Sample Question Paper -1
Class X
Basic Mathematics (241)

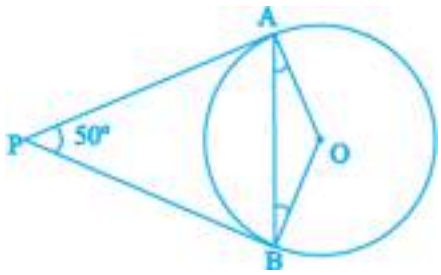
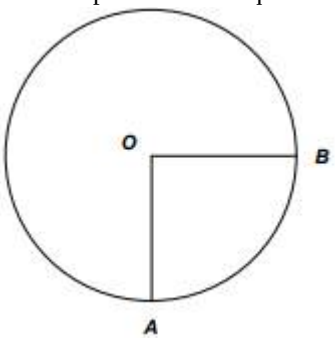
Time Allowed: 3 Hrs **Maximum Marks: 80**

General Instructions:

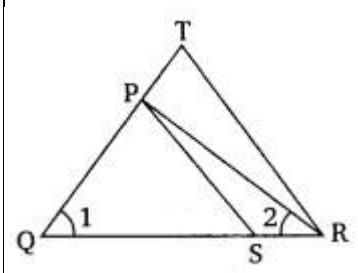
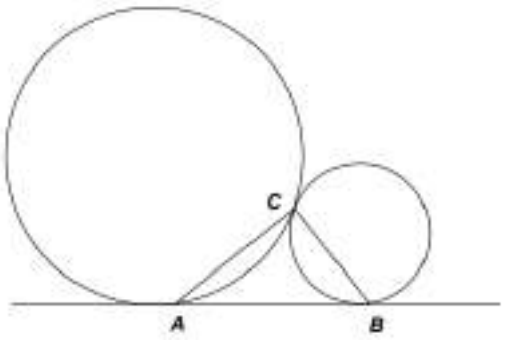
1. **This Question Paper has 5 Sections A, B, C, D, and E.**
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. **Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.**
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. **Section D has 4 Long Answer (LA) type questions carrying 5 marks each.**
6. Section E has 3 sourced based/Case Based/passage based/integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. **All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 2 Qs of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.**
8. **Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.**

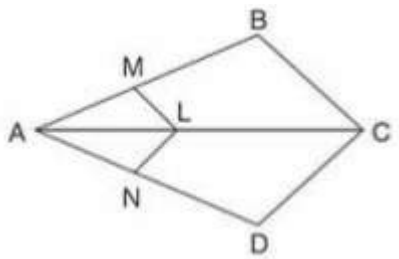
Section A

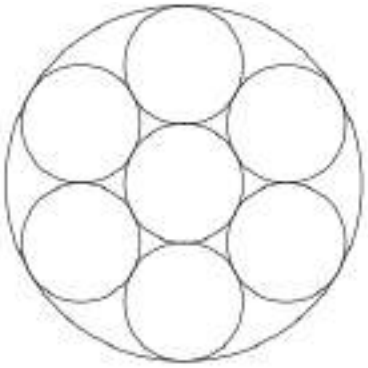
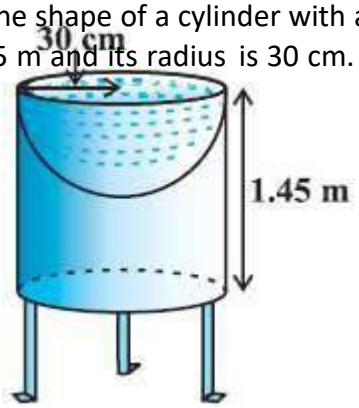
	Section A consists of 20 questions of 1 mark each.	
SN		**Marks**
1	If n is any natural number, then $6^n - 5^n$ always ends with (a)1 (b) 3 (c) 5 (d) 0	1
2	If two positive integers m and n are expressible in the form $m = pq^3$ and $n = p^3q^2$; p,q being prime numbers , then HCF(m,n) is (a)pq (b) pq^2 (c)) p^3q^3 (d)) p^2q^3	1
3	A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 3, is (a) x^2+3 (b) x^2-3 (c) x^2+9 (d) x^2-9	1
4	If the system of equations $3x - y+8 = 0$, $6x - ky+16 = 0$ represent coincident lines , then k = (a) -1/2 (b) 1/2 (c) 2 (d) -2	1
5	If the quadratic equation $x^2 + 4x + k = 0$ has real and equal roots, then (a) $k < 4$ (b) $k > 4$ (c) $k = 4$ (d) $k \geq 4$	1

6	If the distance between the points (4,p) and (1,0) is 5 , then the value of p is (a)4 only (b) ± 4 (c) -4 only (d) 0	1
7	If ΔPQR ~ ΔXYZ and XY = 4cm , YZ = 4.5 cm, ZX = 6.5 cm and PQ = 8cm, then perimeter of ΔPQR is (a) 25 cm (b) 23 cm (c) 15 cm (d) 30 cm	1
8	In ΔABC and ΔDEF , $\angle B = \angle E, \angle F = \angle C$ and AB = 3DE . Then the two triangles are (a) Congruent but not similar (b) Similar but not congruent (c) neither congruent nor similar (d) congruent as well as similar	1
9	 In the figure, if PA and PB are tangents to the circle with centre O such that ∠APB = 50°, then ∠OAB is equal to (a) 25° (b) 30° (c) 40° (d) 50°	1
10	If tanA = 4/3 , then the value of secA is (a) 4/5 (b) 3/5 (c) 3/4 (d) 5/3	1
11	If cosA =3/5 , then the value of 9 + 9 $\tan^2$A is equal to (a) 9 (b) 1 6 (c) 25 (d) 34	1
12	The value of $\tan^2 45^\circ - \sin^2 45^\circ$ (a) 1/4 (b) 3/4 (c) 1/2 (d) 0	1
13	What is the perimeter of a quadrant of a circle (OAB) whose diameter is 10cm? (Use π = 3.14)  (a) 7.85cm (b) 17.85cm (c) 27.85cm (d) 37.85cm	1

14	The area of the circle that can be inscribed in a square of side 6 cm is (a) 36 π cm^2 (b) 18 π cm^2 (c) 12 π cm^2 (d) 9 π cm^2	1
15	If a solid sphere with total surface area 48cm^2 is bisected into two hemispheres, then the total surface area of any one of the hemisphere is (a) 48 cm^2 (b) 60 cm^2 (c) 24 cm^2 (d) 36 cm^2	1
16	For the following distribution : Class: 0 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 Frequency: 10 | 15 | 12 | 20 | 9 the upper limit of the median class is (a) 10 (b) 15 (c) 20 (d) 25	1
17	If the sum of the 15 observations of a data is (434+x) and the mean of the observation is x, , then the value of x is (a) 25 (b) 27 (c) 31 (d) 33	1
18	A card is selected at random from a well shuffled deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is (a) 4 (b) 12 (c) 48 (d) 51	1
	Direction for questions 19 & 20: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.	
19	**Assertion (A):** If product of two numbers is 12960 and their HCF is 18, then their LCM is 720. **Reason (R):** HCF is always a factor of LCM (a)Both Assertion (A) and Reason (R) are true and Reason (R) is the 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.	1
20	**Assertion (A):** The ratio in which the line segment joining A (5, 3) and B (-3, 11) internally divided by the point C(3,5) is 1:3. **Reason (R):** as formula for the internal division is $\left(\frac{mx2 + nx1}{m+n}, \frac{my2 + ny1}{m+n}\right)$ (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the 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.	1

	(d) Assertion (A) is false but Reason (R) is true.	
	Section B	
	Section B consists of 5 questions of 2 marks each.	
21	For which values of p will the following pair of linear equations given below has unique solution? $4x + py + 8 = 0$ $2x + 2y + 2 = 0$	2
22	ABCD is a trapezium in which AB ∥ DC and its diagonals intersect each other at the point O. Show that $\frac{OA}{OC} = \frac{OB}{OD}$ OR, **In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and ∠1 = ∠2. show that ΔPQR ~ ΔTQR.** 	2
23	In figure 1 above, two circles touch each other externally at C, and AB is a common tangent of circles, then find ∠ACB. 	2
24	Evaluate: $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$	2
25	Find the area of a quadrant of a circle whose circumference is 44 cm. **[OR]** Find the diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm.	2

	Section C	
	Section C consists of 6 questions of 3 marks each.	
26	Prove that $\sqrt{2}$ is an irrational number.	3
27	Form a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $5x^2 + 2x - 3$.	3
28	Ram and Sham are two friends in a town; both have their own plots. Ram is an owner of a rectangular plot whose perimeter is 50m and Sham is also the owner of a rectangular plot whose perimeter is 100m. Sham's plot has a length twice that of Ram's plot and breadth is 5m more than that of Ram's plot. Find the dimensions of Ram's and Sham's plot. **[OR]** Two numbers, x and y (x > y), have a difference of 6 and an average of 4. Frame a pair of linear equations in two variables. Determine the values of the two numbers.	3
29	Prove that the parallelogram circumscribing a circle is a rhombus.	3
30	**Prove that** $\frac{sin\theta - 2sin^3\theta}{2cos^3\theta - cos\theta} = tan\theta$ **[OR]** If sin θ + cos θ = $\sqrt{3}$, then prove that tan θ + cot θ = 1	3
31	Apoorva throws two dice once and computes the product of the numbers appearing on the dice. Peehu throws one die and squares the number that appears on it. Who has the better chance of getting the number 36? Why?	3
	Section D	
	Section D consists of 4 questions of 5 marks each.	
32	An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two trains. **[OR]** A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.	5
33	Prove that If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. In given figure, if LM || CB and LN || CD, prove that $\frac{AM}{AB} = \frac{AN}{AD}$. 	5

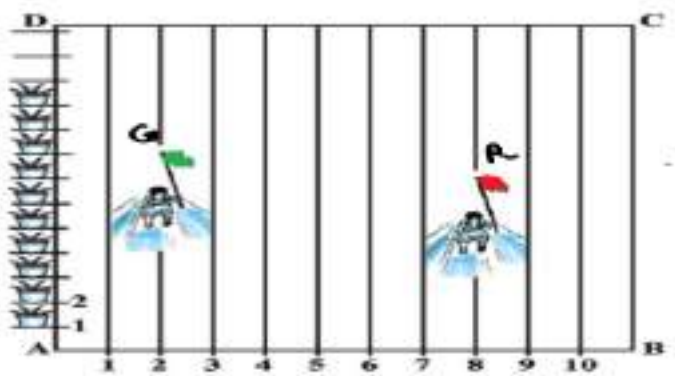
34	Kanupriya runs a bakery shop. The amount of mixture required to make one biscuit is 18 $cm3$. After the biscuit is cooked, it becomes a cylinder of radius 3 cm and height 0.7 cm and has some air trapped inside it. Biscuits are packed in a cylindrical card box of height 14 cm. The arrangement of biscuits is shown above. Based on this information, answer the following questions: (i)How many biscuits will be there in a box? (ii)Find the volume of one biscuit after it is cooked. (iii)Find the volume of air trapped in the biscuit.  **[OR]** Ramesh made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath. 	5
35	The following table shows the ages of the patients admitted in a hospital during a month. Find the mode and the mean of the data given below: Age (in years) | Number of patients 5-15 | 6 15-25 | 11 25-35 | 21 35-45 | 23 45-55 | 14 55-65 | 5	5
	Section E	
	Case study based questions are compulsory.	

36 **Case Study – 1**

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month . Based on the above information answer the following questions.

I.	Find the amount paid by him in 30th installment.	1
II.	If total installments are 40 then find the amount paid in the last installment?	1
III.	Find the amount paid by him in the 30 installments. **[OR]** What amount does he still have to pay after 30th installment?	2

37 In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs 1/4 th the distance AD on the 2nd line and posts a green flag. Preet runs 1/5 th distance AD on the eighth line and posts a red flag.



I.	Find the position of green flag.	1
II.	What is the distance between green flag and red flag?	1

		III.	If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag? **[OR]** If Joy has to post a flag at one-fourth distance from green flag, in the line segment joining the green and red flags, then where should he post his flag?	2

38 **Case Study – 3**

A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919.The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

I.	What is the angle of elevation if they are standing at a distance of 42m away from the monument?	1
II.	They want to see the tower at an angle of 60° . So, they want to know the distance where they should stand and hence find the distance.	1
III.	If the altitude of the Sun is at 60 °, then find the height of the vertical tower that will cast a shadow of length 20 m. **[OR]** The ratio of the length of a rod and its shadow is 1:1. Find the angle of elevation of the Sun.	2

MARKING SCHEME
SAMPLE PAPER-1

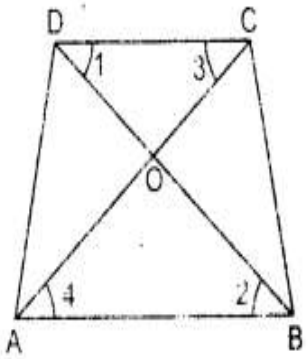
	Section A	
1	(a) 1 For any natural number 6^n and 5^n end with 6 and 5 respectively. Hence $6^n - 5^n$ always end with 6-5 =1 .	1
2	(b) pq^2	1
3	$\alpha + \beta = 0 \Longrightarrow 3+\beta = 0 \implies \beta = -3. Hence\ polynomial = (x+\alpha)(x+\beta) = (x+3)(x-3)$ (d) x^2-9	1
4	(b) 2 $a_1/a_2 = b_1/b_2 = c_1/c_2 \Longrightarrow 3/6 = 1/k = 8/16$ Hence k =2	1
5	(c) k = 4 $b^2 - 4ac = 0 \Longrightarrow 16 - 4k = 0 \Longrightarrow k = 4$	1
6	(b) ± 4 $(4-1)^2 + (p-0)^2 = 5^2 \Longrightarrow 9 + p^2 = 25 \Longrightarrow p^2 = 16$. Hence $p = \pm 4$	1
7	(d) 30 cm	1
8	(b) Similar but not congruent	1
9	(a) 25° $\{\angle APB + \angle AOB = 180^\circ \Longrightarrow \angle AOB = 180^\circ - 50^\circ = 130^\circ$ In ΔAOB, $\angle OBA = \angle OAB$(angles opposite to equal sides); $\angle OAB = (180^\circ - 130^\circ)/2$	1
10	(d) 5/3	1
11	(b) 25 $9(1 + \tan^2 A) = 9\sec^2 A = 9/\cos^2 A = 9 \times 25/9 = 25$	1
12	(c) ½ $\tan^2 45^\circ - \sin^2 45^\circ = 1 - 1/2 = 1/2$	1
13	(b) 17.85cm perimeter of a quadrant of a circle (OAB)= $r+r+l = 2r + 2\frac{\pi r}{4} = d + \frac{\pi d}{4} = 10 + \frac{3.14 \times 10}{4} = 17.85$	1

14	(d) 9 π cm^2 d = 6 , r =3, A = $\pi r^2 = 9\pi$	1
15	(d) 36 cm^2 $4\pi r^2 = 48 \Longrightarrow 3\pi r^2 = 36$	1
16	(b) 15 N= 10+15+12+20+ 9 = 66; N/2= 33 ; 33rd frequency lies in class interval 10-15 from beginning. Median class = 10-15. Upper limit of median class = 15	1
17	(d) 31 $(434+x)/15 = x \Longrightarrow 15x = 434+x \Longrightarrow 14x = 434 \Longrightarrow x = 31$	1
18	(d) 51	1
19	(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not 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).	
	SECTION B	
21	For unique solution : $a_1/a_2 \neq b_1/b_2$ $\Longrightarrow 4/2 \neq p/2$ $\Longrightarrow p \neq 4$ Hence, for all values of p , except 4 , the given pair of linear equations will have a unique solution.	½ ½ ½ ½

22

Given: Diagonals AC and BD intersect at O.

$AB \parallel DC$



½

To Prove: $\frac{OA}{OC} = \frac{OB}{OD}$

Proof: In ΔAOB and ΔCOD

$\angle 1 = \angle 2$

$\angle 3 = \angle 4$ [Alternate angles] ½

$\therefore \quad \Delta AOB \sim \Delta COD$ [AA] ½

$\Rightarrow \quad \frac{OA}{OC} = \frac{OB}{OD}$ [Corresponding sides of similar triangles] ½

½

Or,

From the figure,

$\angle 1 = \angle 2$

$\therefore PQ = PR$ [Sides opposite to equal angles are equal]

In ΔPQS and ΔTQR ½

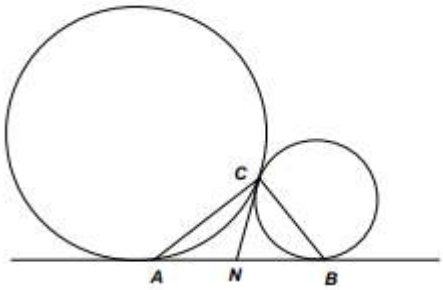
$\Rightarrow \frac{QR}{QS} = \frac{QT}{PR}$

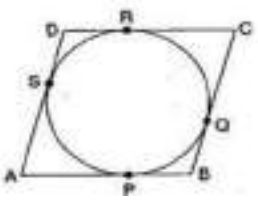
$\Rightarrow \frac{QR}{QS} = \frac{QT}{PR}$ [$\because$ PQ = PR proved above] ½

$\angle PQS = \angle TQR = \angle 1$

$\therefore \Delta PQS \sim \Delta TQR$ [By SAS similarity] ½

Hence, **proved.**

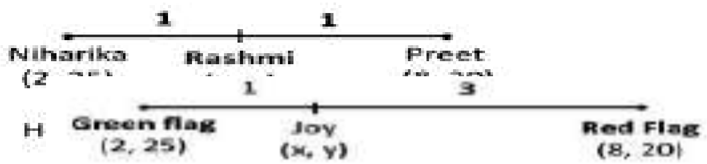
23	 We also know that angle opposite to equal sides is equal. Therefore ∠NCA = ∠NAC and ∠NCB = ∠NBC ∠NCA + ∠NCB = ∠NAC + ∠NBC ∠NCA + ∠NCB + ∠NAC + ∠NBC = 180° ∠NCA + ∠NCB = 90°	½ ½ ½ ½
24	$2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$ $= 2\times1 + \frac{3}{4} - \frac{3}{4}$ $= 2$	1 1
25	R= 44cm/2π =7cm Area of Quadrant = $\pi r^2/4$ $= 22\times49\text{cm}^2/4 = 269.5\ \text{cm}^2$ Or, Area of the circle = Area of first circle + Area of second circle $\Rightarrow \pi R^2 = \pi (r_1)^2 + \pi (r_1)^2$ $\Rightarrow \pi R^2 = \pi (24)^2 + \pi (7)^2 \Rightarrow \pi R^2 = 576\pi + 49\pi$ $\Rightarrow \pi R^2 = 625\pi \Rightarrow R^2 = 625 \Rightarrow R = 25$ Thus, diameter of the circle = 2R = 50 cm	½ ½ 1 ½ ½ 1
	SECTION C	
26	Let us assume to the contrary, that $\sqrt{2}$ is rational. Then we can find a and b ($\neq 0$) such that $\sqrt{2}$ =a/b (assuming that a and b are co-primes). So, $a = \sqrt{2}\, b \Rightarrow a^2 = 2b^2$ Here 2 is a prime number that divides a^2 then 2 divides a also (Using the theorem, if a is a prime number and if a divides p^2, then a divides p, where a is a positive integer) Thus 2 is a factor of a	1 ½

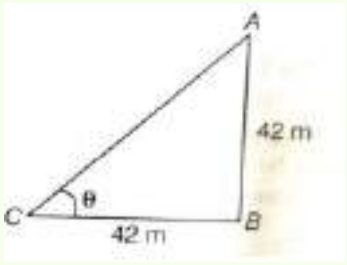
	Since 2 is a factor of a, we can write a = 2c (where c is a constant). Substituting a = 5c We get $(2c)^2 = 2b^2 \Rightarrow 2c^2 = b^2$ This means 2 divides b^2 so 2 divides b also (Using the theorem, if a is a prime number and if a divides p^2, then a divides p, where a is a positive integer). Hence a and b have at least 2 as a common factor. But this contradicts the fact that a and b are coprime. This is the contradiction to our assumption that p and q are co-primes. So, √2 is not a rational number. Therefore, the √2 is irrational.	½ ½ ½
27	$\alpha+\beta=-\frac{2}{5}\ldots(1)$ $\alpha\beta=\frac{-3}{5}\ldots(2)$ $\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}$ $=\frac{\frac{-2}{5}}{\frac{-3}{5}}(\text{from}(1))$ $=\frac{2}{3}$ $\frac{1}{\alpha}\times\frac{1}{\beta}=\frac{1}{\alpha\beta}$ $=\frac{-5}{3}(\text{ from }(2))$ -b/a =2/3 and c/a = -5/3 a=3, b=-2, c =-5 Required polynomial = $ax^2+ bx +c = 3x^2 -2x -5$	1 ½ ½ ½ ½
28	Let length and Breadth of Ram's plot be x m and y m respectively. x+y=25, 2x+(y+5) =50 x= 20, y=5 Length =20m, breadth= 5m of Ram's plot Sham's plot-Length =40m, breadth= 10m Or, x-y = 6 (x+y)/2 =4 X=7 , y=1	1 1 1 ½ ½ 2
29	 Since, the tangents from an external point to a circle are equal. AP = AS …….(i) BP = BQ …….(ii) CR = CQ …….(iii)	1

	DR = DS …….(iv) On adding eq. (i), (ii), (iii) and (iv), we get (AP + BP) + (CR + DR) = (AS + BQ) + (CQ + DS) AB + CD = (AS + DS) + (BQ + CQ) AB + CD = AD + BC AB + AB = AD + AD [Opposite sides of gm are equal] 2AB = 2AD AB = AD But AB = CD and AD = BC [Opposite sides of gm] AB = BC = CD = AD Parallelogram ABCD is a rhombus.	1 1
30	$$\frac{\boldsymbol{sin}\theta - \boldsymbol{2sin^3}\theta}{\boldsymbol{2cos^3}\theta - \boldsymbol{cos}\theta}$$ $$= \frac{\boldsymbol{sin}\theta(\boldsymbol{1 - 2sin^2}\theta)}{\boldsymbol{cos}\theta(\boldsymbol{2cos^2}\theta - \boldsymbol{1})}$$ $$= \frac{\boldsymbol{tan}\theta(\boldsymbol{1 - 2sin^2}\theta)}{\boldsymbol{2(1 - sin^2}\theta) - \boldsymbol{1}}$$ $$= \frac{\boldsymbol{tan}\theta(\boldsymbol{1 - 2sin^2}\theta)}{(\boldsymbol{1 - 2sin^2}\theta)}$$ **= tan**θ	1 1 1
	[OR] $\sin\theta + \cos\theta = \sqrt{3} \Rightarrow (\sin\theta + \cos\theta)^2 = 3$ $\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 3$ $\Rightarrow 1 + 2\sin\theta\cos\theta = 3 \Rightarrow \sin\theta\cos\theta = 1$ Now $\tan\theta + \cot\theta = {}^{\sin\theta}/_{\cos\theta} + {}^{\cos\theta}/_{\sin\theta}$ $= (\sin^2\theta + \cos^2\theta)/\sin\theta\cos\theta$ $= 1/\sin\theta\cos\theta$ $= 1/1 = 1$	½ ½ ½ ½ ½ ½
31	Apoorva throw two dice at once. Number of outcomes for getting product 36 = 1(6×6) ∴ Probability for Apoorv = 1/36 Peehu throws one die Hence, the total number of outcomes = 6 Number of outcomes for getting square36 = 1 ∴ Probability for Peehu = 6/36 = 1/6 Therefore, Peehu has a better chance of getting the number 36.	1 1 1

	Section D	
32	Let the average speed of the passenger train be x km/hr. Then the average speed of express train = (x+11)km/hr $\frac{132}{x} - \frac{132}{x+11} = 1$ $\Rightarrow x^2+11x-1452=0$ $\Rightarrow (x-33)(x+44)=0$ $\Rightarrow (x-33)=0$ or $(x+44)=0$ $\Rightarrow x=33$ or $x=-44$ Speed can not be negative, $\Rightarrow x=33$, $x+11=44$ Hence, the speed of passenger train =33 km/hr and the speed of express train =44 km/hr [OR] Let x be the speed of stream. Let t1 and t2 be the time for upstream and downstream. Now , t1 = t2 +1 $\Rightarrow 48x=(18-x)(18+x)$ $\Rightarrow 48x=324+18x-18x-x^2$ $\Rightarrow x^2+48x-324=0$ $\Rightarrow x^2+54x-6x-324=0$ $\Rightarrow x(x+54)-6(x+54)=0$ $\Rightarrow (x+54)(x-6)=0$ $\Rightarrow x=-54$ or $x=6$ Since speed cannot be negative. $\therefore x=6$ Thus the speed of stream is 6km/hr	1/2 1½ 1 1 1
33	Figure Given, To prove, constructionsProof Application ----	½ 1 ½ 2 1
34	In a layer, 7 biscuits are arranged whose height is 0.7 cm. Total layer in box = 14/0.7 = 20 Number of biscuits in the box = 20 x 7 = 140 19.8 cm^3 (Volume of cylinder = $\pi r^2 h$)	½ 1 2 1½

	Volume of air trap= Volume of biscuit−Volume of sphere = 19.8 −18 = 1.8 cm^3 **[OR]** Let h be height of the cylinder, and r the common radius of the cylinder and hemisphere. Then, the total surface area = CSA of cylinder + CSA of hemisphere $= 2\pi rh + 2\pi r^2 = 2\pi r (h + r)$ $= 2 \times \frac{22}{7} \times 30 (145 + 30)\ cm^2$ $= 2 \times \frac{22}{7} \times 30 \times 175\ cm^2$ $= 33000\ cm^2 = 3.3\ m^2$	1 1 1 1 1
35	Mode: The class which have highest frequency. In this case, class interval 35−45 is the modal class. Now, Lower limit of modal class, l=35, h=10, f1=23, f0=21, f2=14 We know that, $\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ $= 35 + \left(\frac{23 - 21}{2(23) - 21 - 14}\right) \times 10$ $= 35 + \frac{2}{11} \times 10$ $= 35 + 1.818$ Mode =36.8 Lets take assumed mean, A as 30 Class height =10 $\therefore u_i = \frac{x_i - A}{h} = \frac{x_i - 30}{10}$ $\bar{x} = A + h\frac{\sum f_i u_i}{\sum f_i} = 30 + 10 \times \frac{43}{80}$ =30+5.375 =35.375 ≈35.37 Hence, Mode =36.8 years, Mean =35.37 years.	½ **1** **1** **1** **1** **1/2**
	SECTION E	

36	amount paid by him in 30th installment = a+29d = 1000+29×100= 3900 amount paid in the last installment = a+39d = 1000+39×100= 4900 amount paid by him in the 30 installments= n/2 [2a+ (n-1)d] = 30/2 [2×1000 +(30-1)100] = 73500 OR, amount he still have to pay after 30th installment= 118000- 73500 = 44500	**1** **1** **2**
37	Position of the green flag is (2, ¼ ×100) i.e., (2,25) the distance between green flag and red flag = $= \sqrt{(8-2)^2 + (20-25)^2}$ $= \sqrt{(6)^2 + (-5)^2}$ $= \sqrt{(6)^2 + (5)^2}$ $= \sqrt{36+25}$ $= \sqrt{61}$ (i) Position of the blue flag = (5,22.5)  **Finding x** $x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$ Where, $m_1 = 1,\ m_2 = 3$ $x_1 = 2,\ x_2 = 8$ Putting values $x = \frac{1 \times 8 + 3 \times 2}{1+3}$ $x = \frac{8+6}{4}$ $x = \frac{14}{4}$ **x = 3.5** **Finding y** $y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$ Where, $m_1 = 1,\ m_2 = 3$ $y_1 = 25,\ y_2 = 20$ Putting values $y = \frac{1 \times 20 + 3 \times 25}{1+3}$ $y = \frac{20+75}{4}$ $y = \frac{95}{4}$ **y = 23.75** Or, Position of Joy flag is (3.5, 23.75) (i) To find the angle of elevation, tanθ = height of the monument/ distance ofstudents from the monument = 42 /42	**1** **1** **2**

38		 =1= tan 45° Hence, θ =45°	
	(ii)	To find the distance, tan 60° = $\frac{\text{height of the tower}}{\text{distance}}$ $\sqrt{3} = \frac{42}{\text{distance}}$ distance = $\frac{42}{\sqrt{3}}$ distance = 24.64 m	1
	(iii)	To find the height of the vertical tower, tan 60° = $\frac{\text{height of the tower}}{\text{distance}}$ $\sqrt{3} = \frac{\text{height of the tower}}{20}$ Height of the tower = $20\sqrt{3}$	1
	(iv)	To find the angle of elevation of the sun, tan θ = $\frac{\text{height of the tower}}{\text{distance from the tower}}$ = $\frac{1}{1}$ (since the ratios are in 1:1) θ =45°	2