



BK BIRLA CENTRE FOR EDUCATION
SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY | CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL



MID-TERM EXAMINATION 2024-25

MATHEMATICS (041)

Class: X
Date: 21/09/24
Name:

Duration: 3 Hrs
Max. Marks: 80
Exam RNo:

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and 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) with sub-parts.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks have been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

1. The HCF of the two numbers is 27 and their LCM is 162. If one of the numbers is 54, what is the other number? 1m
(a) 36 (b) 45 (C) 9 (d) 81
2. Π (pie) is 1m
(a) an integer (b) a rational Number (C) an irrational number (d) none of these
3. The distance of the point (-3,4) from the x-axis is 1m
(a) 3 (b) -3 (C) 4 (d) 5
4. If A (1,3), B (-1,2), C (2,5) and D(x,4) are the vertices of a parallelogram ABCD then the value of x is 1m
(a) 3 (b) 4 (C) 0 (d) 3/2
5. The pair of equations $2x + 3y = 5$ and $4x + 6y = 15$ has 1m
(a) a unique solution (b) exactly two solutions (C) infinitely many solutions (d) no solutions
6. If a pair of linear equations is inconsistent then the graph lines will be 1m
(a) parallel (b) always coincident (C) always intersecting (d) intersecting or coincident.
7. If one root of the equation $2x^2 + ax + 6 = 0$ is 2 the a is 1m
(a) 7 (b) -7 (C) 7/2 (d) -7/2
8. The sum of roots of $x^2 - 6x + 2 = 0$ is 1m
(a) 2 (b) -2 (C) 6 (d) -6
9. The sum of the first 20 odd natural numbers is 1m
(a) 100 (b) 210 (C) 400 (d) 420
10. What is the common difference of an A.P. where $a_{18} - a_{14} = 32$? 1m
(a) 8 (b) -8 (C) 4 (d) -4
11. If $\sin \alpha = \frac{1}{2}$ then $\cot \alpha = ?$ 1m

- (a) $1/\sqrt{3}$ (b) $\sqrt{3}$ (C) $\sqrt{3}/2$ (d) 1
12. If $\cos \alpha = 4/5$ then $\tan \alpha = ?$ 1m
 (a) $4/3$ (b) $3/5$ (C) $3/4$ (d) none of these
13. If the height of the vertical pole is equal to the length of its shadow on the ground, the angle of elevation of the sun is 1m
 (a) 0° (b) 30° (C) 45° (d) 60°
14. If the length of the shadow of a tower is $\sqrt{3}$ times its height then the angle of elevation of the sun is 1m
 (a) 0° (b) 45° (C) 30° (d) 60°
15. The area of a sector of a circle with a radius of 6 cm if the angle of the sector is 60° . 1m
 (a) $142/7$ (b) $152/7$ (C) $132/7$ (d) none of these
16. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. The length of the arc is 1m
 (a) 21 cm (b) 14 cm (C) 22 cm (d) none of these
17. The mode and mean are given by 7 and 8, respectively. Then the median is: 1m
 (a) $2/23$ (b) $3/23$ (C) $23/3$ (d) none of these
18. The class interval of a given observation is 10 to 15, then the class mark for this interval will be: 1m
 (a) 10 (b) 15 (C) 12.5 (d) none of these
19. Assertion (A):- If the value of mode and mean is 60 and 66 respectively, then the value of median is 64. 1m
 Reason (R):- Median = mode + 2 mean.
 (a) Both Assertion (A) and Reason (R) are the true and Reason (R) is a correct explanation of Assertion (A).
 (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
 (c) Assertion (A) is true and Reason (R) is false.
 (d) Assertion (A) is false and Reason (R) is true.
20. Assertion (A):- The point (a,0) lies on the y-axis. 1m
 Reason (R):- Any point which lies on the y-axis is of the form (0,a).
 (a) Both Assertion (A) and Reason (R) are the true and Reason (R) is a correct explanation of Assertion (A).
 (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
 (c) Assertion (A) is true and Reason (R) is false.
 (d) Assertion (A) is false and Reason (R) is true.

SECTION B

21. Prove that $2 + 3\sqrt{5}$ is an irrational number. 2m

OR

Prove that $\sqrt{5}$ is irrational.

22. For what value of k, the pair of equations $4x - 3y = 9$, $2x + ky = 11$ has no solution? 2m
23. Solve the following quadratic equation for x: $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ 2m

- 24 Which term of the progression 4, 9, 14, 19, ... is 109? 2m

OR

Find the 9th term from the end (towards the first term) of the A.P. 5, 9, 13, ..., 185.

- 25 The circumference of a circle is 22 cm. Calculate the area of its quadrant. 2m

SECTION C

- 26 Find the ratio in which the y-axis divides the line segment joining the points A (5, -6), and B (-1, -4). Also, find the coordinates of the point of division. 3m

- 27 Solve the following pair of equations: 3m
 $49x + 51y = 499$
 $51x + 49y = 501$

OR

Solve the following pair of linear equations for x and y:
 $(bx)/a + (ay)/b = a^2 + b^2$; $x + y = 2ab$

- 28 Find the number of all three-digit natural numbers which are divisible by 9. 3m

- 29 Prove that: 3m

$$\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$$

- 30 In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find: 3m
 (i) the length of the arc
 (ii) area of the sector formed by the arc.

OR

The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

- 31 If the mean of the following distribution is 50, find the value of p. 3m

Class	Frequency
0-20	17
20-40	p
40-60	32
60-80	24
80-100	19

OR

Solve the following quadratic equation for x: $9x^2 - 6b^2x - (a^4 - b^4) = 0$

SECTION D

- 32 The sum of the areas of two squares is 468 m^2 . If their perimeters differ from 24 m, find the sides of the two squares. 5m

OR

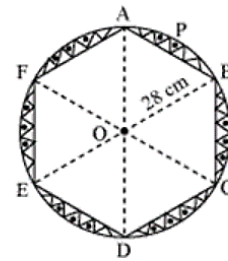
Solve the following quadratic equation for x: $9x^2 - 6b^2x - (a^4 - b^4) = 0$

- 33 The angles of depression of two ships from the top of a lighthouse and on the same side of it are found to be 45° and 30° . If the ships are 200 m apart, find the height of the lighthouse. 5m

OR

Two poles of equal heights are standing opposite to each other on either side of the road, which is 100 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles.

- 34 A round table cover has six equal designs as shown in Figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of Rs. 0.35 per cm^2 . (Use $\sqrt{3} = 1.7$)



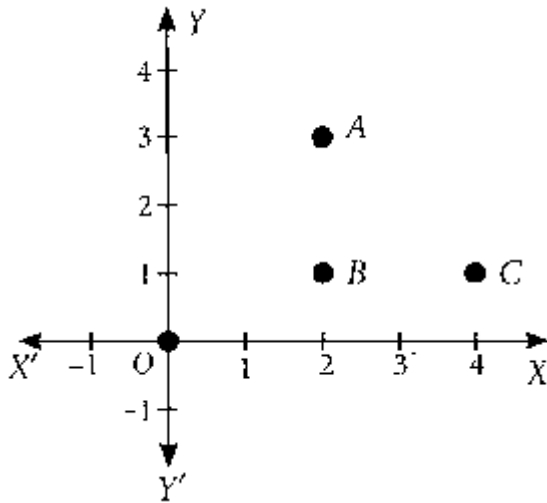
5m

- 35 Find the values of x and y if the median for the following data is 31. 5m

Class	Frequency
0-10	5
10-20	x
20-30	6
30-40	y
40-50	6
50-60	5
Total	40

SECTION E

- 36 Alia and Shagun are friends living on the same street in Patel Nagar. Shagun's house is at the intersection of one street with another street on which there is a library. They both study in the same school and that is not far from Shagun's house. Suppose the school is situated at the point O, i.e., the origin, Alia's house is at A. Shagun's house is at B and the library is at C. Based on the above information, answer the following questions. 4m



1. How far is Alia's house from Shagun's house?
 2. How far is the library from Shagun's house?
 3. How far is the library from Alia's house?
- Or
- How far is Shagun's house from school?

- 37 The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in the city are comprised of fixed charges together with the charge for the distance covered. For a journey of 12 km, the charge paid is Rs. 89; for a journey of 20 km, the charge is Rs.145. 4m
1. What are the equations formed for both conditions?
 2. What will a person have to pay for travelling a distance of 30 km?
 3. Why did he decide to use CNG for his taxi as fuel?
- 38 Accumulating plastics in the environment creates problems for wildlife, their habitats, and humans. Plastics are a threat to the environment. The children of Avantipur decided that they would contribute their service to end the usage of plastics in their village. They fixed posters and hoisted placards depicting plastics' ill effects on human health and the environment. They started their work in June 15th. They started collecting the thrown-off plastic bottles in their locality and started counting them. To their astonishment, they found that the number of plastic bottles that they collected each day was in Arithmetic Progression which went like this: 417,404,391, 4m



- 1. What is the common difference?**
- 2. How many bottles did they collect on June 25th?**
- 3. The children of Avantipur wanted to make their village a plastic-free zone. Identify the day on which they got 1 bottle which was their dream day.**

*******BEST OF LUCK*******