COMMON PRE-BOARD EXAMINATION 2024-25

Subject: MATHEMATICS - STANDARD (041)

Class X

04-12-2024

Time: 3 Hrs. Max. Marks: 80

MARKING SCHEME

SECTION A

Section A consists of 20 questions of 1 mark each.

1	(B)8 cm
2	**(B)** tan30°
3	**(B)**12 - 18
4	**(C)**$\frac{9}{\sqrt{2}}$ cm
5	**(D)**-1
6	**(D)**no solution
7	**(B)**12
8	**(C)**$\frac{1}{m}$
9	**(D)**0.21
10	**(B)**-4
11	**(C)**-1
12	**(D)**$2k^3$
13	**(A)**$\frac{1}{9}$
14	**(A)**6
15	**(B)**$5\sqrt{2}$ cm
16	**(C)1**
17	**(A)**$\sqrt{68}$

18	**(B)**20 cm	
19	(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)	
20	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	
	SECTION B	
21	Let P(x,0) be a point on X-axis PA=PB $PA^2=PB^2$ $(x-2)^2+(0+2)^2=(x+4)^2+(0-2)^2$ $x^2+4-4x+4=x^2+16+8x+4$ $-4x+4=8x+16$ $x=-1$ P(-1,0)	½ m ½ m ½ m ½ m
22 (a)	P(blue marble) $= \frac{1}{5}$, P(black marble) $= \frac{1}{4}$ $\therefore$ P(green marble) $= 1-\left(\frac{1}{5}+\frac{1}{4}\right)=\frac{11}{20}$ Let total number of marbles be x then $\frac{11}{20}\times x = 11 \Rightarrow x = 20$	1 m 1m
	OR	
(b)	Total number of possible outcomes = 34 Favourable number of outcomes is (7, 14, 21, 28 and 35) = 5 P(multiple of 7) $= \frac{5}{34}$	½ m ½ m 1m
23 (a)	$5 \times 11 \times 17 + 3 \times 11 = 11 \times (5 \times 17 + 3)$ $= 11\times 88$ or $11 \times 11 \times 2^3$ It means the number can be expressed as a product of two factors other than 1, therefore the given number is a composite number.	½ m ½ m 1m

(b)	**OR** $480 = 2^5 \times 3 \times 5$ $720 = 2^4 \times 3^2 \times 5$ LCM (480,720) = $2^5 \times 3^2 \times 5 = 1440$ HCF (480, 720) = $2^4 \times 3 \times 5 = 240$	½ m ½ m ½ m ½ m
24	P(x, -1)and Q(0, y) Midpoint Formula: $\frac{x+0}{2} = -3$ x = -6 $\frac{-1+y}{2} = -6$ y = -11 P(-6, -1) and Q(0, -11)	½ m ½ m ½ m ½ m
25	$\sin(A+B) = 1 = \sin 90^0$, so $A+B = 90^0$……(i) $\cos(A-B) = \sqrt{3}/2 = \cos 30^0$, so $A-B = 30^0$……(ii) From (i) & (ii) ∠A = 60° And ∠B = 30°	½ m ½ m 1 m
	SECTION C	
26	Sum = α + β =1 product = αβ = -2 Sum of other zeroes = 2α + 1 + 2β + 1 =2(α+ β) + 2 = 2×1 + 2 = 4 product = (2α + 1) (2β +1) =2(α + β) + 4αβ + 1 = 2×1+ 4× - 2+ 1= -5 Required polynomial $x^2 - 4x - 5$	½ m ½ m ½ m ½ m 1 m
27 **(a)**	Minimum number of rooms required means there should be maximum number of teachers in a room. We have to find HCF of 48, 80 and 144. $48 = 2^4 \times 3$ $80 = 2^4 \times 5$ $144 = 2^4 \times 3^2$ HCF (48, 80, 144) = $2^4 = 16$ Therefore, total number of rooms required = $\frac{48}{16} + \frac{80}{16} + \frac{144}{16} = 17$	½ m ½ m ½ m ½ m ½ m ½ m
(b)		

OR

Required minimum distance = LCM (30, 36, 40)

$30 = 2 \times 3 \times 5 = 2^3 \times 3^2 \times 5$

$36 = 2^2 \times 3^2 = 360$ cm

$40 = 2^3 \times 5$

½ m

Factorisation: 1 ½ m

LCM :1m

28 (a)

$$\text{Area of minor segment} = \frac{22}{7} \times 14 \times 14 \times \frac{60}{360} - \frac{1}{2} \times 14 \times 14 \times \frac{\sqrt{3}}{2}$$

$$= \left(\frac{308}{3} - 49\sqrt{3}\right) cm^2 \text{ or } 17.9 \text{cm}^2$$

2m

1m

OR

(b)

Side of equilateral triangle = 20 m

Length of rope = 14 m

$\theta = 60°$

$$\text{Area grazed by horse} = \frac{\pi r^2 \theta}{360°}$$

$$= \frac{60°}{360°} \times \frac{22}{7} \times 14 \times 14 = \frac{308}{3} \text{ m}^2 \text{ or } 102{\cdot}67 \text{ m}^2$$

$$\text{Area of } \Delta = \frac{\sqrt{3} \times 400}{4} = 100\sqrt{3} \text{ or } 173 \text{ m}^2$$

Required area = $(100\sqrt{3} - 102{\cdot}67)$ m^2 or $70{\cdot}33$ m^2

½ m

1m

1m

½ m

29

$$\text{LHS} = \frac{\frac{\sin\theta}{\cos\theta}}{\frac{(\sin\theta - \cos\theta)}{\sin\theta}} + \frac{\frac{\cos\theta}{\sin\theta}}{\frac{(\cos\theta - \sin\theta)}{\cos\theta}}$$

$$= \frac{1}{(\sin\theta - \cos\theta)} \left[\frac{\sin^2\theta}{\cos\theta} - \frac{\cos^2\theta}{\sin\theta}\right]$$

$$= \frac{1}{(\sin\theta - \cos\theta)} \times \frac{(\sin\theta - \cos\theta)(\sin^2\theta + \cos^2\theta + \sin\theta\cos\theta)}{\sin\theta\cos\theta}$$

$$= \frac{1}{\sin\theta\cos\theta} + 1$$

$= 1 + \sec\theta \operatorname{cosec}\theta = \text{RHS}$

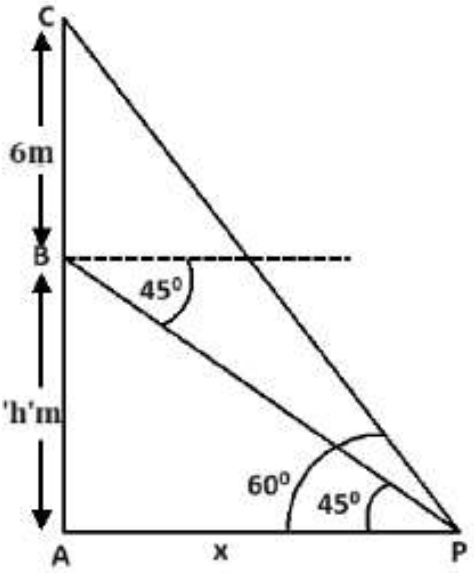
1 m

½ m

1m

½ m

30	Let $2+5\sqrt{3}$ be rational $\therefore\ 2+5\sqrt{3} = \frac{p}{q}$, p, q are integers, $q \neq 0$ $\Rightarrow \sqrt{3} = \left(\frac{p}{q} - 2\right) \div 5 = \frac{p-2q}{5q}$ LHS is irrational and RHS is rational which is a contradiction. $\therefore\ 2+5\sqrt{3}$ is irrational.	½ m ½ m 1m ½ m ½ m
31	Let the side of the first square be x and the side of the second square be y. $x^2 + y^2 = 468$ ...(1) $4x - 4y = 24$ ....(2) ,x > y $4(x - y) = 24$ $x - y = 6$ $x = 6 + y$ Substitute $x = y + 6$ in equation (1) $(y + 6)^2 + y^2 = 468$ $y^2 + 12y + 36 + y^2 = 468$ $2y^2 + 12y + 36 = 468$ $y^2 + 6y + 18 = 234$ $y^2 + 6y + 18 - 234 = 0$ $y^2 + 6y - 216 = 0$ $y^2 + 18y - 12y - 216 = 0$ $y(y + 18) - 12(y + 18) = 0$ $(y + 18)(y - 12) = 0$ $y + 18 = 0$ and $y - 12 = 0$ $y = -18$(rejected) and $y = 12$ Sides of the square are 12 cm and 18 cm.	½ m ½ m 1m ½ m ½ m
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	

32	 Let BC be the pole and AB be the tower of height 'h' m. $\tan 45° = 1 = \frac{h}{x}$ $\Rightarrow h = x$ ---- (i) $\tan 60° = \sqrt{3} = \frac{h+6}{x}$ $\Rightarrow h + 6 = x\sqrt{3}$ ---- (ii) Solving (i) & (ii) to get $h = 3(\sqrt{3}+1) = 8.19$ and $x = 8.19$ Therefore, the height of tower is 8.19 m and the distance of point P from the foot of the tower is 8.19 m	Correct Figure:1m **1m** **½ m** **1 m** **½ m** **½ m** **½ m**

33

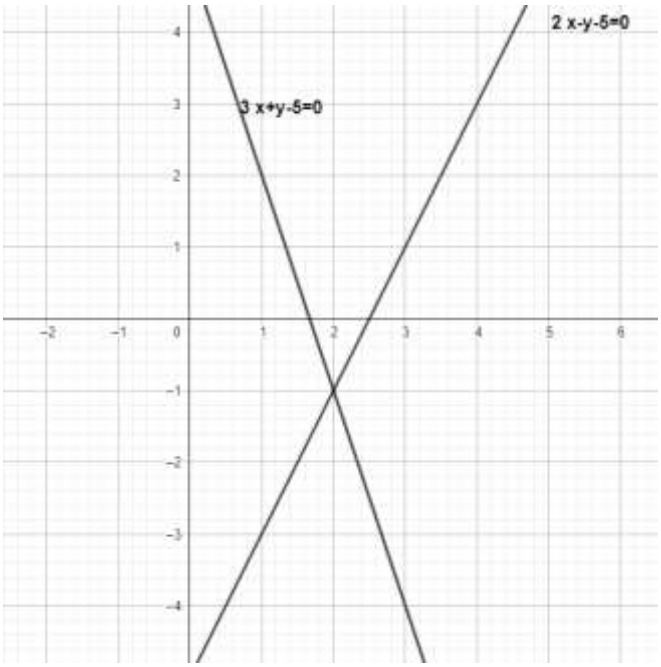
Tabular column

Graph

Solution $x=2, y=1$

Graph of $3x+y-5=0$ meets the $y-$axis at $y=5$

Graph of $2x-y-5=0$ meets the $y-$axis at $y=-5$



3 ½ m

½ m

½ m

½ m

OR

Let the number of right answers and wrong answers be x and y respectively.

3x - y = 40 ... (i)

4x - 2y = 50

⇒ 2x - y = 25 ... (ii)

Solving (i) and (ii), x = 15 ... (iii)

Putting this value in equation (ii), we get

30 - y = 25

y = 5

Therefore, number of right answers = 15

Number of wrong answers = 5

Total number of questions = 20

1 m

1m

2m

½ m

½ m

34

(i)Given, To Prove, Figure (1 ½ m)

Proof : (1 ½ m)

(ii)Let the circle touches the sides AB, BC,CD and AD at P, Q, Rand S respectively.

∴ AP = AS, BP = BQ, DR = DS, CR = CQ

adding, we get (AP + BP) + (DR + CR) = (AS + DS) + (BQ + CQ)

∴ AB + CD = BC + AD

½ m

1m

½ m

35

(a)

Daily Wages(in Rs.)	Number of Workers(f_i)	x_i	u_i	f_iu_i
100-120	10	110	-3	-30
120-140	15	130	-2	-30
140-160	20	150	-1	-20
160-180	22	170	0	0
180-200	18	190	1	18
200-220	12	210	2	24
220-240	13	230	3	39
Total	110			1

1m ½ m ½ m

Mean daily wages $= 170 + \frac{1}{110} \times 20 =$ ₹170.19(approx.)

Mode $= 160 + \frac{22-20}{44-20-18} \times 20 =$ ₹ 166.67(approx.)

1 m

Identifying values and substituting 1 ½ m

Finding Mode ½ m

OR

(b)

Class	Frequency	Cumulative freq.
0-10	f_1	f_1
10-20	5	$5 + f_1$
20-30	9	$14 + f_1$
30-40	12	$26 + f_1$
40-50	f_2	$26 + f_1 + f_2$
50-60	3	$29 + f_1 + f_2$
60-70	2	$31 + f_1 + f_2$
	40	

1 m

Median = 32.5 $\Rightarrow$ median class is 30-40.

Now $32.5 = 30 + \frac{10}{12}(20 - 14 - f_1)$

$\Rightarrow f_1 = 3$

Also $31 + f_1 + f_2 = 40$

$\Rightarrow f_2 = 6$

½ m

2 m

½ m

½ m

½ m

SECTION E

36 **Case Study Based-1**

(i)3, 7, 11,…..

a_{20} = a + 19d

= 3 + 19 ×4

= 3+ 76 = 79 cm

1m

½ m

½ m

(ii) **(a)** a_n = 43

a + (n -1)d = 43

3+(n-1)4 = 43

n – 1=10

n = 11

½ m

1

½ m

OR

(b) S_n = 136

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

136 = $\frac{n}{2}(2 \times 3 + (n-1)4)$

272 = n(6 + 4n -4)

272 = n(2 + 4n)

272= 2n + 4 n^2

$2n^2$ + n – 136 = 0

Solving, n = 8

(iii) 6π, 14π, 22π, …….

½ m

1m

½ m

1m

37 **Case Study Based-2**

$(i)\frac{V_s}{V_c} = \frac{\frac{2}{3}\pi r^3}{\frac{1}{3}\pi r^2 h} = \frac{2r}{h} = \frac{3}{2}$

Ratio= 3:2

(ii)$l = \sqrt{28^2 + 21^2}$ = $\sqrt{28^2 + 21^2}$ = 35 cm

(iii)(a) Volume of the toy = (Volume of cone + Volume of sphere)

= $(\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3) = \frac{1}{3}\pi \times 21^2(28 + 42)$

=32340 cm^3

1m

½ m

½ m

½ m

1

½ m

OR

(b) TSA of the toy = (CSA of cone + CSA of sphere)

= $\pi rl + 2\pi r^2 = \frac{22}{7} \times 21(35 + 42)$

= 66×77 =5082 cm^2

½ m

1m

½ m

38 **Case Study Based-3**

(i) AA or AAA similarity — **1m**

(ii) $\frac{1.5}{x} = \frac{1.8}{3.6}$ — **½ m**

x = 3m — **½ m**

(iii) (a)Let the distance between Mirror and Ramesh be y m.

$\frac{3}{1.5} = \frac{3-y}{y}$ — **½ m**

4.5 – 1.5y = 3 y — **1**

y = $\frac{4.5}{4.5}$ = 1m — **½ m**

OR

(b)Let the distance between Mirror and Ramesh be y m.

Therefore, the distance between pole and mirror is (3-y) m

$\frac{3}{1.5} = \frac{3-y}{y}$ — **½ m**

4.5 – 1.5y = 3 y — **½ m**

y = $\frac{4.5}{4.5}$ = 1m — **½ m**

Required distance = 3 -1 = 2m — **½ m**