	PRE-BOARD CLASS X SESSION 2023-24 MARKING SCHEME MATHEMATICS STANDARD (041) CODE – MATHMATICS STANDARD/10/A TIME=3 HOURS MM=80	
Q.NO.	**EXPECTED ANSWERS/VALUE POINTS**	**MARKS**
	SECTION A	
Q1.	(c) q	1
Q2.	(d) Infinite	1
Q3.	(b) does not exist	1
Q4.	(b) $x^2-4x+1=0$	1
Q5.	(c) 0	1
Q6.	(b) 100 m	1
Q7.	(b)47.5°	1
Q8.	(d) PS	1
Q9.	(c) (3,4)	1
Q10.	(d) infinitely many	1
Q11.	(a)-1	1
Q12.	(c) 3	1
Q13.	(a) $\frac{20}{\sqrt{3}}$ m	1
Q14.	(c) 480	1
Q15.	(c) 25 cm	1
Q16.	(d) $416cm^3$	1
Q17.	(d)214.5	1
Q18.	(b) increases by 3	1
Q19.	(b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A)	1
Q 20.	(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	1
	SECTION B	
Q21	Let $\sqrt{5}$ be a rational number. $\therefore \sqrt{5} = \frac{p}{q}$, where $q\neq0$ and let p & q be co-primes. $5q^2 = p^2 \Rightarrow p^2$ is divisible by $5 \Rightarrow$ p is divisible by 5 $\Rightarrow p = 5a$, where 'a' is some integer ----- (i) $25a^2 = 5q^2 \Rightarrow q^2 = 5a^2 \Rightarrow q^2$ is divisible by $5 \Rightarrow$ q is divisible by 5 $\Rightarrow q = 5b$, where 'b' is some integer ----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are co-primes. $\therefore \sqrt{5}$ is an irrational number.	½ ½ ½ ½

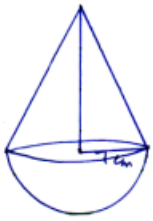
Q22	As $XZ \parallel BC$ Therefore $\frac{AX}{XB} = \frac{3}{2} = \frac{AZ}{ZC}$ – (i)	½
	$\Delta AXY \sim \Delta ABM$	½
	$\Rightarrow \frac{AX}{AB} = \frac{XY}{BM}$ or $\frac{3}{5} = \frac{XY}{3}$	½
	$\Rightarrow XY = \frac{9}{5}$ or $1{\cdot}8$ cm	½
Q23	$\angle QPT = 55°$	½
	$\Rightarrow \angle OPQ = 90° - 55° = 35°$	
	$\Rightarrow \angle OQP = 35°$	1
	$\angle POQ = 180° - 70° = 110°$	
	And reflex $\angle POQ = 250°$	½
	Hence $\angle PRQ = 125°$	
Q24	$m^2 + n^2 = (a\cos\theta + b\sin\theta)^2 + (a\sin\theta - b\cos\theta)^2$	½
	$= a^2(\cos^2\theta + \sin^2\theta) + b^2(\sin^2\theta + \cos^2\theta)$	1
	$= a^2 + b^2$	½
	OR	
	$\sin\theta + \cos\theta = \sqrt{3}$	
	squaring both sides	1
	$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 3$	½
	$\Rightarrow 1 + 2\sin\theta\cos\theta = 3$	
	$\Rightarrow \sin\theta\cos\theta = 1$	½

Q25	Angle subtended by minute hand in 20 minutes $= \frac{360^\circ}{60} \times 20 = 120^\circ$ $r = 14$ $\text{Area} = \frac{22}{7} \times 14 \times 14 \times \frac{120}{360}$ $= \frac{616}{3}$ or 205.33 $\therefore$ required area is $\frac{616}{3}$ cm^2 or 205.33 cm^2 OR Angle subtended by minor arc=360˚-300˚=60˚ Area of minor arc= $\frac{60^\circ}{360^\circ}$ x 3.14x 6 x 6 = 18.84cm^2	½ 1 ½ ½ 1 ½
	SECTION C	
Q26	**LCM = 432** **i.e.** $\frac{432}{60}$ **= 7 min 12 sec.** **$\Rightarrow$ traffic lights will change simultaneously again at 7 : 7 : 12 a.m.**	**2** **1**
Q27	$\alpha + \beta = -\frac{5}{3}$ and $\alpha\beta = \frac{k}{3}$ $\alpha^2 + \beta^2 + \alpha\beta = \frac{19}{9} \Rightarrow (\alpha + \beta)^2 - \alpha\beta = \frac{19}{9}$ $\frac{25}{9} - \frac{k}{3} = \frac{19}{9} \Rightarrow \frac{k}{3} = \frac{2}{3}$ $\Rightarrow k = 2$	**½** **1** **1** **½**
Q28	$TP = TQ$ $\Rightarrow \angle TPQ = \angle TQP$ Let $\angle PTQ$ be θ $\Rightarrow \angle TPQ = \angle TQP = \frac{180^\circ - \theta}{2} = 90^\circ - \frac{\theta}{2}$ Now $\angle OPT = 90^\circ$ $\Rightarrow \angle OPQ = 90^\circ - (90^\circ - \frac{\theta}{2}) = \frac{\theta}{2}$ $\angle PTQ = 2 \angle OPQ$ **OR**	1 1 1

	DR = DS = 3 cm $\therefore$ AR = AD – DR = 17 – 3 = 14 cm $\Rightarrow$ AQ = AR = 14 cm $\therefore$ QB = AB – AQ = 20 – 14 = 6 cm Since QB = OP = r $\therefore$ radius = 6 cm	½ 1 ½ ½ ½
Q29	system has infinite number of solutions $\therefore \frac{2}{2a} = \frac{3}{a+b} = \frac{7}{28}$ $\Rightarrow \frac{1}{a} = \frac{1}{4} \Rightarrow a = 4$ and $a + b = 12 \Rightarrow b = 8$ **OR** $217x + 131y = 913$ $131x + 217y = 827$] Adding $348(x+y) = 1740$ $x + y = 5$ Subtracting, $86(x-y) = 86$ $x - y = 1$ $\Rightarrow x = 3, y = 2$	1 1 1 1 1 ½+ ½
Q30	LHS= $\frac{(\tan\theta + \sec\theta) - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$ $= \frac{(\tan\theta + \sec\theta)(1 - \sec\theta + \tan\theta)}{\tan\theta - \sec\theta + 1}$ = tanθ+secθ $= \frac{1 + \sin\theta}{\cos\theta}$ = RHS	1 1 ½ ½
Q31		Correct table 2 marks

CLASS INTERVAL	f_i	x_i	f_ix_i
0-15	17	7.5	127.5
15-30	20	22.5	450
30-45	18	37.5	675
45-60	21	52.5	1102.5

	60-75 | 15 | 67.5 | 1012.5 75-90 | 9 | 82.5 | 742.5 | | | 4110 Mean=$\frac{4110}{100}$ = 41.1	1
	SECTION D	
Q32	Let there be x articles. Then the production cost of each article =3+2x Total production cost =x(3+2x)=90 $3x+2x^2=90$ $2x^2+3x-90=0$ $2x^2+15x-12x-90=0$ $2x(x-6)+15(x-6)=0$ $(2x+15)(x-6)=0$ $x=6, -\frac{15}{2}$ Number cannot be negative. So, number of articles =6 The cost of each article =Rs.15 **OR** Let the actual marks be x Therefore, $9(x+10)=x^2$ i.e., $x^2-9x-90=0$ i.e., $x^2-15x+6x-90=0$ i.e., $x(x-15)+6(x-15)=0$ i.e., $(x+6)(x-15)=0$ Therefore, $x=-6$ or $x=15$ Since x is the marks obtained, $x \neq -6$. Therefore, $x=15$. So, Ajita got 15 marks in her mathematics test.	2 1 1 1 `2 1 1 1
Q33	Given and To Prove Figure and Construction Proof	½ ½ 2

	$\frac{BD}{DA} = \frac{BE}{EC}$ -----(1) $\frac{BD}{DA} = \frac{BC}{CL}$ -----(2) Hence, $\frac{BE}{EC} = \frac{BC}{CL}$ $\frac{4}{2} = \frac{6}{CL}$ CL=3 cm	½ ½ 1
Q34	Radius of cone = radius of hemisphere = 7 cm ∴Height of cone = 14 cm Volume of solid = Volume of hemisphere + volume of cone $= \frac{2}{3}\pi(7)^3 + \frac{1}{3}\pi(7)^2 14$  $= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7(14+14)$ $= \frac{154}{3} \times 28 = \frac{4312}{3} cm^2$ or $1437.33\ cm^2$ **OR** Radius of each cone = Radius of cylinder = $\frac{3}{2}$ cm Height of each cone 'H' = 2 cm Height of cylinder 'h' = 12 – 4 = 8 cm Volume of air = Volume of cylinder + Volume of 2 cones $= \pi r^2 h + 2\frac{1}{3}\pi r^2 H$ $= \pi r^2\left(h + \frac{2}{3}H\right) = \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2}\left(8 + \frac{2}{3} \times 2\right)$ $= \frac{22}{7} \times \frac{9}{4} \times \frac{28}{3} = 66\ cm^3$	1 1½+1 ½ 1 1 1½+1 ½ 1
Q35		Correct table 2marks

Monthly Expenditure	fi	xi	cf	fixi
1000-1500	24	1250	24	30,000
1500-2000	40	1750	64	70,000

2000-2500	33	2250	97	74,250
2500-3000	**X=28**	**2750**	**125**	**77,000**
3000-3500	30	3250	155	97,500
3500-4000	22	3750	177	82,500
4000-4500	16	4250	193	68,000
4500-5000	7	4750	200	33,250

172+x=200 ½
X=28
Mean=$\frac{532500}{200}$ = 2662.5 1
$\frac{n}{2}$ = 100 ½
Median Class is 2500-3000
Median= 2500+ $\frac{100-97}{28}$ x 500
= 2500 + 53.57
= 2553.57 1

SECTION E

Q36

(i) In ΔOPB, cos30˚=$\frac{OP}{OB}$ ½

$\frac{\sqrt{3}}{2}$ =$\frac{36}{OB}$

OB=24√3 m ½

(ii) In ΔOPB, tan30˚=$\frac{PB}{36}$

PB=$\frac{36}{\sqrt{3}}$ 1

PB=12√3 m

In ΔOAP, tan45˚=$\frac{AP}{36}$ ½

AP=36m ½

AB=AP-PB=36-12√3=12(3-√3) m

OR

Area of ΔOPB= $\frac{1}{2}$ X OP X PB 1

= $\frac{1}{2}$ X 36 X 12√3 ½

= 216 m^2 ½

(iii) In ΔOAP, tan45˚=$\frac{AP}{36}$ ½

AP=36m

height of the Section A from the base of the tower= AP=36m ½

Q37

(i) Since each row is increasing by 10 seats, so it is an AP with first term a= 30, and common difference d=10. ½

So number of seats in 10th row = a_{10} = a+ 9d

= 30 + 9×10 = 120 ½

(ii) Sn = $\frac{n}{2}$(2a + (n-1)d)

		$1500 = \frac{n}{2}$ (2 × 30 + (n-1)10) $3000 = 50n + 10n^2$ $n^2 + 5n - 300 = 0$ $n^2 + 20n - 15n - 300 = 0$ (n+20) (n-15) =0 Rejecting the negative value, n= 15 **OR** No. of seats already put up to the 10th row = S_{10} $S_{10} = \frac{10}{2}\{2 \times 30 + (10-1)10)\}$ $= 5(60 + 90) = 750$ So, the number of seats still required to be put are 1500 -750 = 750	½ ½ ½ ½ ½ ½ ½ ½
	(iii)	If no. of rows =17 then the middle row is the 9th row $a_8 = a + 8d$ $= 30 + 80 = 110$ seats	½ ½
Q38	(i)	R(200,400) , S(-200,400)	½+ ½
	(ii)	PQ=200+200=400m Area of Square PQRS=400x400=160000 m^2 **OR** Diagonal PR=$\sqrt{(400)^2+(400)^2}$ $=\sqrt{3200}$ or $400\sqrt{2}$	1 1 1 1
	(iii)	C(-600,0) ; A(200,800) ; S(-200,400) S divides CA in the ratio k:1 $-200 = \frac{k(200)+1(-600)}{k+1}$ K=1	½ ½