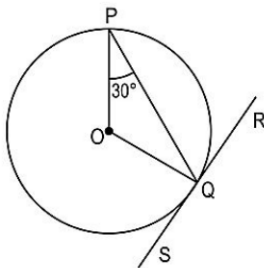


**Instructions to the Students**

- Write only question numbers clearly outside the margin (1, 2, 3.i, 5.b, 4.c.ii, etc.).
- Do not write questions or any titles. (For ex. - Do not write **II. Answer the following**).
- After every answer, give a one-line space.
- For Multiple choice Questions - Both Option and Answer should be written.
- Bullet points & Sub-points should be written inside the margin.
- Do not fold / staple the paper.

Section A**Multiple choice Questions :****(20 x 1 = 20)**

1. John is proving $2 + \sqrt{3}$ is irrational.
He starts the solution as follows.
Step 1: Let us assume that, to the contrary, $2 + \sqrt{3}$ is rational.
Which of the following could be step 2?
 - a) $2 + \sqrt{3} = \frac{a}{b}$, where a and b integers and $b \neq 0$
 - b) $2 + \sqrt{3} = \frac{a}{b}$, where a and b whole numbers and $b \neq 0$.
 - c) $2 + \sqrt{3} = \frac{a}{b}$, where a and b coprimes and $b \neq 0$
 - d) $2 + \sqrt{3} = \frac{a}{b}$, where a and b natural numbers.
2. The coordinates of the point which divides the line joining (2, -2) and (6, -2) in the ratio 1:3 are:
 - a) (2.5,-2)
 - b) (3.5,0)
 - c) (2.5,-1)
 - d) (3,-1)
3. The graph of the pair of equations $2x - 3y = 5$ and $3x - 2y = 8$ intersect at:
 - a) (15,-1)
 - b) (-14,1)
 - c) $(\frac{14}{5}, \frac{1}{5})$
 - d) $(\frac{-14}{5}, \frac{-1}{5})$
4. In the figure below, O is the centre of the circle, RS is a tangent to the circle at Q.



(Note: The figure is not to scale.)

Which of the following gives the measure of $\angle PQR$?

- a) 30°
 - b) 45°
 - c) 60°
 - d) 90°
5. If $\operatorname{cosec} A = \frac{13}{12}$, then the value of $\frac{2 \sin A - 3 \cos A}{4 \sin A - 9 \cos A}$
 - a) 4
 - b) 5
 - c) 6
 - d) 3
 6. The quadratic equation $x^2 - 4x - 3\sqrt{2} = 0$ has
 - a) Two distinct real roots
 - b) Two equal real roots
 - c) No real roots
 - d) More than 2 real roots

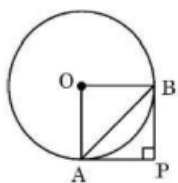
7. In a circle of radius 14 cm, an arc subtends an angle of 45° at the centre, then the area of the sector is
a) 71 cm^2 b) 76 cm^2 c) 77 cm^2 d) 154 cm^2
8. A box contains cards numbered 9 to 53. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square is :
a) $\frac{1}{45}$ b) $\frac{2}{15}$ c) $\frac{4}{45}$ d) $\frac{1}{9}$
9. If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$ for $0 < (A+B) \leq 90^\circ$ and $A > B$, then A and B are
a) $60^\circ, 30^\circ$ b) $60^\circ, 15^\circ$ c) $45^\circ, 15^\circ$ d) $60^\circ, 25^\circ$
10. The largest number that will divide 445, 572 and 699 leaving remainders 4, 5 and 6 respectively is:
a) 63 b) 36 c) 34 d) 45
11. A sphere and cube have equal surface area. The ratio of the volumes of the sphere to that of cube is
a) $\sqrt{\pi} : \sqrt{6}$ b) $\sqrt{\pi} : \sqrt{3}$ c) $\sqrt{6} : \sqrt{\pi}$ d) $\sqrt{3} : \sqrt{\pi}$
12. Which of the following equations has no real roots?
a) $2x^2 + 3\sqrt{2}x + 2 = 0$ b) $3x^2 + x - \sqrt{5} = 0$ c) $x^2 - 4x - 8 = 0$ d) $x^2 - 3x + 6 = 0$
13. If the area of circle is numerically equal to twice its circumference, then the diameter of the circle is
a) 4 units b) 6 units c) 8 units d) 12 units
14. If $\Delta ABC \sim \Delta DEF$, $AB = 6\text{cm}$, $DE = 9\text{cm}$, $EF = 6\text{cm}$ and $FD = 12\text{cm}$, then the perimeter of ΔABC is
a) 28 cm b) 28.5 cm c) 18 cm d) 23 cm
15. Find the probability of getting a sum 7 from two dice.
a) $\frac{1}{6}$ b) $\frac{1}{8}$ c) $\frac{1}{12}$ d) $\frac{1}{36}$
16. The distance between the points $(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$ is
a) $a^2 + b^2$ b) $a^2 - b^2$ c) $\sqrt{a^2 + b^2}$ d) $\sqrt{a^2 - b^2}$

17. Consider the following frequency distribution

Class	0-5	6-11	12-17	18-23	24-29
Frequency	13	10	15	8	11

The upper limit of the median class is

- a) 17 b) 17.5 c) 18 d) 18.5
18. In the adjoining figure, PA and PB are tangents to a circle with centre O such that $\angle P = 90^\circ$. If $AB = 3\sqrt{2} \text{ cm}$, then the diameter of the circle is



- a) $3\sqrt{2} \text{ cm}$ b) $6\sqrt{2} \text{ cm}$ c) 3cm d) 6cm
19. Assertion (A): $\sin(A + B) = \sin A + \sin B$
Reason (R): For any value of θ , $1 + \tan^2\theta = \sec^2\theta$
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.

20. Assertion (A): If LCM of two numbers is 2475 and their product is 12375, then their HCF is 5
Reason (R): $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$.
a) Both (A) and (R) are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
c) (A) is correct but (R) is wrong
d) (A) is wrong but (R) is correct

Section B

Very Short Answer Type Questions :

(5 x 2 = 10)

- 21.a. If $\frac{4}{5}$, a , 2 are in AP, find the value of a .

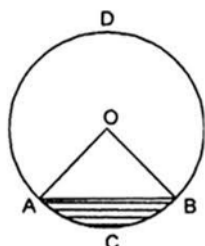
(OR)

- 21.b. Find the sum of the following APs: $\frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \dots$, to 11 terms

22. Evaluate : $\frac{\cos 45^\circ}{\sec 30^\circ} + \frac{1}{\sec 60^\circ}$

23. ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

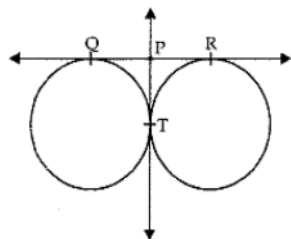
- 24.a. Find the area of the segment of a circle of radius 14 cm, if the length of the corresponding arc ACB is 22 cm and $\angle AOB = 90^\circ$



(OR)

- 24.b. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

25. In fig., QR is a common tangent to the given circles, touching externally at the point T. The tangent at T meet QR at P. If $PT = 3.8$ cm, find the length of QR.



Section C

Short Answer Type Questions :

(6 x 3 = 18)

26. If a circle touches the side BC of a triangle ABC at P and the extended sides AB and AC at Q and R respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$

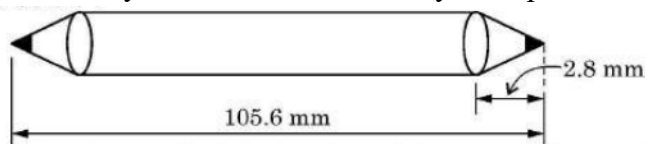
27. A sweet shopkeeper prepares 396 gulab jamuns and 342 ras-gullas. He packs them into containers. Each container consists of either gulab jamun or ras-gullas but have equal number of pieces. Find the number of pieces he should put in each box so that number of boxes are least.
28. Find the zeros of the polynomial $f(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$, and verify the relation between zeros and its coefficients.
- 29.a. Prove that : $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2\sec^2\theta}{\tan^2\theta - 1}$
- (OR)
- 29.b. Prove that $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + \sec\theta \operatorname{cosec}\theta$
30. A card is drawn at random from a standard deck of 52 playing cards. Find the probability that the card drawn is:
- a queen.
 - a spade.
 - a queen of spades.
- 31.a. Check graphically whether the pair of linear equations $2x + 3y = 12$; $5x - 3y = 9$ is consistent. If so, solve it graphically.
- (OR)
- 31.b. Determine the values of m and n so that the following system of linear equation have infinite number of solutions :
- $$(2m-1)x + 3y - 5 = 0$$
- $$3x + (n-1)y - 2 = 0$$

Section D

Long Answer Type Questions :

(4 x 5 = 20)

32. Find x in terms of a, b and c : $\frac{a}{x-a} + \frac{b}{x-b} = \frac{2c}{x-c}$, $x \neq a, b, c$.
33. State and prove Basic proportionality theorem.
- 34.a. The internal and external diameters of a hollow hemispherical vessel are 16 cm and 12 cm respectively. If the cost of painting 1 cm^2 of the surface area is Rs. 5.00, find the total cost of painting the vessel all over. (Use $\pi = 3.14$)
- (OR)
- 34.b. On the day of her examination, Riya sharpened her pencil from both ends as shown below:



The diameter of the cylindrical and conical part of the pencil is 4.2 mm. If the height of each conical part is 2.8 mm and length of entire pencil is 105.6 mm, find the total surface area of the pencil.

- 35.a. The median of the following data is 525. Find the values of x and y , if total frequency is 100 :

Class	Frequency
0-100	2
100-200	5
200-300	x
300-400	12
400-500	17
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4

(OR)

- 35.b. Literacy rates of 40 cities are given in the following table. It is given that mean literacy rate is 63.5, then find the missing frequencies x and y .

Literacy rate (in %)	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
Number of cities	1	2	3	x	y	6	8	4	2	3	2

Section E

Case Based Questions :

(3 x 4 = 12)

36. In a class the teacher asks every student to write an example of A.P. Two friends Geeta and Madhuri writes their progressions as -5, -2, 1, 4, ... and 187, 184, 181, respectively. Now, the teacher asks various students of the class the following questions on these two progressions. Help students to find the answers of the questions.

- 36.i. Find the 34th term of the progression written by Madhuri. [1]
 a) 286 b) 88 c) -99 d) 190

- 36.ii. Find the 19th term of the progression written by Geeta. [1]
 a) 49 b) 59 c) 52 d) 62

- 36.iii.a. Find the sum of first 10 terms of the progression written by Geeta. [2]
 a) 85 b) 95 c) 110 d) 200

(OR)

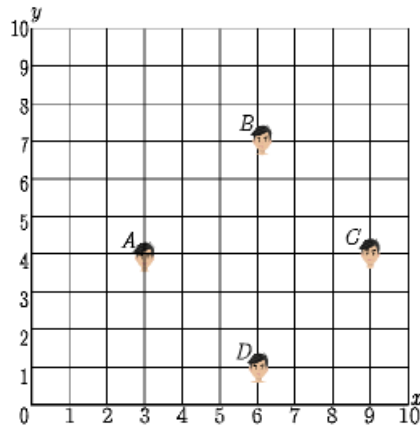
- 36.iii.b. Which term of the two progressions will have the same value? [2]
 a) 31 b) 33 c) 32 d) 30

37. Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life.



Have you noticed that in school assembly you always stand in row and column and this make a

coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below.



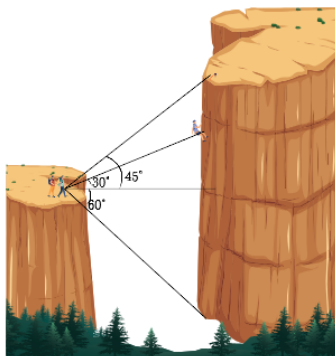
Here A, B, C and D are four friends Amar, Bharat, Colin and David.

- 37.i. What is the distance between A and B ? [1]
 37.ii. What is the distance between C and D ? [1]
 37.iii.a. What is the distance between A and C ? [2]

(OR)

- 37.iii.b. What is the distance between D and B ? [2]

38. Height of a Climber : Himalayan Trekking Club has just hiked to the south rim of a large canyon, when they spot a climber attempting to scale the taller northern face. Knowing the distance between the sheer walls of the northern and southern faces of the canyon is approximately 150 meter, they attempt to compute the distance remaining for the climbers to reach the top of the northern rim.



Using a homemade transit, they sight an angle of depression of 60° to the bottom of the north face, and angles of elevation of 30° and 45° to the climbers and top of the northern rim respectively.

- 38.i. How high is the southern rim of the canyon? [1]
 38.ii. The angle formed by the line of sight with the horizontal when the point being viewed is above the horizontal level is called? [1]
 38.iii.a. How high is the northern rim? [2]

(OR)

- 38.iii.b. How much farther until the climber reaches the top? [2]

*** ALL THE BEST***