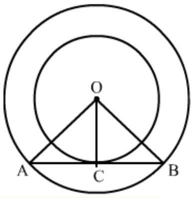
COMMON PRE-BOARD EXAMINATION 2022-23

Subject: Mathematics (Standard) (041) Answer Key

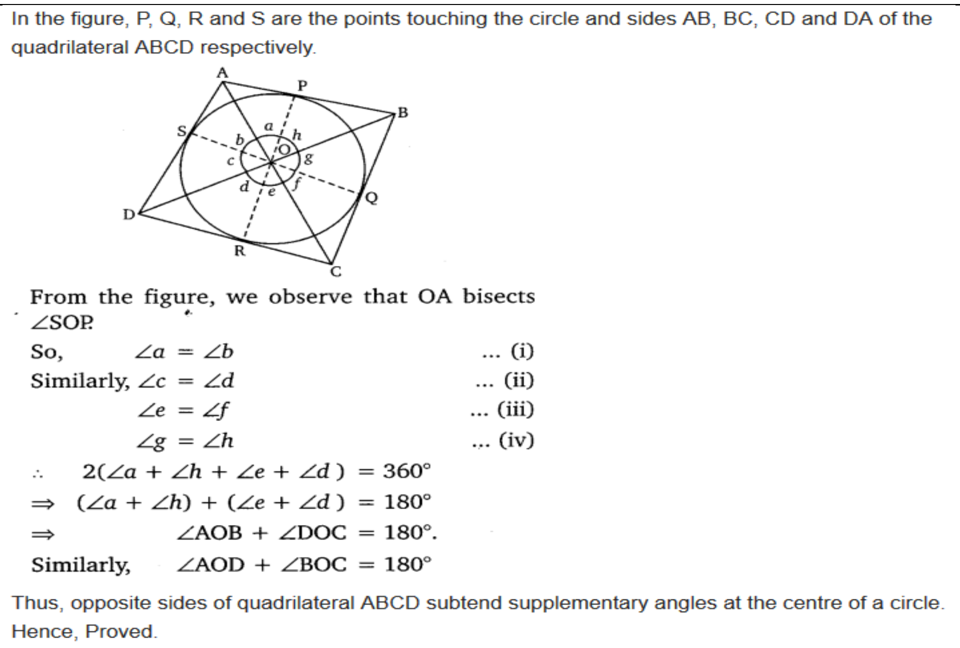
Class: X
Date:

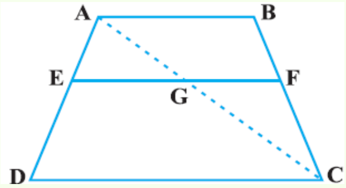
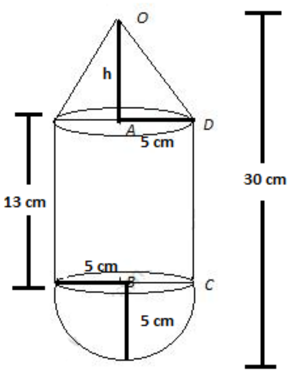
Time: 3 Hours
Max. Marks: 80

Q.No.		Marks
	SECTION - A	
	(Section A consists of 20 questions of 1 mark each)	
1.	(d) 7	1
2.	(d) −3	1
3.	(a) $\frac{1}{4}$	1
4.	(a)no solution	1
5.	(c) 1unit	1
6.	(b) 9 cm	1
7.	(a)4	1
8.	(b) $\frac{169}{144}$	1
9.	(b) 2.7 cm	1
10.	(d) 6 cm	1
11.	(c) 34°	1
12.	(a) 14 cm	1
13.	(c) 126 cm^2	1
14.	(b) Median	1
15.	(a) 59	1
16.	(b) 12.5	1
17.	(a) $\frac{4}{11}$	1
18.	(b) 4sinA.cosA	1
19.	(a)Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	1
20.	(b)Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).	1
	SECTION-B **(Section B consists of 5 questions of 2 marks each)**	
21.	$\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ $\frac{\alpha}{12} = \frac{3}{\alpha} \neq \frac{\alpha-3}{\alpha}$ $\alpha^2 = 36, \quad \alpha = \pm 6$ $\alpha = 6$	½ + ½+ ½ + ½
22.	$\Delta AEB \sim \Delta DEC$ (AA similarity rule)	1

	$\frac{AE}{DE} = \frac{EB}{EC} = \frac{AB}{DC}$ (Corresponding sides are proportional) AE x CE = BE x DE	½ + ½
23.	Join OA,OB and OC  ∴ ∠OCA = ∠OCB = 90° (Theorem 10.1) Now, In △OCA and △OCB ∠OCA = ∠OCB = 90° OA = OB (Radii of the larger circle) OC = OC (Common) By RHS congruency △OCA ≅ △OCB ∴ CA = CB	1 ½ + ½
24.	Here, Ө =30° l = 17.6 cm l = θ/ 360 x 2πr = 17 .6 1/12 x 22/7 x r = 8.8 r = 8.8 x 12 x 7 / 22 = 16.8 cm **OR** Perimeter = l + 2r Perimeter = θ/ 360 x 2πr + 2r = 60 / 360 x 2 x 22/7 x 10.5 + 21 = 1 /6 x 3 x 22 + 21 = 11 + 21 = 33 cm	½ + ½ ½ + ½ ½ ½ 1
25.	$\tan^2 45° – \cos^2 30° = x \tan^2 60° \cos^2 45°$ $= (1)^2 – (\frac{\sqrt{3}}{2})^2 = x (\sqrt{3})^2 (\frac{1}{\sqrt{2}})^2$ $\frac{1}{2} = x (3 \times ½)$ x = 1/3 **OR** If tanӨ = $\frac{1}{\sqrt{3}}$, Ө = 30° $\frac{cosec^2\theta - sec^2\theta}{cosec^2\theta + sec^2\theta} .= \frac{cosec^2 30° - sec^2 30°}{cosec^2 30° + sec^2 30°}$	1 ½ + ½ ½ ½

	$= \frac{2-4/3}{2+4/3}$ = 2 / 10 = 1/5	½ + ½
	SECTION-C **(Section C consists of 6 questions of 3 marks each)**	
26.	Let us assume to the contrary that 9 — 5$\sqrt{3}$ is rational, 9 — 5$\sqrt{3}$ = a/b, a and b are integers and b≠ 0. — 5$\sqrt{3}$ = a/b—9 $\sqrt{3}$ = a—9b / -5b a , —9b and –5b are integers a—9b / -5b is rational. $\sqrt{3}$ is rational, but we know that $\sqrt{3}$ is irrational. Our assumption is wrong. 9 — 5$\sqrt{3}$ is irrational	1 ½ 1½
27.	α + β = 3, αβ = 2, x^2 –3x + 2	1 + 1+1
28.	X = $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$ X = $\frac{4\sqrt{3} \pm \sqrt{48-48}}{2\times3}$ X = $\frac{4\sqrt{3} \pm 0}{6}$ = 2$\sqrt{3}$ / 3 **OR** b^2 – 4ac = 0 4 (k—5)^2— 4(k—5) (2) = 0 4(k—5) (k—7) = 0 K = 5, k = 7 Ans: K = 5	½ 1 ½ 1 ½ 1 1 ½
29.	(sinϴ + cosecϴ)^2 + (cosϴ + secϴ)^2 = sin^{2}ϴ + cosec^{2}ϴ + 2sinϴcosecϴ + cos^{2}ϴ + sec^{2}ϴ + 2cosϴ secϴ = (sin^{2}ϴ + cos^{2}ϴ) + sec^{2}ϴ + cosec^{2}ϴ + 2sinϴ cosecϴ + 2cosϴ secϴ = 1 + 1 + tan^{2}ϴ + 1 + cot^{2}ϴ + 2 + 2 = 7 + tan^{2}ϴ + cot^{2}ϴ	1 1 1
30.	AB = AC, AR = AQ, CR = CP , BQ = BP (Theorem 10.1)------------(1) (Perimeter of ΔABC) = AB + BC + AC = AB + CP + BP + AC = (AB + CR) + (BQ + AC) (From (1)) = AR + AQ = AQ +AQ = 2AQ AQ = $\frac{1}{2}$ (Perimeter of ΔABC) **OR**	1 1

	 In the figure, P, Q, R and S are the points touching the circle and sides AB, BC, CD and DA of the quadrilateral ABCD respectively. From the figure, we observe that OA bisects ∠SOP. So, $\angle a = \angle b$ ... (i) Similarly, $\angle c = \angle d$ ... (ii) $\angle e = \angle f$ ... (iii) $\angle g = \angle h$ ... (iv) $\therefore \quad 2(\angle a + \angle h + \angle e + \angle d) = 360°$ $\Rightarrow \quad (\angle a + \angle h) + (\angle e + \angle d) = 180°$ $\Rightarrow \quad \angle AOB + \angle DOC = 180°$. Similarly, $\angle AOD + \angle BOC = 180°$ Thus, opposite sides of quadrilateral ABCD subtend supplementary angles at the centre of a circle. Hence, Proved.	1 1 1
31.	(i)a multiple of 7 = 14/100 = 7/50 (ii)a perfect square number = 9/100 (iii)a two digit number = 90/100 = 9/10	1+1+1
	SETCION-D **(Section D consists of 4 questions of 5 marks each)**	
32.	Let the speed of the train be x km/hr. Speed when increased by 5 km/ hr = (x + 100) km/hr $1500 / x - 1500/ x + 100 = 1/2$ $1500 (x + 100 -x)/ x^2 + 100x = ½$ $300000 = x^2 + 100x$ $x^2 + 100x - 300000 = 0$ $(x-500)(x + 600)=0$ X = -500 , x = 600 The speed of the train is 600 km/hr. **OR** Lets say Arun scored marks in Hindi = x And he scored marks in English = y He scored total marks in hindi and English = 30 x + y = 30…………....(1) If Arun scored two marks more in hindi than his score would be= (x + 2) If he scored 3 marks less in English than his score would be = (x +3) Product of the marks would be 210	½ 1 1 1 ½ 1 1

	$(x+2)(y-3) = 210$ …...........(2) Solving equation 1 and 2 We find the value of y from equation 1 and put that value in equation 2 $y = 30-x$ Put value of y in equation 2 $\Rightarrow(x+2)(30-x-3) = 210$ $x^2 \ \ -25x+156 = \ 0$ $x-12)(x-13)=0$ $x = 12$ and $x = 13$ Hindi = 12 ,English = 18 Hindi = 13 , English = 17.	1 1 1 ½ ½
33.	 $AB \parallel DC$ & $EF \parallel DC$, therefore $AB \parallel EF \parallel DC$ Join AC which intersects EF at G. In $\triangle ADC$, $EG \parallel DC$ [∵EF is the extension of EG] $AE / ED = AG / GC \rightarrow(1)$ [Converse of BPT) Similarly in $\triangle ABC$, $AB \parallel GF$, Therefore Similarly in $\triangle ABC$, $AB \parallel GF$, Therefore $BF / FC = AG/ GC \rightarrow(2)$ From (1) & (2) , $AE / ED = BF/ FC$ (ii) $AD/DB = AE/EC$ $1.5/ 3 = 1 / EC$, $EC = 2$ cm	½ 1 1 ½ ½ 1 ½
34.	 Height of the cylindrical part(H) =13cm	½

Radius of cone , cylinder and hemi sphere =5cm

r=5cm for hemisphere cylinder and cone.

Height of cone h =30−5−13=12

$$L = \sqrt{h^2 + r^2} = \sqrt{169} = 13 \text{ cm}$$ ½

Area of canvas required= CSA of hemisphere + CSA of cylinder + CSA of cone 1

$$A = 2\pi r^2 + 2\pi rH + \pi rl$$

$$A = \pi r (2r + 2h + l)$$ 1 ½

$$= 22/7 \times 5 (2\times5 + 2 \times13 + 13)$$

$$= 770 \text{ cm}^2$$

OR

Cuboid:

L = 15 m, B = 7 m and H = 8 m, respectively. Also, 1 ½

the diameter of the half cylinder = 7 m and its height = 15 m. ½

Volume of the empty shed = volume of the cuboid + $\frac{1}{2}$ volume of the cylinder = LBH + ½ $\pi r^2 h$ 1

$$= (15 \times 8 \times 7) + (½ \times \frac{22}{7} \times 3.5 \times 3.5 \times 15)$$ 1 ½

$$= 840 + 288.75 = 1128.75 \text{ m}^3$$

The total space occupied by the machinery and 20 workers =

$$= 300 + (20 \times 0.08) = 300 + 1.6 = 31.6 \text{ m}^3$$

The volume of the air, when there are machinery and workers = 1

$$= 1128.75 – 301.6 = 827.15 \text{ m}^3$$ ½

35.

CI	f	cf
0-10	10	10
10-20	f1	10 +f1
20-30	25	35+f1
30-40	30	65+f1
40-50	f2	65+f1 +f2
50-60	10	75+f1+f2

1

75 + f1 + f2 = 100 , f1 + f2 = 25………….(1) 1

We have been given that median = 32, which lies in the range 30 – 40. Therefore, 30 – 40 is the median class. So,

L = 30

N = 100

f = 30

cf = 35 + x ½

h = 10 – 0 = 10 ½

$$median = l + \left(\frac{\frac{N}{2} - Cf}{f}\right) h$$

1

	$median = 30 + \left(\frac{50-(f1+35}{30}\right)10 = 32$ f1 = 9 f2 = 16	½ + ½
	<u>SECTION-E</u> (Case study based questions are compulsory)	
36.	L(5,10) ,to B(0,7),P(8,6) and N(2,6) 1.DISTANCE: LB = $\sqrt{5^2 + 3^2} = \sqrt{34}$ 2.ratio (m:n) = 3 : 2, coordinate of Kota (K).= $\left(\frac{mx2+nx1}{m+n}, \frac{my2+ny1}{m+n}\right)$ $= \left(\frac{3(0)+2(5)}{5}, \frac{3(7)+2(10)}{5}\right)$ = (2, 31/5) 3.NL = $\sqrt{25}$ = 5 units NP = $\sqrt{36}$ = 6 units LP = $\sqrt{25}$ = 5 NLP is an isosceles triangle **OR** L(5,10) , P(8,6) the Point on y a-axis be (0,y). M(0,Y) $MP^2 = ML^2$ $(0-5)^2 + (y-10)^2 = (0-8)^2 + (y-6)^2$ $25 + y^2 - 20y + 100 = 64 + y^2 - 12y + 36$ -8y = -25, y = 25/8 , The required point (0, 25/8).	1 ½ ½ 2 2
37	1.51,49,47,………………. 2.a = First term = 51 secs , d = - 2 last term = 31 31 = 51 + (n - 1)(-2) => 10 = n - 1 => n = 11 11 Terms OR 35 = 51 + (n - 1)(-2) => -16 = -2n + 2 , n = 9 3. d = (x + 10) – 2x = 10—x d = (3x+ 2)— (x + 10) = 2x—8 , x = 8	1 2 2 1
38.	1.The angle of elevation = 45° 2.Diatance = 14 $\sqrt{3}$ m **OR** Height of the vertical tower = 20 $\sqrt{3}$ m 3.The elevation of the sun = 45°	1+2+1

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