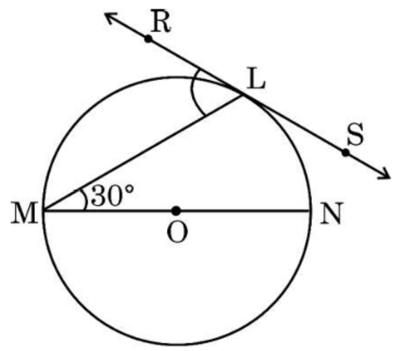
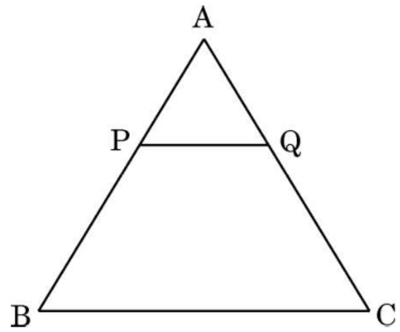
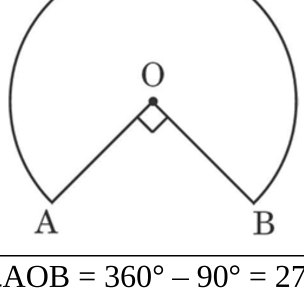
SOLUTIONS
MATHEMATICS (Subject Code–041) (PAPER CODE: 30/2/1)

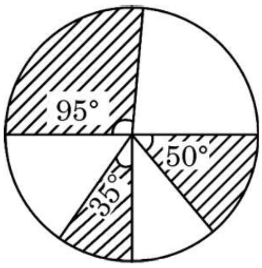
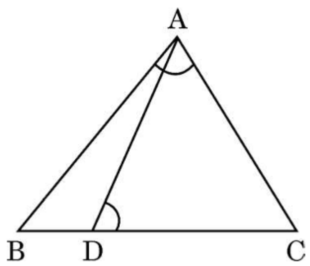
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A This section has **20** Multiple Choice Questions (MCQs) carrying 1 mark each.	
1.	If $7\cos^2\theta + 3\sin^2\theta = 4$, then the value of θ is : (A) 30° (B) 45° (C) 60° (D) 90°	
Sol.	(C) 60°	**1**
2.	The probability of drawing an even prime number out of numbers from 1 to 30 is : (A) $\frac{1}{30}$ (B) $\frac{4}{15}$ (C) $\frac{7}{30}$ (D) 0	
Sol.	(A) $\frac{1}{30}$	**1**
3.	The quadratic equation whose roots are 7 and $\frac{1}{7}$ is : (A) $7x^2 - 50x + 7 = 0$ (B) $7x^2 - 50x + 1 = 0$ (C) $7x^2 + 50x - 7 = 0$ (D) $7x^2 + 50x - 1 = 0$	
Sol.	(A) $7x^2 - 50x + 7 = 0$	**1**
4.	The least number which is a perfect square and is divisible by each of 16, 20 and 50, is : (A) 1200 (B) 100 (C) 3600 (D) 2400	
Sol.	The correct option is not available in the given options. Full marks may be awarded to every attempt.	**1**

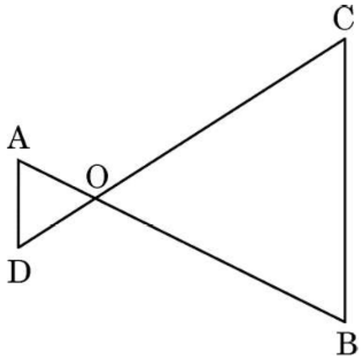
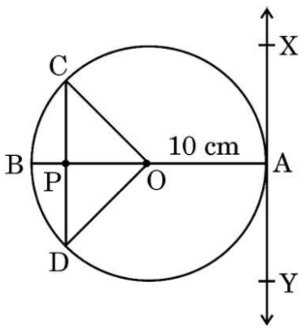
5.	The coordinates of the end points of a diameter of a circle are (5, – 2) and (5, 2). The length of the radius of the circle is : (A) ± 2 (B) ± 4 (C) 4 (D) 2	
Sol.	(D) 2	**1**
6.	The points (– 5, 0), (5, 0) and (0, 4) are the vertices of a triangle which is a/an : (A) right-angled triangle (B) isosceles triangle (C) equilateral triangle (D) scalene triangle	
Sol.	(B) isosceles triangle	**1**
7.	In the given figure, RS is the tangent to the circle at the point L and MN is the diameter. If ∠ NML = 30°, then ∠ RLM is :  (A) 30° (B) 60° (C) 90° (D) 120°	
Sol.	(B) 60°	**1**
8.	In the given figure, PQ || BC. If $\frac{AP}{PB} = \frac{4}{13}$ and AC = 20·4 cm, then the length of AQ is :  (A) 2·8 cm (B) 5·8 cm (C) 3·8 cm (D) 4·8 cm	
Sol.	(D) 4.8 cm	**1**

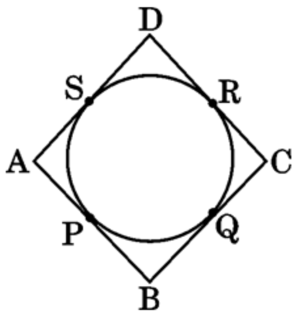
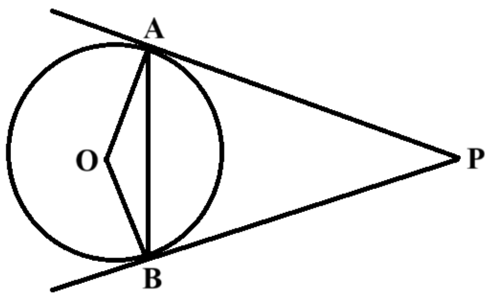
9.	Which of the following statements is ***incorrect*** ? (A) Two congruent figures are always similar. (B) A square and a rhombus of the same area are always similar. (C) Two equilateral triangles are always similar. (D) Two similar triangles need not be congruent.	
Sol.	(B) A square and a rhombus of the same area are always similar.	**1**
10.	The sum of the exponents of prime factors in the prime factorisation of 4004 is : (A) 5 (B) 4 (C) 3 (D) 2	
Sol.	(A) 5	**1**
11.	In a cricket match, a batsman hits the boundary 7 times out of the 42 balls he plays. The probability of his ***not*** hitting a boundary is : (A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{5}{6}$ (D) $\frac{1}{6}$	
Sol.	(C) $\frac{5}{6}$	**1**
12.	If a large circular pizza is divided into 5 equal sectors, then the central angle of each sector will be : (A) 60° (B) 90° (C) 45° (D) 72°	
Sol.	(D) 72°	**1**
13.	If $\sin 30° \tan 45° = \frac{\sec 60°}{k}$, then the value of k is : (A) 4 (B) 3 (C) 2 (D) 1	
Sol.	(A) 4	**1**

14.	The line represented by the equation $x - y = 0$ is : (A) parallel to x-axis (B) parallel to y-axis (C) passing through the origin (D) passing through the point (3, 2)	
Sol.	(C) passing through the origin.	**1**
15.	The 10^{th} term of the AP $5, \frac{19}{4}, \frac{9}{2}, \frac{17}{4}, \ldots$ is : (A) $\frac{11}{4}$ (B) $\frac{4}{11}$ (C) $\frac{13}{4}$ (D) $\frac{4}{13}$	
Sol.	(A) $\frac{11}{4}$	**1**
16.	If -4 is a zero of the polynomial $p(x) = x^2 - x - (2 + 2k)$, then the value of k is : (A) 3 (B) 9 (C) 6 (D) -9	
Sol.	(B) 9	**1**
17.	The equation of a line parallel to the x-axis and at a distance of 3 units below x-axis is : (A) $x = 3$ (B) $x = -3$ (C) $y = -3$ (D) $y = 3$	
Sol.	(C) $y = -3$	**1**
18.	The HCF of 40, 110 and 360 is : (A) 40 (B) 110 (C) 360 (D) 10	
Sol.	(D) 10	**1**

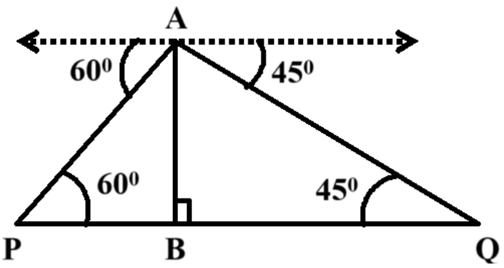
	*Questions number **19** and **20** are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.* (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.	
19.	*Assertion (A) :* Common difference of the AP : 5, 1, – 3, – 7, ... is 4. *Reason (R):* Common difference of the AP : $a_1, a_2, a_3, \ldots, a_n$ is obtained by $d = a_n - a_{n-1}$.	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	**1**
20.	*Assertion (A) :* The pair of linear equations $px + 3y + 59 = 0$ and $2x + 6y + 118 = 0$ will have infinitely many solutions if $p = 1$. *Reason (R):* If the pair of linear equations $px + 3y + 19 = 0$ and $2x + 6y + 157 = 0$ has a unique solution, then $p \neq 1$.	
Sol.	(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).	**1**
	SECTION B This section has **5** Very Short Answer (VSA) type questions carrying 2 marks each.	
21.	If p and q are zeroes of the polynomial $p(y) = 21y^2 - y - 2$, then find the value of $(1 - p) . (1 - q)$.	
Sol.	$p + q = \frac{1}{21}$ $p.q = \frac{-2}{21}$ $(1 - p)(1 - q) = 1 - (p + q) + pq$ $= 1 - \frac{1}{21} - \frac{2}{21}$ $= \frac{18}{21}$ or $\frac{6}{7}$	½ ½ ½ ½
22 (a)	In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and ∠ AOB = 90°. If AO = OB = 42 cm, then find the perimeter of the top of the table.  	
Sol.	Reflex ∠AOB = 360° – 90° = 270°	½

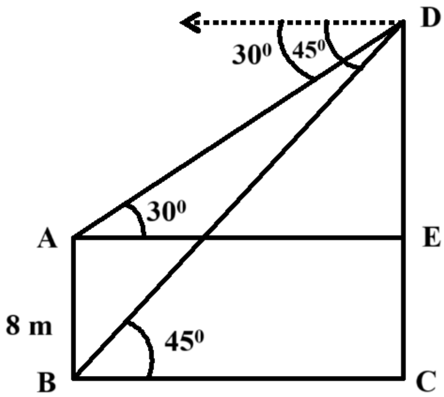
	Perimeter of the top of table = length of major arc + 2 × radius $= \frac{270}{360} \times 2 \times \frac{22}{7} \times 42 + 2 \times 42$ = 282 cm	1 ½
	OR	
22 (b)	In the given figure, three sectors of a circle of radius 5 cm, making angles 35°, 50° and 95° at the centre are shaded. Find the area of the shaded region. [Use $\pi = \frac{22}{7}$] 	
Sol.	Area of shaded region $= \frac{95}{360} \times \frac{22}{7} \times (5)^2 + \frac{50}{360} \times \frac{22}{7} \times (5)^2 + \frac{35}{360} \times \frac{22}{7} \times (5)^2$ $= \frac{(95+50+35)}{360} \times \frac{22}{7} \times (5)^2$ $= \frac{180}{360} \times \frac{22}{7} \times (5)^2$ $= \frac{275}{7}$ cm² or 39.29 cm² approx.	1 ½ ½
23.	If $\tan A = \sqrt{3}$; where A is an acute angle, then find the value of $\frac{\sin^2 A}{1+\cos^2 A}$.	
Sol.	$\tan A = \sqrt{3} = \tan 60°$ $\Rightarrow A = 60°$ $\frac{\sin^2 A}{1+\cos^2 A} = \frac{\sin^2 60°}{1+\cos^2 60°}$ $= \frac{\left(\frac{\sqrt{3}}{2}\right)^2}{1+\left(\frac{1}{2}\right)^2}$ $= \frac{3}{5}$	½ 1 ½
24 (a)	In the given figure, D is a point on the side BC of Δ ABC such that ∠ ADC = ∠ BAC. Show that $CA^2 = CD \cdot CB$. 	
Sol.	In Δ ACD and Δ BCA ∠ ADC = ∠ BAC ∠ ACD = ∠ BCA	

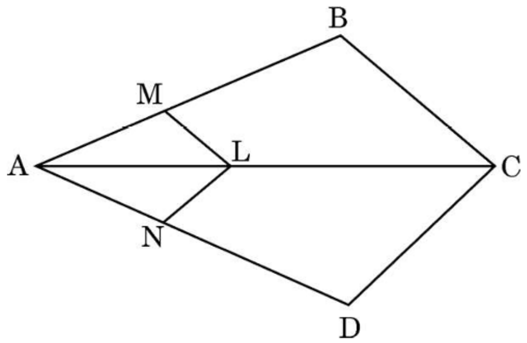
	∴ Δ ACD ~ Δ BCA So, $\frac{CA}{CB} = \frac{CD}{CA}$ ⟹ $CA^2 = CD.CB$	1 ½ ½
	OR	
24 (b)	In the given figure, OA . OB = OC . OD. Show that ∠ A = ∠ C and ∠ B = ∠ D. 	
Sol.	Given OA.OB = OC.OD ⟹ $\frac{OA}{OC} = \frac{OD}{OB}$ & ∠ AOD = ∠ COB ∴ Δ AOD ~ Δ COB So, ∠ D = ∠ B and ∠ A = ∠ C	 ½ ½ ½ ½
25.	At point A on the diameter AB of a circle of radius 10 cm, tangent XAY is drawn to the circle. Find the length of the chord CD parallel to XY at a distance of 16 cm from A. 	
Sol.	AP = 16 cm ∴ OP = 16 – 10 = 6 cm XY ∥ CD ∴ ∠ CPO = 90° In right Δ OPC, CP = $\sqrt{(10)^2 - (6)^2}$ = 8 cm CD = 2 × CP = 2 × 8 = 16 cm	 ½ 1 ½

	SECTION C This section has **6** Short Answer (SA) type questions carrying 3 marks each.	
26 (a)	Prove that the parallelogram circumscribing a circle is a rhombus.	
Sol.	Correct figure  We know that lengths of tangents drawn from an external point to a circle are equal ∴ AP = AS --- ① BP = BQ --- ② CR = CQ --- ③ DR = DS --- ④ Adding ①, ②, ③ and ④, we have (AP + BP) + (CR + DR) = AS + (BQ + CQ) + DS ⟹ AB + CD = BC + AD ∵ AB = CD and BC = AD ∴ AB = BC = CD = AD Therefore, ABCD is a rhombus.	½ 1 ½ ½ ½
	OR	
26 (b)	Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.	
Sol.	PA and PB are tangents from the external point P to the circle with centre O. Correct figure  ∠ OAP = ∠ OBP = 90° In quadrilateral OAPB, ∠ APB + ∠ OAP + ∠ OBP + ∠ AOB = 360° ⟹ ∠ APB + 90° + 90° + ∠ AOB = 360° ⟹ ∠ APB + ∠ AOB = 180° ∴ ∠ APB and ∠ AOB are supplementary.	 1 1 ½ ½

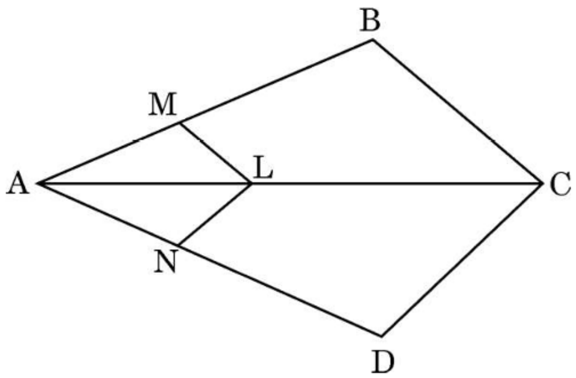
27 (a)	Prove that : $\left(1+\frac{1}{\tan^2\theta}\right)\left(1+\frac{1}{\cot^2\theta}\right)=\frac{1}{\sin^2\theta-\sin^4\theta}$	
Sol.	LHS = $(1+\cot^2\theta)(1+\tan^2\theta)$ $=\text{cosec}^2\theta.\sec^2\theta$ $=\frac{1}{\sin^2\theta}.\frac{1}{\cos^2\theta}$ $=\frac{1}{\sin^2\theta\,(1-\sin^2\theta)}$ $=\frac{1}{\sin^2\theta-\sin^4\theta}$ = RHS	**1** ½ ½ ½ ½
	OR	
27 (b)	Prove that : $\sqrt{\frac{\text{cosec}\,\theta-1}{\text{cosec}\,\theta+1}}+\sqrt{\frac{\text{cosec}\,\theta+1}{\text{cosec}\,\theta-1}}=2\sec\theta$	
Sol.	LHS = $\frac{\text{cosec}\,\theta-1+\text{cosec}\,\theta+1}{\sqrt{(\text{cosec}\,\theta+1)(\text{cosec}\,\theta-1)}}$ $=\frac{2\,\text{cosec}\,\theta}{\sqrt{(\text{cosec}^2\theta-1)}}$ $=\frac{2\,\text{cosec}\,\theta}{\cot\theta}$ $=2\sec\theta$ = RHS	**1** **1** ½ ½
28.	If the mid-point of the line segment joining the points A(3, 4) and B(k, 6) is P(x, y) and x + y – 10 = 0, then find the value of k.	
Sol.	$x=\frac{3+k}{2}$ and $y=\frac{4+6}{2}=5$ $\therefore\left(\frac{3+k}{2}\right)+5-10=0$ $\Rightarrow k=7$	½ ½ **1** **1**
29.	The length of the hour hand of a clock is 10 cm. Find the area of the minor sector swept by the hour hand of the clock between 5 a.m. to 8 a.m. Also, find the area of the major sector.	
Sol.	Central angle subtended by hour hand between 5 am to 8 am = $\frac{360^\circ}{12}\times 3=90^\circ$ Area of minor segment = $\frac{90}{360}\times\frac{22}{7}\times(10)^2$ $=\frac{550}{7}$ or 78.57 cm^2 approx. Area of circle = $\frac{22}{7}\times(10)^2=\frac{2200}{7}$ cm^2 Area of major segment = $\frac{2200}{7}-\frac{550}{7}$ $=\frac{1650}{7}$ or 235.71 cm^2 approx.	½ **1** ½ ½ ½
30.	Prove that $\sqrt{3}$ is an irrational number.	
Sol.	Let $\sqrt{3}$ be a rational number. $\therefore\sqrt{3}=\frac{p}{q}$, where q ≠ 0 and let p & q be coprimes. $\Rightarrow 3q^2=p^2$	 ½

	$\Rightarrow p^2$ is divisible by 3. $\Rightarrow$ p is divisible by 3. ----- ① Let p = 3a, where 'a' is some integer $\therefore 9a^2 = 3q^2$ $\Rightarrow q^2 = 3a^2$ $\Rightarrow q^2$ is divisible by 3 $\Rightarrow$ q is divisible by 3 ----- ② $\therefore$ 3 divides both p & q. ① and ② leads to contradiction as p and q are coprimes. Hence, $\sqrt{3}$ is an irrational number.	 1 1 ½
31.	A sum of ₹ 2,000 is invested at 7% per annum simple interest. Calculate the interests at the end of 1^{st}, 2^{nd} and 3^{rd} year. Do these interests form an AP ? If so, find the interest at the end of the 27^{th} year.	
Sol.	Interest at the end of 1^{st} year = $\frac{2000 \times 7 \times 1}{100}$ = ₹ 140 Interest at the end of 2^{nd} year = $\frac{2000 \times 7 \times 2}{100}$ = ₹ 280 Interest at the end of 3^{rd} year = $\frac{2000 \times 7 \times 3}{100}$ = ₹ 420 140, 280, 420, … Yes, Interests form an AP with first term = 140 and common difference = 140 Interest at the end of 27^{th} year = $140 + 26 \times 140$ = ₹ 3780	½ ½ ½ ½ ½ ½
	SECTION D This section has **4** Long Answer (LA) type questions carrying 5 marks each.	
32 (a)	Two ships are sailing in the sea on either side of a lighthouse. The angles of depression to the two ships as observed from the top of the lighthouse are 60° and 45°, respectively. If the distance between the ships is $100\left(\frac{1+\sqrt{3}}{\sqrt{3}}\right)$ m, then find the height of the lighthouse.	
Sol.	Correct figure  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	1 1 ½

	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	½ ½ ½ ½ ½
	OR	
32 (b)	The angles of depression of the top and the bottom of an 8 m tall building from the top of another multistoried building are 30° and 45°, respectively. Find the height of the multistoried building and the distance between the two buildings.	
Sol.	Correct figure  Here, CD represents the multistoried building. In right Δ DEA $\frac{DE}{AE} = \tan 30° = \frac{1}{\sqrt{3}}$ $\Rightarrow$ AE = $\sqrt{3}$ DE --- ① In right Δ DCB $\frac{DC}{BC} = \tan 45° = 1$ $\Rightarrow$ BC = DC --- ② From figure, AE = BC $\therefore \sqrt{3}$ DE = DC $\Rightarrow \sqrt{3}$ (DC – 8) = DC $\Rightarrow$ DC = $\frac{8\sqrt{3}}{\sqrt{3}-1}$ $= \frac{8\sqrt{3}}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = (12 + 4\sqrt{3})$ m From ②, BC = $(12 + 4\sqrt{3})$ m	**1** **1** ½ ½ ½ ½ ½ ½

33 (a)	The sum of the areas of two squares is 52 cm^2 and difference of their perimeters is 8 cm. Find the lengths of the sides of the two squares.	
Sol.	Let the lengths of the sides of two squares be 'x' cm and 'y' cm such that x > y. ATQ $x^2 + y^2 = 52$ --- ① $4x - 4y = 8$ or $x - y = 2$ --- ② From ① and ②, we have $y^2 + 2y - 24 = 0$ $\Rightarrow (y + 6)(y - 4) = 0$ $\therefore y = 4$ So, $x = 2 + 4 = 6$ ∴ Lengths of the sides of two squares are 6 cm and 4 cm respectively.	 **1** **1** **1** **1** ½ ½
	OR	
33 (b)	The time taken by a person to travel an upward distance of 150 km was $2\frac{1}{2}$ hours more than the time taken in the downward return journey. If he returned at a speed of 10 km/h more than the speed while going up, find the speeds in each direction.	
Sol.	Let the speed in upward direction be 'x' km/h and the speed in downward direction = (x + 10) km/h ATQ $\frac{150}{x} - \frac{150}{x+10} = \frac{5}{2}$ $\Rightarrow x^2 + 10x - 600 = 0$ $\Rightarrow (x + 30)(x - 20) = 0$ $\therefore x = 20$ and $x + 10 = 20 + 10 = 30$ Therefore, speeds in upward and downward direction are 20 km/h and 30 km/h respectively.	½ **2** **1** ½ ½ ½
34.	Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points divides the other two sides in the same ratio. Hence, in the figure given below, prove that $\frac{AM}{MB} = \frac{AN}{ND}$ where LM || CB and LN || CD.  	
Sol.	Correct figure, given, to prove and construction	**1½**

Correct proof **1½**



In Δ ABC, LM ∥ CB

$$\frac{AM}{MB} = \frac{AL}{LC} \quad \text{---} \ ①$$ **1**

In Δ ADC, LN ∥ CD

$$\frac{AN}{ND} = \frac{AL}{LC} \quad \text{---} \ ②$$ **½**

from ① and ②, we have

$$\frac{AM}{MB} = \frac{AN}{ND}$$ **½**

35. Find the Mean and Mode of the following frequency distribution :

Class	*Frequency*
0 – 10	8
10 – 20	7
20 – 30	15
30 – 40	20
40 – 50	12
50 – 60	8
60 – 70	10

Sol.

Class	frequency (f_i)	x_i	$u_i = \frac{x_i - 35}{10}$	$f_i u_i$
0 – 10	8	5	– 3	– 24
10 – 20	7	15	– 2	– 14
20 – 30	15	25	– 1	– 15
30 – 40	20	35 = a	0	0
40 – 50	12	45	1	12
50 – 60	8	55	2	16
60 – 70	10	65	3	30
Total	80			5

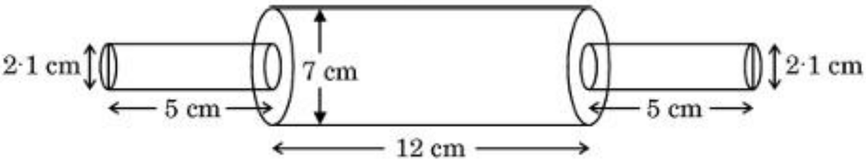
Correct table **1½**

Mean = $35 + \frac{5}{80} \times 10$ **1**

= 35.625 **½**

	Modal Class is 30 – 40 Mode = $30 + \left(\frac{20-15}{2\times20-15-12}\right) \times 10$ $= \frac{440}{13}$ or 33.85 approx.	½ 1 ½
	SECTION E This section has **3** case study based questions carrying 4 marks each.	
36.	**Case Study – 1** A school is organizing a grand cultural event to show the talent of its students. To accommodate the guests, the school plans to rent chairs and tables from a local supplier. It finds that rent for each chair is ₹ 50 and for each table is ₹ 200. The school spends ₹ 30,000 for renting the chairs and tables. Also, the total number of items (chairs and tables) rented are 300.  **If the school rents 'x' chairs and 'y' tables, answer the following questions :** (i) Write down the pair of linear equations representing the given information. (ii) (a) Find the number of chairs and number of tables rented by the school. **OR** (b) If the school wants to spend a maximum of ₹ 27,000 on 300 items (tables and chairs), then find the number of chairs and tables it can rent. (iii) What is maximum number of tables that can be rented in ₹ 30,000 if no chairs are rented ?	
Sol.	(i) $x + y = 300$ and $50x + 200y = 30000$ or $x + 4y = 600$ (ii) (a) $x + y = 300$ and $x + 4y = 600$ Solving the equations, we get $x = 200$ and $y = 100$ ∴ Number of chairs and tables rented by the school are 200 and 100 respectively. **OR** (b) $x + y = 300$ and $50x + 200y = 27000$ or $x + 4y = 540$ Solving the equations, we get $x = 220$ and $y = 80$ ∴ Number of chairs and tables rented by the school are 220 and 80 respectively. (iii) Number of tables $= \frac{30000}{200} = 150$ ∴ Maximum number of tables that can be rented is 150 if no chairs are rented.	½ ½ 1 + 1 1 ½ + ½ 1

37.	**Case Study – 2** Rahul is a lucky charm for his cricket team. He has a jar of cards with numbers from 10 to 74. Before each match, he draws a card from the jar. If the card bears an even number, the team wins. If the number is even and divisible by 5, they win by a big margin. If the number is an odd number less than 30, they win by a small margin. And if the number is a prime number between 50 and 74, they lose.  Answer the following questions if Rahul draws a card today : (i) What is the probability that Rahul draws a card with an even number ? (ii) What is the probability that Rahul draws a card with an odd number less than 30 ? (iii) (a) What is the probability that Rahul draws a card with a prime number between 50 and 74 ? **OR** (b) What is the probability that Rahul draws a card with an even number divisible by 5 ?	
Sol.	(i) Total possible outcomes = 74 – 10 + 1 = 65 P (even number) = $\frac{33}{65}$ (ii) P (odd number less than 30) = $\frac{10}{65}$ or $\frac{2}{13}$ (iii) (a) Favourable outcomes are 53, 59, 61, 67, 71, 73 Number of favourable outcomes = 6 P (prime number between 50 and 74) = $\frac{6}{65}$ **OR** (b) Favourable outcomes are 10, 20, 30, 40, 50, 60, 70 Number of favourble outcomes = 7 P (even number divisble by 5) = $\frac{7}{65}$	½ ½ **1** **1** **1** **1** **1**

38.	**Case Study – 3** A skilled carpenter decided to craft a special rolling pin for the local baker. He carefully joined three cylindrical pieces of wood – two small ones on the ends and one larger in the centre to create a perfect tool. The baker loved the rolling pin, as it rolled out the smoothest dough for breads and pastries.   The length of the bigger cylindrical part is 12 cm and diameter is 7 cm and the length of each smaller cylindrical part is 5 cm and diameter is 2·1 cm. Based on the above information, answer the following questions : (i) Find the volume of the bigger cylindrical part. (ii) Find the curved surface area of the bigger cylindrical part. (iii) (a) Find the ratio of the volume of the bigger cylindrical part to the total volume of the two smaller (identical) cylindrical parts. **OR** (b) Find the sum of the curved surface areas of the two identical smaller cylindrical parts.	
Sol.	(i) Volume of the bigger cylindrical part = $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 12$ $= 462 \text{ cm}^3$ (ii) The Curved Surface Area of bigger cylindrical part = $2 \times \frac{22}{7} \times \frac{7}{2} \times 12$ $= 264 \text{ cm}^2$ (iii) (a) Total volume of the two smaller cylindrical parts = $2 \times \frac{22}{7} \times \frac{2.1}{2} \times \frac{2.1}{2} \times 5$ $= 34.65 \text{ cm}^3$ Required ratio = $\frac{462}{34.65} = \frac{3080}{231}$ $\therefore$ Required ratio is 3080 : 231 **OR** (b) The Sum of Curved Surface Area of two smaller cylindrical parts = $2 \times 2 \times \frac{22}{7} \times \frac{2.1}{2} \times 5$ $= 66 \text{ cm}^2$	½ ½ ½ ½ ½ ½ **1** **1** **1**