ISWKP2/041/1

INDIAN SCHOOL AL WADI AL KABIR

Second Rehearsal Examination (2024-25)

Sub: MATHEMATICS STANDARD (041)

Date: 16-01-2025 **Set 1** Marking Scheme Maximum marks: 80

Class: X Time: 3 hours

SECTION A

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

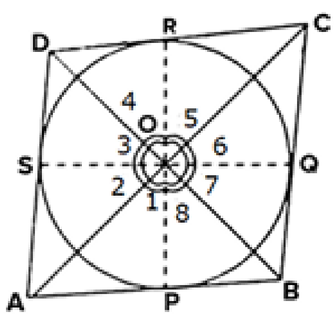
Q.1.	**(C)** 0	**Q.11.**	**(A)** 30°
Q.2.	**(A)** all real values except 10	**Q.12.**	**(C)** $\frac{4}{8}$
Q.3.	**(D)** $\frac{1}{26}$	**Q.13.**	**(A)** a = -1, b = 2
Q.4.	**(A)** 3024	**Q.14.**	**(B)** 10
Q.5.	**(D)** -1	**Q.15.**	**(B)** -12, 18
Q.6.	**(B)** 27 cm	**Q.16.**	**(B)** 20: 27
Q.7.	**(D)** 60°	**Q.17.**	**(C)** 2
Q.8.	**(B)** 2 units	**Q.18.**	**(B)** 4
Q.9.	**(B)** $\frac{7}{0.01}$	**Q.19.**	(a) Both (A) and (R) are true and (R) is the correct explanation of (A)
Q.10.	**(C)** $\frac{50\sqrt{2}}{\pi}$ cm	**Q.20.**	(b)Both (A) and (R) are true and (R) is ***not*** the correct explanation of (A)

SECTION B

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

Q.21.	(a) $\dfrac{2\times\frac{1}{\sqrt{3}}\times 2\times 1}{1-\frac{3}{4}}$	1½
	$= \dfrac{16}{\sqrt{3}}$ or $\dfrac{16\sqrt{3}}{3}$	½
	OR	
	$\cos A + \cos^2 A = 1 \Rightarrow \cos A = 1 - \cos^2 A = \sin^2 A$	1
	$\therefore \sin^2 A + \sin^4 A = \cos A + \cos^2 A$ ($\because \sin^2 A = \cos A$) $= 1$	1
Q.22.	$15^n = 5^n \times 3^n$	1
	A number ends with zero if it has two prime factors 2 and 5 both. Since 15^n does not have 2 as a prime factor, so it can't end with zero	1
Q.23.	Join OA and OC	½
	$OA = OC$	
	$\angle OAC = \angle OCA$	½
	Also, $\angle OAB = \angle OCD$	
	$\Rightarrow \angle OAC + \angle OAB = \angle OCA + \angle OCD$	½
	$\Rightarrow \angle BAC = \angle DCA$	½
Q.24	Ans: In ΔPRQ and ΔSTQ	
	$\angle Q = \angle Q$ (common)	½
	$\angle R = \angle T$ (each 90°)	½
	$\therefore$ $\Delta PRQ \sim DSTQ$ (SS similarity corollary)	½
	$\Rightarrow \dfrac{QR}{QT} = \dfrac{QP}{QS} \Rightarrow QR \times QS = QP \times QT$	½
Q.25 a)	Area of the shaded region = area of square − area of sector	½
	$= (10)^2 - \dfrac{90}{360}\pi(5)^2$	
	$= 100 - \dfrac{3.14\times 25}{4}$	1
	$= 80.38\ sq.cm$	½
	OR	

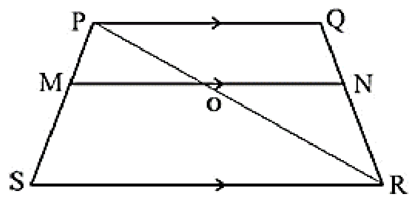
Q.25 b)	Angle subtended by minute hand in 20 minutes $= \frac{360°}{60} \times 20 = 120°$ r = 14 Area $= \frac{22}{7} \times 14 \times 14 \times \frac{120}{360}$ $= \frac{616}{3}$ or 205.33 ∴ required area is $\frac{616}{3}$ cm^2 or 205.33 cm^2	½ 1 ½
	SECTION C	
	This section comprises of short answer (SA) type questions of 3 marks each.	
Q.26 a)	$217x + 131y = 913$ $131x + 217y = 827$ Adding $348(x + y) = 1740$ $x + y = 5$ Subtracting, $86(x - y) = 86$ $x - y = 1$ $\Rightarrow x = 3, y = 2$ **OR**	1 1 ½ + ½
Q.26 b)	Let present age of Rashmi and Nazma be x years and y years respectively. Therefore, $x - 3 = 3(y - 3)$ or $x - 3y + 6 = 0$ and $x + 10 = 2(y + 10)$ or $x - 2y - 10 = 0$ Solving equations to get $x = 42$, $y = 16$ ∴ Present age of Rashmi is 42 years and that of Nazma is 16 years.	1 1 1
Q.27.	Assuming $\frac{5-\sqrt{2}}{3}$ to be a rational number. $\Rightarrow \frac{5-\sqrt{2}}{3} = \frac{p}{q}$,where p and q are integers & $q \neq 0$ $\Rightarrow \sqrt{2} = \frac{5q-3p}{q}$ Here RHS is rational but LHS is irrational. Therefore our assumption is wrong.	½ ½ 1 ½ ½

Q.28.	L.H.S $= \frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$ Divide Numerator and Denominator by cos θ. $= \frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta}$ $= \frac{\tan\theta - 1 + \sec\theta}{(\tan\theta - \sec\theta) + (\sec^2\theta - \tan^2\theta)}$ $= \frac{\tan\theta - 1 + \sec\theta}{(\sec\theta - \tan\theta)(\tan\theta + \sec\theta - 1)}$ $= \frac{1}{\sec\theta - \tan\theta}$ = R.H.S	1 1 ½ ½
Q.29 a)	TP = TQ ⇒ ∠ TPQ = ∠ TQP Let ∠ PTQ be θ ⇒ ∠ TPQ = ∠ TQP $= \frac{180° - \theta}{2} = 90° - \frac{\theta}{2}$ Now ∠ OPT = 90° ⇒ ∠OPQ = 90° – (90° – $\frac{\theta}{2}$) = $\frac{\theta}{2}$ ∠ PTQ = 2 ∠ OPQ	1 1 1
	OR	
b)	Given: A quadrilateral ABCD circumscribes a circle with centre O 	

		$\frac{1}{2}$ for fig.
	To Prove: $\angle$ AOB + $\angle$ COD = 180° *and* $\angle$ BOC + $\angle$ AOD = 180° Proof: In Δ AOP and Δ AOS OA = OA (common) OP = OS (radii) AP = AS (tangents from an external point) $\therefore$ Δ AOP $\cong$ Δ AOS (SSS criteria) $\therefore$ $\angle 1 = \angle 2$ ||ly, $\angle 3 = \angle 4$, $\angle 5 = \angle 6$ and $\angle 7 = \angle 8$ Now $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360°$ $\Rightarrow 2(\angle 1 + \angle 4 + \angle 5 + \angle 8) = 360°$ $\Rightarrow (\angle 1 + \angle 8) + (\angle 4 + \angle 5) = 180°$ $\Rightarrow \angle AOB + \angle COD = 180°$ ||ly, $\angle BOC + \angle AOD = 180°$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
Q.30.	Modal class is 50 – 60, ℓ= 50, f_1 = 16, f_0 = 10, f_2 = x, h = 10 Mode = $\ell + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ $57.5 = 50 + \left(\frac{16 - 10}{32 - 10 - x}\right) \times 10$ $7.5 = \left(\frac{6}{22 - x}\right) \times 10$ $7.5 = \frac{60}{22-x}$; 165 – 7.5x = 60 7.5x = 105; x = $\frac{105}{7.5}$ = 14	½ ½ ½ ½ ½ ½
Q.31.	$2t^2 - 9t - 45 = 2t^2 - 15t + 6t - 45$ $= (2t - 15)(t + 3)$ $\therefore$ zeroes of the polynomial are $\frac{15}{2}$ and – 3. Sum of the zeroes = $\frac{15}{2} + (-3) = \frac{9}{2} = \frac{-(\text{coefficient of t})}{\text{coefficient of } t^2}$ Product of the zeroes = $\frac{15}{2} \times (-3) = -\frac{45}{2} = \frac{\text{constant term}}{\text{coefficient of } t^2}$ (Use variable x in place of t)	1 1 ½ ½
	SECTION D	
	This section comprises long answer (LA) type questions of 5 marks each.	
Q.32.	(i) Given, to prove,fig, consruction Proof	(1 ½) (1 ½)

(ii)

Join PR ½



PQ ∥ SR and MN ∥ PQ ⇒ MN ∥ SR

In Δ PSR,

$\frac{PM}{MS} = \frac{PO}{OR}$ … (i) ½

In Δ PQR,

$\frac{PO}{OR} = \frac{QN}{NR}$ … (ii) ½

From (i) and (ii), $\frac{PM}{MS} = \frac{QN}{NR}$ ½

Q.33.

(a)

Diameter of hemisphere = side of the cube = 21 cm

∴ radius of hemisphere = $\frac{21}{2}$ cm ½

(i) Volume of the wood left = volume of cube – volume of hemisphere

$= 21^3 - \frac{2}{3} \times \frac{22}{7} \times \left(\frac{21}{2}\right)^3$ **1**

$= 6835.5 \text{ cm}^3$ **1**

(ii) Total surface area of remaining solid = TSA of cube – base area of hemisphere + CSA of hemisphere

$= 6 \times 21^2 - \frac{22}{7} \times \left(\frac{21}{2}\right)^2 + 2 \times \frac{22}{7} \times \left(\frac{21}{2}\right)^2$ **1½**

$= 2992.5 \text{ cm}^2$ **1**

OR

(b)

Since the inner diameter of the glass = 5 cm and height = 10 cm,

the apparent capacity of the glass = $\pi r^2 h$ ½

$= 3.14 \times 2.5 \times 2.5 \times 10 \text{ cm}^3 = 196.25 \text{ cm}^3$ 1 ½

But the actual capacity of the glass is less by the volume of the hemisphere at the base of the glass.

$\frac{2}{3}\pi r^3 = \frac{2}{3} \times 3.14 \times 2.5 \times 2.5 \times 2.5 \text{ cm}^3 = 32.71 \text{ cm}^3$ 1 ½

So, the actual capacity of the glass = apparent capacity of glass – volume of the hemisphere

$= (196.25 - 32.71) \text{ cm}^3$ 1

$= 163.54 \text{ cm}^3$ ½

Q.34.		

Class	x_i	f_i	$u_i = \frac{x_i - 67\cdot5}{5}$	f_iu_i	cf
50 – 55	52·5	2	– 3	– 6	2
55 – 60	57·5	8	– 2	– 16	10
60 – 65	62·5	12	-1	-12	22
65 – 70	67·5 = a	24	0	0	46
70 – 75	72·5	38	1	38	84
75 – 80	77·5	16	2	32	100
		100		36	

2 for correct table

$$\text{Mean} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$$

$$= 67\cdot5 + \left(\frac{36}{100} \times 5\right) = 69\cdot3$$

$1+\frac{1}{2}$

$$\text{Median} = l + \frac{\frac{N}{2} - cf}{f} \times h$$

$$= 70 + \frac{50-46}{38} \times 5 = 70.5$$

$1+\frac{1}{2}$

Q.35.

(a)

Here $a_1 = -4$, $a_n = 29$ and $S_n = 150$ — 1

Now $29 = -4 + (n-1)d = (n-1)d = 33$ — 1 ½

Also $S_n = 150 = \frac{n}{2}(-4+29) \Rightarrow n = 12$ — 1 ½

From (i), d = 3 — ½

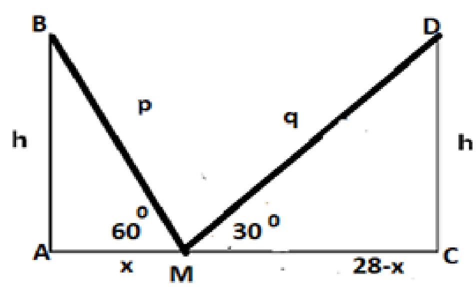
Hence common difference = 3

OR

(b)

	Given $\frac{a+10d}{a+16d} = \frac{3}{4}$ $\Rightarrow 4a + 40d = 3a + 48d$ $\Rightarrow a = 8d$ (i) therefore $\frac{a_5}{a_{21}} = \frac{a+4d}{a+20d} = \frac{3}{7}$ using(i) $a_5 : a_{21} = 3 : 7$ $\frac{s_5}{s_{21}} = \frac{\frac{5}{2}(2a+4d)}{\frac{21}{2}(2a+20d)} = \frac{5 \times 20d}{21 \times 36d} = \frac{25}{189}$ Therefore, S_5:S_{21}=25:189	1 1 1 2

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

Q.36.	**Case Study- 1** (i) Let AB and CD be the 2 poles and M be a point somewhere between their bases in the same line. 	
(ii a)	$\tan 60^0 = \frac{h}{x} \Rightarrow h = x\sqrt{3}$ $\tan 30^0 = \frac{h}{28-x} \Rightarrow h = \frac{(28-x)}{\sqrt{3}}$ $\therefore h = 7\sqrt{3}\ m$	½ ½ 1

	(ii) (b) BM = p and DM = q $\sin 60^0 = \frac{h}{p} \Rightarrow h = \frac{p\sqrt{3}}{2}$ $\sin 30^0 = \frac{h}{q} \Rightarrow h = \frac{q}{2}$ $\therefore \frac{p\sqrt{3}}{2} = \frac{q}{2} \Rightarrow q = \sqrt{3}p$	$^1/_2$ $^1/_2$ 1
	(iii) $\tan 60^0 = \frac{7\sqrt{3}}{x} \Rightarrow x = 7m = AM$ $MC = 28 - x = 21\ m$	½ ½

Q.37.

Case Study- 2

1. The coordinates of Alia's house and Shagun's house are A (2, 3) and B (2, 1) respectively.

∴ Distance of Alia's house from Shagun's house is,

$$BA = \sqrt{(2-2)^2 + (3-1)^2} = \sqrt{(0)^2 + (2)^2}$$
$$= \sqrt{0+4} = 2 \text{ units.}$$

2. The coordinates of Shagun's house and library are B (2, 1) and (4, 1) respectively.

Distance of library from Shagun's house is,

$$BC = \sqrt{(4-2)^2 + (1-1)^2}$$
$$= \sqrt{(2)^2 + (0)^2} = \sqrt{4+0} = 2 \text{ units.}$$

3. The coordinates of school, Alia's house, Shagun's house and library are 0(0, 0), A (2, 3), B (2, 1) and C (4,1)

Now, $BA = \sqrt{(2-2)^2 + (3-1)^2} = \sqrt{(0)^2 + (2)^2}$
$= \sqrt{0+4} = 2$ units.
$BC = \sqrt{(4-2)^2 + (1-1)^2} = \sqrt{(2)^2 + (0)^2}$
$= \sqrt{4+0} = 2$ units.
and $BO = \sqrt{(0-2)^2 + (0-1)^2} = \sqrt{(-2)^2 + (-1)^2}$
$= \sqrt{4+1} = \sqrt{5}$ units.

Here, BO is greater than BA and BC.
For Shagun, School (0) is father than Alia's house (A) and library (C). **Hence proved.**

Q.38.	**Case Study – 3**	
	(i) $(18 + x)(12 + x) = 2(18 \times 12)$	1
	(ii) $x^2 + 30x - 216 = 0$	1
	(iii) Solving : $x^2 + 30x - 216 = 0$ $\Rightarrow (x + 36)(x - 6) = 0$ $x \neq -36 \therefore \Rightarrow x = 6.$	1
	new dimensions are 24 cm $\times$ 18 cm	1
	OR	
	(iii) If $(18 + x)(12 + x) = 220$ then $x^2 + 30x - 4 = 0$ Here D = 900 + 16 = 916 which is not a perfect square.	1
	Thus we can't have any such rational value of x.	1

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