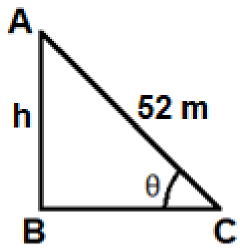
MATHEMATICS STANDARD – Code No. (041)

MARKING SCHEME

CLASS X (2026 - 27)

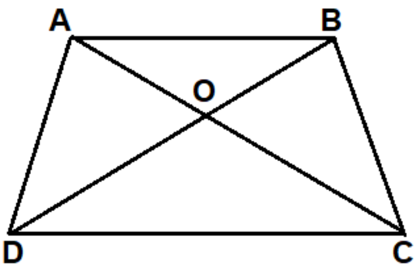
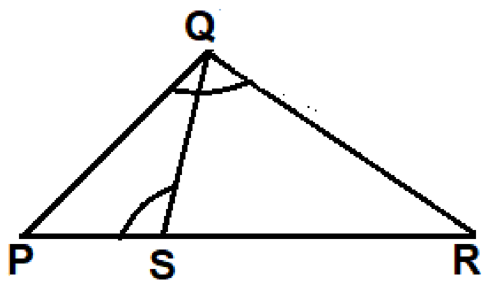
SECTION: A (Solution of MCQs of 1 Mark each, no part marks)

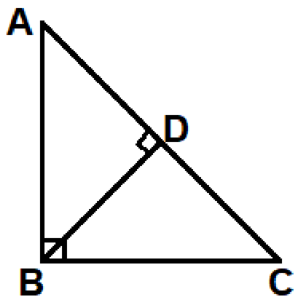
Q. No.	Ans.	Hints/Solution	Marks
1.	**(B)** 26	134 – 4 = 130 and 188 – 6 = 182 HCF (130, 182) = 26	**1**
2.	**(C)** $-\frac{r}{p}$	Substituting q = p + r in f(x) $f(x) = px^2 + (p + r)x + r$ $= (x + 1)(px + r)$ Zeroes are – 1 or $-\frac{r}{p}$.	**1**
3.	**(B)** II only	(5, – 1) is a solution of I: 3x – 3y = 18 also. But this will make the system of equations as consistent and dependent. Only II: 2x – 3y = 13 fulfills the given condition of having only one point of intersection.	**1**
4.	**(C)** 0, – 1	As (1 – p) is a root of the quadratic equation $x^2 + px + 1 - p = 0$, $\therefore (1 - p)^2 + p(1 - p) + 1 - p = 0$, $\Rightarrow p = 1$ Now quadratic equation will be: $x^2 + x = 0$ $x(x+1) = 0$ So the roots are 0, -1	**1**
5.	**(A)** – 26	$-62 = 10 + (n - 1)(-3) \Rightarrow n = 25$. Thus $\frac{25+1}{2} = 13^{th}$ term is the middle term. $\therefore a_{13} = 10 + 12(-3) = -26$	**1**
6.	**(D)** 17.5	Ratio of perimeters of similar triangles = ratio of their corresponding sides $\therefore \frac{56}{70} = \frac{14}{\text{corresponding side}}$ corresponding side = 17.5	**1**
7.	**(A)** (0, 0)	Mid-point of AB will lie on the perpendicular bisector of the line segment joining the points A (– 3, – 4) and B (3, 4). $\therefore$ Coordinates of mid-point of A and B are $\left(\frac{-3+3}{2}, \frac{-4+4}{2}\right) = (0, 0)$	**1**
8.	**(C)** 45°, 15°	$\tan(A + B) = \sqrt{3}$ $\Rightarrow (A + B) = 60°$ …. (i) $\tan(A - B) = \frac{1}{\sqrt{3}}$ $\Rightarrow (A - B) = 30°$ …. (ii) Solving equation (i) and (ii), we get A = 45° and B = 15°.	**1**
9.	**(D)** $\frac{5}{48}$	Total outcomes = 96 Perfect square numbers – 4, 9, 16, 25, 36, 49, 64, 81 perfect cubes are 8, 27, 64, common number is 64 Number of favourable outcomes = 10 P(either a perfect square or a perfect cube) = $\frac{10}{96} = \frac{5}{48}$	**1**

10.	**(B)** 10^5	Total revolutions = $\frac{66 \times 10^5 \times 7}{22 \times 21}$ = 10^5	**1**
11.	**(B)** 160 cm^2	Side of cube = 4 cm Dimensions of resulting cuboid: length = 8 cm, breadth = 4 cm, height = 4 cm. Total surface area = 2 (8 × 4 + 4 × 4 + 8 × 4) = 160 cm^2	**1**
12.	**(D)** 37.5	Let number of men be x and number of women be y $\frac{38\text{x} + 30\text{y}}{\text{x} + \text{y}}$ = 35 ⇒ 38x + 30y = 35x + 35y ⇒ 3x = 5y ∴ $\frac{\text{x}}{\text{y}} = \frac{5}{3}$ % age of women = $\frac{3}{8}$ × 100 = 37.5	**1**
13.	**(A)** $\frac{1}{4}$	Total outcomes = 36 Favourable outcomes = (1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3) P (E) = $\frac{9}{36} = \frac{1}{4}$	**1**
14.	**(A)** $2\sqrt{17}$ units	Coordinates of midpoint of QR i.e. M are $\left(\frac{6+0}{2}, \frac{4+0}{2}\right) = (3,2)$ Median PM $= \sqrt{(5-3)^2 + (-6-2)^2} = \sqrt{68} = 2\sqrt{17}$ units	**1**
15.	**(B)** 8 cm	A = $\frac{1}{2}$ l × r ⇒ 24π = $\frac{1}{2}$ × 6 π × r ⇒ r = 8 cm.	**1**
16.	**(C)** 25	Mode = 3 Median – 2 Mean = 3 (32) – 2 (35.5) = 25	**1**
17.	**(C)** 48 m	tan θ = $\frac{12}{5}$ ∴ sin θ = $\frac{12}{13}$ ⇒ $\frac{\text{h}}{52} = \frac{12}{13}$ ⇒ h = 48 m  	**1**
18.	**(B)** $\frac{13}{46}$	Total remaining cards = 52 – (2 + 4) = 46 P(a heart card) = $\frac{13}{46}$	**1**
19.	**(A)**	Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**	**1**
20.	**(A)**	Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**	**1**

Section –B

[This section comprises of solution of very short answer type questions (VSA) of 2 marks each]

Q. No.	HINTS/SOLUTION	Marks
21. (A)	Length = 9.75 m = 975 cm Breadth = 6.75 m = 675 cm Height = 5.25 m = 525 cm Length of longest unmarked ruler = HCF (975, 675, 525) $\left.\begin{array}{l}975 = 3 \times 5^2 \times 13\\675 = 3^3 \times 5^2\\525 = 3 \times 5^2 \times 7\end{array}\right\}$ ∴ HCF (975, 675, 525) = 3×5^2 = 75 Hence, the length of longest unmarked ruler is 75 cm or 0.75 m	½ 1 ½
	OR	
21. (B)	LCM of 5, 6 and 8 is 120 i.e., all the bells toll together after an interval of 120 minutes or 2 hours. Thus, all the bells will again toll together at 12:00 noon, 2:00 pm, 4:00 pm and 6 p.m. i.e., 4 times So, the bells will toll together 4 more times, till the park is closed at 7:00 p.m.	1 1
22. (A)	 In Δ AOB and Δ COD $\left.\begin{array}{l}\angle OAB = \angle OCD\\\angle OBA = \angle ODC\end{array}\right\}$ (Alternate interior angles) ∴ Δ AOB ~ Δ COD (AA criterion) $\Rightarrow \frac{AO}{CO} = \frac{BO}{DO}$ or $\frac{AO}{BO} = \frac{CO}{DO}$	1 ½ ½
	OR	
22. (B)	 In Δ PRQ and Δ PQS ∠ PQR = ∠ QSP (Given) ∠ QPR = ∠ QPS (Common) ∴ Δ PRQ ~ Δ PQS (AA criterion)	1

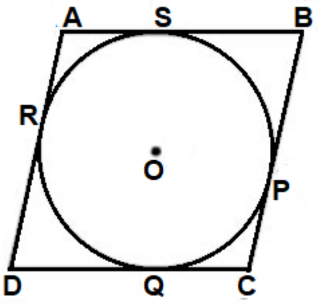
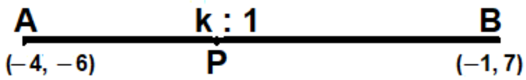
	$\Rightarrow \frac{PQ}{PS} = \frac{PR}{PQ} \Rightarrow \frac{6}{3} = \frac{PR}{6}$ ∴ PR = 12 cm **<u>For visually Impaired Candidates:</u>**  In triangle BCD and triangle ACB Angle BDC = Angle ABC (each 90 degree) Angle BCD = Angle ACB (common) ∴ Triangle BCD is similar to Triangle ACB (AA criterion)	½ ½ ½ ½ 1
23.	$\tan\theta = \frac{1}{\sqrt{5}} \Rightarrow \cot\theta = \sqrt{5}$ $\sec^2\theta = 1 + \tan^2\theta = 1 + \left(\frac{1}{\sqrt{5}}\right)^2 = \frac{6}{5}$ and $\operatorname{cosec}^2\theta = 1 + \cot^2\theta = 1 + \left(\sqrt{5}\right)^2 = 6$ $\therefore \frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta} = \frac{6 - \frac{6}{5}}{6 + \frac{6}{5}} = \frac{2}{3}$	 ½ ½ 1
24.	Radius = $\frac{28}{2}$ = 14 cm Area of sector = $\frac{1}{2} \times l \times r$ $= \frac{1}{2} \times 22 \times 14$ $= 154\ cm^2$	½ 1 ½
25.	Total number of outcomes = 36 Favourable outcomes = 6 {(1,2), (1,3), (1,5), (2,1), (3,1), (5,1)} P (Prime Product) = $\frac{6}{36} = \frac{1}{6}$	½ ½ 1

Section – C

[This section comprises of solution short answer type questions (SA) of 3 marks each]

Q. No.	HINTS/SOLUTION	Marks
26.	Let us assume that $2 + 3\sqrt{3}$ be rational number. Then $2 + 3\sqrt{3} = \frac{a}{b}$, where 'a' and 'b' are integers & b ≠ 0 $\Rightarrow \sqrt{3} = \frac{a - 2b}{3b}$	 1

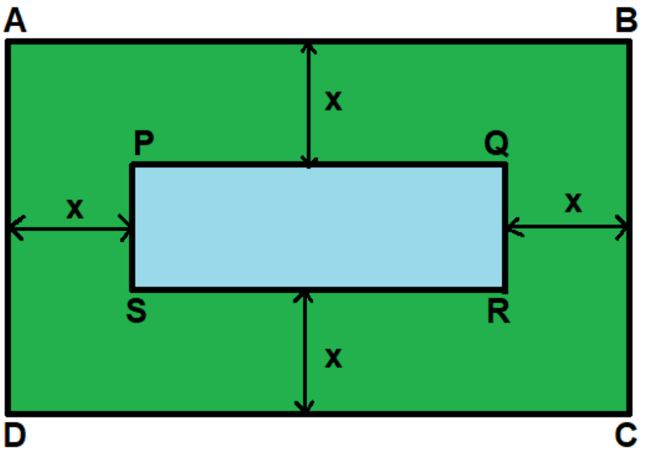
	Since ‘a’ and ‘b’ are integers. $\therefore \frac{a-2b}{3b}$ is rational number. So, $\sqrt{3}$ is rational number which contradicts the given fact that $\sqrt{3}$ is irrational number. Hence, our assumption is wrong. Therefore $2 + 3\sqrt{3}$ is irrational number.	**1** **1**
27.	$\alpha + \beta = 4$ and $\alpha\beta = \frac{5}{2}$ $(\alpha + \frac{1}{\beta}) \times (\beta + \frac{1}{\alpha}) = (\frac{\alpha\beta + 1}{\beta}) \times (\frac{\alpha\beta + 1}{\alpha}) = \frac{(\alpha\beta + 1)^2}{\alpha\beta}$ $= \frac{\left(\frac{5}{2} + 1\right)^2}{\frac{5}{2}}$ $= \frac{49}{10}$	**1** **½** **1** **½**
28. (A)	Number of the sides of the given polygon is ‘n’. The exterior angles of the given polygon are in A.P. Here a = 8 and d = 4 As sum of all the exterior angles of a polygon is 360° $\therefore S_n = 360$ $\Rightarrow \frac{n}{2}[2 \times 8 + (n-1) \times 4] = 360$ $\Rightarrow n^2 + 3n - 180 = 0$ $\Rightarrow (n + 15)(n - 12) = 0$ $\therefore n = -15$ or 12 Angle is always positive. $\therefore n = 12$ So, the number of sides in the given polygon is 12.	**1** **1** **½** **½**
	OR	
28. (B)	Required A.P. is 20, 40, 60, …, 380 Here a = 20 and d = 20 Let $a_n = 380$ $\Rightarrow 20 + (n-1) \times 20 = 380$ $\Rightarrow n = 19$ $\therefore S_{19} = \frac{19}{2}[20 + 380]$ $= 3800$	**1** **½** **½** **½** **½**

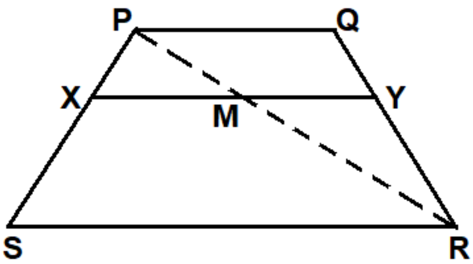
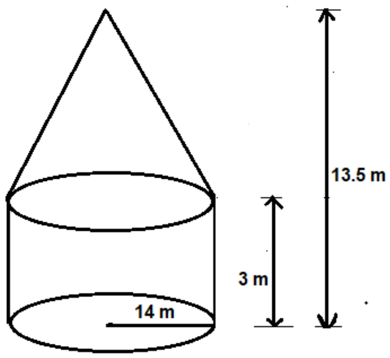
29.	 Given, ABCD is a parallelogram circumscribing a circle. AS = AR --- (i) BS = BP --- (ii) CQ = CP --- (iii) DQ = DR --- (iv) (Length of tangents drawn from an external point to a circle are equal) Adding (i), (ii), (iii) and (iv), we get AS + BS + CQ + DQ = AR + BP + CP + DR ⇒ AB + CD = AD + BC ⇒ 2 AB = 2 AD ⇒ AB = AD Since adjacent sides of parallelogram ABCD are equal. Therefore, ABCD is a rhombus.	1 1 1
30.	 Let x-axis divides the line segment joining the points A (– 4, – 6) and B (–1, 7) at P (x, 0) in the ratio k:1. Coordinates of P are $\left[\frac{k(-1)+1(-4)}{k+1}, \frac{k(7)+1(-6)}{k+1}\right]$ or $\left[\frac{-k-4}{k+1}, \frac{7k-6}{k+1}\right]$ Since point P lies on x – axis $\therefore \frac{7k-6}{k+1} = 0 \Rightarrow k = \frac{6}{7}$ So, point P divides AB in the ratio 6:7 Coordinates of P, are $\left(\frac{-34}{13}, 0\right)$.	1 ½ ½ 1
31. (A)	Jyoti made error in step 2. The correct solution is as under: $\frac{\cos\theta}{1-\sin\theta} + \frac{1-\sin\theta}{\cos\theta}$ $= \frac{\cos^2\theta + (1-\sin\theta)^2}{(1-\sin\theta)\times\cos\theta}$ $= \frac{\cos^2\theta + 1 + \sin^2\theta - 2\sin\theta}{(1-\sin\theta)\times\cos\theta}$ $= \frac{2-2\sin\theta}{(1-\sin\theta)\times\cos\theta}$	1 1 ½

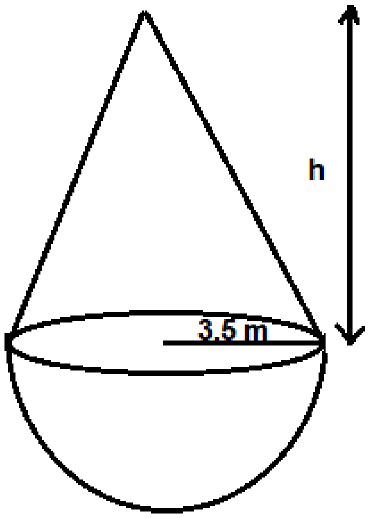
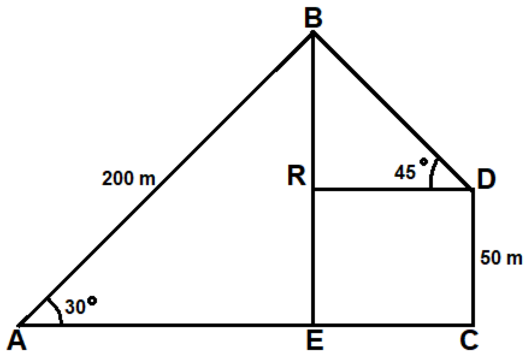
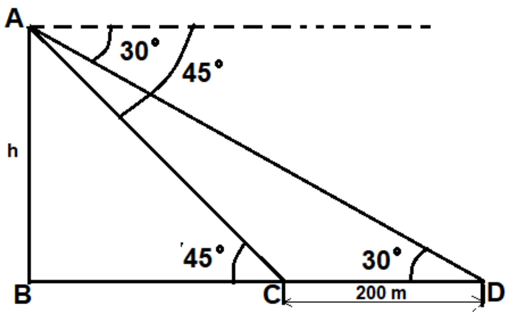
	$= \frac{2 \times (1 - \sin\theta)}{(1 - \sin\theta)\times\cos\theta}$ $= \frac{2}{\cos\theta} = 2\sec\theta$	½
	OR	
31. (B)	Given: $\frac{1}{\sin x - \cos x} = \frac{\operatorname{cosec} x}{\sqrt{2}}$ $\Rightarrow \sin x - \cos x = \sqrt{2}\sin x$ Squaring both sides, we get $2\sin x\cos x = 1 - 2\sin^2 x$ --- (i) Now, LHS = $\left(\frac{1}{\sin x + \cos x}\right)^2 = \frac{1}{1 + 2\sin x\cos x}$ $= \frac{1}{1 + (1 - 2sin^2x)} = \frac{1}{2cos^2x}$ $= \frac{\sec^2 x}{2}$ = RHS	 ½ 1 ½ ½ ½

Section –D

[This section comprises of solution of long answer type questions (LA) of 5 marks each]

Q. No.	HINTS/SOLUTION	Marks
32.	 ABCD is the rectangular park and PQRS is the swimming pool. Let ‘x’ be the uniform width of the grass strip. Then, length of the swimming pool, PQ = (50 – 2x) m and breadth of the swimming pool, QR = (40 – 2x) m Area of rectangular park – Area of swimming pool = Area of grass strip. 50 × 40 – (50 – 2x) (40 – 2x) = 1184 $\Rightarrow x^2 - 45x + 296 = 0$ $\Rightarrow (x - 8)(x - 37) = 0$ $\Rightarrow x = 8, 37$ Rejecting x = 37, as length and breadth cannot be negative integers.	 ½ 1 1 ½

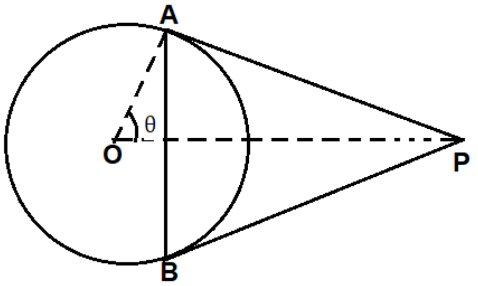
	$\therefore$ x = 8	1
	Thus, length of the swimming pool = (50 – 2x) = 50 – 16 = 34 m.	½
	and breadth of the swimming pool = (40 – 2x) = 40 – 16 = 24 m	½
33.	Correct figure, given, to prove, construction	1
	Correct proof	2
		
	Join PR intersecting XY at M.	½
	In Δ PSR, XM || SR	
	$\therefore \frac{PX}{XS} = \frac{PM}{MR}$ --- (i)	½
	In Δ PQR, MY || PQ	
	$\therefore \frac{QY}{YR} = \frac{PM}{MR}$ --- (ii)	½
	From (i) and (ii), we get	
	$\frac{PX}{XS} = \frac{QY}{YR}$	½
34. (A)		
	Height of Conical part = 13.5 – 3 = 10.5 m	½
	Slant height (*l*) = $\sqrt{(14)^2 + (10.5)^2}$ = 17.5 m	1
	CSA of Conical part = $\pi rl = \frac{22}{7} \times 14 \times 17.5 = 770$ m^2	1
	CSA of Cylindrical part = $2\pi rh = 2 \times \frac{22}{7} \times 14 \times 3 = 264$ m^2	1
	Total area of canvas required = CSA of conical part + CSA of cylindrical part + Wastage = 770 + 264 + 26 = 1060 m^2	½
	Cost of canvas to be purchased @ ₹ 250 / m^2 = 250 × 1060 = ₹ 265000	1
	OR	

34. (B)	Let 'h' cm be the height of conical part. Volume of wood in the toy = Volume of conical part + Volume of hemispherical part 	
	$166\frac{5}{6} = \frac{1}{3} \times \pi \times r^2 \times h + \frac{2}{3} \times \pi \times r^3$ $\Rightarrow \frac{1001}{6} = \frac{1}{3} \times \frac{22}{7} \times (3.5)^2 \times h + \frac{2}{3} \times \frac{22}{7} \times (3.5)^3$	2
	$\Rightarrow$ h = 6 cm	1
	CSA of hemispherical part = $2 \times \pi \times r^2$ $= 2 \times \frac{22}{7} \times (3.5)^2$ = 77 cm^2	1
	Cost of painting hemispherical part @ ₹ 15 / cm^2 = 15 × 77 = ₹ 1155	1
35. (A)		
	Correct figure	1
	Let Manish is standing at point 'A' and Mahesh is standing at point 'D'. Distance of kite from Manish = 200 m In rt. angled Δ AEB $\frac{BE}{200} = \sin 30° = \frac{1}{2}$	1
	$\Rightarrow$ BE = 100 m	½
	BR = BE – RE = BE – DC = 100 – 50 = 50 m	1
	In rt. angled Δ BRD $\frac{50}{BD} = \sin 45° = \frac{1}{\sqrt{2}}$	1
	$\Rightarrow$ BD = $50\sqrt{2}$ m	½
	∴ Distance of kite from Mahesh is $50\sqrt{2}$ m	
	OR	
35. (B)		

	Correct figure Let the height of the lighthouse be 'h' m. In rt. angled Δ ABC $\frac{h}{BC}$ = tan 45° = 1 ⇒ BC = h --- (i) In rt. angled Δ ABD $\frac{h}{h+200}$ = tan 30° = $\frac{1}{\sqrt{3}}$ ⇒ h = $\frac{200}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$ ⇒ h = 100 $(\sqrt{3}+1)$ ∴ height of the lighthouse is 100 $(\sqrt{3}+1)$ m.	1 1 ½ 1 ½ 1

Section –E

[This section comprises solution of 3 case- study/passage-based questions of 4 marks]

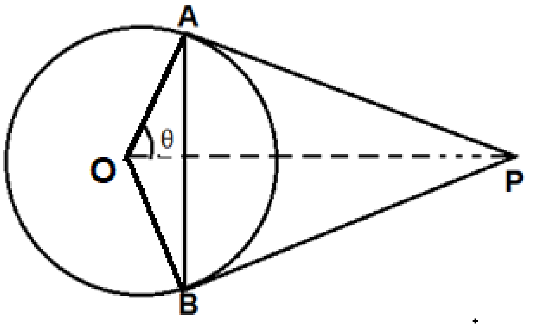
Q. No.	HINTS/SOLUTION	Marks
36.	Let the number of small bottles and large bottles be 'x' and 'y' respectively. (i) 10x + 15y = 12750 or 2x + 3y = 2550 (ii) 12x + 17y = 34250 (iii) **(A)** According to the question, x + y = 1000 --- (i) 10x + 15y = 12750 --- (ii) Solving (i) and (ii), we get x = 450 & y = 550 Number of small and large bottles sold are 450 and 550 respectively. **OR** (iii) **(B)** According to the question, x + y = 2500 --- (i) 12x + 17y = 34250 --- (ii) Solving (i) and (ii), we get x = 1650 & y = 850 Number of small and large bottles sold are 1650 and 850 respectively.	 1 1 1 1 1 1
37.	 (i) ∠OAP = 90° (Radius is perpendicular to tangent at the point of contact)	 1

(ii) In right angled Δ OAP, $OP^2 = OA^2 + AP^2$

$\Rightarrow (18)^2 = (9)^2 + AP^2$ **½**

$\Rightarrow AP = \sqrt{243} = 9\sqrt{3}$ m **½**

(iii) **(A)**



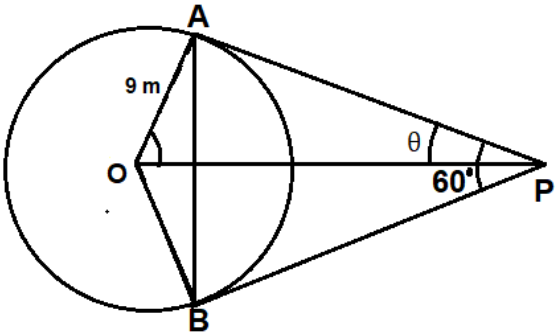
In right angled Δ OAP, $\cos\theta = \frac{9}{18} = \frac{1}{2} = \cos 60°$ **1**

$\Rightarrow \theta = 60°$ **½**

$\therefore \angle AOB = 2\theta = 120°$ **½**

OR

(iii) **(B)**



If tangent inclined at 60°, then $\angle OPA = \frac{1}{2} \times 60° = 30°$ **½**

In right angled Δ OPA, $\frac{9}{AP} = \tan 30° = \frac{1}{\sqrt{3}}$ **1**

$\Rightarrow AP = 9\sqrt{3}$ m **½**

38. (i) 30 – 40 **1**

(ii)

Marks	**Number of students (*f*)**	***cf***
0 – 10	3	3
10 – 20	6	9
20 – 30	12	21
30 – 40	15	36
40 – 50	14	50

Since $\frac{N}{2} = 25$. $\therefore$ Median class is 30 – 40. **1**

	(iii) **(A)**	

C.I.	f_i	x_i	f_ix_i
0 – 10	3	5	15
10 – 20	6	15	90
20 – 30	12	25	300
30 – 40	15	35	525
40 – 50	14	45	630
Total	50		1560

Correct Table 1

Average performance i.e. mean = $\frac{1560}{50}$ = 31.2 **1**

OR

(iii) **(B)** Here, modal class is 30 – 40, f_0 = 12, f_1 = 15, f_2 = 14 **½**

Mode = $30 + \left(\frac{15-12}{2\times 15-12-14}\right)\times 10$ **1**

= 37.5 **½**