

Time: 3 hrs.

MM: 80

Total no. of questions 38

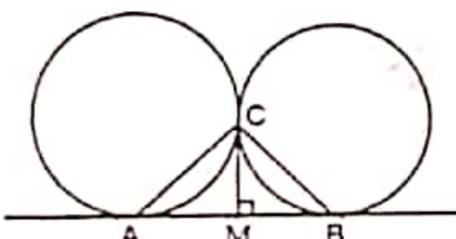
Total no. of pages :5

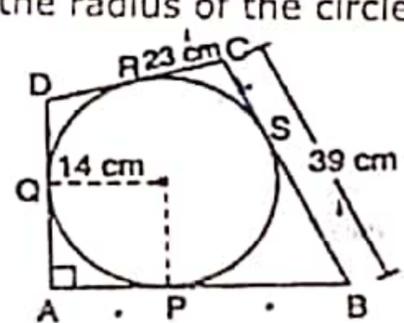
General Instructions :

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required.

SECTION A

(Section A consists of 20 questions of 1 mark each)

Q1	If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; a, b being prime numbers, then LCM (p, q) is: (a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3														
Q2	The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are: (a) m, m + 3 (b) -m, m + 3 (c) m, -(m + 3) (d) -m, -(m + 3)														
Q3	If the circumference of a circle and the perimeter of a square are equal, then (a) Area of the circle = Area of the square (b) Area of the circle > Area of the square (c) Area of the circle < Area of the square (d) Nothing definite can be said about the relation between the areas of the circle and square.														
Q4	The sum of the lower limit of median class and the upper limit of the modal class of the following data is: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Marks</th> <th>0 - 10</th> <th>10 - 20</th> <th>20 - 30</th> <th>30 - 40</th> <th>40 - 50</th> <th>50 - 60</th> </tr> </thead> <tbody> <tr> <td>No. of students</td> <td>8</td> <td>10</td> <td>12</td> <td>22</td> <td>30</td> <td>18</td> </tr> </tbody> </table> (a) 70 (b) 80 (c) 90 (d) 100	Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	No. of students	8	10	12	22	30	18
Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60									
No. of students	8	10	12	22	30	18									
Q5	Two circles touch each other externally at C and AB is common tangent of circles, then $\angle ACB$ is: (a) 70° (b) 60° (c) 100° (d) 90° 														
Q6	The radius of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is: (a) 2.1 cm (b) 4.2 cm (c) 3.1 cm (d) 2.2 cm														
Q7	If a pole 6m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is: (a) 60° (b) 45° (c) 30° (d) 90°														

Q8	$(\sin 30^\circ + \cos 30^\circ) - (\sin 60^\circ + \cos 60^\circ) =$ (a) -1 (b) 0 (c) 1 (d) 2
Q9	If $\sin A = 1/2$ and $\cos B = 1/2$, then $A + B =$ (a) 0° (b) 30° (c) 60° (d) 90°
Q10	If the distance between the points $(2, -2)$ and $(-1, x)$ is 5, one of the values of x is: (a) -2 (b) 2 (c) -1 (d) 1
Q11	If $\text{LCM}(77, 99) = 693$, then $\text{HCF}(77, 99)$ is: (a) 11 (b) 7 (c) 9 (d) 22
Q12	In the given figure, quadrilateral ABCD is circumscribed, touching the circle at P, Q, R and S such that $\angle DAB = 90^\circ$, If $CR = 23$ cm and $CB = 39$ cm and the radius of the circle is 14 cm, then the measure of AB is: (a) 37 cm (b) 16 cm (c) 30 cm (d) 39 cm
	
Q13	Two dice are thrown simultaneously, then the probability of getting doublet is: (a) $1/36$ (b) $1/6$ (c) $5/6$ (d) $11/36$
Q14	If the numbers $n - 2$, $4n - 1$ and $5n + 2$ are in AP, then the value of n is: (a) 1 (b) 2 (c) -1 (d) -2
Q15	In a circle of diameter 42 cm, if an arc subtends an angle of 60° at the centre, then the length of the arc is: (a) $22/7$ cm (b) 11 cm (c) 22 cm (d) 44 cm
Q16	In the ΔABC , D and E are points on side AB and AC respectively such that $DE \parallel BC$. If $AE = 2$ cm, $AD = 3$ cm and $BD = 4.5$ cm, then CE equals: (a) 1 cm (b) 2 cm (c) 3 cm (d) 4 cm
Q17	The probability that a non leap year selected at random will contain 53 Sundays is: (a) $1/7$ (b) $2/7$ (c) $3/7$ (d) $5/7$
Q18	A card is selected from a deck of 52 cards. The probability of being a red face card is: (a) $3/26$ (b) $3/13$ (c) $2/13$ (d) $1/2$
	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option: (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 and 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.
Q19	Assertion: If product of two numbers is 5780 and their HCF is 17, then their LCM is 340 Reason: HCF is always a factor of LCM
Q20	Assertion: The point $(0, 4)$ lies on y-axis. Reason: The y co-ordinate of the point on x-axis is zero.

SECTION B

(Section B consists of 5 questions of 2 marks each)

Q21 If $\sin A = \cos A$, find the value of $2\tan^2 A + \sin^2 A + 1$.

OR

If $A=60^\circ$ and $B=30^\circ$, verify that: $\sin(A+B) = \sin A \cos B + \cos A \sin B$

Q22 ABCD is a trapezium in which $AB \parallel CD$ and its diagonals intersect each other at the point O.

Using a similarity criterion of two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$.

Q23 Find the mean of the following distribution:

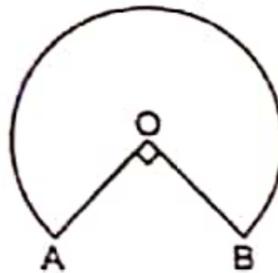
Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	12	18	15	25	26	15	9

Q24 Two concentric circles are of radii 5 cm and 3 cm, find the length of the chord of the larger circle which touches the smaller circle.

Q25 The length of the minute hand of a clock is 14 cm, find the area swept by the minute hand in 10 minutes

OR

In the given figure, the shape of the top of a table is that a sector of a circle with centre O and $\angle AOB = 90^\circ$. If $AO = OB = 42$ cm, find the perimeter of the top of the table.



SECTION C

(Section C consists of 6 questions of 3 marks each.)

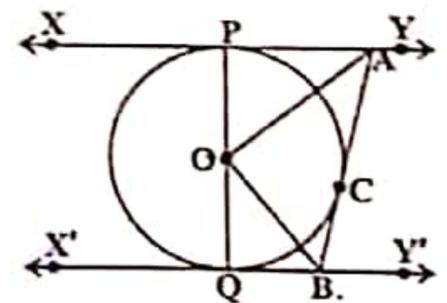
Q26 Solve for x and y:
 $99x + 101y = 499$ and $101x + 99y = 501$

Q27 If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, prove that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

OR

If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, prove that $m^2 - n^2 = 4\sqrt{mn}$.

Q28 In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



Q29 Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.

OR

Find the quadratic polynomial sum and product of whose zeros are -1 and -20 respectively. Also find the zeroes of the polynomial so obtained.

Q30 If the system of equations $2x + 3y = 7$ and $(a + b)x + (2a - b)y = 21$ has infinitely many solutions, then find a and b .

Q31 Prove that $\sqrt{5}$ is an irrational number.

SECTION D

(Section D consists of 4 questions of 5 marks each)

Q32 A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21 cm and its volume is $\frac{2}{3}$ of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.

OR

A vessel full of water is in the form of an inverted cone of height 8 cm and the radius of its top, which is open, is 5 cm. 100 spherical lead balls are dropped into the vessel. One fourth of the water flows out of the vessel, find the radius of a spherical ball.

Q33 A train, travelling at a uniform speed for 360 km, would have taken 48 minutes less to travel the same distance if its speed were 5 km/h more, find the original speed of the train.

OR

Two water taps together can fill a tank in 6 hours. The tap of larger diameter takes 9 hours less than the smaller one to fill the tank separately, find the time in which each tap can separately fill the tank.

Q34 State and prove Basic Proportional Theorem.

Q35 If the median of the following distribution is 58 and sum of all the frequencies is 140, find the value of x and y .

Class	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Frequency	8	10	x	25	40	y	15	7

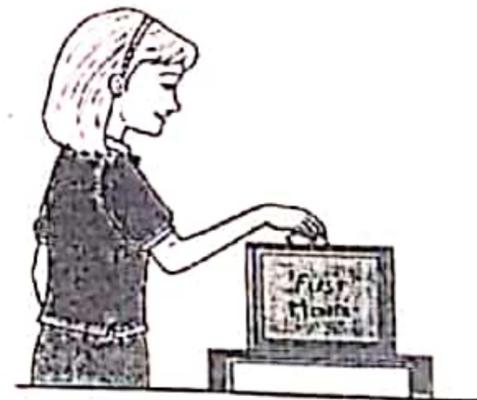
SECTION E

Case study-based questions are compulsory.

(Section E consists of 3 questions of 4 marks each)

(Each question has 3 parts with mark(s) 1+1+2 with choice in 2 marks question)

Q36 Ananya saves ₹. 24 in the first month ₹. 30 in the second month and ₹. 36 in the third month. She continues to save in this manner.



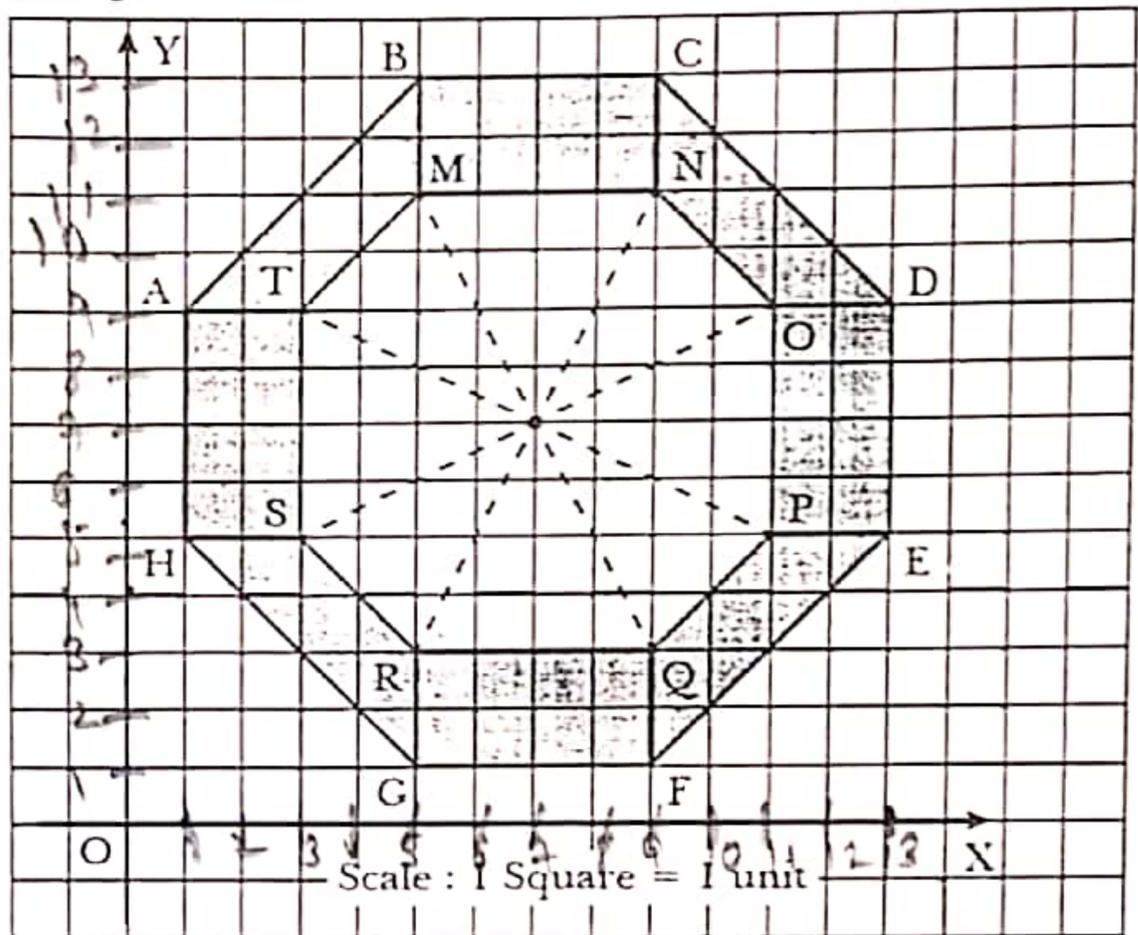
Based on the above information, answer the following questions.

- Whether the monthly savings of Ananya form an AP or not? If yes then write the first term and common difference.
- What is the amount that she will save in 15th month?
- Which month, will she save ₹. 66?

OR

What is the common difference of an AP whose n th term is $8 - 5n$?

37 The top of a table is shown in the figure given below:



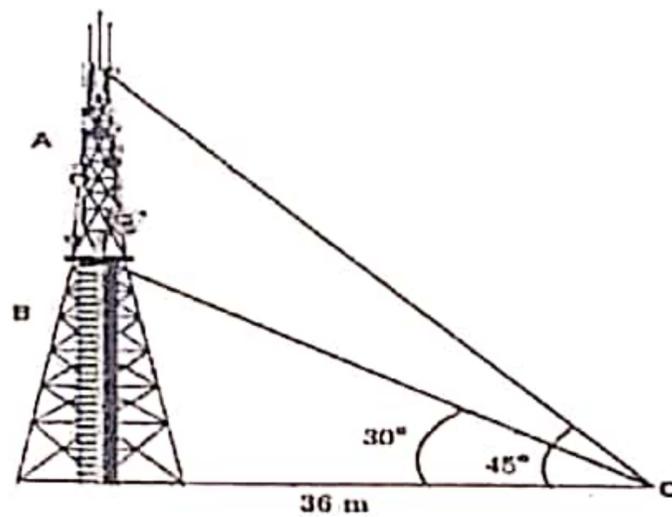
Based on the above information, answer the following questions.

- Find the distance between points A and B.
- Write the co-ordinates of the mid-point of line segment joining points M and Q.
- If G is taken as the origin, and x, y axis put along GF and GB, then find the point denoted by coordinates (4, 2) and (8, 4).

OR

Find the coordinates of H, G and also find the distance between them.

- Q38 Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section A is 45° .



Based on the above information, answer the following questions.

- What is the height of the section B?
- What is the height of the section A?
- What is the length of the wire structure from the point O to the top of section A?

OR

What is the length of the wire structure from the point O to the top of section B?