Section A

* Choose the right answer from the given options. [1 Marks Each] [18]

1. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is

    (A) 21 　　　　　 (B) 7 　　　　　 (C) 28 　　　　　 (D) 14

2. If $\left(a^2 + b^2\right) x^2 + 2(ac + bd)x + c^2 + d^2 = 0$ has no real roots, then

    (A) $ab = cd$ 　　 (B) $ad = bc$ 　　 (C) $ad \neq bc$ 　　 (D) $ac = bd$

3. The volume of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is

    (A) $58.2 cm^3$ 　　 (B) $19.4 cm^3$ 　　 (C) $9.7 cm^3$ 　　 (D) $77.6 cm^3$

4. If one root of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ is 1 , then the other root is _____.

    (A) $\frac{a(b-c)}{c(a-b)}$ 　　 (B) $\frac{c(a-b)}{a(b-c)}$ 　　 (C) $\frac{b(c-a)}{a(b-c)}$ 　　 (D) $\frac{a(b-c)}{b(c-a)}$

5. The 11th term of the AP: $-5, \frac{-5}{2}, 0, \frac{5}{2}, \ldots$ is

    (A) -30 　　 (B) -20 　　 (C) 30 　　 (D) 20

6. The distance between the points $(0, 0)$ and $(a - b, a + b)$ is

    (A) $2\sqrt{ab}$ 　　 (B) $\sqrt{2a^2 + 2b^2}$ 　　 (C) $2\sqrt{a^2 + b^2}$ 　　 (D) $\sqrt{2a^2 + ab}$

7. The zeros of the quadratic polynomial $x^2 + 88x + 125$ are

    (A) both negative 　　　　　　　 (B) both positive

    (C) both equal 　　　　　　　　　 (D) one positive and one negative
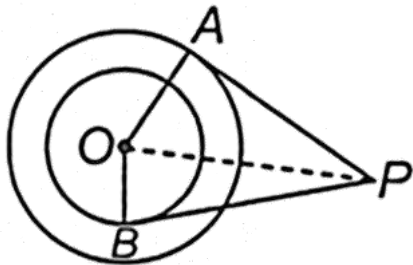
8. We have, AB||DE and BD||EF.Then
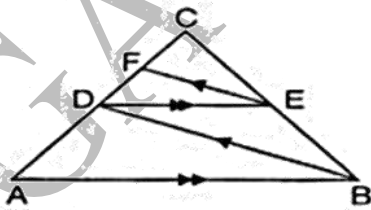
    (A) $BC^2 = AB \cdot CE$ 　 (B) $AC^2 = BC \cdot DC$ 　 (C) $AB^2 = AC \cdot DE$ 　 (D) $DC^2 = CF \times AC$

9. In the given figure, if AQ = 4 cm, QR = 7 cm, DS = 3 cm, then x is equal to
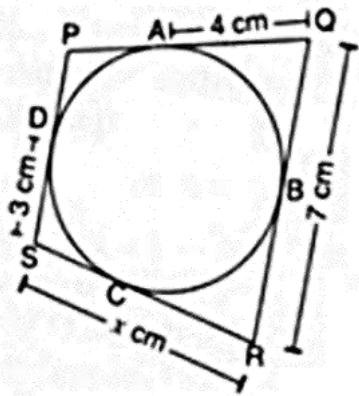
(A) 6 cm   (B) 10 cm   (C) 11 cm   (D) 8 cm

10. In the given figure, O is the centre of two concentric circles of radii 5 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles. If PA = 12 cm, then PB =

(A) $3\sqrt{5} cm$ (B) $5\sqrt{2} cm$ (C) $5\sqrt{10} cm$ (D) $4\sqrt{10} cm$

11. If $a \sin\theta + b\cos\theta = c$, then the value of $a\cos\theta - b\sin\theta$ is
    (A) $\sqrt{a^2 + b^2 - c^2}$ (B) $\sqrt{a^2 + b^2 + c^2}$ (C) $\sqrt{a^2 - b^2 + c^2}$ (D) $\sqrt{a^2 - b^2 - c^2}$

12. If the HCF of 72 and 234 is 18, then the LCM (72, 234) is:
   (A) 936   (B) 836   (C) 234   (D) 324

13. The tops of two towers of heights x and y, standing on a level ground subtend angles of 30° and 60° respectively at the centre of the line joining their feet. Then, $x : y$ is
    (A) $1 : 3$ (B) $2 : 1$ (C) $1 : 2$ (D) $3 : 1$

14. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. The area of the sector formed by the arc is:
    (A) $231 cm^2$ (B) $250 cm^2$ (C) $220 cm^2$ (D) $200 cm^2$

15. A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right-circular cone (see figure 2). The value of angle θ is:

figure 1 figure 2
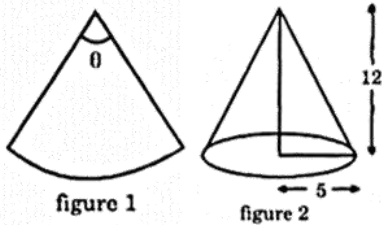
(A) $\frac{5\pi}{13}$ (B) $\frac{6\pi}{13}$ (C) $\frac{10\pi}{13}$ (D) $\frac{9\pi}{13}$

16. A letter is chosen at random from the letters of the word **ASSOCIATION**. Find the probability that the chosen letter is a vowel.

   (A) $\frac{6}{11}$ (B) $\frac{7}{11}$ (C) $\frac{5}{11}$ (D) $\frac{3}{11}$

17. Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the dice is 7 is
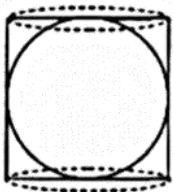
   (A) 7   (B) 2   (C) 0   (D) 1

18. In a data, if $l = 40, h = 15, f_1 = 7, f_0 = 3, f_2 = 6$, then the mode is

   (A) 82   (B) 62   (C) 52   (D) 72

 * A statement of Assertion (A) is followed by a statement of Reason (R).   **[2]**
Choose the correct option.

19. **Assertion (A):** In the given figure, a sphere is inscribed in a cylinder. The surface area of the sphere is not equal to the curved surface area of the cylinder.

   Reason (R): Surface area of sphere is $4\pi r^2$

   (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 true but R is false.

   (D) A is false but R is true.

20. **Assertion (A):** $a_n - a_{n-1}$ is not independent of n then the given sequence is an AP.

   **Reason (R):** Common difference $d = a_n - a_{n-1}$ is constant or independent of n.

   (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 true but R is false.
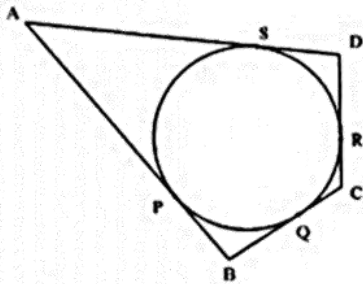
   (D) A is false but R is true.

* Given section consists of questions of 2 marks each. [10]

21. Prove that $2 + 3\sqrt{3}$ is an irrational number. It is given that $\sqrt{3}$ is an irrational number.

22. In the given figure, XZ is parallel to $BC. AZ = 3cm, ZC = 2cm, BM = 3cm$ and $MC = 5cm$. Find the length of XY.
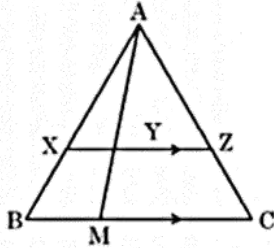
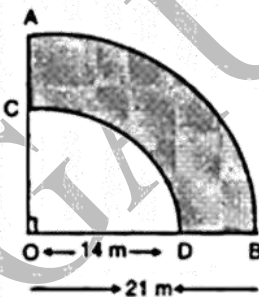23. A quadrilateral ABCD is drawn to the circumference of a circle. Prove that: AB + CD = AD + BC

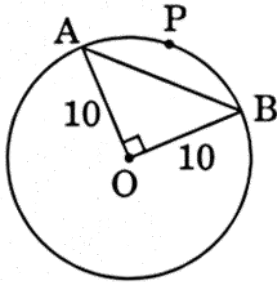24. If $x = a\cos^3\theta, y = b\sin^3\theta$, prove that $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$

OR

* If $\sqrt{2}\sin\theta = 1$, find the value of $\sec^2\theta - \csc^2\theta$.

25. $ABCD$ is a flower bed. If $OA = 21m$ and $OC = 14m$, find the area of the bed.

OR

* In Figure, a chord AB of a circle of radius 10 cm subtends a right angle at the centre

Find

i. Area of sector OAPB

ii. Area of minor segment APB. (Use $\pi = 3.14$)

<div style="text-align:center; border:1px solid; display:inline-block;">Section C</div>

* **Given section consists of questions of 3 marks each.**   [18]

26. Find the LCM and HCF of 404 and 96 and verify that LCM × HCF = product of the two numbers

27. The mid-point P of the line segment joining the points A (-10,4) and B (- 2,0) lies on the line segment joining the points C (- 9, - 4) and D (- 4, y). Find the ratio in which P divides CD. Also, find the value of y

28. Had Aarush scored 8 more marks in a Mathematics test, out of 35 marks, 7 times these marks would have been 4 less than square of his actual marks. How many marks did he get in the test?

    OR

* If two pipes function simultaneously, a reservoir will be filled in 12 hours. One pipe fills the reservoir 10 hours faster than the other. How many hours will the second pipe take to fill the reservoir?

29. In Figure, XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersects XY at A and $X'Y'$ at B . Prove that $\angle AOB = 90°$.
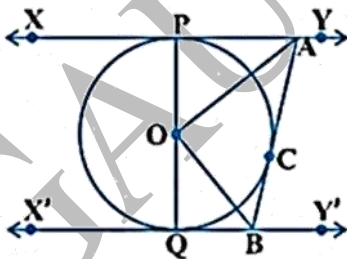
    OR

* If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

30. Prove that $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

31. The angle of elevation of the top of a tower from a point A on the ground is $30°$. On moving a distance of 20 metre towards the foot of the tower to a point B the angle of elevation increases to $60°$. Find the height of the tower and the distance of the tower from the point A .

* **Given section consists of questions of 5 marks each.** [20]

32. Abdul travelled 300 km by train and 200 km by taxi taking 5 hours 30 minutes. But, if he travels 260 km by train and 240 km by taxi, he takes 6 minutes longer. Find the speed of the train and that of the taxi.

    OR

* The ratio of incomes of two persons is 11 : 7 and the ratio of their expenditures is 9 : 5. If each of them manages to save Rs 400 per month, find their monthly incomes.

33. Find the lengths of the medians of a $\triangle ABC$ having vertices at $A(0,-1), B(2,1)$ and $C(0,3)$.

34. In a cylindrical vessel of radius 10 cm , containing some water, 9000 small spherical balls are dropped which are completely immersed in water which raises the water level. If each spherical ball is of radius 0.5 cm , then find the rise in the level of water in the vessel.

    OR

* A hemispherical depression is cut out from one face of a cubical block of side 7 cm , such that the diameter of the hemisphere is equal to the edge of the cube. Find the surface area of the remaining solid.

35. In an A.P., the nth term is $\frac{1}{m}$ and the mth term is $\frac{1}{n}$. Find (i) $(mn)^{\text{th}}$ term, (ii) sum of first (mn) terms.

* **Case study based questions** [12]

36. **Read the following text carefully and answer the questions that follow:**
    An object which is thrown or projected into the air, subject to only the acceleration of gravity is called a projectile, and its path is called its trajectory. This curved path was shown by Galileo to be a parabola. Parabola is represented by a polynomial. If the polynomial to represent the distance covered is, $p(t) = -5t^2 + 40t + 1.2$

    i. What is the degree of the polynomial $p(t) = -5t^2 + 40t + 1.2$? (1)
    ii. What is the height of the projectile at the time of 4 seconds after it is

launched? (1)

iii. What is the name of the polynomial $p(t) = -5t^2 + 40t + 1.2$ that is classified based on its degree? (2)

OR

What are the factors of the given quadratic equation $p(x) = x^2 - 5x + 6$? (2)

37. **Read the following text carefully and answer the questions that follow:**

Under the physical and health education a medical check up program was conducted in a Vidyalaya to improve the health and fitness conditions of the students. Reading of the heights of 50 students was obtained as given in the table below:

Height (in cm)	Number of students
135-140	2
140-145	8
145-150	10
150-155	15
155-160	6
160-165	5
165-170	4

i. Find the lower class limit of the modal class. (1)
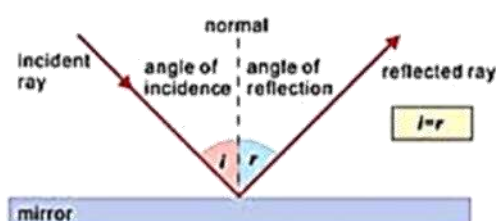
ii. Find the median class. (1)

iii. Find the assumed mean of the data. (2)

OR

Find the median of the given data. (2)

38. **Read the following text carefully and answer the questions that follow:**

The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection.

Suresh places a mirror on level ground to determine the height of a pole (with traffic light fired on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Suresh's eye level is 1.5 m above the ground. The distance of Suresh and the pole from the mirror are 1.8 m and 6 m respectively.
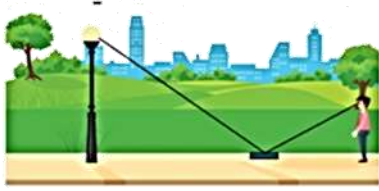
i. Which criterion of similarity is applicable to similar triangles? (1)

ii. What is the height of the pole? (1)

iii. If angle of incidence is i, find tan i. (2)

OR

Now Suresh move behind such that distance between pole and Suresh is 13 meters. He place mirror between

him and pole to see the reflection of light in right position. What is the distance between mirror and Suresh? (2)

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