

**CBSE BOARD
SAMPLE PAPERS
(2023-24)
MATHEMATICS
Class-X (BASIC)**

CONTENTS



CBSE SAMPLE PAPERS

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CBSE PAPER - 2022-23 (BASIC)
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

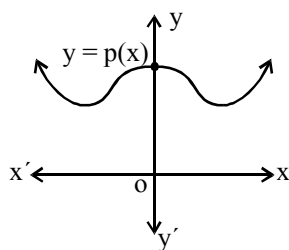
- » This question paper contains 38 questions. All questions are compulsory.
- » This Question Paper is divided into FIVE Sections - Section A, B, C, D and E.
- » In Section-A question number 1 to 18 are Multiple Choice Questions (MCQs) and question number 19 & 20 are Assertion-Reason based questions of 1 mark each.
- » In Section-B question number 21 to 25 are Short-Answer-I (SA-I) type questions of 2 marks each.
- » In Section-C question number 26 to 31 are Short Answer-II (SA-II) type questions carrying 3 marks each.
- » In Section-D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.
- » In Section-E question number 36 to 38 are Case Based integrated units of Assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case-study.
- » There is no overall choice. However: an internal choice has been provided in 2 questions in Section-B, 2 questions in Section-C, 2 questions in Section-D and 3 question in Section-E.
- » Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.
- » Use of calculator is NOT allowed.

SECTION-A

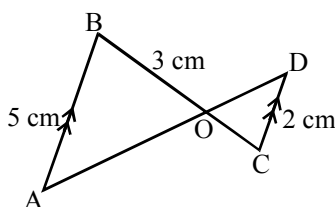
Section-A consists of 20 questions of 1 mark each.

1. The prime factorisation of natural number 288 is
 (1) $2^4 \times 3^3$ (2) $2^4 \times 3^2$ (3) $2^5 \times 3^2$ (4) $2^5 \times 3^1$
2. If $2 \cos \theta = 1$, then the value of θ is
 (1) 45° (2) 60° (3) 30° (4) 90°
3. A card is drawn at random from a well-shuffled deck of 52 cards. The probability of getting a red card is :
 (1) $\frac{1}{26}$ (2) $\frac{1}{13}$ (3) $\frac{1}{4}$ (4) $\frac{1}{2}$
4. The discriminant of the quadratic equation $2x^2 - 5x - 3 = 0$ is
 (1) 1 (2) 49 (3) 7 (4) 19
5. The distance between the points (3, 0) and (0, -3) is
 (1) $2\sqrt{3}$ units (2) 6 units (3) 3 units (4) $3\sqrt{2}$ units
6. The seventh term of an A.P. whose first term is 28 and common difference is -4
 (1) 0 (2) 4 (3) 52 (4) 56

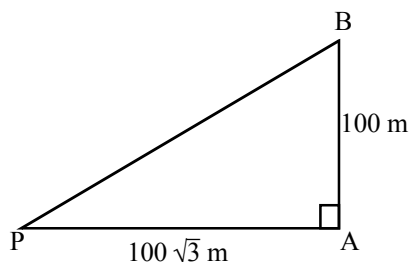
7. The graph of $y = p(x)$ is shown in the figure for some polynomial $p(x)$. The number of zeroes of $p(x)$ is/are:



- (1) 0 (2) 1 (3) 2 (4) 3
8. The sides of two similar triangles are in the ratio 4 : 7. The ratio of their perimeters is
- (1) 4 : 7 (2) 12 : 21 (3) 16 : 49 (4) 7 : 4
9. In the given figure, $AB \parallel CD$. If $AB = 5$ cm, $CD = 2$ cm and $OB = 3$ cm, then the length of OC is



- (1) $\frac{15}{2}$ cm (2) $\frac{10}{3}$ cm (3) $\frac{6}{5}$ cm (4) $\frac{3}{5}$ cm
10. The sum and the product of zeroes of the polynomial $p(x) = x^2 + 5x + 6$ are respectively
- (1) 5, -6 (2) -5, 6 (3) 2, 3 (4) -2, -3
11. A die is thrown once. Find the probability of getting a number less than 7.
- (1) $\frac{5}{6}$ (2) 1 (3) $\frac{1}{6}$ (4) 0
12. The angle subtended by a vertical pole of height 100 m at a point on the ground $100\sqrt{3}$ m from the base has measure of :



- (1) 90° (2) 60° (3) 45° (4) 30°

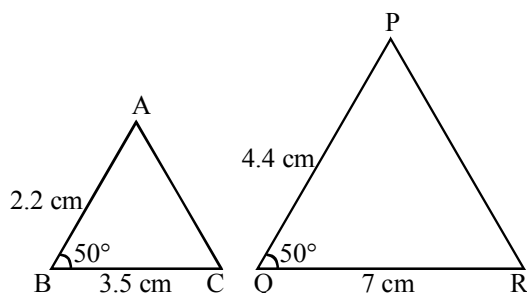
13. The volume of a cone of radius 'r' and height '3r' is :

- (1) $\frac{1}{3} \pi r^3$ (2) $3 \pi r^3$ (3) $9 \pi r^3$ (4) πr^3

14. The distance between two parallel tangents of a circle of diameter 7 cm is:

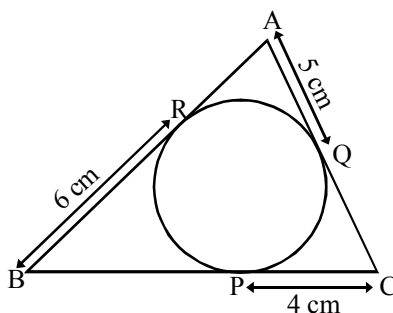
- (1) 7 cm (2) 14 cm (3) $\frac{7}{2}$ cm (4) 28 cm

15.

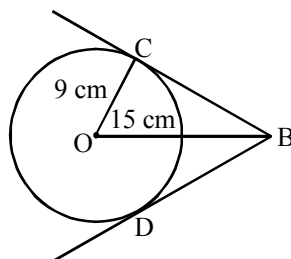


In the above figure, the criterion of similarity by which $\Delta ABC \sim \Delta PQR$ is :

- (1) SSA (Side – Side – Angle) Similarity (2) ASA (Angle – Side – Angle) Similarity
(3) SAS (Side – Angle – Side) Similarity (4) AA (Angle – Angle) Similarity
16. The larger of two supplementary angles exceeds the smaller by 18 degrees. What is the measure of larger angle ?
- (1) 81° (2) 99° (3) 36° (4) 54°
17. In the given figure, the perimeter of ΔABC is :



- (1) 30 cm (2) 15 cm (3) 45 cm (4) 60 cm
18. In the given figure, BC and BD are tangents to the circle with centre O and radius 9 cm. If $OB = 15$ cm, then the length $(BC + BD)$ is :



- (1) 18 cm (2) 12 cm (3) 24 cm (4) 36 cm

Direction for (Q.19 and Q.20) : In question numbers 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option :

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.

19. Assertion (A) : A tangent to a circle is perpendicular to the radius through the point of contact.

Reason (R) : The lengths of tangents drawn from the external point to a circle are equal.

20. Assertion (A) : The system of linear equations $3x + 5y - 4 = 0$ and $15x + 25y - 25 = 0$ is inconsistent.

Reason (R) : The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is inconsistent

if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

SECTION-B

This section comprises of Short Answer (SA-I) type questions of 2 marks each.

21. (a) Find the coordinates of the point which divides the line segment joining the points $(7, -1)$ and $(-3, 4)$ internally in the ratio $2 : 3$.

OR

(b) Find the value(s) of y for which the distance between the points $A(3, -1)$ and $B(11, y)$ is 10 units.

22. Evaluate : $\tan^2 60^\circ - 2 \operatorname{cosec}^2 30^\circ - 2 \tan^2 30^\circ$.

23. Find the LCM and HCF of 92 and 510, using prime factorisation.

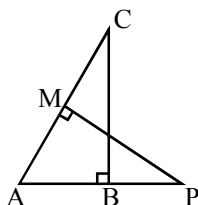
24. (a) Solve for x and y : $x + y = 6$, $2x - 3y = 4$.

OR

(b) Find out whether the following pair of linear equations are consistent or inconsistent:

$$5x - 3y = 11, \quad -10x + 6y = 22$$

25. In the given figure, ABC and AMP are two right triangles, right angled at B and M, respectively. Prove that $\triangle ABC \sim \triangle AMP$.



SECTION-C

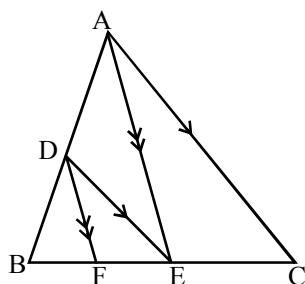
This section comprises of Short Answer (SA-II) type questions of 3 marks each.

26. (a) Prove that $\sec\theta (1 - \sin\theta) (\sec\theta + \tan\theta) = 1$

OR

(b) Prove that $\frac{1 + \sec\theta}{\sec\theta} = \frac{\sin^2\theta}{1 - \cos\theta}$

27. Show that the points A(1, 7), B(4, 2), C(-1, -1) and D(-4, 4) are vertices of the square ABCD.
28. Prove that the tangents drawn from an external point to a circle are equal in length.
29. If α , β are zeroes of the quadratic polynomial $x^2 + 3x + 2$, find a quadratic polynomial whose zeroes are $\alpha + 1$ and $\beta + 1$.
30. Prove that $3 + 7\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.
31. (a) In the given figure, $DE \parallel AC$ and $DF \parallel AE$

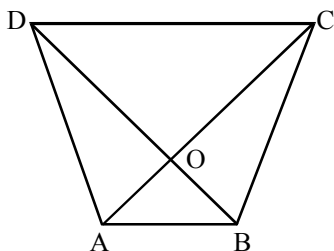


Prove that

$$\frac{BF}{FE} = \frac{BE}{EC}$$

OR

- (b) The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{OD}$



Show that quadrilateral ABCD is a trapezium.

SECTION-D

This section comprises of Long Answer (LA) type, of 5 marks each.

32. (a) The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 80 m more than the shorter side, find the length of the sides of the field.

OR

- (b) The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present age.

33. A vessel is in the form of a hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel. Also, find the volume of the vessel.
34. The table given below shows the daily expenditure on food of 25 households in a locality:

Daily expenditure (₹)	100-150	150-200	200-250	250-300	300-350
Number of household	4	5	12	2	2

Find the mean daily expenditure on food. Also, find the mode of the data.

35. (a) A TV tower stands vertically on the bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60° . From another point 20 m away from the point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower.

OR

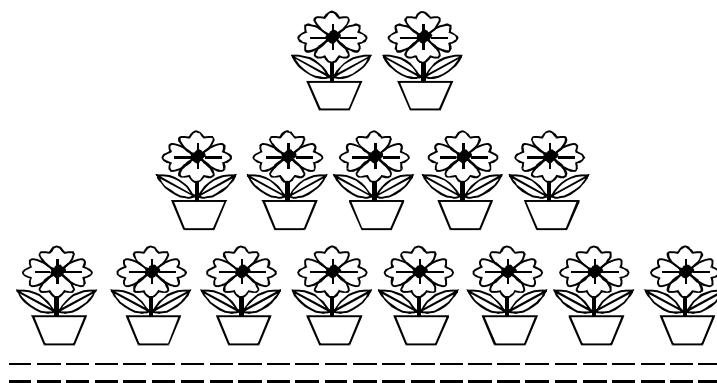
- (b) An aeroplane when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$)

SECTION-E

This section comprises of 3 Case Study questions, each of 4 marks.

36. Case Study-1

Aahana being a plant lover decides to convert her balcony into beautiful garden full of plants. She bought few plants with pots for her balcony. She placed the pots in such a way that number of pots in the first row is 2, second row is 5, third row is 8 and so on.



Based on the above information, answer the following questions :

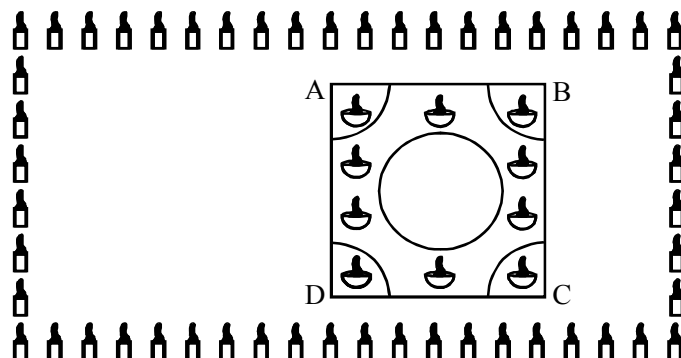
- Find the number of pots placed in the 10th row.
- Find the difference in the number of pots placed in 5th row and 2nd row.
- If Aahana wants to place 100 pots in total, then find the total number of rows formed in the arrangement.

OR

- If Aahana has sufficient space for 12 rows, then how many total number of pots are placed by her with the same arrangement ?

37. Case Study-2

Interschool Rangoli Competition was organized by one of the reputed schools of Odissa. The theme of the Rangoli Competition was Diwali celebrations where students were supposed to make mathematical designs. Students from various schools participated and made beautiful Rangoli designs. One such design is given below.



Rangoli is in the shape of square marked as ABCD, side of square being 40 cm. At each corner of a square, a quadrant of circle of radius 10 cm is drawn (in which diyas are kept). Also a circle of diameter 20 cm is drawn inside the square.

- What is the area of square ABCD ?
- Find the area of the circle.
- If the circle and the four quadrants are cut off from the square ABCD and removed, then find the area of remaining portion of square ABCD.

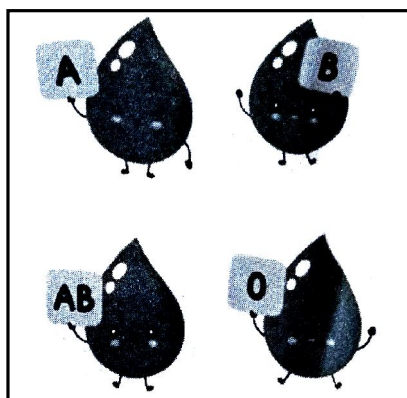
OR

- Find the combined area of 4 quadrants and the circle removed.

38. Case Study-3

Blood group describes the type of blood a person has. It is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells. Blood types predict whether a serious reaction will occur in a blood transfusion.

In a sample of 50 people, 21 had type O blood, 22 had type A, 5 had type B and rest had type AB blood group.



Based on the above, answer the following questions:

- (i) What is the probability that a person chosen at random had type O blood?
- (ii) What is the probability that a person chosen at random had type AB blood group?
- (iii) What is the probability that a person chosen at random had neither type A nor type B blood group?

OR

- (iii) What is the probability that person chosen at random had either type A or type B or type O blood group ?
-

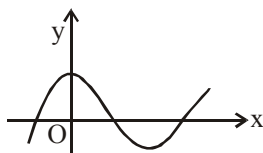
SAMPLE PAPER - 1
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

- » All questions are compulsory.
- » The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- » Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.
Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.
Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.
Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.
Section E has 3 case based integrated units of assessment 4 marks each with sub-parts of the values of 1, 1 and 2 marks each respectively.
- » All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- » There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- » Use of calculators and cell-phones are not permitted in the Examination Hall.

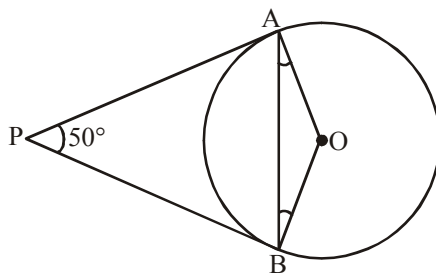
SECTION-A

1. HCF of 168 and 126 is
(1) 21 (2) 42 (3) 14 (4) 18
2. Empirical relationship between the three measures of central tendency is
(1) $2 \text{ Mean} = 3 \text{ Median} - \text{Mode}$
(2) $2 \text{ Mode} = 3 \text{ Median} - \text{Mean}$
(3) $\text{Mode} = 2 \text{ Mean} - 3 \text{ Median}$
(4) $3 \text{ Median} = 2 \text{ Mode} + \text{Mean}$
3. Which of the following equations has 2 as a root?
(1) $x^2 - 4x + 5 = 0$
(2) $x^2 + 3x - 12 = 0$
(3) $2x^2 - 7x + 6 = 0$
(4) $3x^2 - 6x - 2 = 0$
4. 325 can be expressed as a product of its primes as
(1) $5^2 \times 7$ (2) $5^2 \times 13$ (3) 5×13^2 (4) $2 \times 3^2 \times 5^2$
5. One card is drawn from a well shuffled deck of 52 cards. The probability that it is black queen is
(1) $\frac{1}{26}$ (2) $\frac{1}{13}$ (3) $\frac{1}{52}$ (4) $\frac{2}{13}$

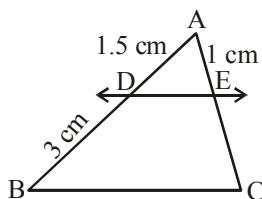
6. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when
 (1) $\angle B = \angle E$ (2) $\angle A = \angle D$ (3) $\angle B = \angle D$ (4) $\angle A = \angle F$
7. Which of the following is the decimal expansion of an irrational number
 (1) 4.561 (2) $0.\overline{12}$ (3) 5.010010001..... (4) 6.03
8. The following figure shows the graph of $y = p(x)$, where $p(x)$ is a polynomial in variable x . The number of zeroes of the polynomial $p(x)$ is



- (1) 1 (2) 2 (3) 3 (4) 4
9. In the figure, if PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, then $\angle OAB$ is equal to



- (1) 25° (2) 30° (3) 40° (4) 50°
10. The mid point of the line segment joining the points $(-5, 7)$ and $(-1, 3)$ is
 (1) $(-3, 7)$ (2) $(-3, 5)$ (3) $(-1, 5)$ (4) $(5, -3)$
11. The point which divides the line segment joining the points $A(0, 5)$ and $B(5, 0)$ internally in the ratio $2 : 3$ is
 (1) $(3, 2)$ (2) $(2, 2)$ (3) $(2, 3)$ (4) $(3, 3)$
12. The pair of lines represented by the equations $2x + y + 3 = 0$ and $4x + ky + 6 = 0$ will be parallel if value of k is
 (1) 1 (2) 4 (3) 6 (4) 2
13. The value of $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$ is
 (1) 1 (2) 2 (3) 3 (4) 4
14. Value of $\cos 0^\circ \cdot \cos 30^\circ \cdot \cos 45^\circ \cdot \cos 60^\circ \cdot \cos 90^\circ$ is
 (1) $\sqrt{3}$ (2) 1 (3) 0 (4) 4
15. In the given figure, if $DE \parallel BC$, find EC.



- (1) 1.5 cm (2) 2 cm (3) 3 cm (4) 4 cm

16. Find the area of the circle whose circumference is 22 cm.
 (1) 38.5 cm^2 (2) 77 cm^2 (3) 22 cm^2 (4) 44 cm^2
17. If area of quadrant of a circle is 38.5 cm^2 then find its diameter (use $\pi = \frac{22}{7}$).
 (1) 7 cm (2) 14 cm (3) 21 cm (4) 28 cm
18. A dice is thrown once. Find the probability of getting a prime number.
 (1) 1 (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $\frac{1}{2}$
19. **Assertion (A) :** PQ is tangent to a circle with centre O at point P. If ΔOPQ is an isosceles triangle, then $\angle OQP = 45^\circ$.
Reason (R) : If two tangent inclined at 60° are drawn to a circle of radius 3 cm, then the length of each tangent is $3\sqrt{3} \text{ cm}$.
 (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.
20. **Assertion (A) :** All regular polygons of the same number of sides such as equilateral triangle, square etc. are similar.
Reason (R) : Two polygons are said to be similar if their corresponding angles are equal and length of corresponding sides are proportional.
 (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

21. If two coins are tossed simulatenously. Find the probability of getting 2 heads.
22. A lot of 25 bulbs contain 5 defective ones. One bulb is drawn at random from the lot. What is the probability that the bulb is good.

OR

Two dice are thrown simultaneously at random. Find the probability of getting a sum of eight.

23. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.
24. ΔPQR is right angled isosceles triangle, right angled at R. Find value of $\sin P$.

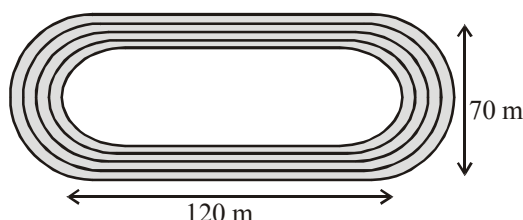
OR

If $15 \cot A = 8$, then find value of $\operatorname{cosec} A$.

25. If the quadratic equation $x^2 - 2x + k = 0$ has equal roots, then find the value of k.

SECTION-C

26. Find the zeroes of the quadratic polynomial $x^2 - 3x - 10$ and verify the relationship between the zeroes and coefficient.
27. Following figure depicts a park where two opposite sides are parallel and left and right ends are semi-circular in shape. It has a 7m wide track for walking.



Two friends Seema and Meena went to the park. Meena said that area of the track is 4066m^2 . Is she right? Explain.

28. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$

OR

Prove that : $\frac{\tan A + \sin A}{\tan A - \sin A} = \frac{\sec A + 1}{\sec A - 1}$

29. Prove that $\sqrt{3}$ is irrational.

OR

An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

30. Prove that the lengths of tangents drawn from an external point to a circle are equal.
31. Solve $2x + 3y = 11$ and $x - 2y = -12$ algebraically and hence find the value of 'm' for which $y = mx + 3$.

SECTION-D

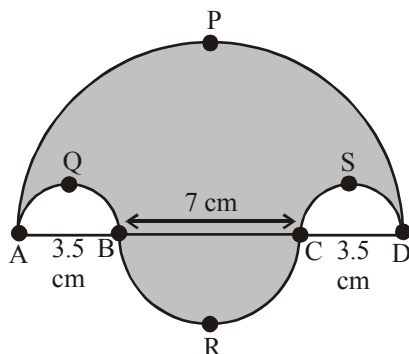
32. If the sum of first 14 terms of an A.P. is 1050 and its first term is 10, find the 20th term. Also, find sum of first 20 terms.

OR

The first term of an A.P. is 5, the last term is 45 and sum is 400. Find the number of terms and the common difference.

33. As observed from the top of a 75 m high light house above the sea level, the angles of depression of two ships are 30° and 45° respectively. If one ship is exactly behind the other on the same side of the light house and in the same straight line, find the distance between the two ships. (use $\sqrt{3} = 1.732$)
34. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

35. Find the area of the shaded region in figure, \widehat{APD} , \widehat{AQB} , \widehat{BRC} and \widehat{CSD} are semi-circles of diameter 14 cm, 3.5 cm, 7 cm and 3.5 cm respectively. $\left(\text{Use } \pi = \frac{22}{7} \right)$.



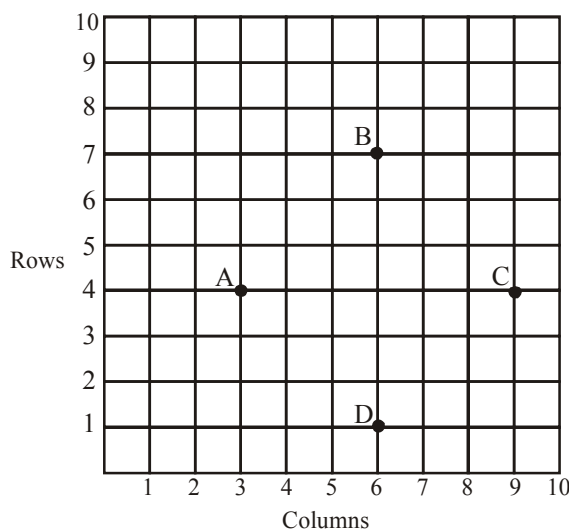
OR

The internal and external diameters of a hollow hemispherical vessel are 16 cm and 12 cm respectively. If the cost of painting 1 cm² of the surface area is Rs.5, find the total cost of painting the vessel all over. (Use $\pi = 3.14$)

SECTION-E

36. Case study-1

In a class room, four students Sita, Gita, Rita and Anita are sitting at A(3, 4), B(6, 7), C(9, 4), D(6, 1) respectively. Then a new student Anjali joins the class.



- Teacher tells Anjali to sit in the middle of the four students. Find the coordinates of the position where she can sit.
- Calculate the distance between Sita and Anita.
- Which two students are equidistant from Gita.

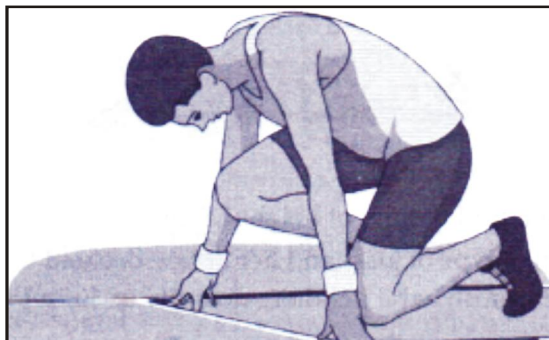
OR

Name the figure formed by joining A, B, C and D

37. Case study-2

100 m RACE

A stopwatch was used to find the time that it took a group of students to run 100 m.



Time (in sec)	0-20	20-40	40-60	60-80	80-100
Number of students	8	10	13	6	3

- (i) Estimate the mean time taken by a student to finish the race.

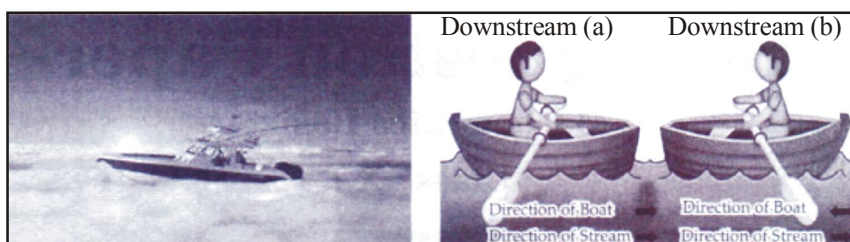
OR

Find the sum of lower limits of median class and modal class.

- (ii) How many students finished the race within 1 minute?
 (iii) How many students finished the race within 40 sec?

38. Case study-3

The speed of a motor boat is 20 km/hr. For covering the distance of 15 km the boat took 1 hour more for upstream than downstream.



- (i) If speed of the stream be x km/h, then find the speed of the motorboat in upstream.
 (ii) Write the relation between speed, distance and time?
 (iii) Find the quadratic equation for the speed of the current?

OR

What is the speed of current?

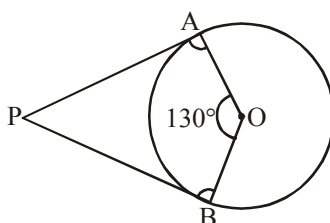
SAMPLE PAPER - 2
TIME : 3 HRS.
MAX. MARKS : 80
GENERAL INSTRUCTIONS :

- » All questions are compulsory.
- » The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- » Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.
Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.
Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.
Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.
Section E has 3 case based integrated units of assessment 4 marks each with sub-parts of the values of 1, 1 and 2 marks each respectively.
- » All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- » There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- » Use of calculators and cell-phones are not permitted in the Examination Hall.

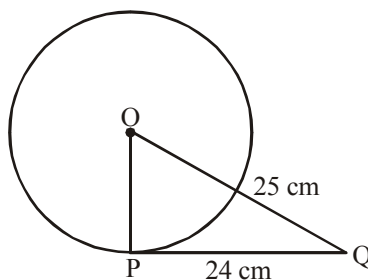
SECTION-A

1. If $f(x) = ax + b$; then the zero of $f(x)$ is
 (1) $-\frac{b}{a}$ (2) $\frac{a}{b}$ (3) $\frac{b}{a}$ (4) 1
2. Pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has
 (1) unique solution (2) exactly two solutions
 (3) infinitely many solutions (4) no solution
3. The distance of point P(2, 3) from X-axis is
 (1) 2 units (2) 3 units (3) 1 units (4) 5 units
4. If $\cos A = \frac{4}{5}$ then the value of $\tan A$ is
 (1) $\frac{3}{5}$ (2) $\frac{3}{4}$ (3) $\frac{4}{3}$ (4) $\frac{5}{3}$
5. Maximum number of tangents that can be drawn through a point which is outside the circle is
 (1) 3 (2) 2 (3) 1 (4) 0
6. The common difference of an AP whose first two terms are -3 and 4 is
 (1) 17 (2) 7 (3) 143 (4) -143
7. If mean and median are 10.5 and 9.6 respectively then mode is
 (1) 12.3 (2) 8.7 (3) 7.8 (4) 6

8. A coin is tossed two times, the probability of one head is
 (1) $\frac{1}{4}$ (2) $\frac{3}{4}$ (3) $\frac{1}{6}$ (4) $\frac{1}{2}$
9. If $P(-1,1)$ is the mid-point of the line segment joining $A(-3,b)$ and $B(1, b + 4)$, then $b =$
 (1) 1 (2) 2 (3) -2 (4) -1
10. The sum of the roots of the equations $x^2 - 6x + 2 = 0$ is
 (1) -6 (2) 6 (3) 2 (4) 3
11. Evaluate : $\frac{1}{2}\sin^2 90^\circ + \frac{1}{8}\cos^2 60^\circ$
 (1) $\frac{17}{32}$ (2) $\frac{14}{30}$ (3) $\frac{15}{32}$ (4) None of these
12. The angle of elevation of the top of a tower from a point on the ground 15 m away from the foot of the tower is 60° . The height of the tower is
 (1) 15 m (2) 30 m (3) $15\sqrt{3}$ m (4) $30\sqrt{3}$ m
13. In the adjoining figure, if the angle between two radii of a circle is 130° , then find the angle between the tangent at the ends of the radii.



- (1) 90° (2) 50° (3) 70° (4) 60°
14. If $P(x, y)$ is midpoint of $A(5, 1)$ and $B(-1, 5)$ then find x and y .
 (1) $x = 2, y = 3$ (2) $x = 3, y = 2$ (3) $x = 2, y = 2$ (4) $x = 3, y = 3$
15. $\triangle ABC$ and $\triangle DEF$ are two similar triangles such that $\angle A = 45^\circ$, $\angle E = 56^\circ$, then $\angle C$ is equal to
 (1) 45° (2) 56° (3) 79° (4) 54°
16. From a point Q the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is

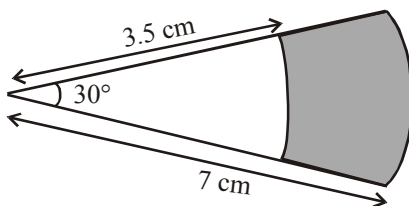


- (1) 7 cm (2) 12 cm (3) 15 cm (4) 24.5 cm

17. In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, the two triangles are :
 (1) congruent but not similar (2) similar but not congruent
 (3) neither congruent nor similar (4) congruent as well as similar
18. In a $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. If $\frac{AD}{DB} = \frac{2}{3}$, then $\frac{BC}{DE}$ is
 (1) $\frac{5}{2}$ (2) $\frac{3}{2}$ (3) $\frac{5}{3}$ (4) $\frac{2}{3}$
19. **Assertion (A) :** If the pair of linear equations $3x + y = 3$ and $6x + ky = 8$ do not have a solution, then the value of k is 2.
Reason (R) : If the pair of linear equations $x + y - 4 = 0$ and $2x + ky = 3$ do not have a solution, then the value of k is 2.
 (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.
20. **Assertion (A) :** If $HCF(336, 54) = 9$, then $LCM(336, 54) = 2016$.
Reason (R) : The sum of exponents of prime factors in the prime factorisation of 196 is 4.
 (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

21. In figure, sectors of two concentric circles of radii 7 cm and 3.5 cm are given. Find the area of shaded region. (Use $\pi = \frac{22}{7}$)



OR

The diameter of a wheel is 1.26 m. What is the distance covered in 500 revolutions?

22. If $5\tan\theta = 4$, then the value of $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$.

OR

If $\cos A + \cos^2 A = 1$ then find the value of $\sin^2 A + \sin^4 A$.

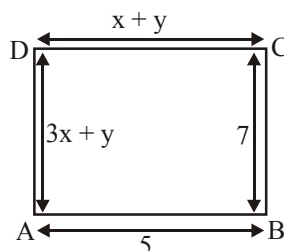
23. The heights of two poles are 80 m and 65 m. If the line joining their tops makes an angle of 45° with the horizontal, then find the distance between the poles.
24. Given that $\sqrt{3}$ is an irrational number, show that $(5 + 2\sqrt{3})$ is an irrational number.
25. A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

SECTION-C

26. Find the mode of the following data :

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	7	10	15	8	10

27. In the given figure, ABCD is a rectangle. Find the values of x and y.



OR

The coach of a cricket team buys 7 bats and 6 balls for ₹3800. Later, she buys 3 bats and 5 balls for ₹ 1750. Find the cost of each bat and each ball.

28. Prove that $\sqrt{2}$ is irrational.
29. If 7 times the 7th term of an A.P. is equal to 11 times the 11th term, then find its 18th term.

OR

Find the 20th term from the end of the AP 3, 8, 13,, 253.

30. In what ratio does the y-axis divide the line segment joining P(–4, 2) and Q(8, 3) ?
31. From a solid cylinder of height 15 cm and diameter 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to nearest cm^2 .

SECTION-D

32. Solve the following pair of linear equations graphically :
 $2x + 3y = 12$ and $x - y = 1$.

OR

Speed of a boat in still water is 15 km/h. It goes 30 km upstream and returns back at the same point in 4 hours 30 minutes. Find the speed of the stream.

33. From the top of a hill the angles of depression of two consecutive kilometre stones due East are found to be 30° and 45° . Find the height of the hill.

OR

The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60° . From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is 45° . Find the height of the tower PQ and the distance PX. (Use $\sqrt{3} = 1.73$)

34. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice-cream. The ice-cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.
35. a, b and c are the sides of a right triangle, where c is the hypotenuse. A circle, of radius r, touches the

sides of the triangle. Prove that $r = \frac{a + b - c}{2}$.

SECTION-E

36. Case Study-1

Your friend Veer wants to participate in a 200 m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31 seconds.



- (i) Form A.P. for the given situation.
- (ii) What is the minimum number of days he needs to practice till his goal is achieved?
- (iii) If n^{th} term of an A.P. is given by $a_n = 2n + 3$, then find the common difference of A.P.

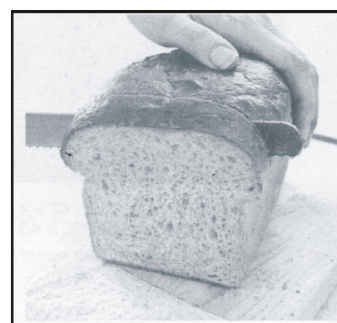
OR

Find the value of x , for which $2x$, $x + 10$, $3x + 2$ are three consecutive terms of an A.P.

37. Case Study-2

The best way to determine a loaf's freshness is to see how it responds to a sharp serrated knife. Freshly baked loaves will be difficult to slice because they're full of moisture. When bread dries out, it becomes easier to slice since it keeps its shape better-up to a point. When bread becomes truly stale, it will be so hard that it's difficult to slice. A bread manufacturer wants to know the lifetime of the product. For this, he tested the life time of 400 packets of bread. The following tables gives the distribution of the life time of 400 packets.

Lifetime (in hours)	Number of packets (Cumulative frequency)
150-200	14
200-250	70
250-300	130
300-350	216
350-400	290
400-450	352
450-500	400



On the basis of the above information, answer the following questions :

- (i) If m be the class mark and b be the upper limit of a class in a continuous frequency distribution, then find the lower limit of the class.
- (ii) Find the average life time of a packet.

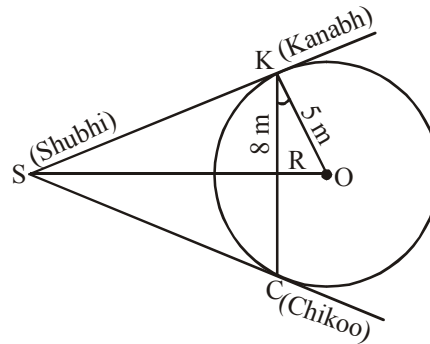
OR

Find the median life time of a packet.

- (iii) If empirical formula is used, then find the modal life time of a packet.

38. Case Study-3

There is a circular field of radius 5 m. Kanabh, Chikoo and Shubhi are playing with ball, in which Kanabh and Chikoo are standing on the boundary of the circle. The distance between Kanabh and Chikoo is 8 m. From Shubhi point S, two tangents are drawn as shown in the figure. Give the answer of the following questions.



- (i) What is the relation between the lengths of SK and SC?
- (ii) What is the length (distance) of OR?

OR

The sum of angles SKR and OKR.

- (iii) Find the distance between Kanabh and Shubhi.

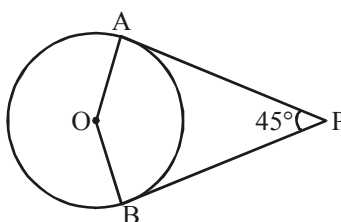
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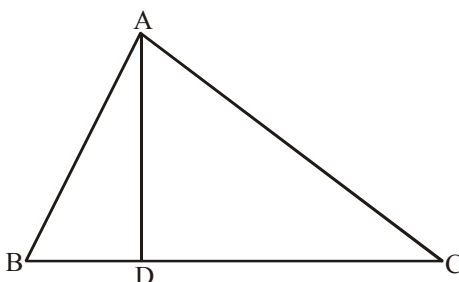
SECTION-A

1. In an AP, if common difference is -4 and seventh term is 4 , then first term is
 (1) -4 (2) 4 (3) 28 (4) 20
2. LCM of 96 and 404 is
 (1) 2202 (2) 9696 (3) 5656 (4) 4040
3. Which of the following is not a polynomial?
 (1) $\sqrt{3}x^2 - 2\sqrt{3}x + 3$ (2) $\frac{3}{2}x^3 - 5x - \frac{1}{\sqrt{2}}x - 1$ (3) $x + \frac{1}{x}$ (4) $5x^2 - 3x + \sqrt{2}$
4. Degree of polynomial $y^5 - 2y^6 + y^3 - \sqrt{2}y^7 + 1$ is
 (1) $\sqrt{2}$ (2) 7 (3) 6 (4) 5
5. In a single throw of die, the probability of getting a multiple of 3 is
 (1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{6}$ (4) $\frac{2}{3}$
6. Write the first term of an A.P. whose n^{th} term is $a_n = 3n + 7$.
 (1) 10 (2) 13 (3) 3 (4) 4

7. O is the centre and PA and PB are tangents to the circle. Then find $\angle AOB$.

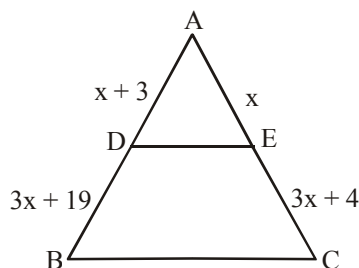


- (1) 90° (2) 180° (3) 75° (4) 135°
8. If p is a prime number, then LCM of p and (p + 1) is
 (1) $p \frac{(p+1)}{2}$ (2) $(p+1)^2$ (3) $p(p+1)$ (4) p^2
9. A quadratic equation $ax^2 + bx + c = 0$ has two distinct real roots, if $b^2 - 4ac$
 (1) = 0 (2) > 0 (3) < 0 (4) ≥ 0
10. The equations $2x + y = 12$ and $x - y = 1$ have _____ solution.
 (1) unique (2) infinite (3) no (4) more than one
11. The distance of the point P(4, -3) from the origin is
 (1) 4 units (2) 3 units (3) 5 units (4) 10 units
12. The value of $\sin 45^\circ \sin 30^\circ + \cos 45^\circ \cos 30^\circ$ is
 (1) $\frac{1}{2}$ (2) 1 (3) $\frac{\sqrt{3}}{2}$ (4) $\frac{1+\sqrt{3}}{2\sqrt{2}}$
13. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string.
 (1) 60 m (2) $40\sqrt{3}$ m (3) 40 m (4) $60\sqrt{3}$ m
14. The sum and product of the zeroes of a quadratic polynomial are 2 and -15 respectively. Find the quadratic polynomial.
 (1) $x^2 + 2x + 15$ (2) $x^2 - 2x + 15$ (3) $x^2 + 2x - 15$ (4) $x^2 - 2x - 15$
15. 5 books and 7 pens together costs ₹79 whereas 7 books and 5 pens together costs ₹77. The cost of a book and a pen is
 (1) Rs.156 (2) Rs.13 (3) Rs.7 (4) None of these
16. In the figure given below, $\angle BAC = 90^\circ$ and $AD \perp BC$. Then :

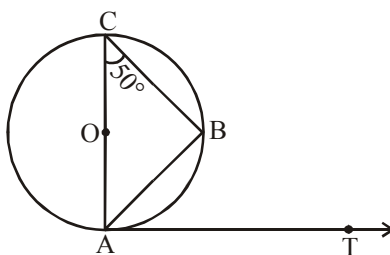


- (1) $BD \times CD = BC^2$ (2) $AB \times AC = BC^2$ (3) $BD \times CD = AD^2$ (4) $AB \times AC = AD^2$

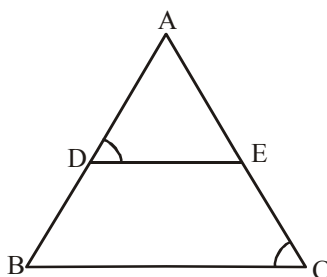
17. In figure, the value of x for which $DE \parallel BC$ is



- (1) 4 (2) 1 (3) 3 (4) 2
18. In the given figure, AB is a chord of the circle and AOC is its diameter, such that $\angle ACB = 50^\circ$. If AT is the tangent to the circle at the point A , then $\angle BAT$ is equal to



- (1) 65° (2) 60° (3) 50° (4) 40°
19. **Assertion (A) :** A tangent to a circle is perpendicular to the radius through the point of contact.
Reason (R) : The length of tangent drawn from an external point to a circle are equal.
- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.
20. **Assertion (A) :** If D is a point on side QR of $\triangle PQR$ such that $PD \perp QR$, then $\triangle PQD \sim \triangle PRD$.
Reason (R) : In the figure given below, if $\angle D = \angle C$ then $\triangle ADE \sim \triangle ACB$.



- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

21. The diameter of a wheel is 40 cm. How many revolutions will it make in covering 176 m ?
22. A line segment is of length 10 units. If the coordinates of its one end are (2, -3) and the abscissa of the other end is 10, then find its ordinate.
23. What is the probability that a number selected from the numbers 1 to 25 is a prime number, when each of the given numbers is equal likely to be selected?
24. If $1 + \sin^2\theta = 3 \sin\theta \cos\theta$, prove that $\tan\theta = 1$ or $\frac{1}{2}$.

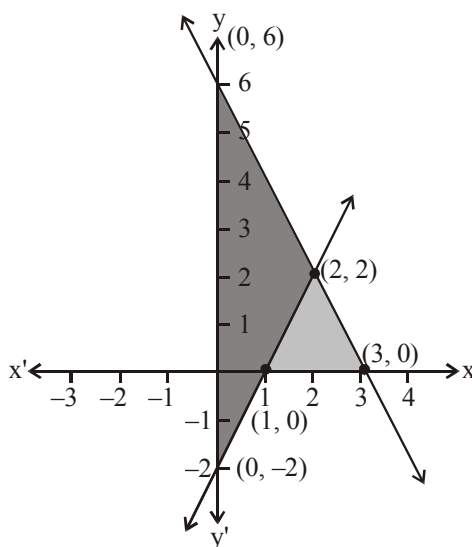
OR

Write the value of $\cot^2\theta - \frac{1}{\sin^2\theta}$.

25. Which term of the A.P., : 3, 15, 27, 39, will be 132 more than its 54th term?

OR

What is the ratio of the area of triangles formed along x-axis and y-axis in the given figure.



SECTION-C

26. Represent the following pair of equations graphically and write the coordinates of points where the lines intersect y-axis : $x + 3y = 6$; $2x - 3y = 12$.

OR

The sum of the numerator and the denominator of a fraction is 4 more than twice the numerator. If 3 is added to each of the numerator and denominator, their ratio becomes 2 : 3. Find the fraction.

27. Find the ratio in which y-axis divides the line segment joining the points A(5, -6) and B(-1, -4). Also find the coordinates of the point of division.

28. Find the value of p , if the mean of the following distribution is 7.5

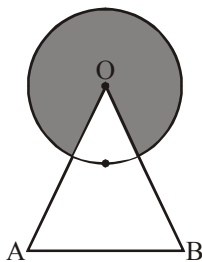
Mid value x	3	5	7	9	11	13
y	6	8	15	p	8	4

OR

For the following grouped frequency distribution, find the mode :

Class	3 – 6	6 – 9	9 – 12	12 – 15	15 – 18	18 – 21	21 – 24
Frequency	2	5	10	23	21	12	3

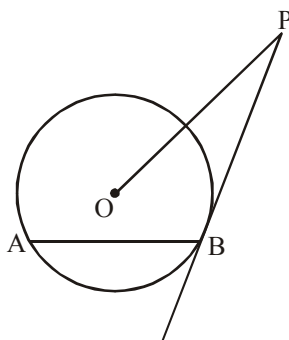
29. If the sum of the zeroes of the polynomial $x^2 - (k + 3)x + (5k - 3)$ is equal to one-fourth of the product of the zeroes, find the value of ' k '.
30. Find the area of shaded region shown in the given figure where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



31. Prove that : $\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta$.

SECTION-D

32. AB is a chord of circle with centre O. At B, a tangent PB is drawn such that its length is 24 cm. The distance of P from the centre is 26 cm. If the chord AB is 16 cm, find its distance from the centre.



33. Literacy rates of 40 cities are given in the following table. If 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

OR

Find the median of the following data :

Height (in cm)	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of students	12	26	34	40	50

34. From a point on the ground, the angles of elevation of the bottom and top of tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

OR

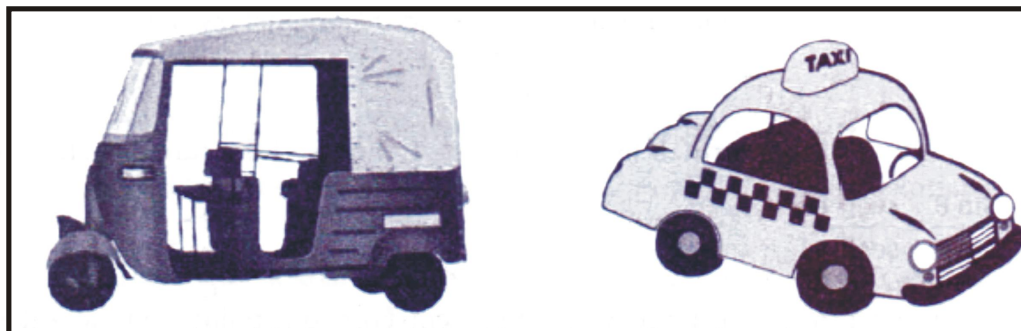
From the top of a 60 m high building, the angles of depression of the top and the bottom of a tower are observed to be 30° and 60° respectively. Find the height of the tower.

35. A solid toy is in the form of right circular cylinder with hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm and the height of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the solid toy. $\left(\text{Use } \pi = \frac{22}{7} \right)$

SECTION-E

36. Case Study-1

It is common that Governments revise travel fares from time to time based on various factors such as inflation (a general increase in prices and fall in the purchasing value of money) on different types of vehicles like Auto-Rickshaws, Taxis, Radio cab etc. The Auto charges in a city comprise of a fixed charge together with the charge per km for the distance covered. Study the following situations.



Name of the city	Distance travelled (km)	Amount paid (Rs.)
City A	10	75
	15	110
City B	8	91
	14	145

Situation 1 : In city A, for a journey of 10 km, the charge paid is Rs.75 and for a journey of 15 km, the charge paid is Rs.110.

Situation 2 : In a city B, for a journey of 8 km, the charge paid is Rs.91 and for a journey of 14 km, the charge paid is Rs.145.

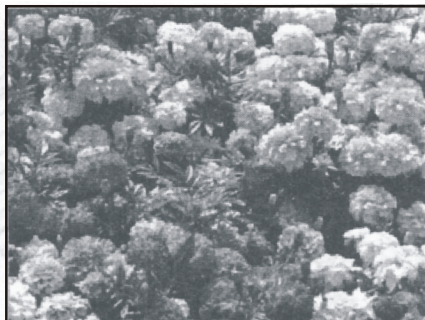
- (i) **Refer situation 1 :** If the fixed charges of auto rickshaw be Rs. x and the running charges Rs. y per km, then frame the linear equations.
- (ii) **Refer situation 2 :** What will a person have to pay for travelling a distance of 30 km?
- (iii) **Refer situation 1 :** A person travels a distance of 50 km. How much amount he has to pay?

OR

Plot the lines of situation 1 on the graph.

37. Case Study-2

A garden consists of 135 rose planted in certain number of columns. There are another set of 225 marigold plants, which is to be planted in the same number of columns.



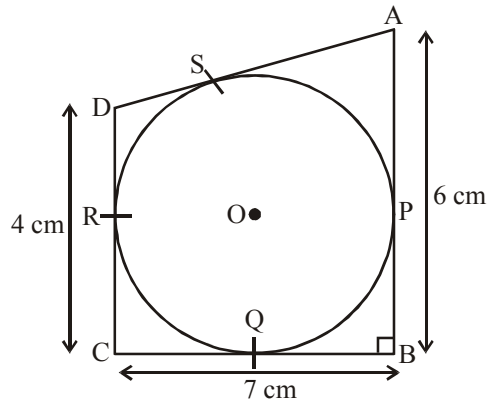
- (i) What is the maximum number of columns in which they can be planted?
- (ii) Find the total number of plants.
- (iii) Find the sum of exponents of the prime factors of the maximum number of columns in which they can be planted.

OR

Find the sum of exponents of the prime factors of total number of plants.

38. Case Study-3

ABCD is a playground. Inside the playground a circular track is present such that it touches AB at point P, BC at Q, CD at R and DA at S.



See the above figure and give answer of the following questions :

- Calculate the value of AD.
- If $CQ = 2$ cm, find length of PB.
- If $CQ = 2$ cm, find length of DS.

OR

What is the perimeter of the playground?

SAMPLE PAPER - 4

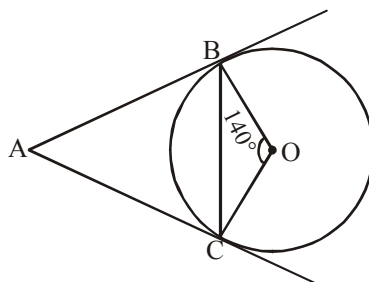
TIME : 3 HRS.
MAX. MARKS : 80

GENERAL INSTRUCTIONS :

- » All questions are compulsory.
- » The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- » Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.
- Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.
- Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.
- Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.
- Section E has 3 case based integrated units of assessment 4 marks each with sub-parts of the values of 1, 1 and 2 marks each respectively.
- » All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- » There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- » Use of calculators and cell-phones are not permitted in the Examination Hall.

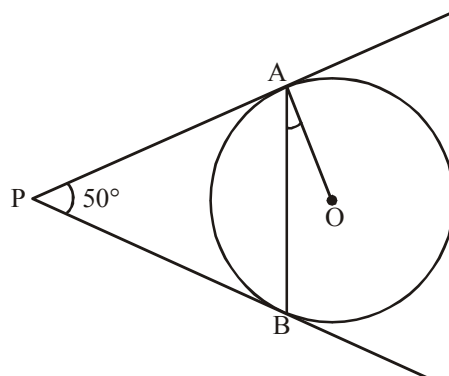
SECTION-A

1. The number of polynomials having zeroes as -2 and 5 is
 (1) 1 (2) 2 (3) 3 (4) more than 3
2. Pair of equations $y = 0$ and $y = -7$ has
 (1) one solution (2) two solutions
 (3) infinitely many solutions (4) no solution
3. The 20th term of the AP 3, 8, 13,, 253 is
 (1) 168 (2) 98 (3) 108 (4) 148
4. If a die is thrown once what is the ratio of probability of getting a number less than 3 to number greater than 2.
 (1) 2 : 1 (2) 1 : 2 (3) 4 : 5 (4) 3 : 5
5. The value of $(\operatorname{cosec}^2\theta - 1) \tan^2\theta$ is
 (1) 0 (2) -1 (3) 1 (4) $\sin\theta$
6. In figure AB and AC are tangent with centre O and $\angle BOC = 140^\circ$, then $\angle BAC$ is equal to



- (1) 40° (2) 50° (3) 140° (4) 150°

7. Mode and mean of data are 12k and 15k, median of data is
 (1) 12k (2) 14k (3) 15k (4) 16k
8. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is
 (1) 2 units (2) π units (3) 4 units (4) 7 units
9. Two cubes each with 6 cm edge are joined end to end. The surface area of resulting cuboid is
 (1) 720 cm^2 (2) 360 cm^2 (3) 180 cm^2 (4) None of these
10. A quadratic polynomial in which the sum and product of whose zeroes are 4 and 5 is
 (1) $x^2 - 4x - 5$ (2) $x^2 + 4x + 5$ (3) $x^2 - 4x + 5$ (4) None of these
11. Next term of the sequence 21, 42, 63,.....is
 (1) 21 (2) 42 (3) 105 (4) 84
12. The value of $\sin 30^\circ + \cos 60^\circ$ is
 (1) $\frac{1}{2}$ (2) 1 (3) $\frac{\sqrt{3}}{2}$ (4) $\sqrt{3}$
13. Determine the nature of roots of $5y^2 - 2y - 2 = 0$.
 (1) Not real (2) Real and equal (3) Real and unequal (4) None of these
14. Find the mid point of $(-1, 7)$ and $(4, -3)$.
 (1) $\left(-\frac{3}{2}, 2\right)$ (2) $\left(-\frac{3}{2}, -2\right)$ (3) $\left(\frac{3}{2}, 2\right)$ (4) $\left(\frac{3}{2}, -2\right)$
15. In the $\triangle ABC$, D and E are points on side AB and AC respectively such that $DE \parallel BC$. If $AE = 2 \text{ cm}$, $AD = 3 \text{ cm}$ and $BD = 4.5 \text{ cm}$, then find CE.
 (1) 6 cm (2) 3 cm (3) 4.5 cm (4) 7 cm
16. The value of $\tan^2 \theta - \frac{1}{\cos^2 \theta}$ is
 (1) 1 (2) -1 (3) 2 (4) $\sec^2 \theta$
17. In figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$. The measure of $\angle OAB$ is

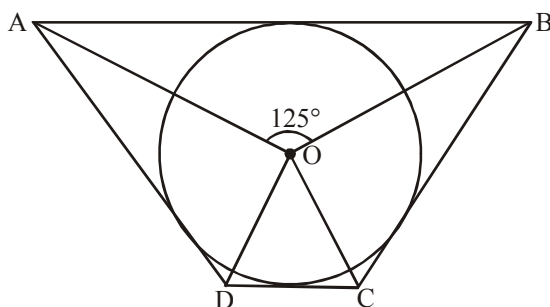


- (1) 25° (2) 30° (3) 50° (4) 45°

18. For what values of k , the equation $x^2 + 4kx + 4 = 0$ has equal roots?
 (1) ± 2 (2) ± 1 (3) 0 (4) 2
19. **Assertion (A)** : If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$ then the value of $x + y = 3$.

Reason (R) : If $\tan\alpha = \frac{5}{12}$, then the value of $\sec\alpha$ is $\frac{13}{12}$.

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.
20. **Assertion (A)** : In the given figure, if $\angle AOB = 125^\circ$, then $\angle COD$ is equal to 55° .

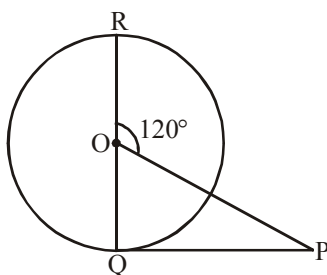


Reason (R) : Opposite sides of a quadrilateral circumscribing a circle subtend supplementary angle at the centre of circle.

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (3) Assertion (A) is true but Reason (R) is false.
 (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

21. PQ is a tangent drawn from an external point P to a circle with centre O and QOR is the diameter of the circle. If $\angle POR = 120^\circ$, What is the measure of $\angle OPQ$?



22. Find the HCF and LCM of 90 and 144 by the prime factorisation method.

OR

The product of two numbers is 4107. If the H.C.F. of these numbers is 37, then find the LCM.

23. Which term of the A.P. : 3, 8, 13, 18,, is 78?

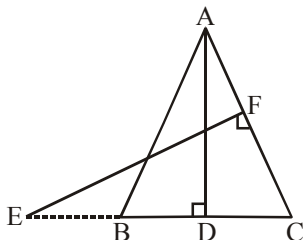
OR

Find the sum of the odd numbers between 0 and 50.

24. Find the ratio in which P(5, m) divides the line segment joining the points A(2, 3) and B(8, -3). Hence find m.
25. D and E are respectively the points on the sides AB and AC of a $\triangle ABC$ such that $BD = 4.2$ cm, $AD = 1.4$ cm, $EC = 5.4$ cm and $AE = 1.8$ cm, show that $DE \parallel BC$.

SECTION-C

26. If the perimeter of semi-circular protractor is 108 cm, find the diameter of the protractor. (Take $\pi = 22/7$)
27. Prove that : $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$.
28. In the given figure, $AB = AC$. E is a point on CB produced. If AD is perpendicular to BC and EF perpendicular to AC. Prove that $\triangle ABD$ is similar to $\triangle ECF$.



29. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeros equal to half of their product.
30. A fraction becomes $\frac{1}{3}$, if 2 is added to both of its numerator and denominator. If 3 is added to both of its numerator and denominator then it becomes $\frac{2}{5}$. Find the fraction.

OR

Solve the following system of linear equations graphically :

$$2x + y = 6, x - 2y + 2 = 0$$

31. The points $A(1, -2)$, $B(2, 3)$, $C(k, 2)$ and $D(-4, -3)$ are the vertices of a parallelogram. Find the value of k .

OR

Find a relation between x and y such that the point $P(x, y)$ is equidistant from the points $A(-5, 3)$ and $B(7, 2)$.

SECTION-D

32. The table shows the daily expenditure on grocery of 25 households in a locality. Find the modal daily expenditure on grocery by a suitable method.

Daily Expenditure (in ₹)	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350
No of households	4	5	12	2	2

OR

The mean of the following frequency distribution is 180 cm. Find the missing frequency f :

Height of plants in cm	Number of plants
120 – 140	4
140 – 160	f
160 – 180	20
180 – 200	12
200 – 220	6
220 – 240	8

33. The sum of the first 7 terms of an AP is 63 and the sum of its next 7 terms is 161. Find the 28th term of this AP.

OR

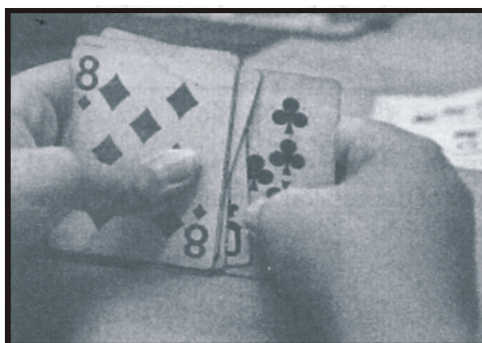
How many terms of an A.P. 9, 17, 25,..... must be taken to give a sum of 636?

34. From a point P on the ground, the angle of elevation of the top of a tower is 30° and that of the top of the flag-staff fixed on the top of the tower is 45° . If the length of the flag-staff is 5 m, find the height of the tower. (Use $\sqrt{3} = 1.732$)
35. The rainwater from a roof of 22 m \times 20 m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, find the rainfall in cm.

SECTION-E

36. Case Study-1

On a weekend Rani was playing cards with her family. The deck has 52 cards. If her brother drew a card.



- (i) Find the probability of getting a king of red colour.
- (ii) Find the probability of getting a face card.
- (iii) Find the probability of getting a red face card.

OR

Find the probability of getting a spade.

37. Case Study-2

A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.



- (i) Find the prime factorisation of 108.
- (ii) In each room the same number of participants are to be seated and all of them being in the same subject, hence find maximum number of participants that can be accommodated in each room.

OR

What is the minimum number of rooms required during the event?

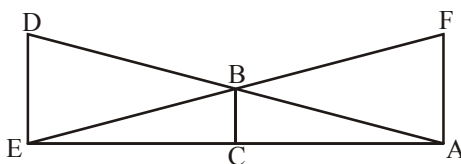
- (iii) Find the LCM of 60, 84 and 108.

38. Case Study-3

Google maps cartography team is working on improving the scalability quality of maps when you use the app on your phones to zoom in using 4 fingers. They are using a proprietary tool called 'MapMaker' to figure out scalability factors. A mathematical model is created for a type of object (below cross-section) to test its scalability on maps app.



In the diagram, $AC = 8$ cm, $CE = 4$ cm. Another enlargement with centre E, maps $\triangle EBC$ onto $\triangle EFA$, $BC = 3.6$ cm.



On the basis of the above information, answer of the following questions :

- (i) An enlargement, with centre A, maps $\triangle ABC$ onto $\triangle ADE$, then find the scale factor of the enlargement.
- (ii) Find the length of AF.
- (iii) An enlargement, with centre A, maps $\triangle ABC$ onto $\triangle ADE$, then find the length of DE

OR

Find the value of $\frac{AB}{BD}$