COMMON PRE-BOARD EXAMINATION

MATHEMATICS (BASIC-MS)–Code No. 041

CLASS-X-(2025-26)

SET: 2

Time allowed: 3 Hrs. **Maximum Marks: 80**

Q. No.	Questions	Marks
1.	(A) Sum of their radii	1
2.	(C) 4	1
3.	(C) a segment	1
4.	(C) 6.4 cm	1
5.	(C) $2^3 \times 3^2 \times 5$	1
6.	(B) 2.3	1
7.	(B) 16th	1
8.	(B) -6	1
9.	(B) 462cm^2	
10.	(D) 0.21	
11.	(C) $\frac{\sqrt{q^2-p^2}}{q}$	1
12.	(A) 5	1
13.	(C) 424.5	1
14.	(C) 2cm	1
15.	(C) $2x^2 - 7x + 6 = 0$	1
16.	(A) 27	1
17.	(B) 4	1
18.	(C) 5	1
19.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	
20.	(C) Assertion (A) is true, but Reason (R) is false	1
21.	$6x^2 - 7x - 3 = 0$ By splitting middle term: $6x^2 - 9x + 2x - 3 = 0$ $3x(2x - 3) + 1(2x - 3) = 0$ $(2x - 3)(3x + 1) = 0$ $\therefore x = 3/2, x = -1/3$ Sum of zeroes = $\frac{3}{2} + \frac{-1}{3} = \frac{7}{6}, \frac{-b}{a} = \frac{-(-7)}{6} = \frac{7}{6}$ Product of zeroes = $\frac{3}{2} \times \frac{-1}{3} = \frac{-1}{2}, \frac{c}{a} = \frac{-3}{6} = \frac{-1}{2}$ Hence verified.	½ ½ ½ ½

22. (a) $6 = 2 \times 3$

$72 = 2^3 \times 3^2$ ½

$120 = 2^3 \times 3 \times 5$ ½

HCF = $2^1 \times 3^1 = 6$ ½

LCM = $2^3 \times 3^2 \times 5 = 360$ ½

OR

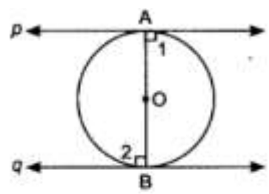
(b) Time taken by cyclists = 30, 40, 48 minutes

Identify LCM ½

LCM of (30, 40, 48) = 240 minutes 1

∴ They will meet again after 240 minutes (4 hours). ½

23.



½

AB is a diameter of the circle, p & q are two tangents, OA⊥p and OB⊥q (radius is perpendicular to tangent through the point of contact) ½

Therefore ∠1 = ∠2 = 90° ½

⇒ p // q (∠1 and ∠2 are alternate interior angle) ½

24. sin A cos B + cos A sin B = sin45°cos30°+cos45°sin30° ½

$$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2}$$ ½

$$= \frac{\sqrt{3}+1}{2\sqrt{2}}$$ ½

$$= \frac{\sqrt{2}(\sqrt{3}+1)}{4}$$ ½

OR

$\sin^2 30^0 + \cos^2 45^0 - \cos 0^0 \times \tan 45^0$

$$= \left(\frac{1}{2}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 - 1 \times 1$$ 1

$$= \frac{1}{4} + \frac{1}{2} - 1$$ ½

$$= \frac{1+2-4}{4} = \frac{-1}{4}$$ ½

25. Let the integers be x and x+1 ½

$x(x+1) = 306$

$x^2 + x - 306 = 0$ ½

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ½

$x = \frac{-1 \pm \sqrt{1^2 + 1224}}{2}$

$x = \frac{-1 \pm 35}{2}$ = 17 ½

Therefore the integers are
17 and 18

26. Integers between 50 and 500 divisible by 7: 56, 63, …, 497. ½

n = $\frac{[(497 - 56)}{7}$ + 1 = 64. ½

Sum = $\frac{n}{2}$ (a + a_n) ½

= $\frac{64}{2}$ × (56 + 497) ½

= 32 × 553 ½

∴ Sum = 17,696. ½

27. Assume $\sqrt{2} - \sqrt{5}$ is rational = r. ½

Then $\sqrt{2}$ = r + $\sqrt{5}$

⇒ $\sqrt{2}$ − r = $\sqrt{5}$ ½

Squaring both sides:

2 – 2r$\sqrt{2}$ + r² = 5 ⇒ –2r$\sqrt{2}$ = 3 – r². ½

⇒ $\sqrt{2} = \frac{r^2 - 3}{2r}$ ½

RHS is rational ($\frac{integer}{integer}$) ½

LHS = $\sqrt{2}$, rational. ½

LHS ≠ RHS contradiction.
∴ √2 – √5 is irrational

28. LHS = $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2$ ½

= $\sin^2\theta + 2\sin\theta\,\text{cosec}\theta + \text{cosec}^2\theta + \cos^2\theta + 2\sec\theta\cos\theta + \sec^2\theta$ ½

= $\sin^2\theta + 2 + \text{cosec}^2\theta + \cos^2\theta + 2 + \sec^2\theta$ ½

= $4 + (\sin^2\theta + \cos^2\theta) + (\sec^2\theta + \text{cosec}^2\theta)$ ½

= $5 + (1 + \tan^2\theta + 1 + \cot^2\theta)$ ½

= $7 + \tan^2\theta + \cot^2\theta$. ½

Hence proved.

29.

C I	f	cf
65 - 85	7	7

½

85 - 105	8	15
105 - 125	7	22
125 - 145	20	42
145 - 165	14	56
165 - 185	9	65
185 - 205	5	70

Median class is 125-145 ½

Median = $l + \frac{(\frac{n}{2} - cf)}{f} \times h$ ½

$= 125 + \frac{35-22}{20} \times 20$ ½

= 125 + 13 ½

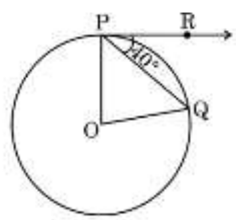
= 138 ½

30. Given ∠QPR = 40° (angle between tangent and chord PQ). 1

∠POQ = 2 × ∠QPR = 80°.

∴ Measure of ∠POQ = 80° 1

1



OR

AP= BP(tangents from external point P) ½

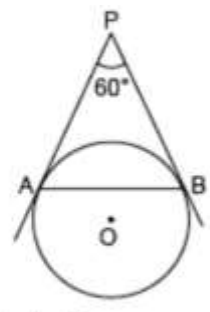
∠PAB = ∠PBA(angles opposite to equal sides) ½

∠APB +∠PAB +∠PBA = 180° ½

∠PAB = 60° ½

ΔAPB is an equilateral triangle. ½

AB=AP = 5cm ½



31. Let original length = x, breadth = y. ½
$(x-5)(y+3) = xy - 9$ …(1)
$(x+3)(y+2) = xy + 67$ …(2)
Expanding: ½
$xy + 2x + 3y + 6 = xy + 67 \Rightarrow 2x + 3y = 61$ …(A)
$xy - 5y + 3x - 15 = xy - 9 \Rightarrow -5y + 3x = 6$ ...(B)
Solving (A) and (B): From (B), $3x = 5y + 6$

½

$\Rightarrow x = \frac{5y + 6}{3}$

Substitute in (A): $\frac{2(5y+6)}{3} + 3y = 61$ ½

$\Rightarrow 19y + 12 = 183 \Rightarrow y = 9.$

Then $x = \frac{5\times9+6}{3} = \frac{51}{3} = 17.$

∴ Dimensions: length = 17 units, breadth = 9 units.

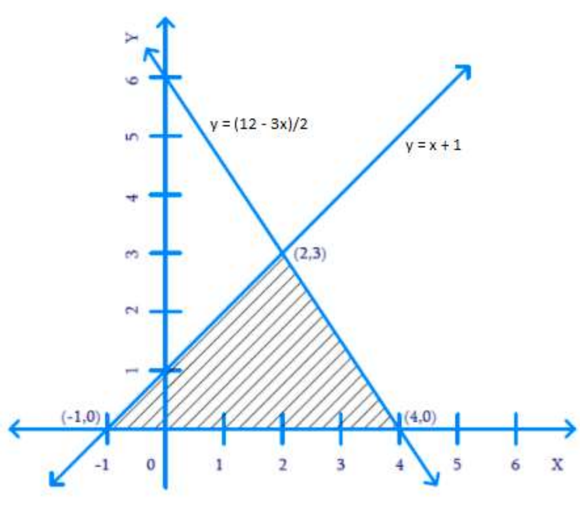
½
½

OR

1

Solutions of $x - y + 1 = 0$ are (-1,0), (2,3) and (2,2)

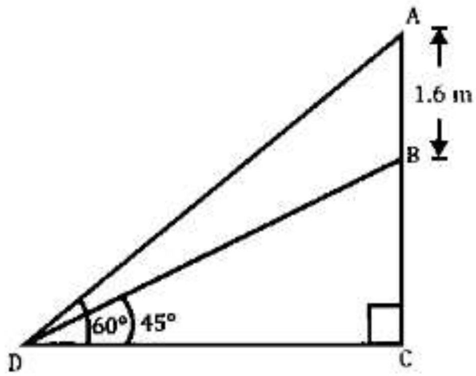
And solutions of $3x + 2y - 12 = 0$ are (0,6) , (2 ,3) and (4,0) ½



1

Vertices of the triangle are (2,3), (4,0) and (-1,0). 1½

32.



1

In ΔBCD,

$\tan 45° = \frac{BC}{CD}$ ½

$1 = \frac{BC}{CD}$

½

Thus, BC = CD

In ΔACD, In ΔACD,

$\tan 60° = \frac{AC}{CD}$ ½

$\tan 60° = \frac{AB+BC}{CD}$

½

$\sqrt{3} = \frac{1.6+BC}{BC}$ [Since BC = CD]

½

$\sqrt{3}$ BC = 1.6 + BC

$\sqrt{3}$ BC - BC = 1.6

BC ($\sqrt{3}$ - 1) = 1.6

$BC = \frac{1.6}{\sqrt{3}-1} = \frac{1.6}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

$= \frac{1.6\,(\sqrt{3}+1)}{2}$ ½

= 0.8 ($\sqrt{3}$ + 1)

½

Height of pedestal BC = 0.8 ($\sqrt{3}$ + 1) m.=2.185

½

33.(A) The volume of the cuboidal portion of the shed is given by the formula

V cuboid=length × width × height ½

= 14× 20 × 7 = $1960 m^3$ 1

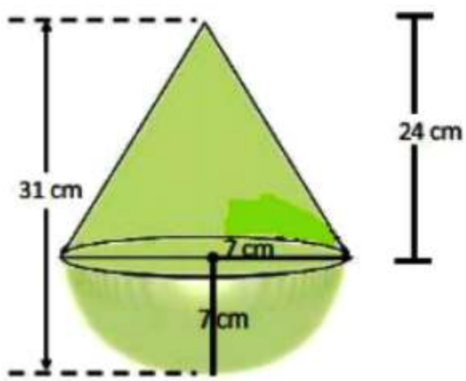
Volume of the half cylinder = $\frac{1}{2}\pi r^2 h = \frac{1}{2}\pi \times 7^2 \times 20$ = $1540 m^3$ 1

Total volume = 1960 +1540 = $3500 m^3$ 1

Space occupied by machinery = $400 m^3$ ½

Therefore remaining space = 3500 – 400 = $3100 m^3$ 1

OR

(B)  ½

Total height of the toy is 31 cm.

Radius of hemisphere = 7 cm. ½

∴ The height of the cone is h = 31 – 7 = 24 cm. ½

Radius of cone is r = 7cm.

∴ The slant height of the cone is l = $\sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2}$ ½

$= \sqrt{625}$ = 25 cm. ½

Total surface area of toy = surface area of hemisphere + surface area of cone.

$=2\pi r^2 + \pi rl = \pi r$ (l+2r)

$= \frac{22}{7} \times 7$ (2 × 7 + 25) 1

= 22 × (14 + 25) ½

= 22 × 39 = 858 cm^2. 1

34. Distance = 300 km, speed = x km/h, ½

time = $\frac{300}{x}$ hours. ½

When speed increased by 5 km/h, time = $\frac{300}{(x+5)}$ hours, 2 hours less. ½

$$\frac{300}{x} - \frac{300}{(x+5)} = 2$$ 1

$$\Rightarrow \frac{300(x+5)}{x(x+5)} - \frac{300x}{x(x+5)} = 2$$ ½

$$\Rightarrow 2x^2 + 10x - 1500 = 0$$ ½

$\Rightarrow x^2 + 5x - 750 = 0$ ½

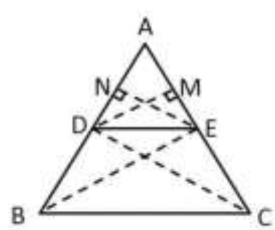
Solving x = 25 (since speed can't be negative) ½

∴ Original speed = 25 km/h. ½

OR

Let incomes = 9x, 7x and expenditures = 4y, 3y. ½+½
Savings = 9x – 4y = 2000, 7x – 3y = 2000. ½
Solving: (9x – 4y) – (7x – 3y) = 0 ½
⇒ 2x – y = 0 ½
⇒ y = 2x. ½
Substitute in first: 9x – 8x = 2000 ½
⇒ x = 2000. ½
∴ Incomes: 9x = ₹18,000, 7x = ₹14,000. ½ + ½

35. Theorem: A line drawn parallel to one side of a triangle divides the other two sides in the same ratio.
Proof:



Consider ΔABC, line DE ∥ BC intersects AB, AC at D and E. ½
Draw CE ∥ AD meeting BC at F.

In ΔADE and ΔDBE ½

Ar(ΔADE) $= \frac{1}{2} \times AD \times EN$

$\text{Ar}(\Delta DBE) = \frac{1}{2} \times DB \times EN$ ½

$\frac{\text{Ar}(\Delta ADE)}{\text{Ar}(\Delta DBE)} = \frac{AD}{DB}$ ------(1) ½

Also in ΔADE and ΔECA

$\text{Ar}(\Delta ADE) = \frac{1}{2} \times AE \times DM$ ½

$\text{Ar}(\Delta ECD) = \frac{1}{2} \times EC \times DM$

½

$\frac{\text{Ar}(\Delta ADE)}{\text{Ar}(\Delta ECD)} = \frac{AE}{EC}$ ------(2) ½

But ΔDBE and ΔECD are on the same base and between the same parallels. ½

Hence ar(ΔDBE) = $ar(\Delta ECD)$-----(3) 1

Therefore , from (1) , (2) and (3) , $\frac{AD}{DB} = \frac{AE}{EC}$

36. (i) Probability that the selected family has two or three children= 19+7 = 26% 1

(ii) Probability that the selected family has more than two children = 7+3 = 10% 1

(iii) Probability that the selected family has more than one child.= 19+7+3 = 29%

2

OR

(iii) Probability that the selected family has less than three children = 51+20+19 = 90%

37. Coordinates of A = (1, 9), B = (5, 13) 1

Coordinates of C = (9, 13), D = (13, 9) 1

Midpoint = $(\frac{9+13}{2}, \frac{13+9}{2})$ = (11, 11)

2

Coordinates of M = (5, 11), N = (9, 11)

MN = $\sqrt{4^2 + 0^2}$ = 4

OR

2

The point which divides MN in the ratio 1:3 is $(\frac{9+15}{4}, \frac{11+33}{4})$ = (6, 11)

38. (i) $\angle$ROS = $\frac{360}{8} = 45°$ 1

1

(ii) Perimeter of sector OPQ = 21+21+$\frac{1}{8} \times 2 \times \frac{22}{7} \times 21$ = 58.5cm (iii)(A)Area of shaded region PQRS = $\frac{1}{8} \times \pi\ (R^2 - r^2)$ = $\frac{1}{8} \times 3.14\ (21^2 - 10^2)$

= $\frac{1}{8} \times 3.14 \times 341$ = 133.84cm^2 2

OR

(iii)(B)Area of shaded region ACB 2

i.e. the segment ACB

= ¼ πr^2- area of ΔOAB

= $\frac{1}{4} \times 3.14 \times 100 - \frac{1}{2} \times 10 \times 10$ = 78.5 – 50 = 28.5cm