KOTHARI INTERNATIONAL SCHOOL, NOIDA
TERM-END EXAMINATION, SESSION: 2023-24
GRADE: 9, SUBJECT: MATHEMATICS (041)
SET A

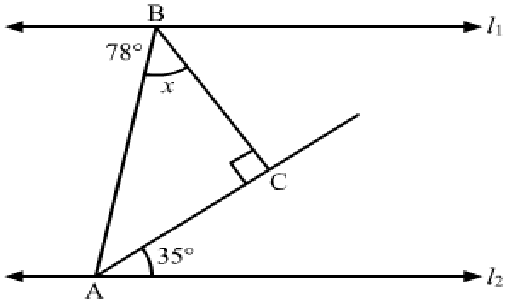
DATE & DAY: MONDAY, FEBRUARY 12, 2024
MAXIMUM MARKS: 80 **TIME ALLOTTED: 3 HOURS**
NAME: ________________ **ROLL NUMBER:___________**

GENERAL INSTRUCTIONS:

1. *This Question Paper has 5 Sections A-E.*
2. *Section A has 20 MCQs carrying 1 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)*
7. *All Questions are compulsory. However, internal choice has been provided in each section*
8. *Draw neat figures wherever required. Take π =22/7 wherever required if not stated.*

Q.No.	SECTION – A (20*1 = 20)	Marks
1.	If the volume of a sphere is numerically equal to its surface area, then its diameter is: (a)2 units (b) 1 unit (c) 3 units (d) 6 units	1
2.	The coordinates of the two points are P(4,6) and Q(-5,-7). Find (abscissa P – abscissa Q) (a) - 1 (b) 9 (c) 13 (d) - 9	1
3.	“If $x + y = 10$ then $x + y + z = 10 + z$. Then Euclid’s axiom that illustrates this statement is: (a) First axiom (b) Second axiom (c) Third axiom (d) Fourth axiom	1
4.	A rabbit covers y metres distance by walking 10 metres in slow motion and the remaining by x jumps, each jump contains 2 metres. Express this information in a linear equation. (a) 2x +y = 10 (b) 2y + 2x = 10 (c) y = 10 + 2x (d) y + 10 =2x	1
5.	Factor of $27x^3 + 8y^3 + 54x^2y + 36y^2x$ is (a) 3x+2y (b) 3x-2y (c) 9x-8y (d) 9x+8y	1
6.	Which of the following statements is true? (a) π and 22/7 are both rational (b) π and 22/7 are both irrational (c) π is rational and 22/7 is irrational (d) π is irrational and 22/7 is rational	1

7. In the given figure, for which value of x is $l_1 \parallel l_2$? **1**



(a) 37° (b) 43° (c) 45° (d) 47°

8. The graph of linear equation 6x-2y = 8 cuts the y-axis at (a) (0,-2) (b) (0, 4) (c) (0, -4) (d) (0, 2) **1**

9. The number of line segments determined by three collinear points is: **1**
(a) 1 (b) 2 (c) 3 (d) 4

10. The range of the data 25, 18, 20, 22, 16, 6, 17, 15, 12, 30, 32, 10, 19, 8, 11 and 20 is **1**
(a) 10 (b) 15 (c) 18 (d) 26

11. (x+1) is a factor of $x^n + 1$ only if **1**
(a) n is an odd integer (b) n is an even integer
(c) n is a negative integer (d) n is a positive integer

12. AD is the diameter of a circle and AB is a chord. If AD = 34 cm, AB = 30 cm, the distance of AB from the centre of the circle is **1**
(a) 17 cm (b) 15 cm (c) 4 cm (d) 8 cm

13. Side BC of a triangle ABC has been produced to a point D such that ∠ACD = 120°. If ∠B = 1/2 ∠A then measure ∠B is equal to **1**
(a) 80° (b) 75° (c) 60° (d) 90°

14. If a + b + c = 7 and ab + bc + ca = 20, find the value of $a^2 + b^2 + c^2$ **1**
(a) 49 (b) 40 (c) 9 (d) 90

15. The region between a chord and either of it arcs is called : **1**
(a) sector of a circle (b) segment of a circle
(c) quadrant of a circle (d) secant of a circle

16. The number of consecutive zeros in $2^3 \times 3^4 \times 5^4 \times 7$, is **1**
(a) 3 (b) 4 (c) 2 (d) 5

17. The product $(a + b)(a - b)(a^2 - ab + b^2)(a^2 + ab + b^2)$ is equal to **1**
(a) $a^6 + b^6$ (b) $a^6 - b^6$ (c) $a^3 - b^3$ (d) $a^3 + b^3$

18. In a frequency distribution, the mid-value of a class is 10 and the width of the class is 6. The lower limit of the class is : **1**
(a)6 (b) 8 (c) 10 (d) 7

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 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 the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but 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):** $7^8 \div 7^4 = 7^4$ **1**

Reason (R): If a > 0 be a real number and p and q are rational numbers.
Then $a^p \times a^q = a^{p+q}$.

20. **Assertion (A):** The height of a triangle is 18 cm and its area is $72 cm^2$ and its base is 8 cm **1**

Reason: Area of triangle= ½ base x height

SECTION – B (5 * 2= 10)

21 The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. Find the ratios of the surface areas of the balloon in the two cases. **2**

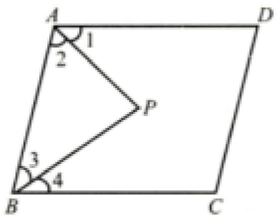
22 If $\frac{a}{b} + \frac{b}{a} = -1$, **2**

then find the value of a^3 - b^3

OR

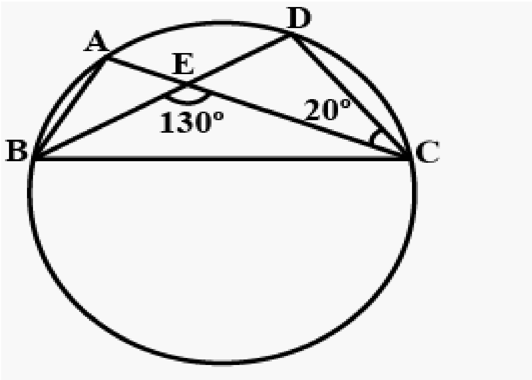
If (x + 1) is a factor of $ax^3 + x^2 - 2x + 4a - 9$, find the value of a.

23 In the given figure, AP and BP are angle bisector of ∠A and ∠B which meets at P on the parallelogram ABCD. Then 2∠APB = **2**



a. ∠ C+∠ D
b. ∠ A+∠ C
c. ∠ B+∠ D
d. 2 ∠ C

24 A,B,C,D are the four points on a circle. AC and BD intersect at a point E such that BEC = 130° and ECD = 20° . Find ∟BAC **2**



25 Evaluate : 2

$$\frac{4}{7}\sqrt{147} + \frac{3}{8}\sqrt{192} - \frac{1}{5}\sqrt{75}$$

SECTION – C (6*3 = 18)

26 If $\left(\frac{3}{4}\right)^{6} \times \left(\frac{16}{9}\right)^{5} = \left(\frac{4}{3}\right)^{x+2}$, find the value of x. 3

27 A hemispherical bowl is made of steel 0.25 cm thick. The inside radius of the bowl is 5 cm. find the volume of steel used in making the bowl. 3

OR

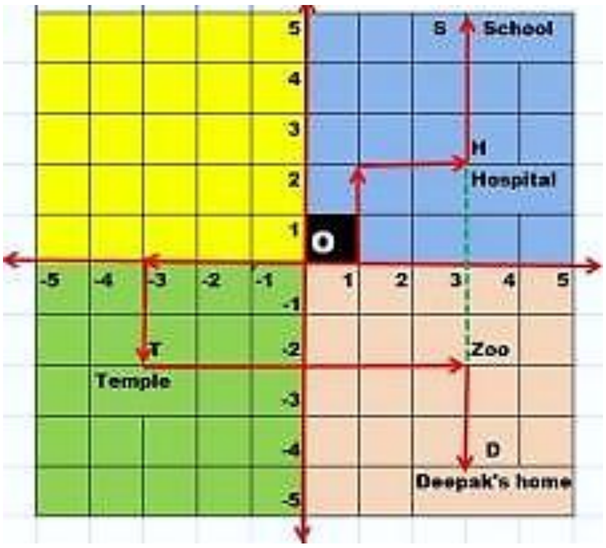
A spherical ball of lead 3 cm in diameter is melted and recast into three spherical balls. If the diameters of two balls be 3/2 cm and 2 cm, find the diameter of the third ball.

28 The Radius of the circle is 10 cm. There are two chords of length 16 cm each. What will be the distance of these chords from the centre of the circle? 3

OR

Prove that the angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

29 Read the Source/Text given below and answer the questions: 3



In the above picture, one small square is of size 1 km x1 km. From the starting point O(0,0) Deepak started to drive towards his home. He first drove 3km to the left then he turned to his left and drove 2 km, there he found a temple. He worshipped there and drove 6km in the left direction, there was a zoo, and from the zoo, he drove 2km on the right side, and then he reached his home.
From O Sanjay drove for his school, he drove 1km to his right then took a left turn and drove 2km then again took a right turn and drives 2 km. He found a hospital on the way. From the Hospital, he drove 3 km and finally reached his school.

A. What are the coordinates of the Hospital?

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

B. What is common abscissa of school, Hospital, Zoo, and Deepak's home?

(a)5 (b) 7 (c) 3 (d) 2

C. Deepak Drove in which quadrants?

(a) I and II (b) II and III (c) III and IV (d) IV and I

OR

Find the area of the polygon formed by plotting the points *P* (0, 1), *Q* (0, 5), and *R* (3, 4) on the graph.

30 Factorize the cubic equation $x^3 – 23x^2 + 142x – 120$. **3**

31 (I) Show that x = 2 and y = 1 satisfy the linear equation 2x + 3y = 7. **1**
(II) Write four solutions of 2x + 3y = 8. **2**

OR

Ravish tells his daughter Aarushi, "Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be". If the present ages of Aarushi and Ravish are *x* and *y* years respectively, then find their present ages.

SECTION – D (4 * 5 = 20)

32 A hemispherical dome of a building needs to be painted. if the circumference of the base of the dome is 17.6 m, find the cost of painting it, given the cost of painting is Rs. 5 per 100 cm^2 **5**

OR

Find the radius and the curved surface area of the cone made from a quadrant of a circle of radius 42 cm.

33 A random survey of the number of children of various age groups playing in the park was found: **3**

2

Age [in years]	1 - 2	2 - 3	3 - 5	5 - 7	7 - 10
No. of children	3	5	7	10	13

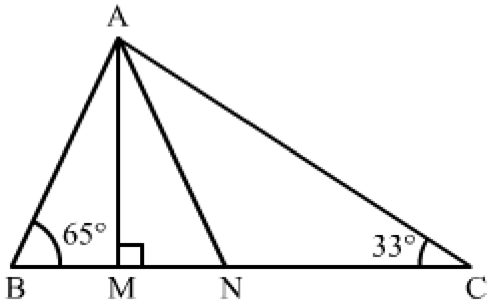
Draw a histogram to represent the data above.

OR

Draw the frequency polygon representing the following frequency distribution.

Class interval	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 59
Frequency	12	16	20	8	10	4

34 In the given figure, $AM \perp BC$, and AN are the bisectors of $\angle A$. If $\angle B = 65°$ and $\angle C = 33°$, find $\angle MAN$. **5**



35 The polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by $(x - 4)$ leave the remainders R_1 and R_2 respectively. Find the values of a in each of the following cases, if **0.5**

(a) $R_1 = R_2$

(b) $R_1 + R_2 = 0$ **1.5**

(c) $2R_1 - R_2 = 0$ **1.5**

OR **1.5**

If $a = \dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $b = \dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, find the value of $a^2 + b^2 - 5ab$. **5**

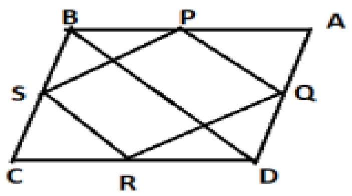
SECTION-E (3 * 4 =12)

36 Triangles are used in bridges because they evenly distribute weight without changing their proportions. When force is applied on a shape like a rectangle it would flatten out. Before triangles were used in bridges, they were weak and could not be very big. To solve that problem engineers would put a post in the middle of a square and make it more sturdy. Isosceles triangles were used to construct a bridge in which the base and equal sides of an isosceles triangle are in the ratio 1:2:2 and its perimeter is 200 m.

A. What are the measurements of the sides of the Isosceles Triangle? **1**

B. What is the semi-perimeter of the Isosceles Triangle?
C. Find the area of the Isosceles Triangle . **1**
2

37 The class teacher of IX class gave students colored papers made by recycling waste products in the shape of a quadrilateral. She asked them to make a parallelogram from it using paper folding.
Then the teacher asks them some questions.



To answer these questions, choose the correct option.
A. How can a parallelogram be formed by using paper folding?
a) Joining the sides of quadrilateral
b) Joining the midpoints of sides of quadrilateral **1**
c) Joining the vertices of quadrilateral
d) None of the above

B. Which of the following is the correct condition?
a) PQ= BD b) PQ= ½ BD c) 3PQ=BD d) PQ=2BD

1

C. Which of the following is the correct condition?
a) 2RS= BD b) RS = 1/3BD c) RS =BD d) RS = 2BD

1

D. Write the formula to find the perimeter of quadrilateral PQRS
a) PQ +QR+RS+PS b) PQ-QR-RS +PS
c) (PQ+QR+RS+PS)/2 d) (PQ+QR+RS+PS)/3 **1**

38 Amit and Rahul are friends who have brilliant ideas and wish to initiate a start-up. They both decide to put in a certain amount to kick the start-up. The product of their investment is given by the polynomial $A(x) = 4x^2 + 12x + 5$ which is the product of their individual investment.

A. What is the total investment by both is x = 1000?
(a)40102005 (b) 4012050 (c) 401205 (d) 4012005 **1**

B. The share of Amit and Rahul invested individually?
(a) (2x + 3,2x + 5) (b) (2x + 1,2x + 3) (c) (2x + 5,2x + 1) (d) None of these **1**

C. What is the name given to the polynomial which represents the amount invested by each one of them?
(a) Cubic (b) Quadratic (c) Linear (d) Zero **1**

D. What is the value of x, if the amount invested by each is equal to zero?
(a) -1/2 (b) – 5/2 (c) Both (a) and (b) (d) None of These **1**