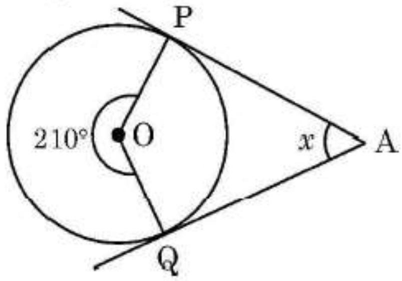
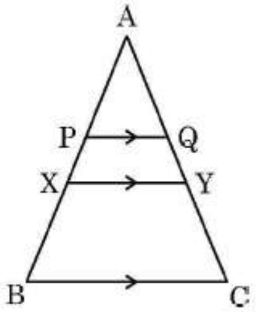
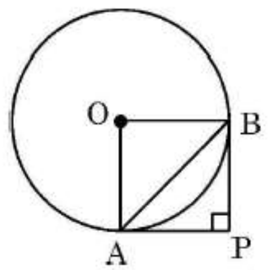
SOLUTIONS
MATHEMATICS (Subject Code–041) (PAPER CODE: 30/6/3)

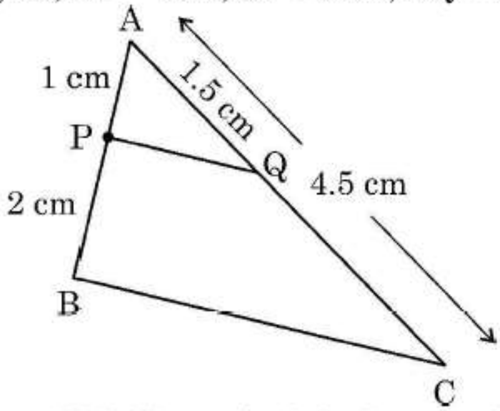
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A **This section consists of 20 multiple choice questions of 1 mark each.**	
1.	For a circle with centre O and radius 5 cm, which of the following statements is true ? **P** : Distance between every pair of parallel tangents is 5 cm. **Q** : Distance between every pair of parallel tangents is 10 cm. **R** : Distance between every pair of parallel tangents must be between 5 cm and 10 cm. **S** : There does not exist a point outside the circle from where length of tangent is 5 cm. (A) P (B) Q (C) R (D) S	
Sol.	(B) Q	**1**
2.	In the adjoining figure, AP and AQ are tangents to the circle with centre O. If reflex $\angle POQ = 210°$, the value of $2x$ is  (A) 30° (B) 60° (C) 120° (D) 300°	
Sol.	(B) 60°	**1**
3.	If $x = 2 \sin 60° \cos 60°$ and $y = \sin^2 30° - \cos^2 30°$ and $x^2 = ky^2$, the value of k is (A) $\sqrt{3}$ (B) $-\sqrt{3}$ (C) 3 (D) –3	
Sol.	(C) 3	**1**

4.	A peacock sitting on the top of a tree of height 10 m observes a snake moving on the ground. If the snake is $10\sqrt{3}$ m away from the base of the tree, then angle of depression of the snake from the eye of the peacock is (A) 30° (B) 45° (C) 60° (D) 90°	
Sol.	(A) 30°	**1**
5.	If a cone of greatest possible volume is hollowed out from a solid wooden cylinder, then the ratio of the volume of remaining wood to the volume of cone hollowed out is (A) 1 : 1 (B) 1 : 3 (C) 2 : 1 (D) 3 : 1	
Sol.	(C) 2:1	**1**
6.	If the mode of some observations is 10 and sum of mean and median is 25, then the mean and median respectively are (A) 12 and 13 (B) 13 and 12 (C) 10 and 15 (D) 15 and 10	
Sol.	(B) 13 and 12	**1**
7.	If the maximum number of students has obtained 52 marks out of 80, then (A) 52 is the mean of the data. (B) 52 is the median of the data. (C) 52 is the mode of the data. (D) 52 is the range of the data.	
Sol.	(C) 52 is the mode of the data.	**1**
8.	The system of equations y + a = 0 and $2x$ = b has (A) No solution (B) $\left(-a, \frac{b}{2}\right)$ as its solution (C) $\left(\frac{b}{2}, -a\right)$ as its solution (D) Infinite solutions	
Sol.	(C) $\left(\frac{b}{2}, -a\right)$ as its solution	**1**
9.	In a right triangle ABC, right-angled at A, if $\sin B = \frac{1}{4}$, then the value of sec B is (A) 4 (B) $\frac{\sqrt{15}}{4}$ (C) $\sqrt{15}$ (D) $\frac{4}{\sqrt{15}}$	
Sol.	(D) $\frac{4}{\sqrt{15}}$	**1**

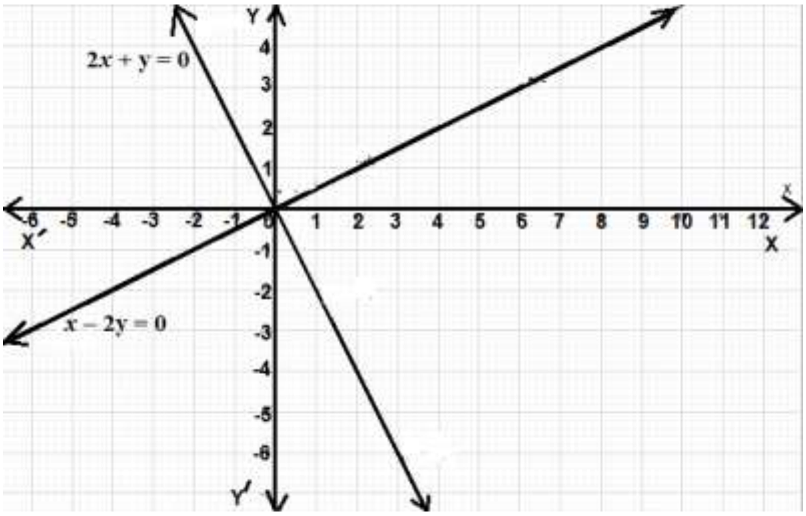
10.	$\sqrt{0.4}$ is a/an (A) natural number (B) integer (C) rational number (D) irrational number	
Sol.	(D) irrational number	**1**
11.	Which of the following cannot be the unit digit of 8^n, where n is a natural number ? (A) 4 (B) 2 (C) 0 (D) 6	
Sol.	(C) 0	**1**
12.	Which of the following equations does not have a real root ? (A) $x^2 = 0$ (B) $2x - 1 = 3$ (C) $x^2 + 1 = 0$ (D) $x^3 + x^2 = 0$	
Sol.	(C) $x^2 + 1 = 0$	**1**
13.	If the zeroes of the polynomial $ax^2 + bx + \frac{2a}{b}$ are reciprocal of each other, then the value of b is (A) 2 (B) $\frac{1}{2}$ (C) –2 (D) $-\frac{1}{2}$	
Sol.	(A) 2	**1**
14.	The distance of point P(3a, 4a) from y-axis is (A) 3a (B) –3a (C) 4a (D) –4a	
Sol.	(A) 3a	**1**

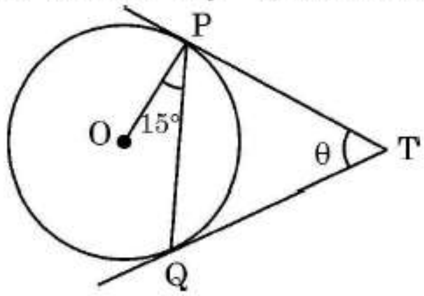
15.	In the adjoining figure, PQ ∥ XY ∥ BC, AP = 2 cm, PX = 1.5 cm and BX = 4 cm. If QY = 0.75 cm, then AQ + CY =  (A) 6 cm (B) 4.5 cm (C) 3 cm (D) 5.25 cm	
Sol.	(C) 3 cm	**1**
16.	Given ΔABC ~ ΔPQR, ∠A = 30° and ∠Q = 90°. The value of (∠R + ∠B) is (A) 90° (B) 120° (C) 150° (D) 180°	
Sol.	(C) 150°	**1**
17.	Two coins are tossed simultaneously. The probability of getting atleast one head is (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1	
Sol.	(C) $\frac{3}{4}$	**1**
18.	In the adjoining figure, PA and PB are tangents to a circle with centre O such that ∠P = 90°. If AB = $3\sqrt{2}$ cm, then the diameter of the circle is  (A) $3\sqrt{2}$ cm (B) $6\sqrt{2}$ cm (C) 3 cm (D) 6 cm	
Sol.	(D) 6 cm	**1**

	Directions : In Question Numbers **19** and **20**, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option from the following : (A) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.	
19.	In an experiment of throwing a die, **Assertion (A) :** Event E_1 : getting a number less than 3 and Event E_2 : getting a number greater than 3 are complementary events. **Reason (R) :** If two events E and F are complementary events, then $P(E) + P(F) = 1$.	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	**1**
20	**Assertion (A) :** For two odd prime numbers x and y, $(x \neq y)$, $LCM(2x, 4y) = 4xy$ **Reason (R) :** $LCM(x, y)$ is a multiple of $HCF(x, y)$.	
Sol.	(B) Both Assertion (A) and Reason (R) are true, but Reason (R)is not correct explanation of Assertion (A).	**1**
SECTION B **This section has 5 very short answer type questions of 2 marks each.**		
21. (a)	If $a \sec\theta + b \tan\theta = m$ and $b \sec\theta + a \tan\theta = n$, prove that $a^2 + n^2 = b^2 + m^2$	
Sol.	$m^2 = a^2 \sec^2\theta + b^2 \tan^2\theta + 2ab \sec\theta \tan\theta$ $n^2 = b^2 \sec^2\theta + a^2 \tan^2\theta + 2ab \sec\theta \tan\theta$ $m^2 - n^2 = a^2(\sec^2\theta - \tan^2\theta) + b^2(\tan^2\theta - \sec^2\theta)$ $\Rightarrow m^2 - n^2 = a^2 - b^2$ or $a^2 + n^2 = m^2 + b^2$	½ ½ ½ ½
	OR	
21. (b)	Use the identity : $\sin^2A + \cos^2A = 1$ to prove that $\tan^2A + 1 = \sec^2A$. Hence, find the value of tan A, when $\sec A = \frac{5}{3}$, where A is an acute angle.	

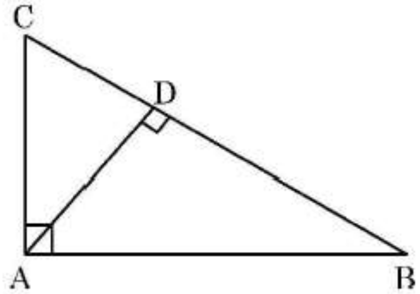
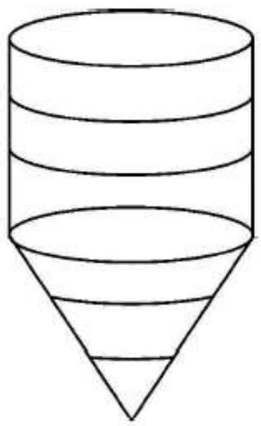
Sol.	$\sin^2 A + \cos^2 A = \mathbf{1}$ Dividing both sides by $\cos^2$A, we get $\frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\cos^2 A} = \frac{1}{\cos^2 A}$ $\tan^2 A + 1 = \sec^2 A$ $\tan^2 A + 1 = \left(\frac{5}{3}\right)^2$ $\tan A = \frac{4}{3}$	 ½ ½ ½ ½
22.	Prove that abscissa of a point P which is equidistant from points with coordinates A(7, 1) and B(3, 5) is 2 more than its ordinate.	
Sol.	Let P (x, y) be equidistant from A(7, 1) and B(3, 5) PA = PB $\Rightarrow$ $PA^2 = PB^2$ $(x-7)^2 + (y-1)^2 = (x-3)^2 + (y-5)^2$ $x^2 + 49 - 14x + y^2 + 1 - 2y = x^2 + 9 - 6x + y^2 + 25 - 10y$ $x = 2 + y$ Thus, abscissa of the point P is 2 more than its ordinate.	 ½ ½ ½ ½
23.	In the adjoining figure, AP = 1 cm, BP = 2 cm, AQ = 1.5 cm and AC = 4.5 cm.  Prove that ΔAPQ ~ ΔABC. Hence find the length of PQ, if BC = 3.6 cm.	
Sol.	$\frac{AP}{AB} = \frac{1}{3}; \frac{AQ}{AC} = \frac{1.5}{4.5} = \frac{1}{3}$ ∠ ACP = ∠ ACB Δ APQ ~ Δ ABC PQ = 1.2cm	½ + ½ ½ ½
24.	A bag contains balls numbered 2 to 91 such that each ball bears a different number. A ball is drawn at random from the bag. Find the probability that (i) it bears a 2– digit number (ii) it bears a multiple of 1.	
Sol.	Total possible outcomes = 90 (i) Number of favourable outcomes for a 2-digit number = 82 P (2-digit number) = $\frac{82}{90}$ or $\frac{41}{45}$	 **1**

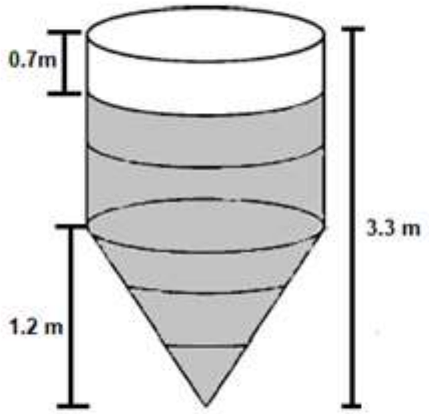
	(ii) Number of favourable outcomes for multiple of 1 = 90 P (a number multiple of 1) = $\frac{90}{90}$ or 1	**1**
25. (a)	Solve the following pair of equations algebraically : $101x + 102y = 304$ $102x + 101y = 305$	
Sol.	Adding equations we get $x + y = 3$ Subtracting equations we get $-x + y = -1$ Solving to get $x = 2$ and $y = 1$	½ ½ ½ + ½
	OR	
25. (b)	In a pair of supplementary angles, the greater angle exceeds the smaller by 50°. Express the given situation as a system of linear equations in two variables and hence obtain the measure of each angle.	
Sol.	Let smaller angle be *x* and greater angle be y ATQ, $x + y = 180$ Also $y = x + 50$ Solving we get $x = 65°$ and $y = 115°$	 ½ ½ ½ + ½
SECTION C **This section has 6 short answer type questions of 3 marks each.**		
26.	Check whether the given system of equations is consistent or not. If consistent, solve graphically. $x - 2y = 0$ $2x + y = 0$	
Sol.	$\frac{a_1}{a_2} = \frac{1}{2}$; $\frac{b_1}{b_2} = \frac{-2}{1} = -2$ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ∴ System of equation is consistent.	½ ½

	 Correct graph Solution is (0,0) or $x = 0$ and $y = 0$	**1½** ½
27.	If the points A(6, 1), B(p, 2), C(9, 4) and D(7, q) are the vertices of a parallelogram ABCD, then find the values of p and q. Hence, check whether ABCD is a rectangle or not.	
Sol.	Diagonals of a parallelogram bisect each other. ∴ Co-ordinates of mid point of diagonal AC = Co-ordinates of mid-point of diagonal BD. $\left(\frac{6+9}{2}, \frac{1+4}{2}\right) = \left(\frac{p+7}{2}, \frac{2+q}{2}\right)$ $\Rightarrow \frac{p+7}{2} = \frac{15}{2}$ and $\frac{2+q}{2} = \frac{5}{2}$ ∴ p = 8 and q = 3 Diagonal AC = $\sqrt{3^2 + 3^2} = 3\sqrt{2}$ Diagonal BD = $\sqrt{(-1)^2 + 1^2} = \sqrt{2}$ AC ≠ BD ∴ ABCD is not a rectangle	**1** ½ ½ ½ ½
28. (a)	Prove that : $\frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta = 0.$	
Sol.	LHS $= \frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta$ $= \frac{\cos\theta(1 - 2\cos^2\theta)}{\sin\theta(1 - 2\sin^2\theta)} + \cot\theta$ $= \frac{\cos\theta}{\sin\theta}\left[\frac{\sin^2\theta + \cos^2\theta - 2\cos^2\theta}{\sin^2\theta + \cos^2\theta - 2\sin^2\theta}\right] + \cot\theta$ $= \frac{\cot\theta(\sin^2\theta - \cos^2\theta)}{(\cos^2\theta - \sin^2\theta)} + \cot\theta$ $= -\cot\theta + \cot\theta$ $= 0 =$ RHS	 ½ **1** **1** ½
	OR	

28. (b)	Given that $\sin\theta + \cos\theta = x$, prove that $\sin^4\theta + \cos^4\theta = \frac{2-(x^2-1)^2}{2}$.	
Sol.	Given: $\sin\theta + \cos\theta = x$ Squaring both sides $\sin^2\theta + \cos^2\theta + 2\cos\theta\sin\theta = x^2$ $2\sin\theta\cos\theta = x^2 - 1$ RHS = $\frac{2-(2\sin\theta\cos\theta)^2}{2}$ $= \frac{2-4\sin^2\theta\cos^2\theta}{2}$ $= 1 - 2\sin^2\theta\cos^2\theta$ $= (\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta$ $= (\sin^4\theta + \cos^4\theta)$ = LHS	**1** ½ ½ ½ ½
29.	In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If $\angle OPQ = 15°$ and $\angle PTQ = \theta$, then find the value of $\sin 2\theta$.  	
Sol.	$\angle$ QPT = 75° $\angle$ PQT = 75° $\theta = 30°$ $\sin 2\theta = \sin 2(30°)$ $= \sin 60° = \frac{\sqrt{3}}{2}$	½ ½ **1** ½ ½
30. (a)	Prove that $\sqrt{5}$ is an irrational number.	
Sol.	Let $\sqrt{5}$ be a rational number. $\therefore \sqrt{5} = \frac{p}{q}$, where $q \neq 0$ and let p & q be the coprimes. $\Rightarrow 5q^2 = p^2$ $\Rightarrow p^2$ is divisible by 5. $\Rightarrow$ p is divisible by 5. ----- ① Let p = 5a, where 'a' is some integer $\therefore 25a^2 = 5q^2$ $\Rightarrow q^2 = 5a^2$ $\Rightarrow q^2$ is divisible by 5. $\Rightarrow$ q is divisible by 5. ----- ②	½ **1** **1**

	∴ 5 divides both p & q. ① and ② leads to contradiction as p and q are coprimes. Hence, $\sqrt{5}$ is an irrational number.	½
	OR	
30. (b)	Let p, q and r be three distinct prime numbers. Check whether $p \cdot q \cdot r + q$ is a composite number or not. Further, give an example for 3 distinct primes p, q, r such that (i) $p \cdot q \cdot r + 1$ is a composite number. (ii) $p \cdot q \cdot r + 1$ is a prime number.	
Sol.	p. q. r + q = q(pr + 1) Thus, the given number has more than 2 factors. Hence it is composite. (i) Taking p = 3, q = 5 and r = 7 pqr + 1 = 3.5.7 + 1 = 106 is a composite number or any other correct example (ii) Taking p = 2, q = 3 and r = 5 pqr + 1 = 2.3.5 + 1 = 31 is a prime number or any other correct example	½ ½ **1** **1**
31.	Find the zeroes of the polynomial $r(x) = 4x^2 + 3x - 1$. Hence, write a polynomial whose zeroes are reciprocal of the zeroes of polynomial $r(x)$.	
Sol.	$p(x) = 4x^2 + 3x - 1$ Zeroes are $\frac{1}{4}, -1$ New zeroes 4, -1 Sum of new zeroes = 4 + (-1) = 3 Product of zeroes = 4 × (-1) = $-$ 4 Required polynomial is $(x^2 - 3x - 4)$	 **1** ½ ½ ½ ½
	SECTION D **This section has 4 long answer type questions of 5 marks each.**	
32. (a)	If a line drawn parallel to one side of triangle intersecting the other two sides in distinct points divides the two sides in the same ratio, then it is parallel to third side. State and prove the converse of the above statement.	
Sol.	Correct Statement of BPT Correct figure, Given, To Prove, Construction Correct Proof of BPT **NOTE*** Given statement in English version is not a correct statement. Full marks may be awarded to any attempt in English medium.	**1** **2** **2**

	OR	
32. (b)	In the adjoining figure, ΔCAB is a right triangle, right angled at A and $AD \perp BC$. Prove that $\Delta ADB \sim \Delta CDA$. Further, if BC = 10 cm and CD = 2 cm, find the length of AD.  	
Sol.	Δ ABC ~ Δ DAC ----- ① Similarly, Δ ABC ~ Δ DBA ----- ② From equations ① and ② Δ DAC ~ Δ DBA or Δ ADB ~ Δ CDA $\frac{AD}{CD} = \frac{BD}{AD}$ $AD^2 = BD \times CD$ $= 8 \times 2$ $\therefore$ AD = 4 cm	**1** ½ **1** ½ ½ **1** ½
33.	Fermentation tanks are designed in the form of cylinder mounted on a cone as shown below :  The total height of the tank is 3.3 m and height of conical part is 1.2 m. The diameter of the cylindrical as well as conical part is 1 m. Find the capacity of the tank. If the level of liquid in the tank is 0.7 m from the top, find the surface area of the tank in contact with liquid.	

Sol	 Diameter = 1 m r = 0.5 m Height of Cylinder (H) = 3.3 – 1.2 = 2.1 m Capacity of the tank = Volume of cylinder + Volume of cone $= \frac{22}{7} \times (0.5)^2 \times 2.1 + \frac{1}{3} \times \frac{22}{7} \times (0.5)^2 \times 1.2$ = 1.96 m^3 Slant height (l)= $\sqrt{(1.2)^2 + (0.5)^2}$ = 1.3 m Height of cylindrical part in contact with liquid = 2.1 – 0.7 = 1.4 m Surface area of tank in contact with liquid = Curved Surface Area of Cylindrical part in contact with liquid + Curved surface Area of cone $= 2 \times \frac{22}{7} \times 0.5 \times 1.4 + \frac{22}{7} \times 0.5 \times 1.3$ = 6.44 m^2 (approx.)	 ½ ½ 1 ½ ½ ½ 1 ½
34.	The population of lions was noted in different regions across the world in the following table :	

Number of lions	Number of regions
0 – 100	2
100 – 200	5
200 – 300	9
300 – 400	12
400 – 500	x
500 – 600	20
600 – 700	15
700 – 800	9
800 – 900	y
900 – 1000	2
	100

If the median of the given data is 525, find the values of x and y.

Sol

Number of lions	**Number of regions**	**Cumulative frequency**
0 – 100	2	2
100 – 200	5	7
200 – 300	9	16
300 – 400	12	28
400 – 500	x	28 + x
500 – 600	20	48 + x
600 – 700	15	63 + x
700 – 800	9	72 + x
800 – 900	y	72 + x + y
900 – 1000	2	74 + x + y
	100	

Correct table — **1**

74 + x + y = 100

x + y = 26 — **1**

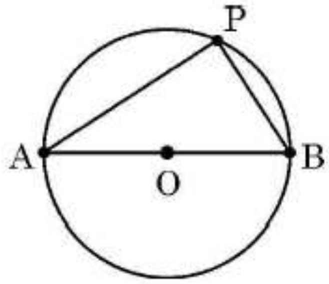
Median class is 500 – 600 — **½**

$$525 = 500 + \left[\frac{\frac{50}{2} - (28+x)}{20}\right] \times 100$$ — **1**

On solving, we get x = 17 — **1**

y = 9 — **½**

35. (a) There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter.



An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.

Sol.

Let distance of gate at P from point B is x m

Then distance of gate at P from point A is (35 + x) m — **½**

In right Δ APB

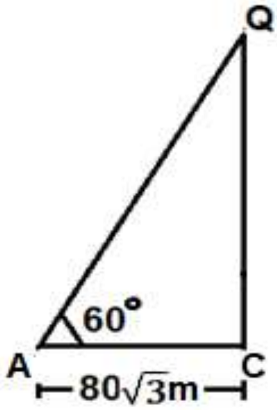
$(x + 35)^2 + x^2 = (65)^2$ — **1**

$x^2 + 35x - 1500 = 0$ — **2**

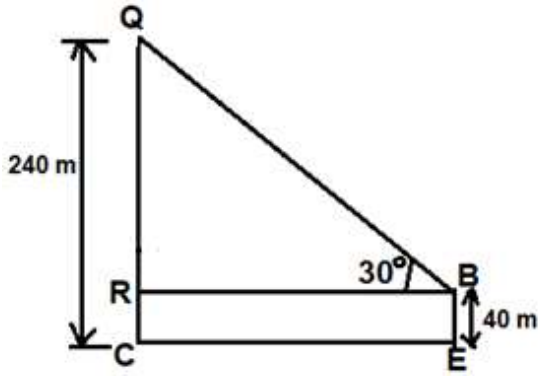
(x + 60)(x – 25) = 0 — **½**

x = 25

	Hence, $x + 35 = 60$ Distance of P from A = 60 m Distance of P from B = 25 m	½ ½
	OR	
35. (b)	Find the smallest value of p for which the quadratic equation $x^2 - 2(p + 1)x + p^2 = 0$ has real roots. Hence, find the roots of the equation so obtained.	
Sol.	For real roots, $D \geq 0$ $[-2(p+1)]^2 - 4p^2 \geq 0$ $\Rightarrow p \geq -\frac{1}{2}$ $\therefore$ smallest value of $p = -\frac{1}{2}$ At $p = -\frac{1}{2}$ given equation becomes $x^2 - 2\left(\frac{-1}{2} + 1\right)x + \left(\frac{-1}{2}\right)^2 = 0$ $x^2 - x + \frac{1}{4} = 0$ or $4x^2 - 4x + 1 = 0$ $(2x - 1)(2x - 1) = 0$ $\therefore$ roots are $\frac{1}{2}, \frac{1}{2}$	½ ½ **1** ½ ½ **1** ½ ½
	SECTION E **This section has 3 case study based questions of 4 marks each**.	
36.	The Statue of Unity situated in Gujarat is the world's largest Statue which stands over a 58 m high base. As part of the project, a student constructed an inclinometer and wishes to find the height of Statue of Unity using it. He noted following observations from two places : **Situation – I :** The angle of elevation of the top of Statue from Place A which is $80\sqrt{3}$ m away from the base of the Statue is found to be 60°. **Situation – II :** The angle of elevation of the top of Statue from a Place B which is 40 m above the ground is found to be 30° and entire height of the Statue including the base is found to be 240 m.	

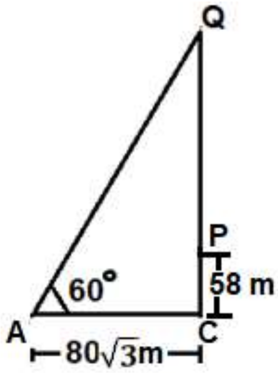
	 Based on given information, answer the following questions : (i) Represent the Situation – I with the help of a diagram. (ii) Represent the Situation – II with the help of a diagram. (iii) (a) Calculate the height of Statue excluding the base and also find the height including the base with the help of Situation – I. **OR** (iii) (b) Find the horizontal distance of point B (Situation – II) from the Statue and the value of tan α, where α is the angle of elevation of top of base of the Statue from point B.	
Sol.	(i)  Correct figure	**1**

(ii)



Correct figure **1**

(iii) (a)



In Δ ACQ

$\frac{QC}{AC} = \tan 60° = \sqrt{3}$

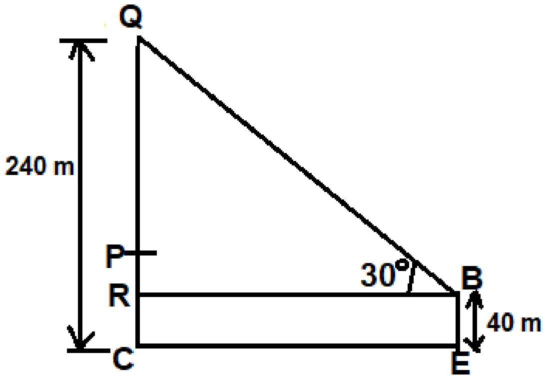
QC = 240 m

Height of statue including base = 240 m **1**

Height of statue excluding base = 240 – 58 = 182 m **1**

OR

(iii) (b)

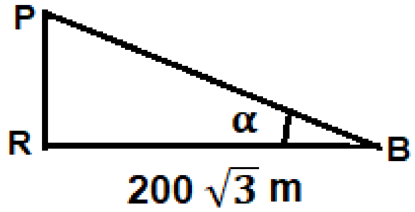


QR = 240 – 40 = 200 m ½

In Δ QRB

$\frac{QR}{RB} = \tan 30° = \frac{1}{\sqrt{3}}$

Horizontal distance RB = 200 $\sqrt{3}$ m ½



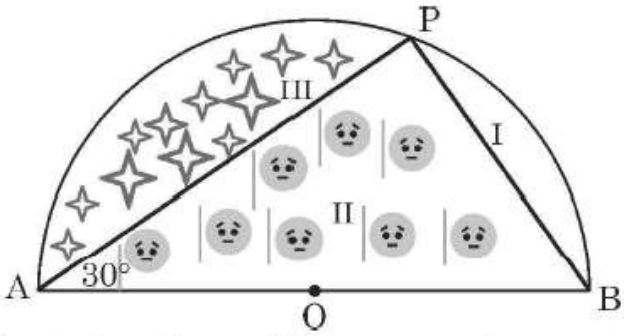
Correct figure ½

In Δ PRB

$\tan \alpha = \frac{PR}{BR}$

$= \frac{18}{200\sqrt{3}}$ or $\frac{3\sqrt{3}}{100}$ ½

37. Anurag purchased a farmhouse which is in the form of a semicircle of diameter 70 m. He divides it into three parts by taking a point P on the semicircle in such a way that ∠PAB = 30° as shown in the following figure, where O is the centre of semicircle.



In part I, he planted saplings of Mango tree, in part II, he grew tomatoes and in part III, he grew oranges. Based on given information, answer the following questions.

(i) What is the measure of ∠POA ?

(ii) Find the length of wire needed to fence entire piece of land.

(iii) (a) Find the area of region in which saplings of Mango tree are planted.

OR

(iii) (b) Find the length of wire needed to fence the region III.

Sol.

(i) ∠ POA = 120° **1**

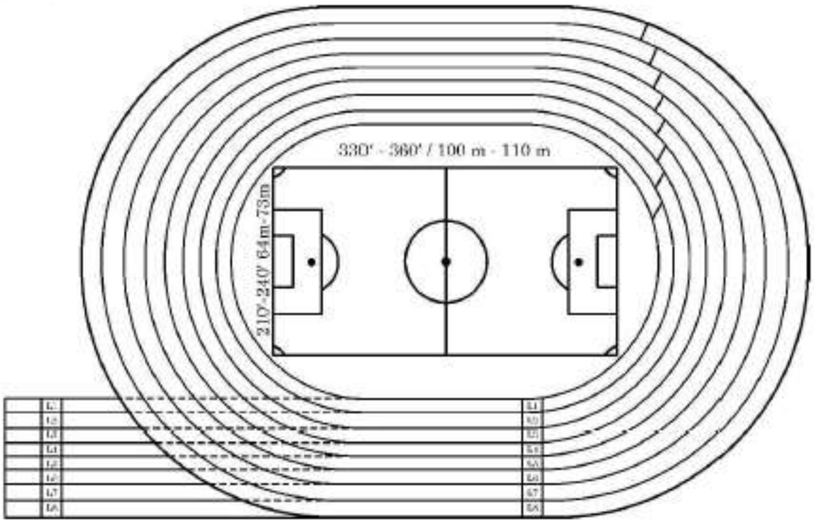
(ii) Length of wire needed to fence entire piece of land = $\frac{22}{7} \times 35 + 70 = 180$ m **1**

(iii) Required area = $\frac{60}{360} \times \frac{22}{7} \times (35)^2 - \frac{\sqrt{3}}{4} \times (35)^2$ **1**

$= \left(\frac{1925}{3} - \frac{1225\sqrt{3}}{4}\right)$ m^2 or 111.89 m^2 (approx.) **1**

OR

(iii) In Δ APB, $\frac{AP}{AB} = \cos 30°$

	AP = $35\sqrt{3}$ m Required length of wire = $\frac{120}{360} \times 2 \times \frac{22}{7} \times 35 + 35\sqrt{3}$ $= \left(\frac{220}{3} + 35\sqrt{3}\right)$ m or 133.8 m (approx.)	1 ½ ½
38.	In order to organise, Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area as shown below :  The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane. Based on given information, answer the following questions, using concept of Arithmetic Progression. (i) What is the length of the 6th lane ? (ii) How long is the 8th lane than that of 4th lane ? (iii) (a) While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student. **OR** (iii) (b) A student took one round each in lane 4 to lane 8. Find the total distance covered by the student.	
Sol.	Here AP is 400, 407.6, 415.2, … (i) a_6 = 400 + 5 (7.6) = 438 m (ii) $a_8 - a_4 = 30.4$ m (iii) $S_6 = \frac{6}{2}$ (2 × 400 + 5 × 7.6) = 2514 m **OR** (iii) Total distance covered = $S_8 - S_3$ $= \frac{8}{2}$ (2 × 400 + 7 × 7.6) $-$ $\frac{3}{2}$ (2 × 400 + 2 × 7.6) = 2190 m	 1 1 1 1 1 1