ISWKP1/041/2

INDIAN SCHOOL AL WADI AL KABIR
First Rehearsal Examination (2023-24)
Sub: MATHEMATICS STANDARD (041)

Date: 05-12-2023   **Set 2**   Maximum marks: 80

Class: X   Time: 3 hours

General Instructions:

Read the following instructions very carefully and strictly follow them:

(i)   This question paper contains **38** questions. **All** questions are **compulsory.**

(ii)   This question paper is divided into **five** Sections **A, B, C, D and E.**

(iii)   In **Section A**, Questions no. **1** to **18** are multiple choice questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.

(iv)   In **Section B**, Questions no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.

(v)   In **Section C**, Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.

(vi)   In **Section D**, Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.

(vii)   In **Section E**, Questions no. **36** to **38** are case study-based questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case-study.

(viii)   There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.

(ix)   Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.

(x)   Use of calculators is **not** allowed.

SECTION A

Section A consists of 20 questions of 1 mark each.

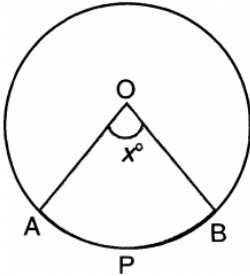**Q.1.** Which of the following cannot be the probability of an event?
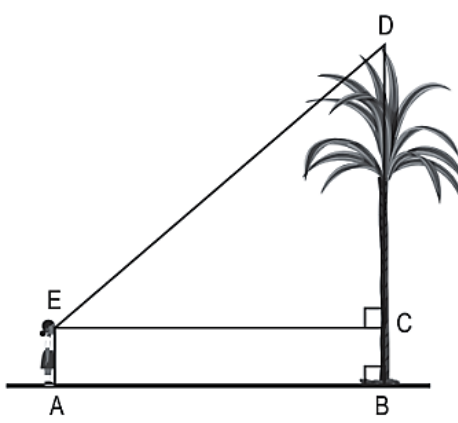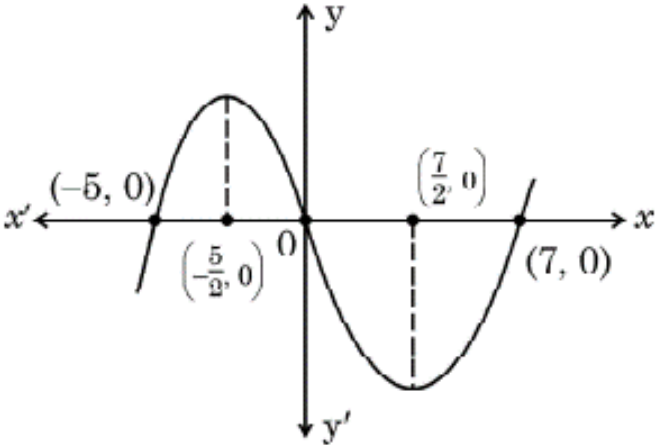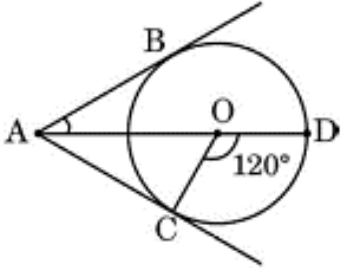
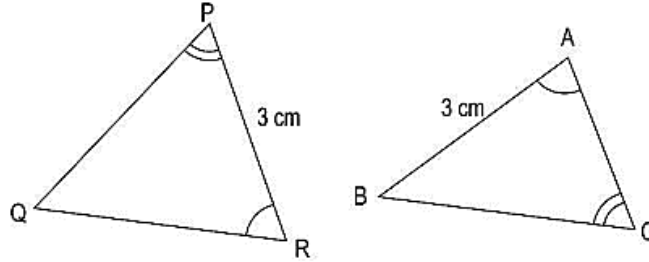| (A)	$\frac{1}{3}$	(B)	0.1	(C)	3%	(D)	$\frac{17}{16}$

Q.2.	In given fig, O is the centre of a circle. If the area of the sector OAPB is $\frac{5}{36}$ times the area of the circle, what is the value of x.								
	(A)	70°	**(B)**	60°	**(C)**	50°	**(D)**	80°	

Q.3.	The mean and median of a frequency distribution are 12 and 15 respectively. The mode of the distribution is								
	(A)	13.5	**(B)**	21	**(C)**	6	**(D)**	14	

Q.4.	The pair of equations ax + 2y = 9 and 3x + by = 18 represents parallel lines, where a, b are integers if								
	(A)	a = b	**(B)**	3a = 2b	**(C)**	ab = 6	**(D)**	2a = 3b	

Q.5.	In what ratio, does x-axis divide the line segment joining the points A (3, 6) and B (-12, -3)?								
	(A)	1: 2	**(B)**	1: 4	**(C)**	4: 1	**(D)**	2: 1	

Q.6.	In a formula racing competition, the time taken by two racing cars A and B to complete one round of the track is 30 minutes and p minutes respectively. If the cars meet again at the starting point for the first time after 90 minutes and the HCF (30, p) = 15, then the value of p is								
	(A)	45 minutes	**(B)**	60 minutes	**(C)**	75 minutes	**(D)**	180 minutes	

Q.7.	If $2 \sin 2A = \sqrt{3}$, then $\angle$ A is equal to								
	(A)	60°	**(B)**	45°	**(C)**	30°	**(D)**	90°	

Q.8.	PQ is a line segment such that the y-coordinate of P is -1 and Q lies on the y-axis. The midpoint of PQ is R (-3, -6). Then the coordinates of Q are						
	(A)	(-11, 0)	**(B)**	(-5, 0)	**(C)**	(0, -11)	**(D)**	(0, -5)

Q.9.	If x = r sin θ and y = r cos θ, then the value of $x^2 + y^2$ is						
	(A)	r	**(B)**	r^2	**(C)**	$\dfrac{1}{r}$	**(D)**	1

Q.10.	The number of revolutions made by a circular wheel of radius 0.7 m in covering a distance of 176 m is:						
	(A)	24	**(B)**	22	**(C)**	75	**(D)**	40

Q.11.	If the sum of first n terms of an A.P is $3n^2 + n$ and its common difference is 6, then its first term is						
	(A)	2	**(B)**	3	**(C)**	1	**(D)**	4

Q.12.	In the figure below, the height of the girl is 1.5 m and the height of the tree is 13.5 m. If AB = 12 $\sqrt{3}$m, then the angle of elevation of the top of the tree from her eyes is						

	(A)	45°	**(B)**	30°	**(C)**	60°	**(D)**	90°

Q.13.	The value(s) of k for which the roots of the quadratic equation $x^2 + 4x + k = 0$ are real, is						
	(A)	k $\geq$ 4	**(B)**	k $\leq$ 4	**(C)**	k ≥ -4	**(D)**	k ≤ -4

Q.14.	Two different dice are thrown together. The probability of getting the sum of the two numbers less than 7 is						
	(A)	$\dfrac{7}{12}$	(B)	$\dfrac{5}{12}$	(C)	$\dfrac{3}{11}$	(D)	$\dfrac{5}{11}$

| Q.15. | The graph of y = p(x) is given in the figure below. Zeroes of the polynomial p(x) are |

	(A)	$-\dfrac{5}{2}, \dfrac{7}{2}$	(B)	-5, 0, 7	(C)	$-5, -\dfrac{5}{2}, \dfrac{7}{2}, 7$	(D)	-5, 7

Q.16.	Two cubes each with 5cm edge are joined end to end. The surface area of the resulting cuboid is
	(A)	$600\ cm^2$	(B)	$150\ cm^2$	(C)	$250\ cm^2$	(D)	$300\ cm^2$

| Q.17. | In the given figure, AC and AB are tangents to a circle centered at O. If ∠ COD = 120°, then ∠BAO is equal to |

	(A)	30°	(B)	45°	(C)	60°	(D)	90°

Q.18.	Two scalene triangles are given below.

Anas and Rishi observed them and said the following:

Anas: *ΔPQR is similar to ΔCBA*   **Rishi:** *ΔPQR is congruent to ΔCBA*

Which of them is/are correct?

(A)	Only Anas	(B)	Only Rishi	(C)	Both Anas and Rishi	(D)	Neither of them

Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

  (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.

Q.19.	**Assertion (A):** PA and PB are tangents to the circle centered at O and ∠ OPA = 30°. Then Δ PAB is an equilateral triangle.

Reason (R): The angle between two tangents drawn from an external point to a circle is complementary to the angle subtended by the line segment joining the points of contact at the centre.

Q.20.	**Assertion (A):** The sum of first 100 natural numbers is 5050.

Reason (R): The sum of first n natural numbers is $\frac{n(n+1)}{2}$.

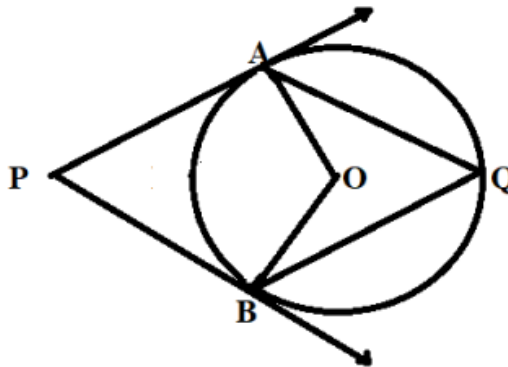|	**SECTION B**
	Section B consists of 5 questions of 2 marks each.
Q.21.	A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability that the card drawn is (i) not an ace (ii) either a king or a queen
Q.22.	(a) The length of the minute-hand of a clock is 14 cm. Find the area swept by the minute hand in 20 minutes. **OR** (b)Area of a sector of a circle of radius 36 cm is $54\pi\ cm^2$. Find the length of the corresponding arc of the sector.
Q.23.	(a) If tan (A + B) = $\sqrt{3}$ and tan (A − B) = $\frac{1}{\sqrt{3}}$; 0° < A + B < 90°; A > B, find A and B **OR** (b)Find the value of x: $2cosec^2 30° + x\ sin^2 60° - \frac{3}{4} tan^2 30° = 10$
Q.24.	Renu purchases two bags of fertilizer of weights 69 kg and 75 kg. Find the maximum value of weight which can measure the weight of the fertilizer exact number of times.
Q.25.	In the given figure, O is the centre of circle. Find ∠AQB, given that PA and PB are tangents to the circle and ∠APB= 75°.

SECTION C

Section C consists of 6 questions of 3 marks each.

Q.26. If the median of the following data is 240, then find the value of the missing frequency f:

Classes	0 -100	100 -200	200 -300	300 -400	400 -500	500 - 600	600 - 700
Frequency	15	17	f	12	9	5	2

Q.27. If α and β are the zeroes of the polynomial p(x) = $2x^2 + 5x + k$ satisfying the relation, $\alpha^2 + \beta^2 + \alpha\beta = \dfrac{21}{4}$, then find the value of k.

Q.28.

(a) If the system of linear equations 2x + 3y = 7 and 2ax + (a + b) y = 28 have infinite number of solutions, then find the values of 'a' and 'b'.

OR

(b) The ratio of the monthly incomes of two persons is 9: 7 and the ratio of their expenditures are 4: 3. If each of them saves ₹ 2000 monthly, find their incomes.

Q.29. Prove that $\dfrac{\cot A - \cos A}{\cot A + \cos A} = \dfrac{\cos^2 A}{(1+sinA)^2}$

Q.30. Show that $5 + 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

Q.31. (a) If AD and PM are medians of triangles ABC and PQR, respectively where ΔABC~ ΔPQR, prove that $\dfrac{AB}{PQ} = \dfrac{AD}{PM}$.

OR

(b) The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\dfrac{AO}{BO} = \dfrac{CO}{DO}$. Show that ABCD is a trapezium.
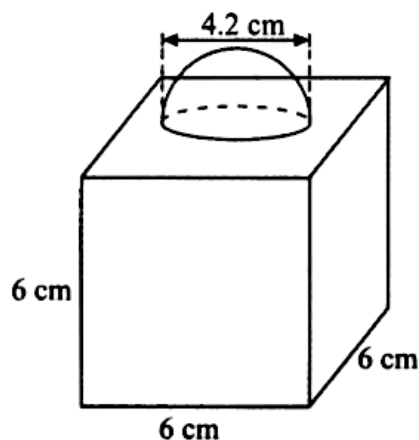
SECTION D

Section D consists of 4 questions of 5 marks each.

Q.32.

(a) In the given figure, a decorative block is shown which is made of two solids, a cube and a hemisphere. The base of the block is a cube with edge 6 cm and the hemisphere fixed on the top has a diameter of 4.2 cm.

Find (i) the total surface area of the block

(ii) the volume of the block formed.

OR

(b)A circus tent is in the shape of a cylinder surmounted by a conical top of same diameter. If their common diameter is 56 m, the height of cylindrical part is 6 m and the total Height of the tent above the ground is 27 m, find the area of canvas used to make the tent keeping a provision of $64m^2$ of canvas for stitching and wastage. Also, find the cost of the canvas to be purchased at the rate of ₹ 120 per m^2.

Q.33.

250 apples in a box were weighed and the distribution of masses of the apples is given in the following table:

Mass (in grams)	80 - 100	100 - 120	120 - 140	140 - 160	160 - 180
No. of apples	20	60	70	40	60

Find the mean and modal mass of the apples:

Q.34.	(a) Solve for x: $\dfrac{3}{x+1} + \dfrac{4}{x-1} = \dfrac{29}{4x-1}$; $x \neq 1, -1, \dfrac{1}{4}$
	OR
	(b) The diagonal of a rectangular field is 16 m more than the shorter side. If the longer side is 14 m more than the shorter side, then find the lengths of the sides of the field.
Q.35.	(i) Prove that the lengths of tangents drawn from an external point to a circle are equal.
	(ii) From an external point P, two tangents, PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D, respectively. If PA = 10 cm, find the perimeter of $\triangle PCD$.
	SECTION E
	This section comprises 3 case study- based questions of 4 marks each.
Q.36.	**Case Study- 1**
	Ahana being a plant lover decides to convert her balcony into beautiful garden full of plants. She bought few plants with pots for her balcony. She placed the pots in such a way that number of pots in the first row is 2, second row is 5, third row is 8 and so on.
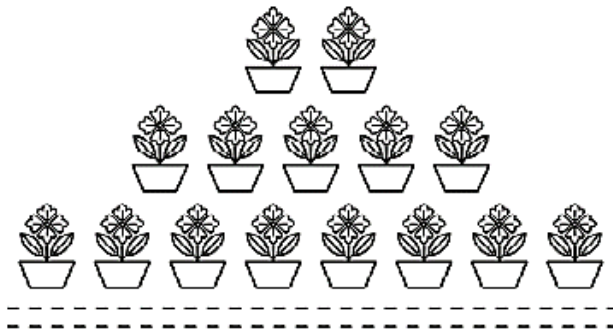
Based on the above information, answer the following questions:

| (i)	Find the number of pots placed in the 10th row.	1m
(ii)	Find the difference in the number of pots placed in the 5th row and 2nd row.	1m
(iii)	(a) If Ahana wants to place 100 pots in total, then find the total number of rows formed in the arrangement.	2m
	OR	
(iii)	(b) If Ahana has sufficient space for 12 rows, then how many total number of pots are placed by her with the same arrangement?	2m

Q.37.

Case Study – 2

Carpooling: It is the sharing of car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves.

Three friends Amar, Bandhu and Chakradev lives in societies represented by the points A, B and C respectively. They all work in offices located in the same building represented by the point O (0, 0). Since they all go to same building every day, they decided to do carpooling to save money on petrol.
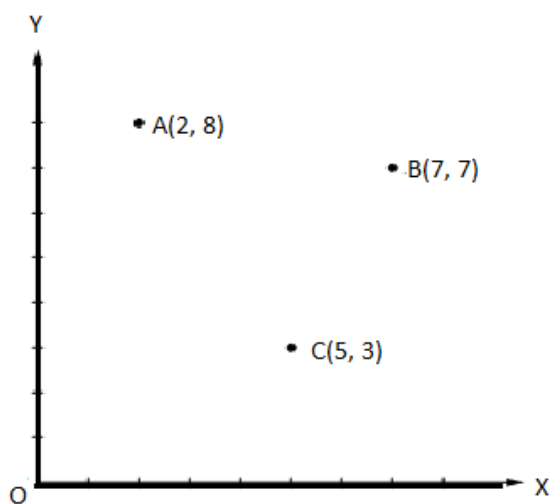
Based on the above information, answer the following questions:

(i)	Which society is nearest to the office O?	1m
(ii)	What is the distance between A and C?	1m
(iii)	(a)If Amar and Bandhu planned to meet at a club situated at the point D which divides the line segment joining the points B and C in the ratio 1: 2, then find the coordinates of the point D.	2m
	OR	
(iii)	(b) Find the least distance among AB, OA and BC?	2m

Q.38.

Case Study- 3

A guard, stationed at the top of a 240 m lighthouse, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes. The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30°.

Based on the above information, answer the following questions:

(i)	Make labelled figure on the basis of the given information.	1m
(ii)	Calculate the distance of the boat from the foot of the lighthouse.	1m
(iii)	(a)After 10 minutes, the guard observed that the boat was approaching the lighthouse and its distance from the lighthouse is reduced by $240(\sqrt{3} - 1)$ m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the lighthouse? **OR**	2m
(iii)	(b) Find the distance of the boat from the lighthouse if the angle of depression of the boat coming towards the lighthouse is found to be 60°. (Use $\sqrt{3} = 1.73$)	2m

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