KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

SESSION ENDING EXAMINATION: 2024-25

SUB: **MATHEMATICS** TIME: 3:00 Hours

CLASS: IX Max. M.: 80 Marks

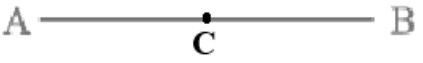
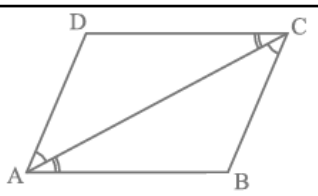
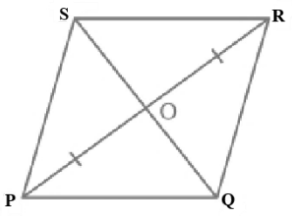
MARKING SCHEME

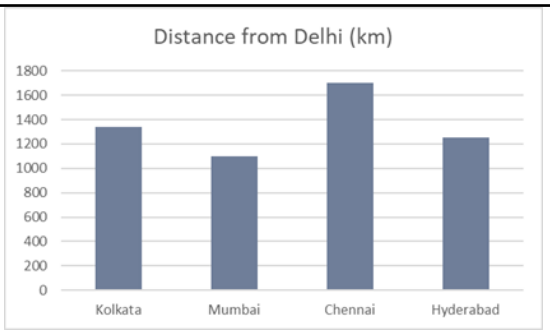
SECTION – A

1.	c) Every rational number can be represented as a fraction.	1
2.	d) 64	1
3.	a) $4x^2 – 3x + 7$	1
4.	d) – 1260	1
5.	c) 9	1
6.	d) Many solutions	1
7.	a) $7x + 2y – 4 = 0$	1
8.	d) Quadrant	1
9.	c) 1 and 3	1
10.	d) $180^0 – y$	1
11.	b) 50^0	1
12.	a) Square	1
13.	b) 50^0	1
14.	b) The perpendicular from the centre of a circle to a chord trisects the chord.	1
15.	c) 40^0	1
16.	c) ₹120	1
17.	d) 6 units	1
18.	b) 25 – 35	1

19.	a) Both Assertion and Reason are **TRUE** and Reason is the correct explanation of Assertion.	1
20.	d) Assertion is **FALSE** but Reason is **TRUE**.	1

SECTION – B

21.	According to the factor theorem (x – a) is a factor of p(x), if p(a) = 0 Now g(x) = x + 1 = 0 ➡ x = - 1 ⇒ $P(x) = 2x^3 + x^2 – 2x – 1$ ⇒ $P(-1) = 2(-1)^3 + (-1)^2 – 2(-1) – 1 = – 2 + 1 + 2 – 1 = 0$ ⇒ So, we conclude that g(x) is a factor of p(x) OR ⇒ If y + 3 is a factor then p (- 3) = 0 [y + 3 = 0, so that y = - 3] ⇒ $P(x) = 3y^2 + ky + 6 = 0$ ⇒ $P(-3) = 3(-3)^2 + k(-3) + 6 = 0$ ⇒ k = 11	½ 1 ½ ½ ½ 1
22.	Since it is given AC = BC  By figure we can say that AC + BC = AB AC + AC = AB (given BC = AC) 2 AC = AB AC = ½ AB	½ ½ 1
23.	Given: ABCD be a parallelogram and AC be a diagonal  To Prove: ΔABC and ΔCDA are congruent Proof: Correct figure and proof OR ⇒ Figure: PQRS is a rhombus,  ⇒ Since diagonals bisect each other at 90^0 ⇒ So, O is the mid-point of PR and PO = RO ⇒ Also, PO = PR/2 = 8/2 = 4 cm and PQ = 5 cm ⇒ POQ is right angled triangle so by Pythagoras Theorem ⇒ OQ = 3 cm ⇒ Hence SQ = 2 × OQ = 2 × 3 = 6 cm	½ 1 ½ ½ ½ 1
24.	Given that: dimeter = 14 m	

	⇒ Radius = 14/2 = 7 m ⇒ Surface area of sphere = $4\pi r^2 = 4\times \frac{22}{7} \times 7 \times 7$ ⇒ $4 \times 22 \times 7 = 616$ ⇒ Area available to the motorcyclist = 616 m^2 OR Given that: diameter = 3.5 m, so r = $\frac{3.5}{2}$ and h = 12 m Volume of cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times \frac{3.5}{2} \times \frac{3.5}{2} \times 12 = 38.5\ m^3$ Capacity of pit in kilolitres = $38.5 \times 1000/1000$ = 38.5 kilolitres	½ 1 ½ ½ 1 ½
25.	Correct scale Horizontal line and vertical line Correct bar graph 	½ 1 ½

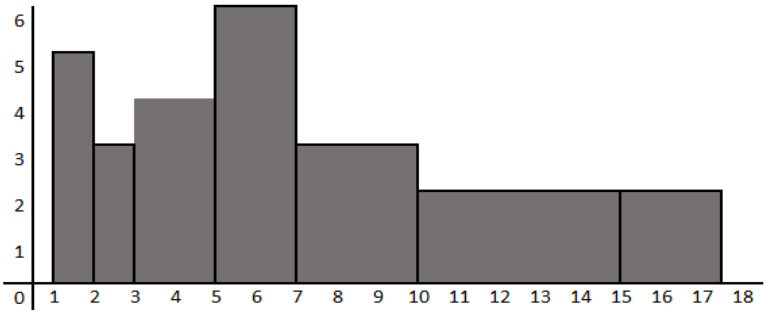
SECTION – C

26.	Rational numbers $\frac{5}{7} = 0.714\ldots$ and $\frac{11}{13} = 0.846\ldots$ Correct three irrational numbers OR Given that Express $0.4\overline{17}$ ⇒ Let x = 0.4171717… (1) Multiply both side by 100 ⇒ 100 x = 41.71717… (2) Subtract (1) from (2) ⇒ 99 x = 41.3 ⇒ x = 41.3/99 = 413/990	3 ½ ½ 1 1
27.	RHS = $\frac{1}{2}(x + y + z)[(x - y)^2 + (y - z)^2 + (z - x)^2]$ ⇒ $\frac{1}{2}(x + y + z)[(x^2 + y^2 - 2xy) + (y^2 + z^2 - 2yz) + (z^2 + x^2 - 2zx)]$	1

	$\Rightarrow \frac{1}{2}(x + y + z)[2x^2 + 2y^2 + 2z^2 - 2xy - 2yz - 2zx]$ $\Rightarrow (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$ $\Rightarrow x^2 + xy^2 + xz^2 - x^2y - xyz - zx^2 + yx^2 + y^3 + yz^2 - xy^2 - y^2z - xyz + zx^2 + zy^2 + z^3 - xyz - yz^2 - xz^2$ $\Rightarrow x^3 + y^3 + z^3 - 3xyz$ = LHS OR $P(x) = x^3 - 3x^2 - 9x - 5$ According to the factor theorem, if p(a) = 0 then (x – a) is a factor of p(x) $\therefore$ Factors of 5 = $\pm$ 1, $\pm$ 5 $\Rightarrow$ If P(1) = 0, then (x – 1) is a factor $P(1) = 1^3 - 3.1^2 - 9.1 - 5 = 1 - 3 - 9 - 5 = -16 \neq 0$, so (x – 1) is not a factor $P(-1) = (-1)^3 - 3.(-1)^2 - 9.(-1) - 5 = -1 - 3 + 9 - 5 = 0$, so (x + 1) is a factor $\Rightarrow P(x) = x^3 - 3x^2 - 9x - 5$ $\Rightarrow = x^2(x + 1) - 4x(x + 1) - 5(x + 1) = (x + 1)(x^2 - 4x - 5)$ $\Rightarrow = (x + 1)((x^2 - 5x + x - 5) = (x + 1)(x + 1)(x - 5)$	1 1 ½ ½ 1 1
28.	(i) $3y + 2x = 9.3\overline{5}$ $\Rightarrow 2x + 3y - 9.3\overline{5} = 0$ $\Rightarrow$ a = 2, b = 3, $c = -9.3\overline{5}$	(ii) $x + \frac{y}{5} - 10 = 0$ $\Rightarrow x + \frac{1}{5}y - 10 = 0$ $\Rightarrow$ a = 1, b = $\frac{1}{5}$, c = – 10	(iii) – 3x + 2 = 0 $\Rightarrow$ – 3x + 0.y + 2 = 0 $\Rightarrow$ a = – 3, b = 0, c = + 2	1 for each
29.	It is given that Point (3, 4) lies on the 3y = ax + 7, $\Rightarrow$ So it should satisfy the linear equation 3y = ax + 7, $\Rightarrow$ Substitute x = 3 and y = 4 in the given equation 3y = ax + 7 $\Rightarrow 3y = ax + 7$ $\Rightarrow 3 \times 4 = a \times 3 + 7$ $\Rightarrow 12 - 7 = 3a$ $\Rightarrow$ A = 5/3			½ ½ 1 1
30.	(i) Coordinates of the points P, R and Q $\Rightarrow$ P = (3, 2) $\Rightarrow$ Q = (3, – 1) $\Rightarrow$ R = (3, 0) (ii) Abscissa of the point L = 3 and ordinate of point M = – 3			½ for each

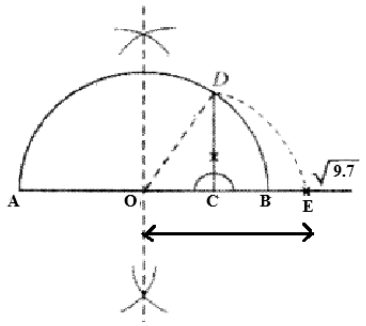
	⇒ Difference = 3 – (– 3) = 3 + 3 = 6	
31.	Correct calculations Correct histogram	1 ½ 1 ½

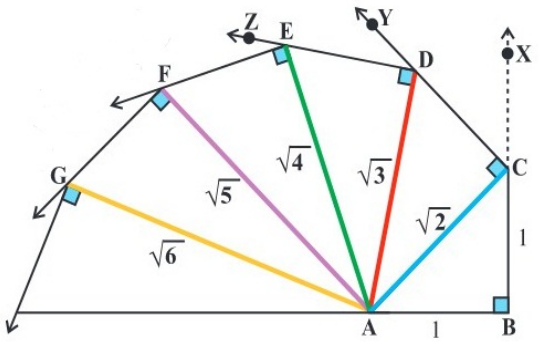
Age (in years)	Number of children	Width of the class	Height of the bar
1 - 2	5	1	5/1 * 1 = 5
2 - 3	3	1	3/1 * 1 = 3
3 - 5	8	2	8/2 * 1 = 4
5 - 7	12	2	12/2 * 1 = 6
7 - 10	9	3	9/3 * 1 = 3
10 - 15	10	5	10/5 * 1 = 2
15 - 17	4	2	4/2 * 1 = 2

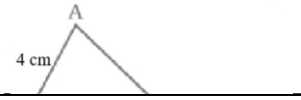


SECTION – D

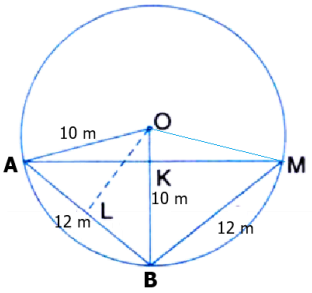
32.	Correct representaion/ construction of $\sqrt{9.7}$ on number line Justification OR Show how $\sqrt{6}$ can be represented on the number line by square root spiral.	4 1 5
33.	Correct statement Given, to prove, contruction Correct proof	1 1 2

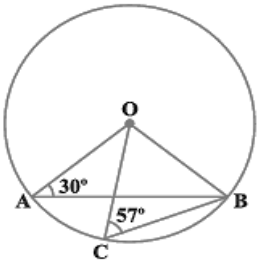






	AB = 8 cm	1
34.	Now onward Ashutosh = A, Bharat = B and Mridul = M Given: A circle of centre O and radius 10 m It means OA = OB = OM = 10 m and AB = BM = 12 m Construction: Join OA, OB, OM, AM and OL ⊥ AB Let intersection point of OB and AM be K Solution: In ΔOAK & ΔOMK ⇒ OA = OM (Radii of same circle) ⇒ OK = OK (Common side) ⇒ $\angle AOK = \angle MOK$ (Angle subtended by equal chords at centre are equal) ⇒ So ΔOAK ≅ ΔOMK (By ASA Congruence rule) ⇒ Therefore AK = MK & $\angle OKA = \angle OKM = 90^0$ (CPCT) ⇒ Hence AM ⊥ OB or AK ⊥ OB Since OL ⊥ AB, so L is the mid-point of AB, ⇒ BL = 6 m ⇒ Therefore ΔOLB is right angled triangle, so by Pythagoras theorem OL = 8 m ⇒ Now, Area of triangle OAB = ½ × AB × OL = ½ ×12 × 8 = 48 m^2 (1) ⇒ Again Area of triangle OAB = ½ × AK × OB = ½ × AK × 10 = 5×AK m^2 (2) ⇒ By eq. (1) and eq. (2) AK = 9.6 m ⇒ Hence AM = AK + KM = 9.6 + 9.6 = 19.2 m **OR** In the adjacent figure, ∠OAB = 30º and ∠OCB = 57º In ΔOAB, ⇒ ∠OAB = ∠OBA = 30^0 (Angle opp. to equal side i.e. radii) ⇒ ∠AOB = 180 – 2 x 30^0 = 120^0 In ΔOCB, ⇒ ∠OCB = ∠OBC = 57^0 (Angle opp. to equal side i.e. radii) ⇒ ∠BOC = 180 – 2 x 57^0 = 120^0 = 66^0	1 1 1 1 1 ½ ½

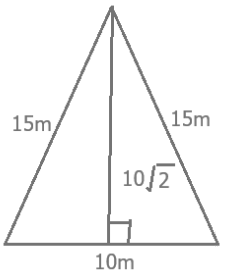




	(i) $\angle AOC = \angle AOB - \angle BOC = 120^0 - 66^0 = 54^0$ (ii) $\angle ABC = \angle OBC - \angle OBA = 57^0 - 30^0 = 27^0$ (iii) Intersecting point of AB and OC is P $\angle OPB = \angle AOP + \angle OAP$ (Exterior angle property) $= \angle AOC + \angle OAB = 54^0 + 30^0 = 84^0$	1 1 2
35.	Radius of sphere = 5 cm $\Rightarrow$ Surface area of sphere = $4\pi r^2 = 100\pi$ Radius of cone = 4 cm and height be 'h' & slant height be 'l' $\Rightarrow$ Curved surface of cone = $\pi r l = 4\pi l$ As per given situation $\Rightarrow$ Surface area of square = 5 × CSA of cone $\Rightarrow$ $100\pi = 5 \times 4\pi l = 20\pi l$ ➡ $l = 5$ cm Also $h = \sqrt{l^2 - r^2}$, $l = 5$ cm, $r = 4$ cm Now height 'h' = 3 cm (by pythagoras theorem) $\Rightarrow$ Volume of cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 4 \times 4 \times 3 = 16\pi = 16 \times 3.14 = 50.24$ cm^2 **OR** We know that Area white washed × Cost of white wash = Total cost $\Rightarrow$ Area white washed × 20 = 4989.60 $\Rightarrow$ Area white washed = 4989.60 / 20 = 249.48 m^2 Now, area white washed is curved surface area of hemisphere $\Rightarrow$ ∴ Inner surface area of dome = 249.48 m^2 Let the radius of dome be 'r' m Surface area of dome = 249.48 m^2 $\Rightarrow$ $2\pi r^2 = 249.48$ m^2 $\Rightarrow$ $2 \times 22/7 \times r^2 = 249.48$ m^2 $\Rightarrow$ $r^2 = 249.48 \times 72 \times 22 = 39.69$ m^2 $\Rightarrow$ $r = \sqrt{39.69} = 6.3$ m Volume of the air inside the dome = Volume of hemisphere $\Rightarrow$ $2/3\ \pi r^3$ $\Rightarrow$ $2/3 \times 22/7 \times 6.3 \times 6.3 \times 6.3 = 523.908$ m^3	½ ½ 1 1 2 ½ ½ 2 2

SECTION – E (Competency Based Questions)

36.	**Swimming Pool Construction** (a) Polynomial to represent the volume of the pool = Volume of cuboid $= l.b.h = (5x+10) . (3x+5) . (x+2) = 5.(3x^3 + 17x^2 + 32x + 20)$ (c) If x = 1, Volume of pool = 360 m^3 (iii) The cost of filling the pool = 360 ×8 = ₹2880 OR Area of the walls of the pool = 2 (l+b).h = 2 (5x+10+3x+5).(x+2) = (16x^2 + 62x + 60) m^2	 1 1 2
37.	(a) Angle y = 120^0 (b) Angle x = 110^0 (c) Reflex ∠EGF = $360^0 – 110^0 = 250^0$ OR Reflex ∠AEG = $360^0 – 50^0 = 310^0$	1 2 1
38.	(a) Sides of an isosceles triangle are 10 m, 15 m, 15 m OR Semi-perimeter of the triangle = 40/2 = 20 m (b) Area of isosceles triangle = ½ base . height $= ½ . 10 . 10\sqrt{2} = 50 \times 1.41$ = 70.50 m^2 (c) Cost of painting = ₹18.50 × 70.50 = ₹1304.25	1 2 1



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