INDIAN SCHOOL AL WADI AL KABIR
Final Examination (2023-24)

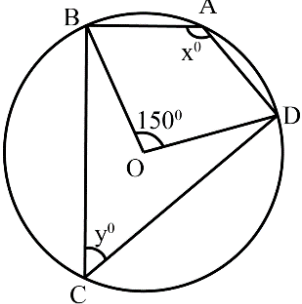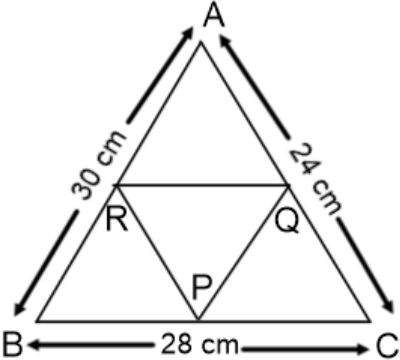| Class: IX	Sub: MATHEMATICS (041)	Max Marks: 80
Date: 27/02/2024	(SET 2)	Time:3 hours

General Instructions:

1. This question paper has 5 sections- A, B, C, D and E.
2. Section A- (MCQ) comprises of 18 questions of 1 mark each and 2 Assertion Reasoning questions of 1 mark each.
3. *Section B-* (Short answer) comprises of 5 questions of 2mark each.
4. *Section C-* (Long answer) comprises of 6 questions of 3 marks each.
5. Section D- (Long answer) comprises of 4 questions of 5 marks each.
6. Section E – comprises of 3 Case study-based questions of 4 marks each with sub parts of the values 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 2 Qs of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
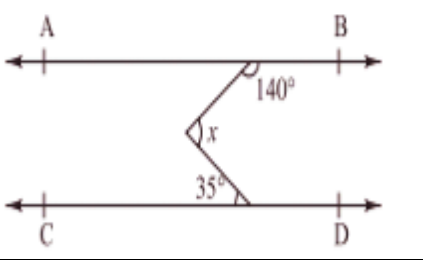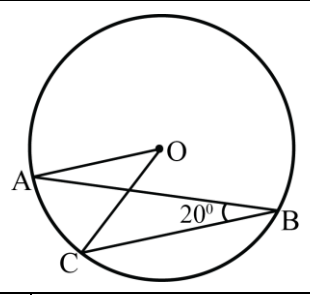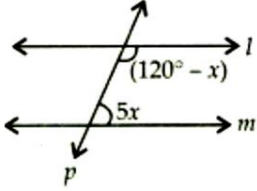
Section A
PART-1(MCQ-1 mark each)

Q.1. Mehul does not like the colour painted on the large wooden ball he has. So, he wants to scratch and remove the colour so that he can paint it with another colour. If the diameter of the ball is 7m, the area he has to scratch will be:

A	$154m^2$	**B**	$145m^2$	**C**	$77m^2$	**D**	$308m^2$

Q.2. The value of a and b if $\frac{\sqrt{2}-1}{\sqrt{2}+1} = a + b\sqrt{2}$ is:

A	$a = 3, b = -2$	**B**	$a = 2, b = 3$	**C**	$a = 3, b = 2$	**D**	$a = -3, b = -2$

Q. 3.	The length of each side of an equilateral triangle is $4\sqrt{3}cm$. Then its area is:							
	A	$21\sqrt{3}cm^2$	**B**	$12\sqrt{3}cm^2$	**C**	$16\sqrt{3}cm^2$	**D**	$8\sqrt{3}cm^2$

Q. 4.	The simplest rationalizing factor of $\frac{1}{\sqrt{12}}$ is:							
	A	$\sqrt{6}$	**B**	$\sqrt{3}$	**C**	$\sqrt{5}$	**D**	$\sqrt{2}$

Q. 5.	If P$(-1,1)$, Q$(3,-4)$, R$(1,-1)$, S$(-2,-3)$ and T$(-4,4)$ are plotted on the graph paper, then the points in the fourth quadrant are:							
	A	P and T	**B**	Q and R	**C**	P and S	**D**	R and S

Q. 6.	In the given figure, O is the centre of the circle. If $\angle BOD = 150°$, then, the values of x and y respectively are:	

	A	$60°, 120°$	**B**	$70°, 110°$	**C**	$150°,30°$	**D**	$105°,75°$

Q. 7.	In ΔABC, AB = 30 cm, BC = 28 cm and AC= 24 cm respectively. If a tape is placed along the sides of ΔQPR which is formed by joining the midpoint of AB, BC and AC respectively, then the length of the tape is:

|	**A**	41 cm	**B**	82 cm	**C**	84 cm	**D**	42 cm

Q. 8.	Which among the following expresses $1.\overline{7}$ in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$?							
	A	$\dfrac{90}{16}$	**B**	$\dfrac{16}{90}$	**C**	$\dfrac{9}{16}$	**D**	$\dfrac{16}{9}$
Q. 9.	"If equals are added to the equals, the wholes are equal" is stated in the form of:							
	A	an axiom	**B**	a definition	**C**	a postulate	**D**	a proof
Q.10.	If $x + 1$ is a factor of the polynomial $2x^2 + kx$, then the value of k is:							
	A	-2	**B**	4	**C**	2	**D**	-3
Q.11.	In ΔABC and ΔPQR, AB = PQ and ∠B = ∠Q. Then the two triangles will be congruent by SAS axiom if:							
	A	AC = PR	**B**	BC = PQ	**C**	AC = QR	**D**	BC = QR
Q.12.	For a frequency distribution, the mid value of the class is 65 and the class size is 8. The upper limit of the class interval is:							
	A	57	**B**	73	**C**	69	**D**	61
Q.13.	The sides of a triangle are in the ratio 12:14:25 and its perimeter is $255\,m$. The measure of the greatest side of the triangle is:							
	A	$120\,m$	**B**	$125\,m$	**C**	$60\,m$	**D**	$70\,m$
Q.14.	Volume of a right circular cone of base area 50cm² and height 9 cm is_____.							
	A	$50\ cm^3$	**B**	$450\ cm^3$	**C**	$150\ cm^3$	**D**	$1350\ cm^3$

Q.15.	In the given figure, AB||CD, then the value of x is:						
	A	285°	**B**	75°	**C**	105°	**D**	145°

Q.16.	In the given figure, O is the centre of the circle.
	If ∠ ABC=20°, then ∠AOC is_____.

	A	20°	**B**	60°	**C**	40°	**D**	10°

Q.17.	The value of k, if x = 2, y = -1 is a solution of the equation 2x - 3y = k is:

	A	1	**B**	6	**C**	5	**D**	7

Q.18.	The value of $300^2 - 299^2$ is_____.

	A	1	**B**	499	**C**	600	**D**	599

ASSERTION AND REASONING (1 mark each)

DIRECTION: 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.

Q.19	**Assertion:** $(x - 1)$ is a factor of $x^3 + 3x^2 + 5x + 9$ **Reason:** If $p(x)$ be a polynomial of degree greater than or equal to one, then $(x - a)$ is a factor of $p(x)$, if $p(a) = 0$
Q.20	**Assertion:** In the given figure, if $l \parallel m$, then the value of x is 15^0. **Reason:** When two parallel lines are cut by a transversal then, each pair of corresponding angles are supplementary.
	Section B (S.A. 2 mark each)
Q.21.	a) The volume of two hemispheres are in the ratio 27:125. Find the ratio of their radii. OR b) Find the volume of a sphere whose surface area is $616 cm^2$. $\left(\pi = \frac{22}{7}\right)$
Q.22.	a) Simplify: $\sqrt{242} - \sqrt{50} + \sqrt{98}$. OR b) Represent $\sqrt{6.5}$ on a number line.
Q.23.	Pookalam is the flower bed or flower pattern designed during Onam in Kerala. Soumya and her friends made a pookalam with isosceles triangle whose perimeter is 32 m and each of the equal sides is 10 m. If the pookalam was made with 8 isosceles triangles, find the total area of the pookalam.

Q.24.	The following graph gives the information about the number of railway tickets sold for different cities on a railway ticket counter between 6.00 am to 10.00 am. Read the bar graph and answer the following questions.
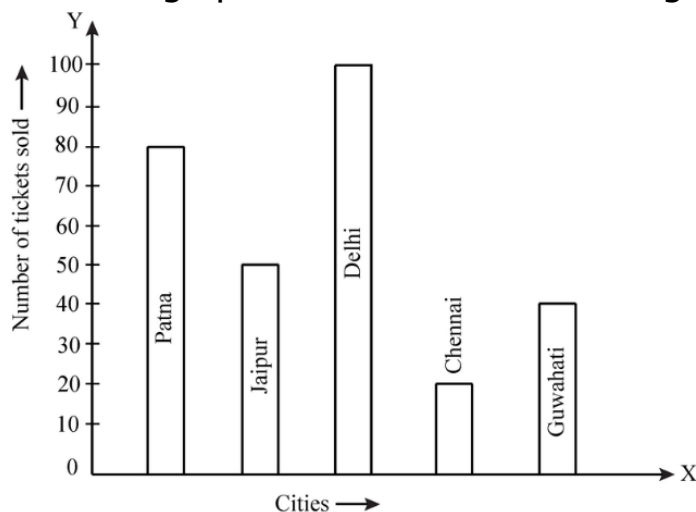
(a) How many tickets were sold in all?
(b) For which city was the maximum number of tickets sold?
(c) For which city was the minimum number of tickets sold?
(d) Find the number of tickets sold for Delhi and Patna taken together.

Q.25.	Express the equation $2(x - 3) + 3y = 0$ in the form of $ax + by + c = 0$ and indicate values of a, b and c.

Section C

(S.A. 3 mark each)

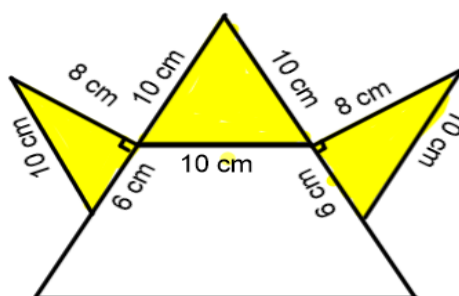| Q.26.	Plot the points A(5, 7), B(5, -1), C($-3, -1$) and D(-3, 7) on the graph paper. Join the points A, B, C and D in order and identify the figure formed.
Q.27.	State any three Euclid's axioms.
Q.28.	Draw a frequency polygon for the following distribution:

Marks obtained	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$	$50-60$
No. of students	7	10	6	8	12	3

Q.29.	a) If f$(x) = 2x^3 - 2x^2 + 5x - 4$, find f(2) + f(-1) +f(0) Or b) Factorize $x^3 - 8x^2 + 5x + 14$.
Q.30.	a) AB is a line segment. P and Q are points on opposite sides of AB, such that each of them is equidistant from the points A and B. Show that: i) Δ PAQ ≅ Δ PBQ. ii) Is ∠ APQ = ∠ BPQ? iii) Δ PAC ≅ Δ PBC. iv) PC is perpendicular to AB. OR b) ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB. Show that ∠ BCD is a right angle.
Q.31.	Suman made a picture with some white paper and grey paper as shown in the figure. White paper is available at her home free of cost. Find the cost of grey paper used at the rate of 50 paise per cm^2. (take $\sqrt{3} = 1.73$)
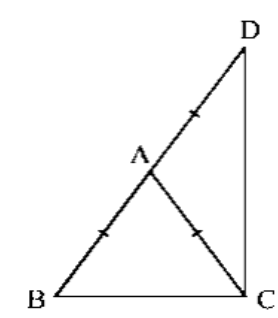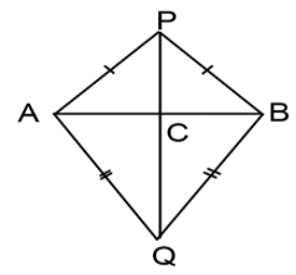
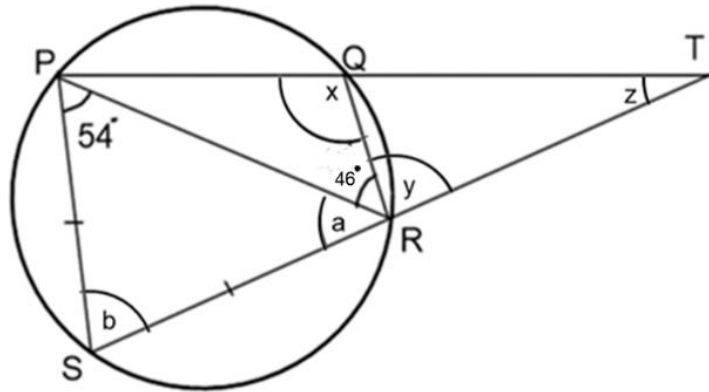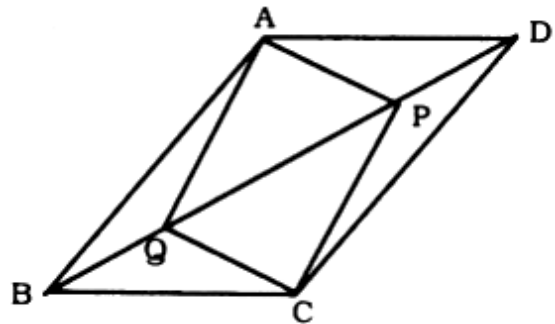|	**Section D**
	(L.A.-5 mark each)
Q.32.	a) Simplify: $\dfrac{4}{(343)^{-\frac{2}{3}}} + \dfrac{1}{(625)^{-\frac{3}{4}}} + \dfrac{2}{(243)^{-\frac{1}{5}}}$ OR b) If $x = \dfrac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}}$, $y = \dfrac{\sqrt{6}+\sqrt{5}}{\sqrt{6}-\sqrt{5}}$, then find the value of $(x + y)^3$
Q.33.	a) Prove that the angle subtended by an arc at the center is double the angle subtended by it at the remaining part of the circle. OR b) In figure, PS = SR, ∠RPS = 54° and ∠PRQ = 46°. Find the measure of angles a, b, x, y and z .
Q.34.	ABCD is a parallelogram. Two points P and Q are taken on the diagonal BD such that DP = BQ. Show that: i) ΔAPD ≅ ΔCQB. ii) AP = CQ. iii) ΔAQB ≅ ΔCPD. iv) AQ = CP. v) APCQ is a parallelogram.

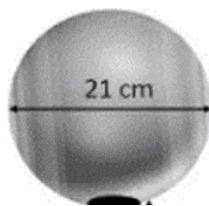| Q.35.	Find three solutions for the equation $x + 2y = 8$ and draw the graph of the linear equation.
	Section E
	(CASE STUDY BASED QUESTIONS- 4 mark each)
Q.36.	CASE STUDY-I Shubham was celebrating his birthday on a roof top garden restaurant along with his parents and sister Reshma. His parents invited their relatives, family friends and neighbours for the party. They decieded that they will provide birthday caps to all children below the age of 12 years. i) Reshma was very passionate for making birthday caps. If the height of a cap is 16 cm and base radius is 12 cm, find the slant height. (1) ii) Reshma served soup along with the starters. How many litres of soup can a conical vessel of base radius 21 cm and height 20 cm hold? $(use \ \pi = \frac{22}{7})$ (1) iii) a)Ravi asked the manager to decorate the hall with metallic spheres of diameter 21 cm as shown in the figure. The contractor painted each sphere with neon green. Find the cost of painting 4 such spheres at the rate of 50 paise per cm^2. (2) 21 cm OR b) A metallic sphere is of radius 2.1 cm. If the density of the metal is 7.8g/cm^3, find the mass of the sphere. (take $\pi=\frac{22}{7}$)

Q.37. CASE STUDY-II:

Polynomials are algebraic expressions that contain indeterminates and constants. Polynomials can be considered as a dialect of mathematics. They are used to express numbers in almost every field of mathematics and are considered very important in certain branches of math, such as calculus.

During an enrichment activity conducted in class IX, some paper slips were made and placed in the box with the name of the topic "POLYNOMIALS" written on it. The students were asked to pick one slip at a time and answer the question in the slip.
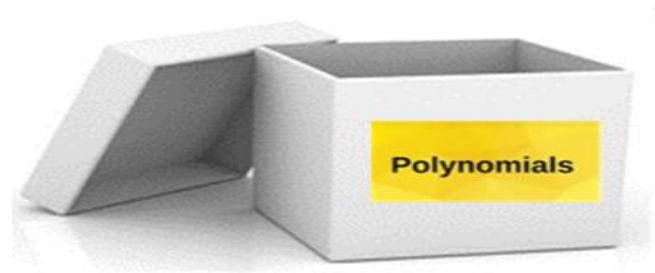
Based on the above information answer the following questions:

i)   The polynomial written on Anvi's slip was p(x)= $x^2 - 2\sqrt{2}x + 1$. What is the value of p ($2\sqrt{2}$)?   (1)

ii) Evaluate 104 × 96 using identities.   (1)

iii) a) If a + b + c=11, ab + bc + ca=36, find $a^2 + b^2 + c^2$.   (2)
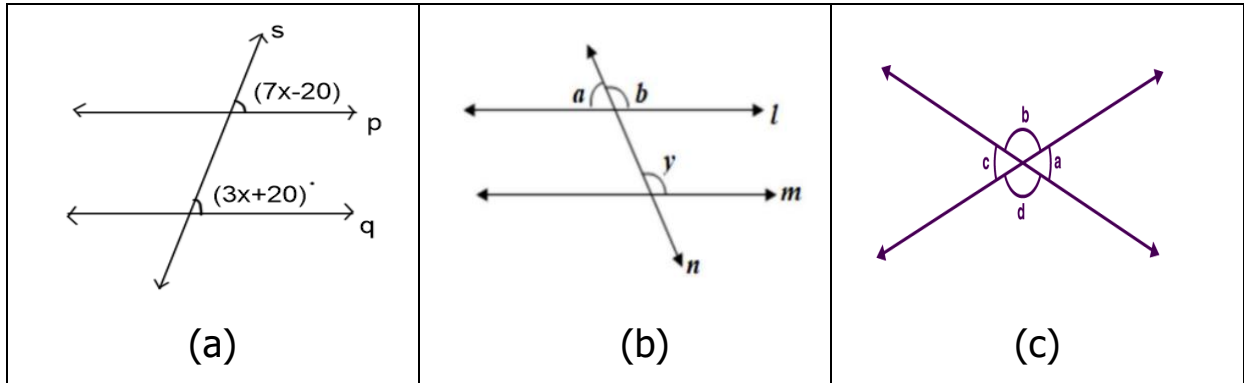
OR

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

Q.38. CASE STUDY-III

As the exams were fast approaching, the teacher did a brainstorming session on the topic Lines and Angles. The teacher drew some figures on the board.

Based on the information given, answer the following questions:

| (a) | (b) | (c) |

i) In figure (a), $p \parallel q$, s is the transversal. Find the value of x. (1)

ii) In figure (b), $l \parallel m$, n is the transversal. If a: b = 2:3. Then find the value of y. (1)

iii) a) In figure (c), Prove that if two lines intersect each other, then the vertically opposite angles are equal. (2)

OR

b) In the given figure, find the value of the angles x, y and z. (2)

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