



BGS INTERNATIONAL PUBLIC SCHOOL

SECTOR - 5, DWARKA, NEW DELHI-75

FINAL EXAMINATION (2023-24)

SUB : MATHEMATICS (041)

CLASS : IX

SET : 2

SCHOOL CODE : 25279

TIME : 3 Hours

M.M : 80

General Instructions :

- i) This Question Paper has 5 sections A, B, C, D & E.
- ii) Section A - 20 MCQs carrying 1 mark each.
- iii) Section B - 5 Short Answer-I (SA-I) type questions carrying 2 marks each. An internal choice in 2 questions has been provided.
- iv) Section C - 6 Short Answer-II (SA-II) type questions carrying 3 marks each. An internal choice in 2 questions has been provided.
- v) Section D - 4 Long Answer (LA) type questions carrying 5 marks each. An internal choice in 2 questions has been provided.
- vi) Section E - 3 Case Based integrated units of assessment (4 marks each) with sub-parts of 1, 1 & 2 marks each respectively. An internal choice has been provided in the 2 marks question.
- vii) Graph sheet will be provided for graph question(s).
- viii) This paper consists of 8 pages.

SECTION A

(1 x 20 = 20 M)

Q1. $\sqrt{12} + \sqrt{10} - \sqrt{2}$ is

- a) a positive rational number
- b) equal to zero
- c) an irrational number
- d) a negative integer

Q2. $x + 1$ is a factor of which polynomial

- a) $x^3 + x^2 - x + 1$
- b) $x^3 + x^2 + x + 1$
- c) $x^4 + x^3 + x^2 + 1$
- d) $x^4 + 3x^3 + 3x^2 + x + 1$

Q3. The radius of a sphere is $2r$, then its volume will be

- a) $\frac{4}{3}\pi r^3$
- b) $4\pi r^3$
- c) $\frac{8}{3}\pi r^3$
- d) $\frac{32}{3}\pi r^3$

Q4. Find the simplified form of $\frac{1}{5-2\sqrt{3}} \div \frac{1}{5+2\sqrt{3}}$

a) $\frac{5+2\sqrt{3}}{5-2\sqrt{3}}$ b) $\frac{5-2\sqrt{3}}{5+2\sqrt{3}}$ c) $\frac{37+20\sqrt{3}}{13}$ d) none of these

Q5. If the area of an equilateral triangle is $16\sqrt{3} \text{ cm}^2$ then the perimeter of the triangle is

a) 48 cm b) 24 cm c) 12 cm d) 36 cm

Q6. The point of the form (a, a) lies on

- a) x-axis b) on the line $y=x$
c) y-axis d) on the line $x+y=0$

Q7. ABCD is a parallelogram in which diagonal AC bisects $\angle BAD$. If $\angle BAC = 35^\circ$ then $\angle ABC = ?$

- a) 70° b) 110° c) 90° d) 120°

Q8. In a triangle ABC, if $\angle A = \angle B + \angle C$ then triangle ABC is a/an

- a) isosceles triangle b) equilateral triangle
c) right triangle d) none of these

Q9. 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

- a) 6 b) 7 c) 8 d) 12

Q10. If $(x-y) = -7$ & $xy = -10$, find the value of $x^3 - y^3$

- a) 130 b) -133 c) 231 d) 137

Q11. If the ratio of volumes of two spheres is 1 : 8, then the ratio of their surface areas is

- a) 1 : 2 b) 1 : 4 c) 1 : 8 d) 1 : 16

Q12. Find the value of $\frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c$

- a) 2 b) 4 c) 1 d) 3

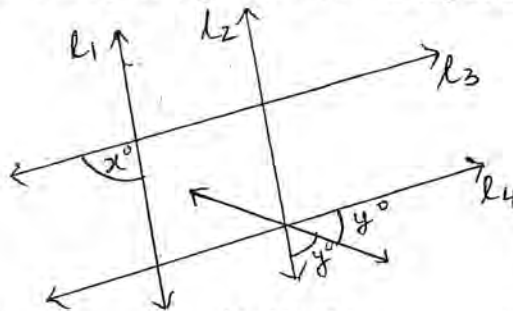
Q13. If $49x^2 - b = (7x + \frac{1}{2})(7x - \frac{1}{2})$ then the value of b is

- a) 0 b) $\frac{1}{\sqrt{2}}$ c) $\frac{1}{4}$ d) $\frac{1}{2}$

✓ Q14. If we multiply or divide both sides of a linear equation with a non-zero number then the solution of the linear equation

- a) changes
- b) changes in case of multiplication
- c) remains the same
- d) changes in case of division

✓ Q15. In figure if $l_1 \parallel l_2$ & $l_3 \parallel l_4$ then what is y in terms of x ?



- a) $90 + x$
- b) $90 + 2x$
- c) $90 - \frac{x}{2}$
- d) $90 - 2x$

✓ Q16. $\sqrt{5}$ is a polynomial of degree

- a) 2
- b) 0
- c) 1
- d) $\frac{1}{2}$

✓ Q17. A histogram is a pictorial representation of the grouped data in which class intervals & frequency are respectively taken along

- a) vertical axis & horizontal axis
- b) vertical axis only
- c) horizontal axis & vertical axis
- d) horizontal axis only

✓ Q18. The diameters of two cones are equal. If their slant heights are in the ratio $5 : 4$, then the ratio of the curved surface areas is

- a) $4 : 5$
- b) $25 : 16$
- c) $16 : 25$
- d) $5 : 4$

DIRECTION : (For Q19 & 20) In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Choose the correct option

Q19. Assertion : If AOB is a diameter of a circle and C is a point on the circle, then

$$AC^2 + BC^2 = AB^2$$

Reason : Angle in a semi-circle is a right angle.

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Assertion is false but reason is true.

Q20. Assertion : If $x = 1 - k$ and $y = 3k$ is a solution of the equation $4x + y + 3 = 0$, then the value of k is 7.

Reason : The solution of the equation satisfies the equation.

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Assertion is false but reason is true.

SECTION B

(2 X 5 = 10 M)

Q21. Find the value of $\left(\frac{3^{-1} \times 5^2}{3^2 \times 5^{-4}}\right)^{\frac{1}{3}} \times \left(\frac{3^{-1} \times 5^{-1}}{3^3 \times 5^{-5}}\right)^{-\frac{1}{2}}$

OR

Q21. Simplify $3\sqrt{45} - \sqrt{125} + \sqrt{200} - \sqrt{50}$

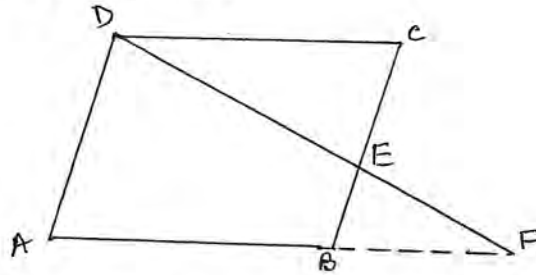
Q22. In ΔABC & ΔPQR , if $AB = AC$, $\angle C = \angle P$ & $\angle B = \angle Q$. Prove that the two triangles are isosceles but not congruent. Write the condition when they will be congruent.

Q23. Factorize $x(x + z) - y(y + z)$

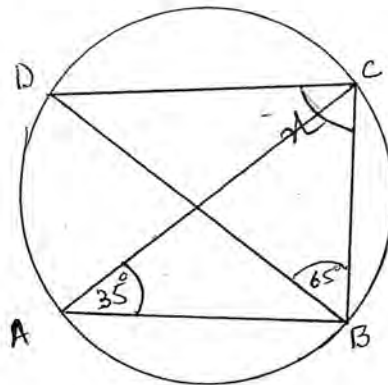
OR

Q23. Factorize $x^2 + 2xy + y^2 - a^2 + 2ab - b^2$

- Q24. ABCD is a parallelogram & E is the mid-point of side BC. DE & AB on producing meet at F. Prove that $AF = 2AB$



- Q25. Find the value of x in the following figure



SECTION C

(3 X 6 = 18 M)

- Q26. Find the value of $(\sqrt{3} + 1)(1 - \sqrt{12}) + \frac{9}{\sqrt{3} + \sqrt{12}}$

OR

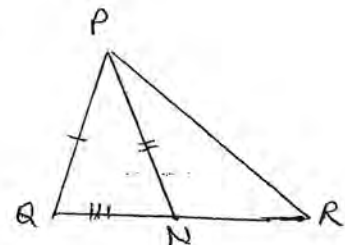
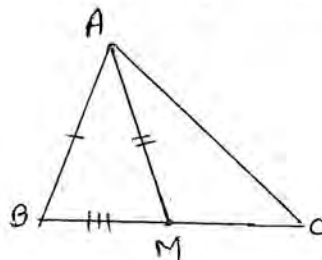
- Q26. Prove that $\frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}} + \frac{3\sqrt{2}}{\sqrt{6} + \sqrt{3}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}} = 0$

- Q27. Prove that the line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.

- Q28. Two sides AB & BC & median AM of one triangle ABC are respectively equal sides PQ & QR and median PN of triangle PQR. Show that

a) $\triangle ABM \cong \triangle PQN$

b) $\triangle ABC \cong \triangle PQR$



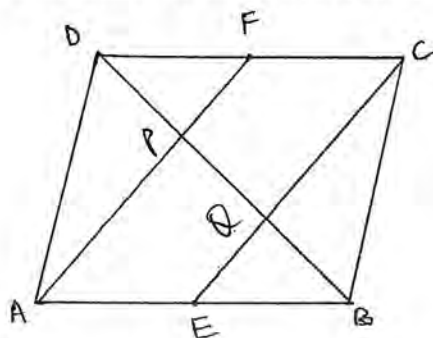
Q29. Using factor theorem, show that $(2x - 3)$ is a factor of $f(x) = 2x^3 - 9x^2 + x + 12$

✓ Q30. Prove that the diagonals of a parallelogram bisect each other.

OR

Q30. In a parallelogram ABCD, E & F are the mid-points of sides AB & CD respectively.

Show that the line segments AF & EC trisect the diagonal BD.



✓ Q31. Prove that the angles in the same segment of a circle are equal.

SECTION D

(5 X 4 = 20 M)

✓ Q32. The coordinates of points given in the following table represent some of the solutions of the equation $y = \frac{3}{2}x - 1$

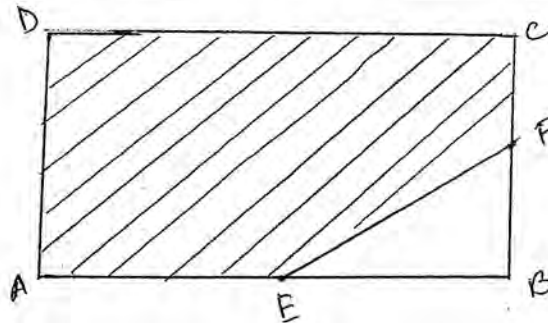
x	2	-	-	-10	1	-
y	-	-4	8	-	-	$-\frac{5}{2}$

Find the missing values. Also, find the coordinates of the points where the line cuts the x-axis and y-axis.

Q33. For the following data, draw a histogram and a frequency polygon.

Marks	Number of Students
10-20	5
20-30	12
30-40	15
40-50	22
50-60	14
60-70	4

- Q34. In the figure ABCD is a rectangle of dimensions 4 cm & 6 cm. E & F are mid-points of AB & BC respectively. Find the area of the shaded region.



OR

- Q34. An umbrella is made by stitching ten triangular pieces of cloth, each measuring 60 cm 60 cm and 20 cm. Find the area of the cloth required for the umbrella.
- Q35. The surface area of a solid sphere is 5544 cm^2 . It is cut into two hemispheres. Calculate the radius of the sphere and the total surface area of each hemisphere.

OR

- Q35. The surface area of a sphere of radius 5 cm is five times the curved surface area of cone of radius 4 cm. Find the height and volume of the cone

SECTION E

(4 X 3 = 12 M)

Q36. Case Study - 1

Sushmit is a delivery boy. He rides scooty on all working days. The distance covered on scooty is given by the polynomial expression $p(x) = x^2 + 3x - 10$. Assuming that he rides at the uniform speed and takes the time given by $g(x) = x - 2$

Use the information stated above and answer the questions given below

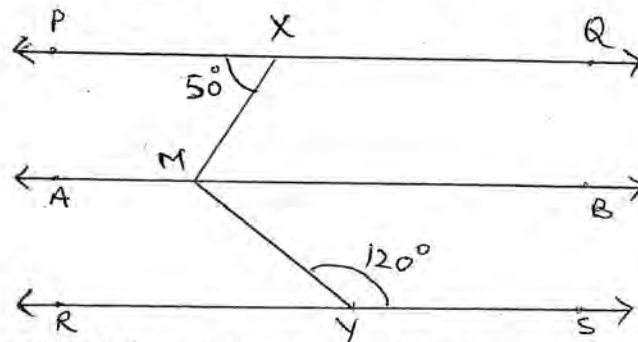
- What is the speed of the scooty? 1
- Find the sum of degrees of the polynomial $p(x)$ and $g(x)$. 1
- If $p(x)$ is replaced by $r(x) = 5x^2 - kx - 18$ and $g(x)$ is a factor of $r(x)$ then what will be the value of k ? 2

OR

- If $p(x)$ is replaced by $4x^2 + 4x - 3$ then what are the possible expressions for time and speed? 2

Q37. Case study – 2

Two parallel roads PQ and RS are at the centre of the city. It was decided to put two huge lamp posts at point X and Y and a statue of Mahatma Gandhi to be placed at point M with lots of palm trees to be planted along the line AB which is parallel to both PQ and RS. The area around M is to be decorated with flowering plants and greenery. The angle $\angle PXY$ is of 50° and angle $\angle MYS$ is of 120°



Based on the above information answer the following questions.

- What is the measure of $\angle XMB$ & $\angle YMB$? 1
- What is the measure of the reflex angle $\angle XMY$? 1
- What is the ratio between the angles $\angle XMB$ and $\angle YMB$? 2

OR

- What type of angles are $\angle PXM$ and $\angle BMX$ are ? 2

Q38. Case study – 3

A Mathematics teacher brings clay in the classroom to teach the topic Surface areas & volumes. First she forms a cone of radius 8 cm and height 4 cm and then she moulds that cone into sphere of radius 4 cm. ($\sqrt{80} = 8.9$)

Based on the above information, answer the following questions.

- Find the volume of cone in terms of π . 1
- Find the volume of sphere. 1
- Find the surface area of the sphere. 2

OR

- Find the curved surface area of cone. 2