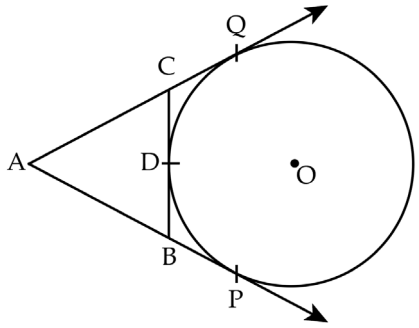
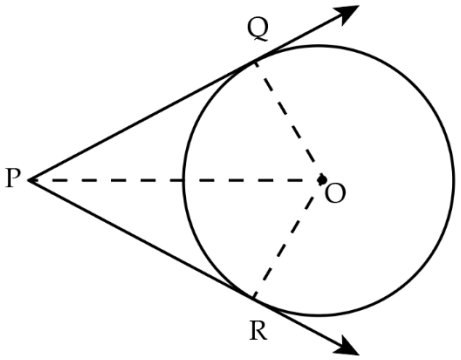
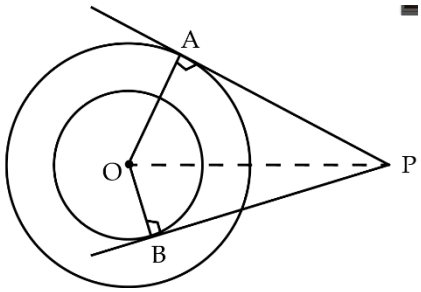
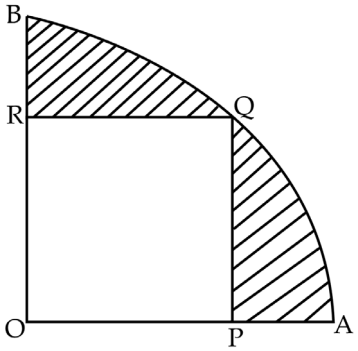
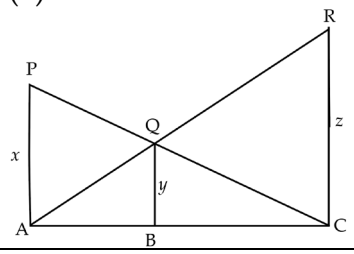
MARKING SCHEME
ALL INDIA SECONDARY SCHOOL EXAMINATION, 2027
Sample Question Paper (2026-27)
Subject: Mathematics (036)

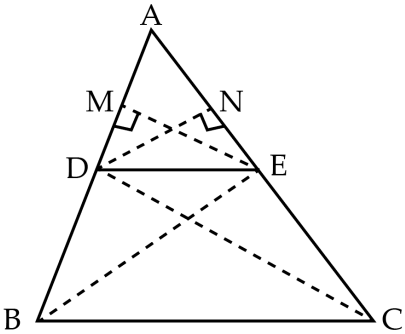
Q.No.	Expected Answer/ Value Points	Distribution of Marks
	Section A	
1.	(c) 35	1
2.	(d) 2	1
3.	(a) 8, –4	1
4.	(d) –3, 6	1
5.	(b) 18	1
6.	(a) (1, 3)	1
7.	(b) $\angle Q = \angle S$	1
8.	(a) 25°	1
9.	(d) Trapezium	1
10.	(c) 3.5 cm	1
11.	(b) 25	1
12.	(d) 24 cm	1
13.	(a) 30°	1
14.	(c) 36 cm	1
15.	(b) 160 cm^2	1
16.	(c) 308 cm^3	1
17.	(d) 5.6	1
18.	(c) $0 \leq P(A) \leq 1$	1
19.	(c) Assertion (A) is true, but Reason (R) is false.	1
20.	(c) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A)	1
	Section B	
21.	$a = 2520, b = 6600$ $LCM(a,b) = 120, HCF(a,b) = 252k$ $LCM(a,b) \times HCF(a,b) = a \times b$ $120 \times 252k = 2520 \times 6600$ $k = \frac{2520 \times 6600}{120 \times 252}$ $k = 550$	½ 1 ½
22.	(a) $A(-2,5), B(3,-4), C(7,10)$ $AB = \sqrt{(3+2)^2 + (-4-5)^2} = \sqrt{25+81} = \sqrt{106}$ $BC = \sqrt{(7-3)^2 + (10+4)^2} = \sqrt{16+196} = \sqrt{212}$ $AC = \sqrt{(7+2)^2 + (10-5)^2} = \sqrt{81+25} = \sqrt{106}$	½ ½ ½

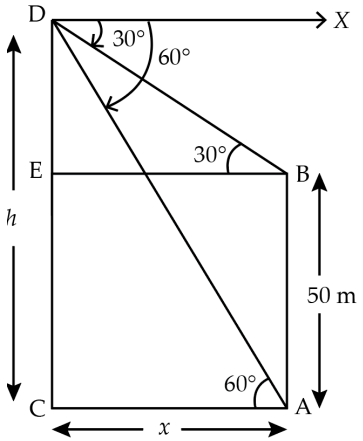
Q.No.	Expected Answer/ Value Points	Distribution of Marks
	Here, $BC^2 = AB^2 + AC^2$ and $AB = AC$. So, A, B, C are vertices of a right-angled isosceles triangle.	½
22.	OR (b) C (x, y) — A (1, 1) — B (2, –3) $3AC = BC = \frac{AC}{BC} = \frac{1}{3}$ $or AC : BC = 1 : 3$ $x = \frac{1(2)+3(1)}{1+3} = \frac{5}{4}; y = \frac{1(-3)+3(1)}{1+3} = 0$ So, coordinate of point C is $\left(\frac{5}{4}, 0\right)$	 ½ ½+½ ½
23.	A (5–p, 3) C (2, 3) B (4, q+5) C is mid-point of AB so $2 = \frac{5-p+4}{2} \Rightarrow p = 5$ $3 = \frac{3+q+5}{2} \Rightarrow q = -2$	 1 1
24.	$CQ = CD = 3\ cm$ (∵ The Lenths of tangents drawn from an external point to a circle are equal)  $AP = AQ$ $AB + BP = AQ$ $AB + BD = AQ$ $[\because BP = BD]$ $8 + BD = 12$ $BD = 4\ cm$	1 1
25.	(a) $\sin 30° \cos 45° + \cos 30° \sin 45°$ $= \frac{1}{2} \times \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}} = \frac{\sqrt{3}+1}{2\sqrt{2}}$	1+1
25.	OR (b) $\tan\theta = \frac{4}{5}$ $\frac{3\sin\theta + 2\cos\theta}{3\sin\theta - 2\cos\theta}$ Dividing numerator and denominator by $\cos\theta$ $= \frac{3\tan\theta + 2}{3\tan\theta - 2}$ $= \frac{3\left(\frac{4}{5}\right)+2}{3\left(\frac{4}{5}\right)-2}$ $= \frac{12+10}{12-10} = \frac{22}{2} = 11$	 ½ ½ ½ ½
	Section C	

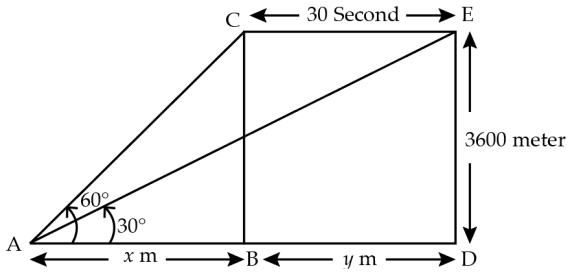
Q.No.	Expected Answer/ Value Points	Distribution of Marks
26.	Let us assume that $3\sqrt{5}$ is a rational number. $3\sqrt{5} = \frac{a}{b}$ (where *a* and *b* are co-prime integers and b≠0) $\sqrt{5} = \frac{a}{3b}$ Since *a* and *b* are integers so $\frac{a}{3b}$ is a rational number. So, $\sqrt{5}$ is rational. But this contradicts the fact that $\sqrt{5}$ is irrational. So, $\sqrt{5}$ is an irrational number. We know product of rational and irrational number is irrational so $3\sqrt{5}$ is an irrational number.	1 1½ ½
27.	Let α, β are zeroes of the polynomial $2x^2 - 5x - 3$ So, $\alpha + \beta = \frac{-b}{a} = \frac{-(-5)}{2} = \frac{5}{2}$ $\alpha\beta = \frac{c}{a} = \frac{-3}{2}$ So zeroes of the polynomial $x^2 + ax + b$ will be 2α and 2β. $2\alpha + 2\beta = \frac{-a}{1}$ $2(\alpha + \beta) = -a$ $2\left(\frac{5}{2}\right) = -a \quad or \quad a = -5$ $(2\alpha)(2\beta) = \frac{b}{1}$ $4\alpha\beta = b \quad or \quad b = 4\left(\frac{-3}{2}\right) = -6$	 1 1 1
28.	(a)  Given: *PQ* and *PR* are two tangents, from an external point P to a circle with centre O. To prove: $PQ = PR$ Construction: Join *OP*, *OQ* and *OR*. Proof: In triangles OQP and ORP $OQ = OR$ (radii of the same circle) $\angle OQP = \angle ORP$ $(OQ \perp PQ \; and \; OR \perp PR)$ $OP = OP$ (common) By RHS congruency $\Delta OQP \cong \Delta ORP$ So $PQ = PR$ (by c.p.c.t)	½ ½ 1 1
	OR	

Q.No.	Expected Answer/ Value Points	Distribution of Marks
28.	(b)  $OA = 5\ cm, OB = 3\ cm, PA = 12\ cm$ Radius is ⊥ on tangent so $\angle OAP = 90°$ In right $\Delta OAP, OP^2 = OA^2 + AP^2$ $OP^2 = 5^2 + 12^2 = 25 + 144 = 169$ $OP = 13\ cm$ $OB \perp PB$ So in right triangle OBP $OB^2 + PB^2 = OP^2$ $3^2 + PB^2 = 169$ $PB^2 = 169 - 9 = 160$ $PB = \sqrt{160} = 4\sqrt{10}\ cm$	 1 1 1
29.	$47x + 31y = 63$ …(i) $31x + 47y = 15$ …(ii) Adding (i) and (ii) $78x + 78y = 78$ Divide all by 78 $x + y = 1$ …(iii) Subtract (ii) from (i) $16x - 16y = 48$ Divide all by 16 $x - y = 3$ …(iv) Adding (iii) and (iv) $x = 2$ From (iii) $y = -1$	 1 1 ½ ½
30.	(a) LHS $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta}$ $= \frac{\sin^2\theta + (1+\cos\theta)^2}{(1+\cos\theta)\sin\theta}$ $= \frac{\sin^2\theta + 1 + \cos^2\theta + 2\cos\theta}{(1+\cos\theta)\sin\theta}$ $= \frac{2+2\cos\theta}{(1+\cos\theta)\sin\theta}$ $= \frac{2(1+\cos\theta)}{(1+\cos\theta)\sin\theta} = \frac{2}{\sin\theta} = 2\ cosec\ \theta$ = RHS	 1 1 ½ ½
30.	OR (b) LHS $(\sin\theta + cosec\ \theta)^2 + (\cos\theta + \sec\theta)^2$ $= \sin^2\theta + cosec^2\theta + 2\sin\theta\, cosec\ \theta + \cos^2\theta + \sec^2\theta + 2\cos\theta\sec\theta$ $= \sin^2\theta + \cos^2\theta + 1 + \cot^2\theta + 2 + 1 + \tan^2\theta + 2$ $= 1 + 1 + \cot^2\theta + 2 + 1 + \tan^2\theta + 2$ $= 7 + \tan^2\theta + \cot^2\theta$ = RHS	 1 1 1

Q.No.	Expected Answer/ Value Points	Distribution of Marks
31.	 $OA = 21\ cm$ (given) $OQ = OA = 21\ cm$ (radius of same circle) Let side of square $OPQR$ is x cm $OP^2 + PQ^2 = OQ^2$ $x^2 + x^2 = 21^2$ $2x^2 = 21^2 \Rightarrow x^2 = \frac{21^2}{2}$ Area of shaded region = area of quadrant – area of square $= \frac{\pi r^2}{4} - x^2$ $= \frac{22}{7} \times \frac{21\times21}{4} - \frac{21\times21}{2}$ $= \frac{21\times21}{2}\left(\frac{11}{7} - 1\right) = \frac{21\times21\times4}{2\times7} = 126\ cm^2$	1 ½ ½ 1
	Section D	
32.	Let the average speed of aeroplane = x km/hour. Reduced speed of aeroplane = $(x - 100)$ km/hour. Distance travelled = 2800 km Increased time = 30 minutes = $\frac{1}{2}$ hour. Time = Distance / Speed According to question $\frac{2800}{x-100} - \frac{2800}{x} = \frac{1}{2}$ $\frac{2800x - 2800x + 280000}{x(x-100)} = \frac{1}{2}$ $x^2 - 100x - 560000 = 0$ $(x - 800)(x + 700) = 0$ $x = 800 \quad or \quad x = -700 \quad$ but $x \neq -700$ $Original\ duration\ of\ flight = \frac{Distance}{Speed} = \frac{2800}{800} = \frac{7}{2} hour$ = 3.5 hours	1 1½ 2 ½
33.	(a) 	

Q.No.	Expected Answer/ Value Points	Distribution of Marks
	In ΔCAP and ΔCBQ $\angle CAP = \angle CBQ$ (each 90°) $\angle ACP = \angle BCQ$ (common) By AA criteria $\Delta CAP \sim \Delta CBQ$ So $\frac{CA}{CB} = \frac{AP}{BQ} = \frac{x}{y}$ ($\because$ corresponding sides of similar triangles are proportional) $\frac{CB}{CA} = \frac{y}{x}$ …(i) In ΔACR and ΔABQ $\angle ACR = \angle ABQ$ (each 90°) $\angle CAR = \angle BAQ$ (common) By AA criteria $\Delta ACR \sim \Delta ABQ$ So $\frac{AC}{AB} = \frac{CR}{BQ} = \frac{z}{y}$ $\frac{AB}{AC} = \frac{y}{z}$ …(ii) Adding (i) and (ii) $\frac{CB}{CA} + \frac{AB}{AC} = \frac{y}{x} + \frac{y}{z}$ $\frac{CB+AB}{AC} = \frac{y}{x} + \frac{y}{z}$ $\frac{AC}{AC} = \frac{y}{x} + \frac{y}{z}$ *or* $1 = \frac{y}{x} + \frac{y}{z}$ $\frac{CB+AB}{AC} = \frac{y}{x} + \frac{y}{z}$ $\frac{1}{y} = \frac{1}{x} + \frac{1}{z}$	1 1 1 1 1 1
33.	OR (b) Statement: If a line is drawn parallel to one side of a triangle to intersect the other two sides in district points, then the other two sides are divided in the same ratio.	1
		½
	Given: In $\Delta ABC, DE \| \| BC$ To prove: $\frac{AD}{DB} = \frac{AE}{EC}$ Construction: Join BE, CD and draw $DN \perp AC$ and $EM \perp AB$	½
	Proof: $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2} \times base \times height}{\frac{1}{2} \times base \times height} = \frac{\frac{1}{2} \times AD \times EM}{\frac{1}{2} \times DB \times EM}$	

Q.No.	Expected Answer/ Value Points	Distribution of Marks
	$\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{AD}{DB}$ …(i) $\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{\frac{1}{2}\times AE\times DN}{\frac{1}{2}\times EC\times DN} = \frac{AE}{EC}$ …(ii) ΔBDE and ΔCDE are on the same base DE and between same parallels BC and DE. So $ar(\Delta BDE) = ar(\Delta CDE)$ From (i) $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{AE}{EC}$ …(iii) Comparing (i) and (iii) $\frac{AD}{DB} = \frac{AE}{EC}$	1 1 1
34.	(a)  Let height of tower = h m Horizontal distance between building and tower = x m $\angle XDB = \angle DBE = 30°$ [alternate interior angles] $\angle XDA = \angle DAC = 60°$ [alternate interior angles] In ΔDCA $\tan 60° = \frac{DC}{CA} = \frac{h}{x}$ $\sqrt{3} = \frac{h}{x}$ $h = \sqrt{3}x$ …(i) In ΔDEB $\tan 30° = \frac{DE}{BE} = \frac{h-50}{x}$ $\frac{1}{\sqrt{3}} = \frac{\sqrt{3}x-50}{x}$ $x = 3x - 50\sqrt{3}$ $2x = 50\sqrt{3}$ $x = 25\sqrt{3}$ m From (i) $h = \sqrt{3} \times 25\sqrt{3} = 75$ m Hence height of tower = 75 m and horizontal distance between building and tower = $x = 25\sqrt{3}$ m	1 1 1 1 1

Q.No.	Expected Answer/ Value Points	Distribution of Marks
	OR	
34.	(b) 	1
	In ΔABC	
	$\tan 60° = \frac{BC}{AB} = \frac{3600\sqrt{3}}{x}$	
	$\sqrt{3} = \frac{3600\sqrt{3}}{x} \Rightarrow x = 3600\ m$	1
	In ΔADE	
	$\tan 30° = \frac{DE}{AD} = \frac{3600\sqrt{3}}{x+y}$	
	$\frac{1}{\sqrt{3}} = \frac{3600\sqrt{3}}{3600+y}$ or $y = 7200\ m$	2
	Distance $y\ m$ is covered in 30 seconds. So speed of aeroplane $= \frac{y}{30}$	
	$= \frac{7200}{30} = 240\ m/sec$	½
	$= \frac{240\times60\times60}{1000} = 864$ km/hour.	½
35.		2 (table)

Marks obtained	No. of students f	Mid value x	fx	c.f.	
0-10	4	5	20	4	
10-20	6	15	90	10	
20-30	7	25	175	17	
30-40	12	35	420	29	Modal Class, Median Class
40-50	5	45	225	34	
50-60	6	55	330	40	
	40		1260		

$Mean = \bar{x} = \frac{\sum fx}{\sum f} = \frac{1260}{40} = 31.5\ marks$

$Median = M = l + \frac{\frac{N}{2}-C}{f} \times h$ 1

$= 30 + \frac{20-17}{12} \times 10$

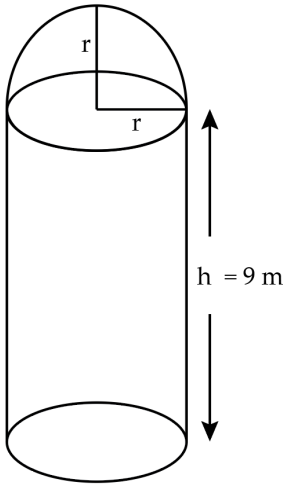
$= 30 + \frac{30}{12} = 30 + 2.5 = 32.5\ marks$ 1

$Mode = m = l + \frac{f_1-f_0}{2f_1-f_0-f_2} \times h$

$= 30 + \frac{12-7}{2\times12-7-5} \times 10$

$= 30 + \frac{50}{12} = 30 + 4.17$ 1

$= 34.17\ marks\ (approx.)$

Q.No.	Expected Answer/ Value Points	Distribution of Marks
	Section E	
36.	Total students participated in survey = 200 $n(S) = 200$ (a) Let E_1 is the event that he sleeps after 11 PM and his favourite subject is Social Science. $n(E_1) = 11$ $P(E_1) = \frac{n(E_1)}{n(S)} = \frac{11}{200}$ (b) Let E_2 is the event that he go to sleep after 10 PM. $n(E_2) = 12 + 14 + 17 + 18 + 7 + 9 + 11 + 11 = 99$ $P(E_2) = \frac{n(E_2)}{n(S)} = \frac{99}{200}$ (c) Let E_2 is the event that he go to sleep between 9 PM and 10 PM and his favourite subject is not Mathematics. $n(E_3) = 13 + 16 + 12 = 41$ $n(E_3) = \frac{n(E_3)}{n(S)} = \frac{41}{200}$ OR (c) Let E_4 is the event that he go to sleep before 10 PM and his favourite subject is either Science or Social Science. $n(E_4) = 12 + 9 + 16 + 12 = 49$ $P(E_4) = \frac{n(E_4)}{n(S)} = \frac{49}{200}$	1 1 1 1 1 1
37.	 Radius of cylindrical part = radius of hemispherical top = r r = 3 m, h = 9 m (height of cylindrical part) (a) Radius of hemi-spherical top = radius of cylindrical part = $r = 3m$ (b) Total heigh of the tank = $h + r = 9 + 3 = 12\ m$ (c) Volume of the tank = $\pi r^2 h + \frac{2}{3}\pi r^3$ $= \frac{22}{7} \times 3 \times 3 \times 9 + \frac{2}{3} \times \frac{22}{7} \times 3 \times 3 \times 3$	1 1 1

Q.No.	Expected Answer/ Value Points	Distribution of Marks
	$= \frac{22}{7} \times 3 \times 3(9+2)$ $= \frac{2178}{7} = 311.14\ m^3$	1
	OR	
	(c) Total surface area of the tank to be painted $= 2\pi rh + 2\pi r^2$ $= 2 \times \frac{22}{7} \times 3 \times 9 + 2 \times \frac{22}{7} \times 3 \times 3$ $= 2 \times \frac{22}{7} \times 9 \times 4$ $= \frac{1584}{7} = 226.29\ m^2$	1 1
38.	(a) As per number of squares in each figure the Arithmetic progression is 1, 5, 9, … Its first term = 1 Common difference = 5 – 1 = 4	1
	(b) As per number of sticks used in each figure the Arithmetic progression is 4, 16, 28, … Its first term = 4 Common difference = 16 – 4 = 12	1
	(c) As per square *AP* is 1, 5, 9, … $a = 1, d = 4$ Number of squares in figure 8 = $a_8 = a + 7d$ $= 1 + 7(4) = 29$ As per number of sticks *AP* is 4, 16, 28, … $a = 4, d = 12$ Number of sticks used in figure 8 = $a_8 = a + 7d$ $= 4 + 7(12) = 88$	1 1
	OR	
	(c) As per sticks *AP* is 4, 16, 28, … $a = 4, d = 12, a_n = 88$ $a + (n-1)d = 88$ $4 + (n-1)12 = 88$ $n = 8$ As per square *AP* is 1, 5, 9 $a = 1, d = 4$ Number of squares in nth figure = a_n $= a + (n-1)d$ $= 1 + (n-1)4 = 1 + 4n - 4$ $= 4n - 3$	 1 1

* * * * *