m above the ground, find the length of her shadow after 4 seconds.

23. PA and PB are tangent segments from an external point P to a circle with centre O. Show that the quadrilateral AOBP is cyclic.

(OR)

Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

24. If α and β are the zeros of $\sqrt{2}x^2 - x - 3\sqrt{2}$ then find the zeros. Also find the value of $\alpha^2 + \beta^2$.

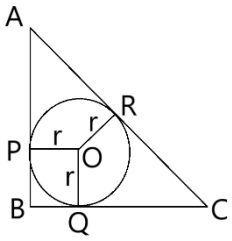
25. If sin A = cos A, find the value of $2\tan^2 A + \sin^2 A - 1$.

Section C

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

26. Prove that $\sqrt{5}$ is an irrational number.

27. ABC is a right triangle, right-angled at B such that BC = 6cm and AB = 8cm. Find the radius of its incircle (refer to the figure given below).



28. Two unbiased coins are tossed simultaneously. Find the probability of getting
    (i) Two heads (ii) At most one head (iii) Atleast one head

29. Find the solution of $x + 4 = 0$ and $x + 2y = 8$ graphically. Find the area of the polygon obtained by these two lines and X-axis.

    (OR)

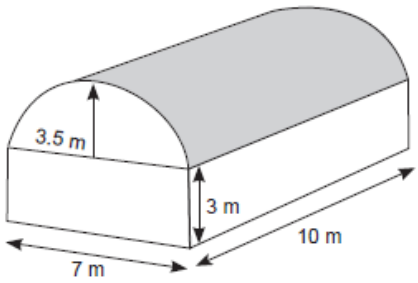
    Check if the pair of equations, $x + y = 3$ and $3x - 2y = 4$, is consistent. If yes, find a solution of it graphically.

30. Prove that: $\frac{1}{secA-1} + \frac{1}{secA+1} = 2\,cosec\,A\;\;cot\,A$

    (OR)

    Prove that: $\sin^6 A + \cos^6 A = 1 - 3\sin^2 A \cos^2 A$.

31. Shanta runs an industry in a shed which is in the shape of a cuboid surmounted by a half cylinder. The base of the shed of dimensions 7 m × 10 m, and the height of the cuboidal portion is 3 m. Find the interior surface area excluding the floor.



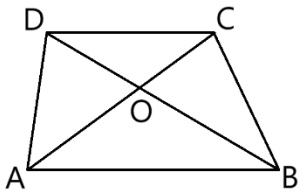
Section D

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

32. State and prove Basic Proportionality Theorem.

    (OR)

Prove that the diagonals of a trapezium divide each other proportionally. Using this result, find the value of x, if in the given figure, $AB \,||\, DC$; $OA = 3x - 19$; $OC = x - 3$; $OD = 4$ and $OB = x - 4$.



33. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

(OR)

300 apples were distributed equally among a certain number of students. Had there been 10 more students, each would have received one apple less. Find the number of students.

34. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table:

Length (in mm)	118-126	127-135	136-144	145-153	154-162	163-171	172-180
No. of leaves	3	5	9	12	5	4	2

(i) Find the median length of the leaves.
(ii) Find the modal length of the leaves.

35. A boy standing on a horizontal plane is flying a drone at a distance of 100 m from him at an elevation of 30^0. A girl standing on the roof of 20 m high building, finds the angle of elevation of the drone to be 45^0. The boy and the girl are on the opposite sides of the drone.
(i) Find the distance of the drone from the girl.
(ii) Find the distance of the boy from the foot of the building.

Section E

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

36. A contract on construction job specifies a penalty for each day for delay of completion of work beyond a certain date. The penalty for the n^{th} day is calculated using an expression $50(3 + n)$. Based on this information, answer the following questions.

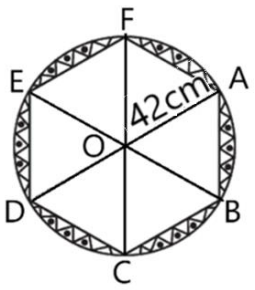
(i) Write the first 4 terms of the APrepresenting the above situation and write itscommon difference. (1)

(ii) Find the ratio of the penalty amount for the first day to the penalty amount for the 30th day. (1)

(iii) The construction is delayed by 30 days altogether. If the construction company has paid the penalty amount for the first 15 days, how much do they need to pay for the remaining 15 days? (2)

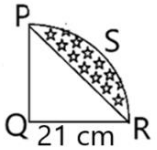
(OR)

Which term of the AP:121,117,113, … … is its first negative term? (2)



(fig 1)

37. In order to encourage handicrafts, Arushi's mother buys articles from handicrafts exhibitions. She bought crochet laces to attach totable cloths. (Fig i) shows a regular hexagon. After attaching the crochet lace, the table cloth is circular in shape with radius 42 cm.
(Fig 2) shows an isosceles right triangle, right angled at Q. After attaching the crochet lace, it is in the shape of a sector of radius 21 cm. Observe the figures and answer the questions given below.
(consider $\sqrt{2} = 1.4, \sqrt{3} = 1.7, \pi = \frac{22}{7}$)



(fig 2)

(i) Find the area of ΔAOB to the nearest cm^2 (1)

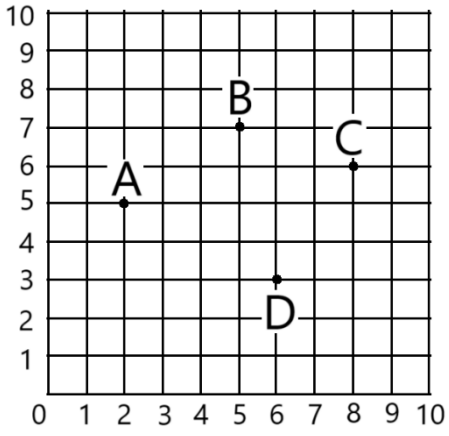
(ii) Find the area of sector AOB. (1)

(iii) Find the cost of the lace in fig(i) if it costs 50 paise per cm^2.

(OR) (2)

Find the perimeter of the segment PSR in fig (ii). (2)

38. Students of a school are standing in rows and columns in their school playground to celebrate their annual sports day. A, B, C and D are the positions of four students as shown in the figure.
Based on the above, answer the following questions:



(i) The Victory stand for prize distribution will be placed at the mid-point of the straight line between A and C. Find the coordinates of the victory stand. (1)

(ii) If B has to run from his position to the victory stand, what is the distance he will cover? (1)

(iv) Using distance formula, show that the students A, B and C are not standing in a straight line. (2)

(OR)

If a point P divides the line segment AD in the ratio 1 : 2, then find the coordinates of P. (2)