

ST. PAUL'S SCHOOL, AYA NAGAR
FINAL TERM EXAMINATION
SESSION 2023-24
MATHEMATICS (041)

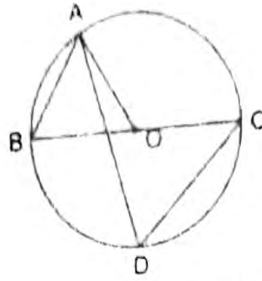
CLASS: IX
TOTAL MARKS: 80

DATE: 09-02-2024
TIME ALLOWED: 3 HOURS

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) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks, and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

SECTION - A		
Q1.	The product of any two irrational numbers is: (a) always an irrational number (b) always a rational number (c) always an integer (d) sometimes rational, sometimes irrational	[1]
Q2.	Point (- 2, 3) lies in the (a) first quadrant (b) second quadrant (c) third quadrant (d) fourth quadrant	[1]
Q3.	If (2, 0) is a solution of the linear equation $2x + 3y = k$, then the value of k is: (a) - 4 (b) 6 (c) 5 (d) 4	[1]
Q4.	In figure, BC is a diameter of the circle and $\angle BAO = 60^\circ$. Then $\angle ADC$ is equal to:	[1]



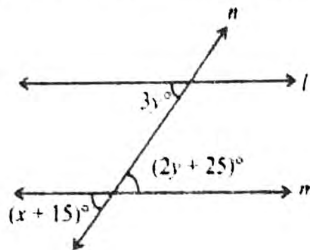
- (a) 30° (b) 45° (c) 60° (d) 120°

Q5. The base diameter of a cone is 10.5 cm, and its slant height is 10 cm. The area of a curved surface is:
 (a) 150 cm^2 (b) 165 cm^2 (c) 177 cm^2 (d) 180 cm^2

Q6. If $x + 2$ is the factor of $x^3 - 2ax^2 + 16$, then value of a is:
 (a) -7 (b) 1 (c) -1 (d) 7

Q7. If the ratio of the radius of two spheres is $1:4$, then the ratio of their volumes will be:
 (a) $1:5$ (b) $5:4$ (c) $5:16$ (d) $1:64$

Q8. In the given figure, if $l \parallel m$, what is the value of x ?



- (a) 60° (b) 50° (c) 45° (d) 30°

Q9. Which of the following equation has graph parallel to y -axis?

- (a) $y = -2$ (b) $x = 1$ (c) $x - y = 2$ (d) $x + y = 2$

Q10. The edges of a triangular board are 6cm, 8cm, and 10cm. The cost of painting it at the rate 9 paise per cm^2 is:

- (a) ₹ 2.16 (b) ₹ 2.0 (c) ₹ 2.48 (d) ₹ 3.0

Q11. Which of the following needs a proof?

- (a) Theorem (b) Axiom (c) Definition (d) Postulate

Q12. For two triangles, if two angles and the included side of one triangle are equal to two angles and the included side of another triangle, then the congruence rule is

- (a) SSS (b) ASA (c) SAS (d) None of these

Q13. The perimeter of a triangle is 60 cm. If its sides are in the ratio $1:3:2$, then its smallest side is

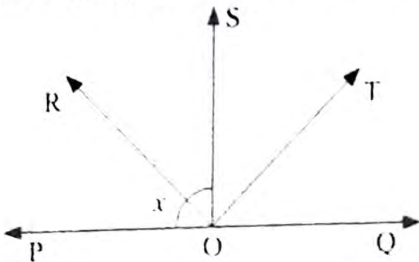
- (a) 15cm (b) 5 cm (c) 10 cm (d) None of these

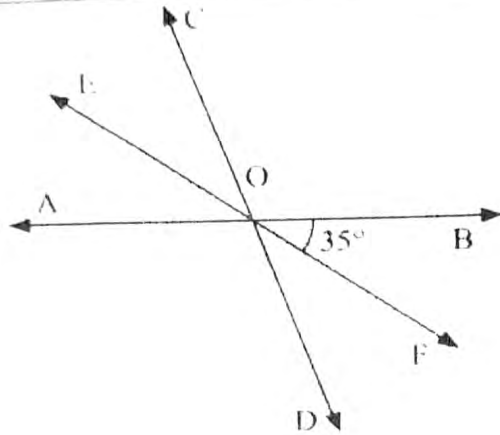
Q14. $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$ is:

- (a) $a - b$ (b) $2b$ (c) $2a$ (d) $2\sqrt{a}$

Q15. If $a + b + c = 0$, then $a^3 + b^3 + c^3 =$

None

	(a) abc	(b) 3abc	(c) 2abc	(d) -3abc	
Q16.	If a linear equation has solutions $(-2, 2)$, $(0, 0)$ and $(2, -2)$, then it is of the form: (a) $y - x = 0$ (b) $x + y = 0$ (c) $-2x + y = 0$ (d) $-x + 2y = 0$				[1]
Q17.	Which one of the following is not the graphical representation of statistical data? (a) bar graph (b) histogram (c) frequency polygon (d) tally marks				[1]
Q18.	The value of 0.423 is (a) $423/1000$ (b) $423/100$ (c) $423/990$ (d) $419/990$				[1]
	<p>For questions 19 and 20, two statements are given – one labelled Assertion(A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below:</p> <p>(i) Both A and R are true and R is the correct explanation of A. (ii) Both A and R are true but R is not the correct explanation of A. (iii) A is true, but R is false. (iv) A is false, but R is true</p>				
Q19.	Assertion: Parallel lines are those which never intersect each other. Reason: Parallel lines can be two or more lines.				[1]
Q20.	Assertion: Degree of non-zero constant polynomial is zero. Reason: Polynomial having two terms is called binomial.				
	SECTION – B				
Q21.	If $32^{2x-1} = 4 \times 8^{x-5}$, then find the value of x. OR Evaluate: $\frac{2^{38} + 2^{37} + 2^{36}}{2^{39} + 2^{38} + 2^{37}}$				[2]
Q22.	If a point C lies between two points A and B such that $AC = BC$, then prove that $AC = \frac{1}{2} AB$ Explain by drawing the figure.				[2]
Q23.	In the given figure, ray OS stands on a line POQ, Ray OR and ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively. If $\angle POS = x$, find $\angle ROT$.				[2]
					
	OR				
	AB, CD and EF are three concurrent lines passing through the point O such that OF bisects $\angle BOD$. If $\angle BOF = 35^\circ$, find $\angle BOC$ and $\angle AOD$.				



- Q24.** Write the coordinates of the following points:
- lying on both axes
 - lying on x-axis and with x-coordinate 4
 - lying on the negative side of x-axis at a distance of 5 units from origin
 - Write the distance of the $(4, -3)$ from y-axis.

[2]

1.5

- Q25.** Express $0.2\overline{6}$ in the form of p/q , where p and q are integers and $q \neq 0$.

[2]

2

SECTION - C

- Q26.** If a and b are rational numbers and $\frac{4+3\sqrt{5}}{4-3\sqrt{5}} = a + b\sqrt{5}$, find the values of a and b.

[3]

2

- Q27.** Find three solutions for the equation: $x + 6y = 12$.

[3]

3

OR

Write $3y = 8x$ in the form of $ax + by = c$. Also find the values of a, b and c. How many solutions of this equation can you find out?

- Q28.** Simplify: $(x + y + z)^2 - (x - y - z)^2$.

[3]

3

- Q29.** Prove that a diagonal divides the parallelogram in two congruent triangles.

[3]

2

OR

Prove that vertically opposite angles are equal.

- Q30.** Prove that "If two non-parallel sides of a trapezium are equal, it is cyclic."

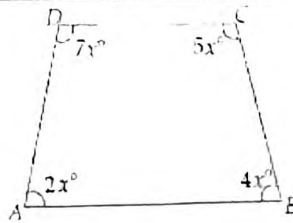
[3]

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- Q31.** The angles A, B, C, D of a quadrilateral ABCD are in the ratio 2 : 4 : 5 : 7. Find the measures of these angles. What type of quadrilateral is it? Give reasons.

[3]

1.9



OR

ABCD is a rhombus. Show that the diagonal AC bisects $\angle A$ as well as $\angle C$ and diagonal BD bisects $\angle B$ as well as $\angle D$.

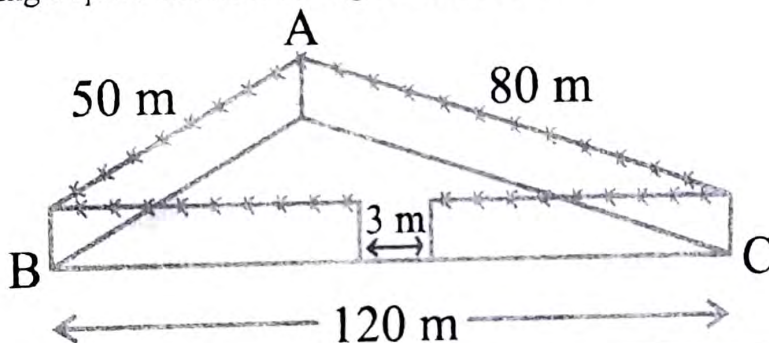
SECTION - D

- Q32. A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1m. If the outer side of each of the cone is to be painted and the cost of painting is 12 per m^2 . What will be the cost of painting all of these cones?

[5]

OR

A triangular park ABC has sides 120m, 80m and. A gardener Dhanika has to put a fence all around it and also plant grass inside. How much area does she need to plant? Find the cost of fencing it with barbed wire at the rate of Rs 20 per metre leaving a space 3m wide for a gate on one side.



- Q33. If $x^2 + y^2 = 49$ and $x - y = 3$ then find the value of $x^3 - y^3$.

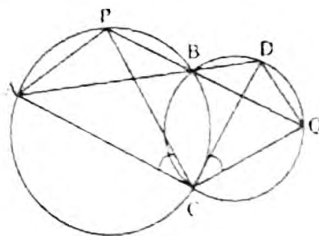
[5]

OR

Find the value of $x^3 + y^3 - 12xy + 64$, when $x + y = -4$.

- Q34. Two circles intersect at two points B and C. Through B, two-line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively. Prove that $\angle ACP = \angle QCD$.

[5]



OR

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Prove that- The angle subtended by an arc at the centre is double the

Q35.

angle subtended by it at any point on the remaining part of the circle.
A random survey of the number of children of various age groups playing in a park was found as follows:

AGE (in years)	Number of children
1-2	5
2-3	3
3-5	6
5-7	12
7-10	9
10-15	10
15-17	4

Draw a histogram to represent the above data.

SECTION – E

Case study based questions are compulsory.

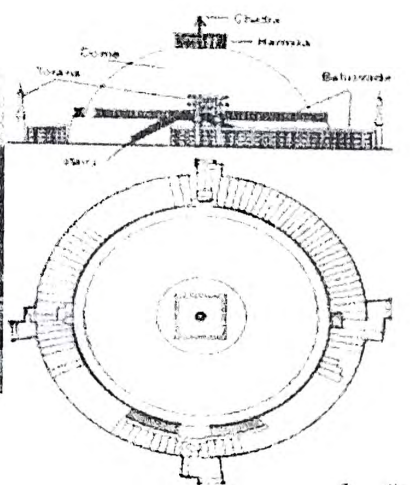
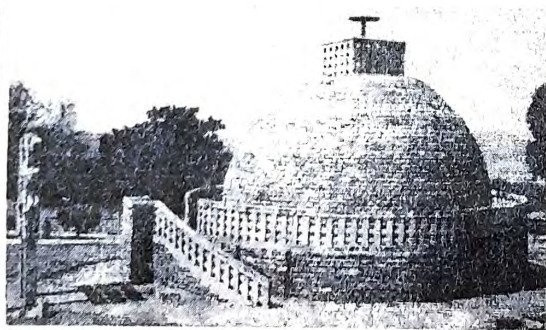
Q36.

The Great Stupa at Sanchi is one of the oldest stone structures in India, and an important monument of Indian Architecture.

It was originally commissioned by the emperor Ashoka in the 3rd century BCE. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha.

It is a perfect example of combination of solid figures.

A big hemispherical dome with a cubical structure mounted on it.



- What is the area of circle of the base of hemispherical brick structure having radius 14 m?
- If the radius of hemisphere is doubled then what will be the ratio of surface areas in these two cases.
- Calculate the volume of the hemispherical dome if the height of the dome is 21 m.

[1]

[1]

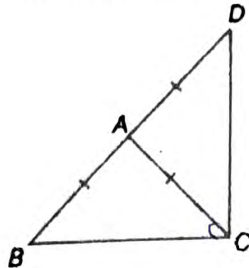
[2]

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OR

Find the area of cloth require to cover the hemispherical dome if the radius of its base is 14m.

- Q37. There is a garden in a government building in the form of a triangle represented by $\triangle ABC$ in the figure which is an isosceles triangle in which $AB = AC$ the Side BA is produced to D such that $AD = AB$ (see figure)

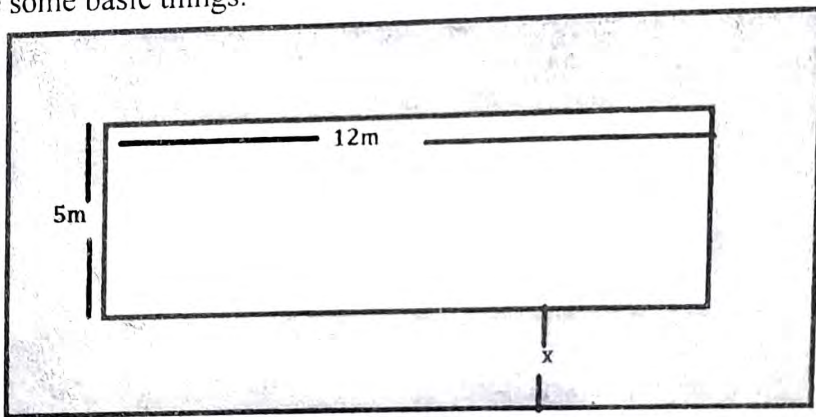


- In $\triangle ADC$ which two equal angles are equal?
- If the two sides are equal in a triangle, then what you can say about the opposite angles of these sides.
- Find $\angle BCD$. Show your work.

OR

Which is complementary pair of angles in the above given figure? Also, write what are complementary angles?

- Q38. In order to input the right values in the AutoCAD software, an engineer needs to calculate some basic things.



On the basis of the above information, answer the following questions:

- What are the dimensions of the outer frame?
- A metal sheet of Aluminum is used to make the frame. What should be the maximum area of sheet before cutting?
- What is the exact area of frame?

OR

Find the factors the polynomial formed in part (ii).