BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS

SENIOR SECONDARY | CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

PRE-BOARD EXAMINATION 3 2024-25

MARKING KEY MATHEMATICS (041)

Class : X
Date :13-01-2025

Duration: 3 Hrs
Max. Marks: **80**

Q No	SECTION - A	Marks
1	(b) both negative	1
2	(b) inconsistent	1
3	(c) 126°	1
4	(c)$\sqrt{162}$	1
5	(d) 16 : 9	1
6	(b) 17/12	1
7	(a) 5	1
8	(b) 2	1
9	(b) 30-40	1
10	(a) 30°	1
11	(c) real and distinct	1
12	(b) 3/ 2	1
13	(c) $\frac{1}{3}\pi r^2(2r+h)$ cm ^{3}	1
14	(c) 7/17	1
15	(a) -12	1
16	(d) 7.51	1
17	(a) 9	1
18	(d)1/7	1
19	(a)	1
20	(b)	1
	SECTION -B	
21	$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$ $404 = 2 \times 2 \times 101$ HCF = 4 LCM = 9696 OR HCF(65,117) = 13 ATQ 65m -117 = 13 m = 2	1 0.5 0.5 1 1
22	(i)$\frac{5}{17}$ (ii) $\frac{13}{17}$	1+ 1

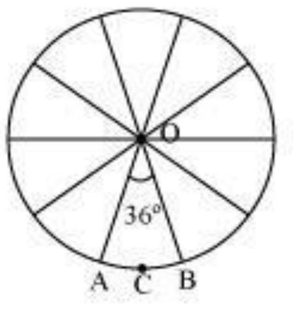
	OR $\frac{122}{144} = \frac{31}{36}$ (ii) $\frac{5}{36}$	1+ 1
23	Substituting correct values Cos 60° = $\frac{1}{2}$, sec 30° = $\frac{2}{\sqrt{3}}$, tan 45° = 1 , sin 30° = $\frac{1}{2}$, cos 30° = $\frac{\sqrt{3}}{2}$ Simplification correct answer: $$\frac{67}{12}$$	1 1
24	Let point on x-axis be P(a, 0) and given that A(2, –5) and B(–2, 9) are equidistant PA = PB Squaring both sides, we get $a^2 + 4 - 4a + 25 = a^2 + 4 + 4a + 81$ $-8a = 56$ $a = -7$ Hence the required point is (–7, 0)	1 1
25	Let the coordinates of B be (x,y) $\frac{3\times x+8}{7} = -1 \Rightarrow 3x + 8 = -7 \Rightarrow x = -5$ $\frac{3\times y+20}{7} = 2 \Rightarrow 3y + 20 = 14 \Rightarrow y = -2$ Coordinates of B are (-5,-2)	1 1
	SECTION - C	
26	In ΔABD and ΔPQR AB/PQ = BD/QR = AC/PM [given] AB/PQ = 2BC/2QM/AC/PM ⇒ AB/PQ = (BC/QM = AC/PM $\Delta ABC \sim \Delta PQM$ (SSS Criteria) ($\angle ABC = \angle PQM$ Or $\angle ABD = \angle PQR$ Now, in ΔABD and ΔPQR AB/PQ = BD/QR ∠ABD = ∠PQR (Proved) ⇒ ΔABC ~ ΔPQR [SAS criterion] OR In ΔABC and ΔADE ∠ C =∠ E = 90° [each] ∠A = ∠A (Common angle) ΔABC ~ ΔADE (By AA similarity)	1 1 1 1

	In ΔABC, $AB^2 = AC^2 + BC^2$ (By Pythagoras theorem) $AB^2 = 25 + 144 = 169$ AB = 13cm $\frac{AB}{AD} = \frac{BC}{DE} = \frac{AC}{AE}$ $\frac{13}{3} = \frac{12}{DE} = \frac{5}{AE} \Rightarrow DE = \frac{36}{13}$ $and\ AE = 15/13$	1/2 1/2 1
27	Let one number be x and another number $(34 - x)$ ATQ $(x - 3)(34 - x + 2) = 260$ Solving and getting the quadratic equation $x^2 - 39x + 368 = 0$ $(x - 16)(x - 23) = 0$ $\Rightarrow x = 16, 23$ If one number is 16, then another number = 34 – 16 =18 If one number is 23, then another number = 34 – 23 =11	1 1 1
28	$6y^2 - 7y + 2$ $\alpha + \beta = \frac{7}{6}$ $\alpha\beta = \frac{2}{6} = \frac{1}{3}$ $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{7}{2}$ $\frac{1}{\alpha} \times \frac{1}{\beta} = \frac{1}{\alpha\beta} = 3$ Quadratic polynomial is $y^2 - \frac{7}{2}y + 3$ or $2y^2 - 7y + 6$	1 1 1
29	R.H.S. = $x^2 + y^2$ $= (a \cos\theta - b \sin\theta)^2 + (a \sin\theta + b \cos\theta)^2$ $= a^2\cos^2\theta + b^2\sin^2\theta - 2ab\cos\theta\sin\theta + a^2\sin^2\theta + b^2\cos^2\theta + 2ab\sin\theta\cos\theta$ $= a^2(\cos^2\theta + \sin^2\theta) + b^2(\sin^2\theta + \cos^2\theta)$ $= a^2 + b^2$ = L.H.S. …[$\because \cos^2\theta + \sin^2\theta = 1$	1 1 1
30	Area of sector = $\theta/360 \times \pi r^2$ Area of the segment = Area of the sector - Area of the corresponding Δ Here, radius, r = 15 cm, θ = 60° AB is the chord that subtends 60° angle at the	

Area of the sector = $\theta/360° \times \pi r^2$
$= 60°/360° \times 3.14 \times 15 \times 15$ cm^2
$= 117.75$ cm^2 1

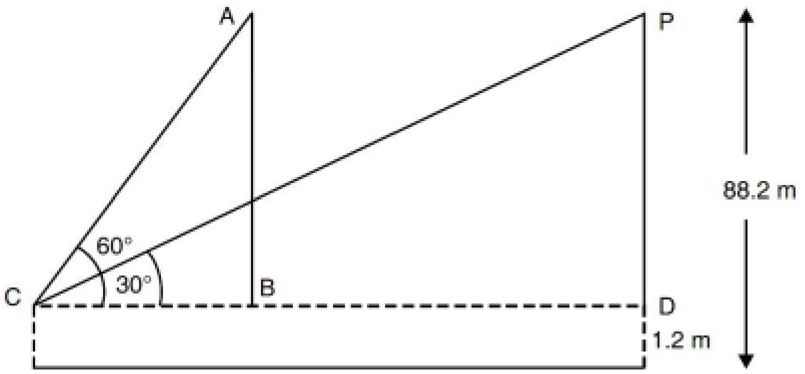
In ΔAOB,
OA = OB = r
$\angle$OBA = $\angle$OAB (Angles opposite to the equal sides in a triangle are equal)
$\angle AOB + \angle OBA + \angle OAB = 180°$
$60° + \angle OAB + \angle OAB = 180°$
$2 \angle OAB = 120°$
$\angle OAB = 60°$
$\therefore$ ΔAOB is a because all its angles are equal.
$\Rightarrow$ AB = OA = OB = r
Area of ΔAOB = $\sqrt{3}/4 \times (\text{side})^2$
$= \sqrt{3}/4\ r^2$
$= \sqrt{3}/4 \times (15 \text{ cm})^2$
$= 1.73/4 \times 225$ cm^2 1
$= 97.3125$ cm^2
(i) Area of minor segment APB = Area of sector - Area of Δ
$= 117.75$ cm^2 - 97.3125 cm^2
$= 20.4375$ cm^2 1

OR
Total length of wire required will be the length of 5 diameters and the circumference of the brooch.
Radius of circle = $\frac{35}{2}$ mm
Circumference of brooch = $2\pi r$
$= 2 \times \frac{22}{7} \times \left(\frac{35}{2}\right)$
= 110 mm
Length of wire required = 110 + 5 × 35 1.5
= 110 + 175 = 285 mm
It can be observed from the figure that each of 10 sectors of the circle is subtending 36° at the centre of the circle.



Therefore, area of each sector = $\frac{36°}{360°} \times \pi r^2$

	$= \frac{1}{10} \times \frac{22}{7} \times \left(\frac{35}{2}\right) \times \left(\frac{35}{2}\right)$ $= \frac{385}{4}$ mm^2	1.5
31	Let $\sqrt{5}$ be a rational number, then we have $\sqrt{5} = \frac{p}{q}$, where p and q are co-primes. $\Rightarrow$ p = $\sqrt{5}q$ Squaring both sides, we get $p^2 = 5q^2$ $\Rightarrow p^{172}$ is divisible by 5 $\Rightarrow$ p is also divisible by 5 So, assume p = 5m where m is any integer. Squaring both sides, we get $p^2 = 25m^2$ But $p^2 = 5q^2$ Therefore, $5q^2 = 25m^2 \Rightarrow q^2 = 5m^2$ $\Rightarrow q^2$is divisible by 5 $\Rightarrow$ q is also divisible by 5 From above we conclude that p and q have one common factor i.e. 5 which contradicts that p and q are co-primes. Therefore, our assumption is wrong. Hence, $\sqrt{5}$ is an irrational number.	1 1 1
	SECTION - D	
32	Correct graph of equation $$x + 3y = 6$$ Correct graph of equation $$2x - 3y = 12$$ Substituting x = 6 and y=0 and finding value of a = 24 OR Let length of rectangle = x units And breadth of rectangle = y units ∴ Area of rectangle xy sq. units According to 1st condition (x - 5)(y + 3) = xy – 9 Or 3x -5y = 6…………….(i) According to 2nd condition (x + 3)(y + 2)= xy + 67 Or 2x + 3y = 61………..(ii) Solving eq (i) and (ii) X =17 and y = 9 Length = 17 units and Breadth = 9 units	1.5 1.5 1 1 1 1 1 1 1
33	Figure Given, To Prove, Construction Proof Solving for EC = 9 cm	2 2 1

34	Correct figure In the figure, let C be the position of the observer (the girl). A and P are two positions of the balloon. CD is the horizontal line from the eyes of the (observer) girl. Here PD = AB = 88.2 m − 1.2 m = 87 m  In rt ΔABC, $\frac{AB}{BC}$ = tan 60° $\frac{87}{BC} = \sqrt{3}$ BC = $\frac{87}{\sqrt{3}}$ In rt ΔPDC, $\frac{PD}{CD}$ = tan 30° $\frac{87}{CD} = \frac{1}{\sqrt{3}}$ CD = $87\sqrt{3}$ BD = CD – CB = $87\sqrt{3} - \frac{87}{\sqrt{3}}$ = $58\sqrt{3} = 58 \times 1.732 = 100.46$ m Hence distance travelled by the balloon is 100.46m	1 1 1 2
35	Finding correct cf column x + y +61=100 ⇒ x + y = 39 Given data, n = 100 ⇒ $\frac{n}{2} = 50$ Median = 868 cf = 21+ x Lower Limit (l) = 860 f =25 and h = 20 Median = l + $(\frac{\frac{n}{2}-cf}{f}) \times h$ Substituting the values and getting x = 19 Also x + y = 39 substituting the value of x and getting y = 20 Hence x = 19 and y = 20 OR Weight (in kgs) | No of students	1 1 1 1 1

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<tr><td>Below 40</td><td>3</td></tr>
<tr><td>40-42</td><td>2</td></tr>
<tr><td>42-44</td><td>4</td></tr>
<tr><td>44-46</td><td>5</td></tr>
<tr><td>46-48</td><td>14</td></tr>
<tr><td>48-50</td><td>3</td></tr>
<tr><td>50-52</td><td>4</td></tr>
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Maximum frequency is 14, Modal class is 46-48
Lower limit (l) = 46, f_1 =14, f_0 = 5, f_2 = 3 h = 2
$Mode = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$
Substituting the given values in the above formula and getting answer
= 46.9 kg
</td><td>1
1
1
1
1</td></tr>
<tr><td></td><td>SECTION - E</td><td></td></tr>
<tr><td>36</td><td>(a) 133
(b) 128
(c) 1365 OR 952</td><td>1
1
2</td></tr>
<tr><td>37</td><td>(a) 150°
(b) 75°.
(c) 75° OR 180°</td><td>1
1
2</td></tr>
<tr><td>38</td><td>(i) $15cm \times 10cm \times 3.5cm = 525cm^3$
(ii) $\frac{1}{3} \times \frac{22}{7} \times 0.5 \times 0.5 \times 1.4 = 0.37cm^3$ (app)
(iii) $525 - 1.48 = 523.52cm^3 (app)$
[OR]
TSA = 2(lb + bh + hl)
= 2($15 \times 10 + 10 \times 3.5 + 15 \times 3.5$)
= $475cm^2$</td><td>1
1
2</td></tr>
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