ST. JOSEPH PUBLIC SCHOOL

Kota Barrage Road, Kota-6 (Raj.)

C.B.S.E. New Delhi, **MATHEMATICS-Basic** — **SOLUTIONS**

Class: **X** — **2025-26**

Time Allowed: 3 Hours — **Max.Marks:80**

SECTION:A

1	c)338	11	a)-2	
2	a) 6	12	b) 51	
3	b)$x^2-16x+9=0$	13	d)15cm	
4	b)9	14	a)30°	
5	$c)\dfrac{15}{4}$	15	b) 24	
6	$a)\ r=3cm,$	16	c)30	
7	(b) ΔEAD	17	b)10-15	
8	(c) l + 2r	18	d)$\frac{1}{2}$	
9	$a)x=2$	19	d) (A) is false but (R) is true	
10	$b)\dfrac{3}{4}$	20	(c) A is true but R is false.	

21.	Zeroes are -5,-2 $\alpha=-5,\beta=-2,a=1,b=7,c=10$ $\alpha+\beta=\dfrac{-b}{a}\ or-5+(-2)=-\dfrac{7}{1}\ or-7=-7$ $\alpha\beta=\frac{c}{a}$ or,-5.-2=10/1 or 10=10	1 1
22	(A)It can be observed that, 2 × 5 × 7 × 11 + 11 × 13 = 11 × (70 + 13) = 11 x 83 which is the product of two factors other than 1. Therefore, it is a composite number. OR (B). The smallest number which is divisible by any two numbers is their LCM. So, Number which is divisible by both 306 and 657 = LCM (306, 657) Since, $306 = 2^1 \times 3^2 \times 17^1$ and $657 = 3^2 \times 73$ LCM (306, 657) = $2^1 \times 3^2 \times 17^1 \times 73$= 22338	1 1 ½ 1 1/2
23.	$\sin\theta+\sin^2\theta=1$ $\sin\theta=1-\sin^2\theta$ $\sin\theta=\cos^2\theta$ $\cos^2\theta+\cos^4\theta=\sin\theta+\sin^2\theta=1$	1 1

Or,	$\tan\theta = \frac{3}{5}$ $\frac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}$ $\frac{5\tan\theta - 3}{4\tan\theta + 3}$ $= \frac{5 \times \frac{3}{5} - 3}{4 \times \frac{3}{5} + 3}$ $= 0$	½ ½ 1
Q 24.	As, P(3, a) lies on the line L, so $3 + a = 5 \Longrightarrow a = 2$ Now, the radius of the circle = CP = $\sqrt{3^2 + 2^2} = \sqrt{13}$ *units*	1 1
Q25.	For equal roots; $b^2 - 4ac = 0$ $k^2 - 24 = 0$ or, $k = \pm 2\sqrt{6}$	1 1
SECTION:C		
Q26.	For correct proof	3
Q27.	(A) Solution: Modal Class is 40 – 60 $l = 40$, $f_1 = 30$, $f_0 = 25$, $f_2 = 24$, $h = 20$ $\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ $= 40 + \left(\frac{30 - 25}{60 - 25 - 24}\right) \times 20$ $= 40 + 9.1 = 49.1$ OR (B)	1 1 1 2 1

Class interval	f_i	x_i (Mid-value)	$d_i = \frac{x_i - 30}{h}$	$f_i d_i$
0-20	7	10	−1	−7
20-40	p	30	0	0
40-60	10	50	1	10
60-80	9	70	2	18
80-100	13	90	3	39
Total	**39 + p**			**60**

Assumed mean(A) = 30, Width of the interval (h) = 20

$\text{Mean} = 30 + \frac{60}{39+p} \times 20 = 54 \Rightarrow 50 = 39 + p \Rightarrow p = 11$

Q28.

Numbers are 2x and 3x — ½

$$\frac{2x-2}{3x-8} = \frac{3}{2}$$ — 1

$x = 4$ — ½

Numbers are 8 and 12 — 1

Or,

For infinitely many solutions

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$ — 1

$$\frac{2}{k+1} = \frac{3}{2k-1} = \frac{-7}{-(4k+1)}$$ — 1

$k = 5$ — 1

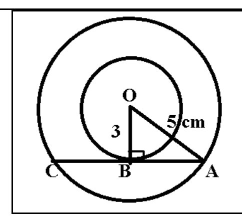
Q29.

$$\frac{5\left(\frac{1}{2}\right)^2 + 4\left(\frac{\sqrt{3}}{2}\right)^2 - (1)^2}{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2}$$ — 1

$$= \frac{5 \times \frac{1}{4} + 4 \times \frac{3}{4} - 1}{\frac{1}{4} + \frac{1}{4}}$$ — 1

$$= \frac{13}{2}$$ — 1

30.



ΔOBA *is right* Δ *at* B (angle b/w radius and tangent is 90° — ½

Using Pythagoras Theorem

$OA^2 = OB^2 + BA^2$

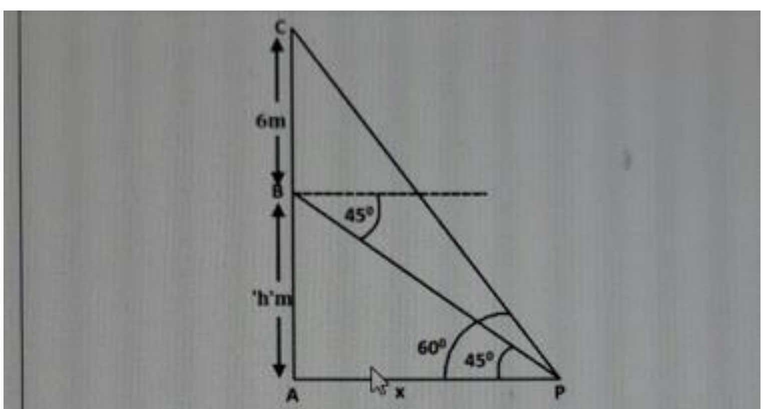
$5^2 = 3^2 + BA^2$

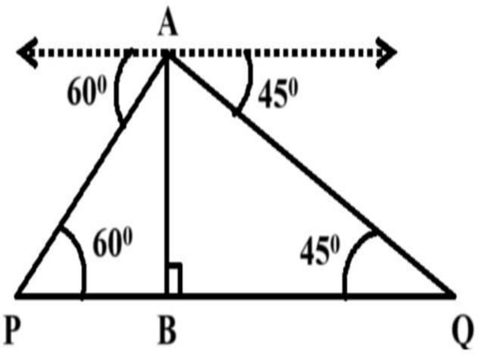
$BA = 4$ — 1

$AC = 2AB$ (perpendicular from centre to the chord bisect the chord) — ½

$AC = 8Cm$ — 1

31.	Sequence of the form: a, a−20, a−40, ………..	1/2
	First term = a, Common difference = d = (a − 20) − a= −20 , n = 7 , S_n = 700	1/2
	Applying formula, of S_7 of AP, we get , a= 160	1
	Therefore, value of first prize = ₹ 160	
	Value of second prize = 160 - 20= ₹ 140	
	Value of third prize = 140 - 20= ₹ 120	
	Value of fourth prize = 120 - 20 = ₹ 100	
	Value of fifth prize = 100 - 20 = ₹ 80	
	Value of sixth prize = 80 - 20 = ₹ 60	1
	Value of seventh prize = 60 - 20 = ₹ 40	
SECTION:D		
32.	Let shorter side be xm	
	∵ Longer side= $(x+30)$m	1
	$\sqrt{x^2+(x+30)^2}=x+60$	1
	$x^2-60x-2700=0$	1
	$(x-90)(x+30)=0$	
	$x=90,-30$	1
	$Shorter\ side=90m$	
	$Longer\ side(90+30)=120m$	1
Or,	Let sides of square xm and ym	½
	Perimeter are 4x and 4y	
	Areas are x^2 and y^2	½
	4x-4y=24	½
	x-y=6	½
	$x^2+y^2=468$	½
	$(y+6)^2+y^2=468$	1
	$y^2+6y-216=0$	1
	y=-18 (rejected) or y=12	
	Sides of squares are 12m 18m	½

Q33.	Given ,To Prove ,Fig Correct proof $\frac{PE}{EQ} = \frac{3.9}{3} = \frac{1 \cdot 3}{1}$ $\frac{PF}{FR} = \frac{3.6}{2 \cdot 4} = \frac{3}{2}$ $therefore\ \frac{PE}{EQ} \neq \frac{PF}{FR}$ EF not parallel to QR (By converse of BPT)	1.5 2.5 1
Q34	Radius of cylinder=radius of hemisphere=3.5cm H=20-(3.5+3.5)=13cm Total volume of solid=vol.of cylinder+2x Volume of H.sphere $\pi r^2 h + 2 \cdot \frac{2}{3} \cdot \pi r^3$ $= \frac{22}{7} \cdot \frac{7}{2} \cdot \frac{7 \cdot}{2} 13 + 2 \cdot \frac{2}{3} \cdot \frac{22}{7} \cdot \frac{7}{2} \cdot \frac{7}{2} \cdot \frac{7}{2}$ $= 680.16$ cubic cm.	1 1 1 1 1
35.	 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) Solve equation 1 and 2 we get H = 8.19 m	1 for fig 2 2

	Here, AB represents the height of the lighthouse In right Δ ABP $\frac{AB}{PB} = \tan 60° = \sqrt{3}$ $\Rightarrow PB = \frac{AB}{\sqrt{3}}$ --- ① In right Δ ABQ $\frac{AB}{BQ} = \tan 45° = 1$ $\Rightarrow BQ = AB$ --- ② Adding ① and ②, we have $PB + BQ = \frac{AB}{\sqrt{3}} + AB$ $\Rightarrow PQ = AB\left(\frac{1+\sqrt{3}}{\sqrt{3}}\right)$ $\Rightarrow 100\left(\frac{1+\sqrt{3}}{\sqrt{3}}\right) = AB\left(\frac{1+\sqrt{3}}{\sqrt{3}}\right)$ $\Rightarrow AB = 100$ m  	
SECTION:E		
36.	(i)(-2,2) (ii)$2\sqrt{2} units$ (iii) $2\sqrt{5} units$ Or, (-10/7,-2/7)	1 1 2 2
37.	(i) 6 (ii) 707.14 cm^2 (iii) 58.93 cm^2 OR 55/7 cm	1 1 2
38.	(i)P (selected student doesn't prefer to walk) = $\frac{80}{100} = \frac{2}{5}$ (ii) P (selected student prefers to walk or use bicycle) = $\frac{170}{200} = \frac{17}{20}$ (iii) P (selected student uses bicycle) = $\frac{110}{200} = \frac{11}{20}$ OR, P (selected student is dropped by car = $\frac{10}{200} = \frac{1}{20}$	1 1 2 2