ST KABIR PUBLIC SCHOOL
SECTOR 26, CHANDIGARH
FINAL EXAMINATION (2023-24)

Class: IX **Duration: 3 hours**
Subject: Mathematics (041) **Max. Marks: 80**

General Instructions:

1. *This Question Paper contains **38** questions. **All** Questions are **compulsory.***
2. *This question paper is divided into **five** Sections – A, B, C, D and E.*
3. *In **Section A,** Questions no. **1** to **18** are multiple choice questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of 1 mark each.*
4. *In **Section B,** Questions no. **21** to **25** are very short answer (VSA) types questions of **2** marks each.*
5. *In **Section C,** Questions no. **26** to **31** are short answer (SA) type questions of **3** marks each.*
6. *In **Section D,** Questions no. **32** to **35** are long answer (LA) type questions of **5** marks each.*
7. *In **Section E,** Questions no. **36** to **38** are case study-based questions of **4** marks each. Internal choice is provided in **2** marks questions in each case-study.*
8. *There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.*
9. *Draw neat diagrams wherever required. Take $\pi = 22/7$ wherever required, if not stated.*
10. *Use of calculators is **not** allowed.*

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each.

Q 1. The product of any two irrational numbers is: **(1)**
(a) always an irrational number
(b) always a rational number
(c) always an integer
(d) sometimes irrational

Q 2. Circles having the same centre and different radii are called---------- circles: **(1)**
(a) concentric
(b) chord
(c) diameter
(d) cyclic

Q 3. If $(x + 2)$ is factor of the polynomial $x^2 - kx + 14$ then the value of k is **(1)**
(a) -9
(b) 9
(c) -2
(d) 14

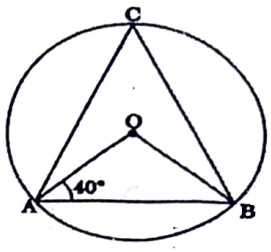
Q 4. The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. The ratios of the surface areas of the balloon in the two cases are: **(1)**
(a) 1: 4
(b) 1: 3
(c) 2: 3
(d) 2: 1

(1)

Q 5. All right angles are equal to one another. This is which of the Euclid's postulate:

(a) Euclid's postulate 5
(b) Euclid's postulate 1
(c) Euclid's postulate 4
(d) Euclid's postulate 3

Q 6. In the given figure, O is the centre of the circle. If $\angle OAB = 40^0$ and C is a point on the circle, then $\angle ACB$ is **(1)**



(a) 60°
(b) 77°
(c) 85°
(d) 50°

Q 7. If in a parallelogram its diagonals bisect each other and are equal, then it is a **(1)**

(a) Square
(b) Rectangle
(c) Rhombus
(d) Parallelogram

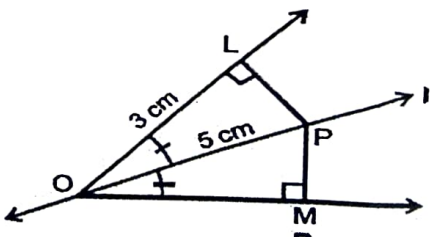
Q 8. The value of polynomial $5x - 4x^2 + 3$, when $x = -1$ is **(1)**

(a) – 6
(b) 6
(c) –2
(d) 2

Q 9. Equation of the line passing through the origin is **(1)**

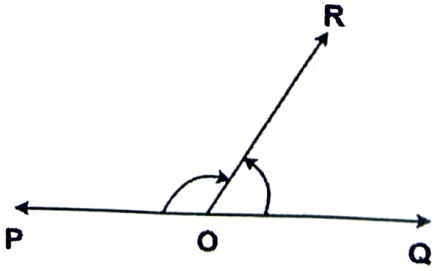
(a) $7y - x = 2$
(b) $x + y = 0$
(c) $-2x + y = -3$
(d) $-3x + 2y = 7$

Q10. In the given figure, the length of PM is **(1)**



(a) 2 cm
(b) 4 cm
(c) 3 cm
(d) 6 cm

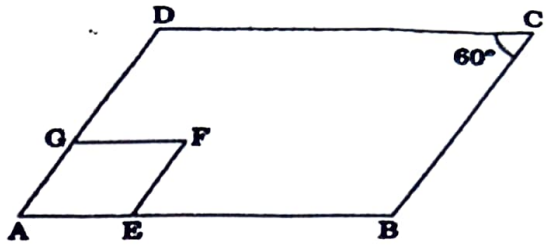
Q11. In the given figure, which pair do the angles $\angle POR$ and $\angle ROQ$ form? **(1)**



(a) Reflex angle
(b) Corresponding angles
(c) Linear Pair
(d) Vertically opposite angles

In the following figure ABCD and AEFG are two parallelograms. If $\angle C = 60°$, then $\angle AEF$ is: (1)

(a) 90°
(b) 80°
(c) 120°
(d) 60 °

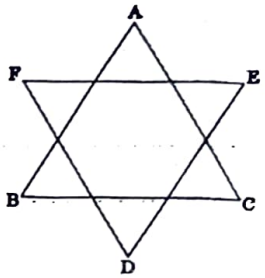


Q13. The sides of a triangular flower bed are 5 m, 8 m and 11 m. The area of the flower bed will be: (1)

(a) $4\sqrt{21}$ m^2
(b) $5\sqrt{21}$ m^2
(c) $\sqrt{21}$ m^2
(d) $\sqrt{11}$ m^2

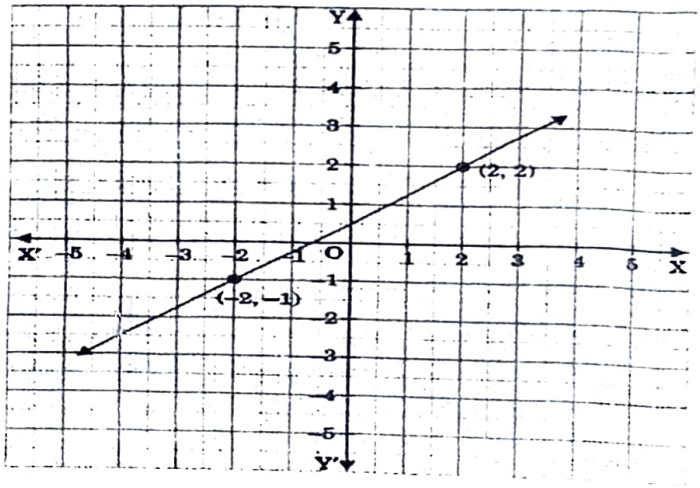
Q14. In the figure $\angle A + \angle B + \angle C + \angle D + \angle E + \angle F = k$ right angles, then the value of k is: (1)

(a) 8
(b) 5
(c) 3
(d) 4



Q15. To which equation does the given graph represent? (1)

(a) $y - x = 0$
(b) $6x + 3y = 0$
(c) $7x + y = 0$
(d) $3x - 4y = -2$

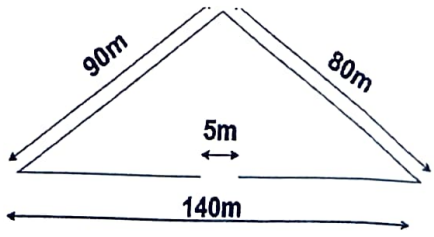


Q16. Simplify: $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$ is (1)

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

Q17. A triangular garden has sides 90 m, 140 m and 80 m. A fence is to be put all around the garden. What will be the total cost of fencing at the rate of ₹15 per meter if a 5 m wide space is to be left on the one side for gate opening. (1)

(a) ₹ 4525
(b) ₹ 4975
(c) ₹ 4575
(d) ₹ 4230



Q18. $\sqrt{11}\,x + 3$ is a polynomial of degree ___ . (1)

(a) one

(b) zero
(c) two
(d) not defined

*Question number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. Choose the correct option. Two statements are given, one labelled as Assertion (A) and the other is 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 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.

Q19. **Assertion:** According to Euclid's 1st axiom- "Things which are equal to the same thing are also equal to one another". **(1)**
Reason: If AB = PQ and PQ = XY, then AB = XY.

Q20. **Assertion:** The polynomial p(x) = 5x – 1 is a linear polynomial. **(1)**
Reason: The general form of linear polynomial is ax + b.

SECTION B

This section comprises very short answer (VSA) types questions of 2 marks each.

Q21. State Euclid's Postulate 2 and 3. **(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. Also mention the axiom used. **(2)**

Q 23. (a) The following is the monthly expenditure (in₹) of ten families of the particular area: **(2)**
145, 115, 129, 135, 139, 158, 170, 175, 188, 163
Make a frequency distribution table by using the following class interval:
100 – 120, 120 – 140, 140 – 160, 160 – 180, 180 – 200.
Also, draw the histogram for the table.

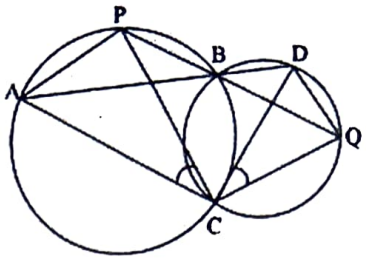
OR

(b) The survey manager of Nestle dairy has recorded monthly expenditures on milk in 100 families of a housing society. This is given in the following frequency distribution table

Monthly Expenditure (in ₹)	0-150	150-300	300-450	450-600	600-750	750-900	900-1050
No. of families	10	14	15	x	28	7	5

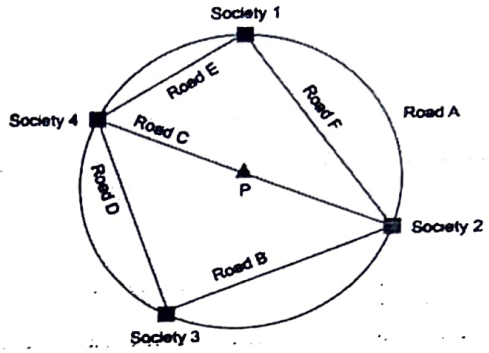
(i) What is the difference between the upper limit of 4th class and lower limit of 2nd class?
(ii) Find x.

(a) 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 & P, Q respectively. Prove that ∠ACP = ∠ QCD. (2)



OR

In the figure, the map is giving the position of four housing societies and the roads connecting them in a township. What would be the measure of the sum of angles formed by the straight roads at Society 1and Society 3? State the theorem used.



Q25. A hemispherical tank has inner radius of 2.8 m. Find its capacity in litres. (2)

SECTION C

This section comprises short answer (SA) types questions of 3 marks each.

Q26. If $32^{2x-1} = 4 \times 8^{x-5}$, then find the value of x. (3)

Q27. Write any three solutions for the equation: $2x + y = 7$. (3)

Q28. (a) If (x + 4) is a factor of the polynomial $x^3 - x^2 - 14x + 24$, find its other factors. (3)

OR

(b) Factorize: (i) $a^3 - 2\sqrt{2}b^3$

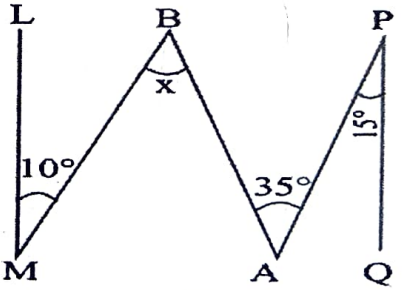
(ii) $(-2x + 5y - 3z)^2$

Q29. Answer the following question based on the linear equation $4x + 3y = 24$ (3)

(i) Draw the graph of the equation by taking three solutions.

(ii) Use this graph to find the area of the triangle formed by this line and the coordinate axes.

Q 30. In the given figure QP ‖ ML, ∠ APQ = 15°, find the value of ∠ x. (3)



Q 31. (a) The sides of a triangle (in cm) are x, x + 1, 2x – 1 and its area (in cm^2) is $x\sqrt{10}$. Find the value of x and the lengths of the sides of the triangle. (3)

OR

(b) Find the area of an isosceles triangle whose base is 10 cm greater than its equal side and its perimeter is 100 cm. Take $\sqrt{5} = 2{\cdot}23$.

SECTION D

This section comprises long answer (LA) types questions of 5 marks each.

Q32. Rationalize the denominator: $\frac{1}{9+\sqrt{5+\sqrt{6}}}$ **(5)**

Q33. (a) Factorize: $x^3 + 13x^2 + 32x + 20$ **(5)**

OR

(b) If $a + b + c = 5$ and $ab + bc + ca = 10$, then prove that $a^3 + b^3 + c^3 - 3abc = -25$

Q 34. Find the values of 'a' and 'b' so that $(2x^3 + ax^2 + x + b)$ has $(x + 2)$ and $(2x - 1)$ as factors. **(5)**

Q 35. (a) 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 1 m. If the outerside 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)**

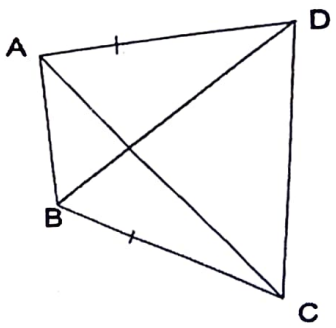
OR

(b) The diameter of the moon is approximately one-fourth the diameter of the earth. Find the ratio of their surface areas and what fraction is the volume of the moon of the volume of the earth.

SECTION E

This section comprises 3 case-based questions of 4 marks each.

Q 36. There is a garden in a government building in the form of a quadrilateral represented by ABCD such that AD = BC and $\angle DAB = \angle CBA$. Use this information to answer the following questions:



(i) Prove that $\Delta ABC \cong \Delta BAD$ **(1)**

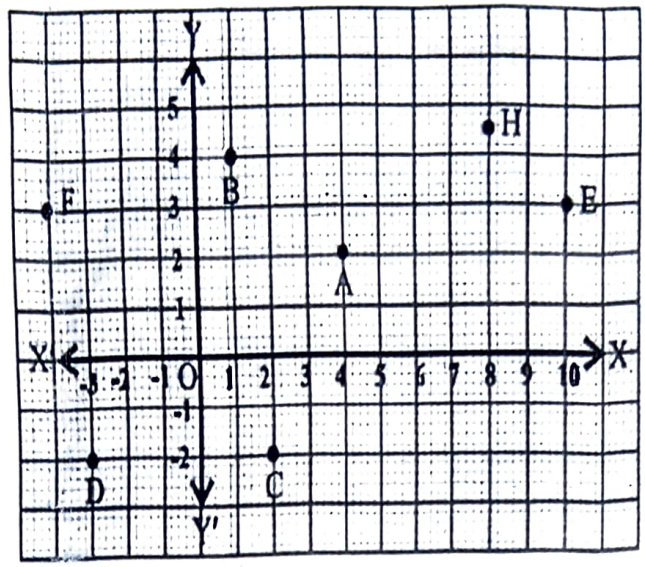
(ii) Write all the corresponding parts of congruent triangles proved in (i). **(1)**

(iii) (a) Prove that $\angle BCD = \angle ADC$. **(2)**

OR

(b) What kind of quadrilateral is it? Give reason for your answer.

Sports in schools have immense benefits for both children and for educational systems. The benefits can be presented in terms of children's development in a number of domains: physical, lifestyle, affective, social, and cognitive so every school provides a playground and sport activities to the students. Rita is a good sports person and takes part in sports activities. The positions of different students in the playground are represented by different points in Cartesian plane as shown in the graph given below. Use this information to answer the following questions;



(i) What are the coordinates of D and F? **(1)**

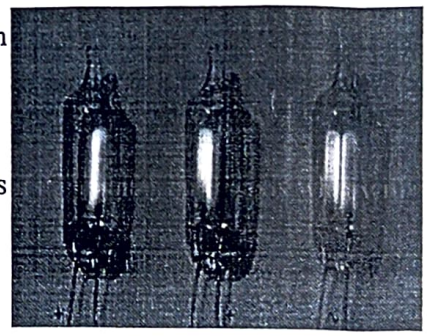
(ii) In which quadrant does the points A, B, C and D lie? **(1)**

(iii) (a) Find the distance between the points C and D, also find the distance between E and F. **(2)**

OR

(b) If a point is present on x-axis what will be its ordinate and if the point is on y –axis what will be its abscissa?

Q38. Small neon lamps are most widely used as visual indicators in electronic equipment and appliances, due to their low power consumption, long life, and ability to operate on mains power. The following table gives the life times of 400 neon lamps



Life time(in hours)	Number of lamps
300 - 400	14
400 – 500	56
500 - 600	60
600 - 700	86
700 - 800	74
800 - 900	62
900 - 1000	48

(i) How many lamps have a life time of more than 700 hours? **(1)**

(ii) What is the sum of class marks of 3rd class and 7th class? **(1)**

(iii) **(a)** Draw histogram for the above distribution. **(2)**

OR

(b) Draw frequency polygon for the above distribution.