



विद्या सर्वार्थ साधिका

ANANDALAYA PRE – BOARD EXAMINATION

Class: X

Subject: Mathematics - Standard (041)

Date : 29-01-2024

M.M: 80

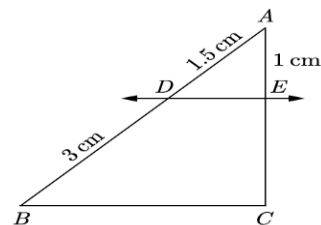
Time: 3 hours

General Instructions:

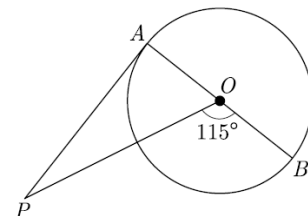
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated 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 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 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$, if not stated.

SECTION – A

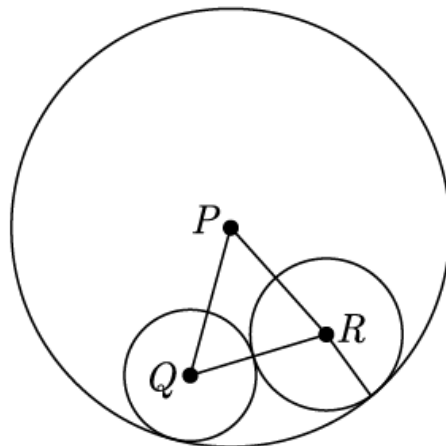
1. The LCM of smallest two-digit composite number and smallest composite number is _____. (1)
(A) 12 (B) 4 (C) 20 (D) 44
2. For what value of k, the pair of linear equations $kx - 4y = 3$, $6x - 12y = 9$ has an infinite number of solutions? (1)
(A) $k = 2$ (B) $k \neq 2$ (C) $k \neq 3$ (D) $k = 4$
3. What will be the nature of the graph lines of the equations $2x + 5y + 15 = 0$ and $6x + 15y + 45 = 0$? (1)
(A) Parallel (B) Coincident (C) Intersecting (D) Perpendicular to each other
4. The quadratic equation $5x^2 - 3x + 1 = 0$ has _____. (1)
(A) two distinct real roots (B) two equal real roots
(C) no real roots (D) more than 2 real roots
5. The n^{th} term of the AP $a, 3a, 5a, \dots$ is _____. (1)
(A) na (B) $(2n - 1)a$ (C) $(2n + 1)a$ (D) $2na$
6. What is the distance of the point $P(-3, -4)$ from the x-axis (in units)? (1)
(A) 3 (B) -3 (C) 4 (D) 5
7. The co-ordinate of the mid-point of the line segment joining the points $A(1, 3)$ and $B(3, 5)$ is _____. (1)
(A) (4, 8) (B) (2, 4) (C) (4, 2) (D) (-3, -2)
8. In the given figure, $DE \parallel BC$. The value of EC is _____. (1)
(A) 1.5 cm (B) 3 cm
(C) 2 cm (D) 1 cm



9. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 115^\circ$, then perimeter of $\angle APO$ is _____. (1)
(A) 25° (B) 30°
(C) 30° (D) 65°



10. In the given figure, three circles with centres P, Q and R are drawn, such that the circles with centres Q and R touch each other externally and they touch the circle with centre P, internally. If $PQ = 10$ cm, $PR = 8$ cm and $QR = 12$ cm, then the diameter of the largest circle is: (1)



- (A) 30 cm (B) 20 cm
(C) 15 cm (D) 40 cm
11. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$, then find the value of $x^2 + y^2$. (1)
(A) 1 (B) $1/2$ (C) 0 (D) $3/2$
12. $(\tan \theta + \cot \theta) (\sin \theta \cdot \cos \theta) =$ _____. (1)
(A) $\sin \theta + \cos \theta$ (B) $\sin \theta - \cos \theta$ (C) 0 (D) 1
13. If the angle of depression of an object from a 75 m high tower is 30° , then find the distance of the object from the tower. (1)
(A) $25\sqrt{3}$ m (B) $50\sqrt{3}$ m (C) 75 m (D) $75\sqrt{3}$ m
14. If the perimeter of a semi-circular protractor is 36 cm, then what is its diameter? (1)
(A) 7cm (B) 18 cm (C) 12cm (D) 14 cm
15. What is the ratio of volumes of two cones with same radii? (1)
(A) $h_1 : h_2$ (B) $s_1 : s_2$ (C) $r_1 : r_2$ (D) none of these
16. Ramesh buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random a tank containing 5 male fish and 9 female fish. Then, find the probability that the fish taken out is a male fish. (1)
(A) $\frac{5}{14}$ (B) $\frac{9}{14}$ (C) $\frac{5}{13}$ (D) $\frac{5}{9}$
17. 2 cards of diamond and 2 cards of club are missing from a pack of 52 cards. What is the probability of getting a black card from the remaining pack? (1)
(A) $\frac{1}{2}$ (B) $\frac{21}{48}$ (C) $\frac{12}{25}$ (D) 1
18. The mean weight of 9 students is 25 kg. If one more student is joined in the group the mean is unchanged, then the weight of the 10th student is _____. (1)
(A) 25 kg (B) 9 kg (C) 35 kg (D) can't say with this data

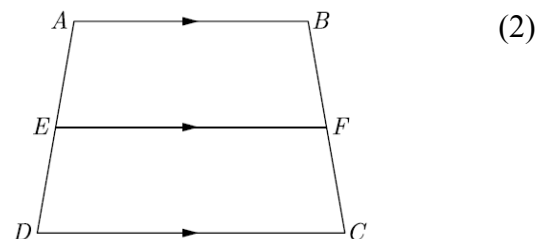
In the questions no. 19 & 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (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.
19. Assertion : If the height of a cone is 24 cm and diameter of the base is 14 cm, then the slant height of the cone is 15 cm. (1)
Reason : If r be the radius and h be the slant height of the cone, then slant height = $\sqrt{h^2 + r^2}$.
20. Assertion : If nth term of an AP is $7 - 4n$, then its common differences is -4 . (1)
Reason : Common difference of an AP is given by $d = a_{n+1} - a_n$.

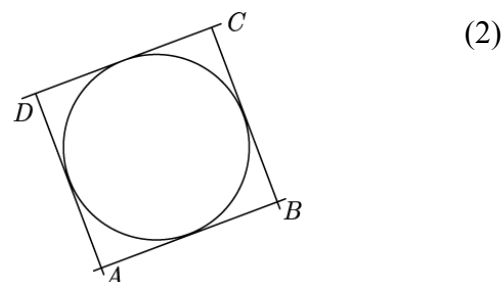
SECTION – B

21. Explain whether $3 \times 12 \times 101 + 4$ is a prime number or a composite number. (2)

22. In the given figure, if ABCD is a trapezium in which $AB \parallel CD \parallel EF$, then prove that $\frac{AE}{ED} = \frac{BF}{FC}$.



23. In figure, a circle touches all the four sides of a quadrilateral ABCD. If $AB = 6$ cm, $BC = 9$ cm and $CD = 8$ cm, then find the length of AD.

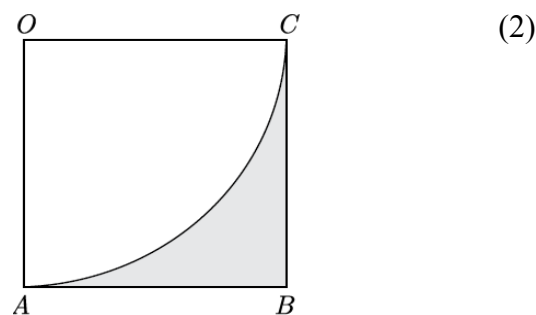


24. If $\sqrt{3} \sin \theta - \cos \theta = 0$ and $0^\circ < \theta < 90^\circ$, find the value of θ . (2)

OR

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

25. In the adjoining figure, OABC is a square of side 7 cm. OAC is a quadrant of a circle with O as centre. Find the area of the shaded region.



OR

A road which is 7 m wide surrounds a circular park whose circumference is 88 m. Find the area of the road.

SECTION – C

26. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together? (3)
27. Solve for x: $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0, x \neq 3, -\frac{3}{2}$. (3)
28. Find whether the following pair of linear equations has a unique solution. If yes, find the solution: $7x - 4y = 49, 5x - 6y = 57$. (3)

OR

Determine the values of m and n so that the following system of linear equation have infinite number of solutions: $(2m - 1)x + 3y - 5 = 0; 3x + (n - 1)y - 2 = 0$.

29. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$. (3)

OR

Prove that, the lengths of tangents drawn from an external point to a circle are equal.

30. Prove that: $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$. (3)
31. Compute the mode for the following frequency distribution: (3)

Size of item (in cm)	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 28
Frequency	5	7	9	17	12	10	6

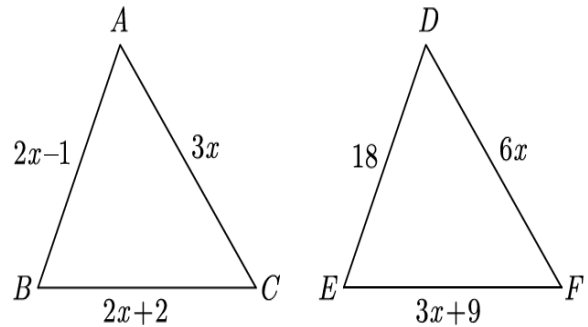
SECTION – D

32. Write all the values of p for which the quadratic equation $x^2 + px + 16 = 0$ has equal roots. Find the roots of the equation so obtained. (5)

OR

In a flight of 600 km, an aircraft was slowed down due to bad weather. The average speed of the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the duration of flight.

33. In Figure, if $\triangle ABC \sim \triangle DEF$ and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle. (5)



34. A solid is in the form of a cylinder with hemispherical end. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. (Use $\pi = 22/7$) (5)

OR

The radii of two right circular cylinders are in the ratio of 2:3 and their height are in the ratio of 5:4. Calculate the ratio of their curved surface area and the ratio of their volumes.

35. The weekly expenditure of 500 families is tabulated below: (5)

Weekly Expenditure (₹)	0 – 1000	1000 – 2000	2000 – 3000	3000 – 4000	4000 – 5000
Number of families	150	200	75	60	15

Find the median expenditure.

SECTION – E

36. Salary: In investigating different job opportunities, you find that firm A will offer a start at ₹ 25,000 per year and guarantee you a raise of ₹ 1,200 each year whereas firm B will offer a start at ₹ 28,000 per year but will guarantee you a raise of only ₹ 800 each year.

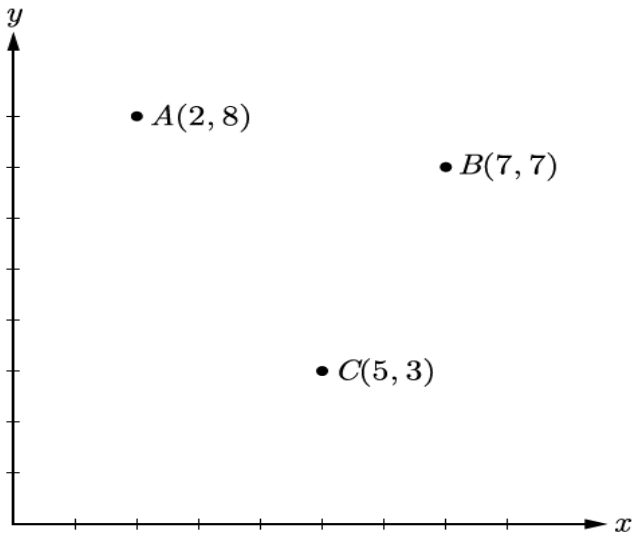


- (i) Over a period of 15 years, how much would you receive from firm A? (1)
 (ii) What would be your annual salary at firm B for the tenth year? (1)
 (iii) Over a period of 15 years, how much would you receive from firm B? (2)

OR

What would be your annual salary at firm A for the tenth year?

37. Carpooling: It is the sharing of car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves. By having more people using one vehicle, carpooling reduces each person's travel costs such as: fuel costs, tolls, and the stress of driving. Carpooling is also a more environmentally friendly and sustainable way to travel as sharing journeys reduces air pollution, carbon emissions, traffic congestion on the roads, and the need for parking spaces.



Three friends Amar, Bina and Charvin lives in societies represented by the points A, B and C respectively. They all work in offices located in a same building represented by the point O. Since they all go to same building every day, they decided to do carpooling to save money on petrol. Based on the above information, answer the following questions.

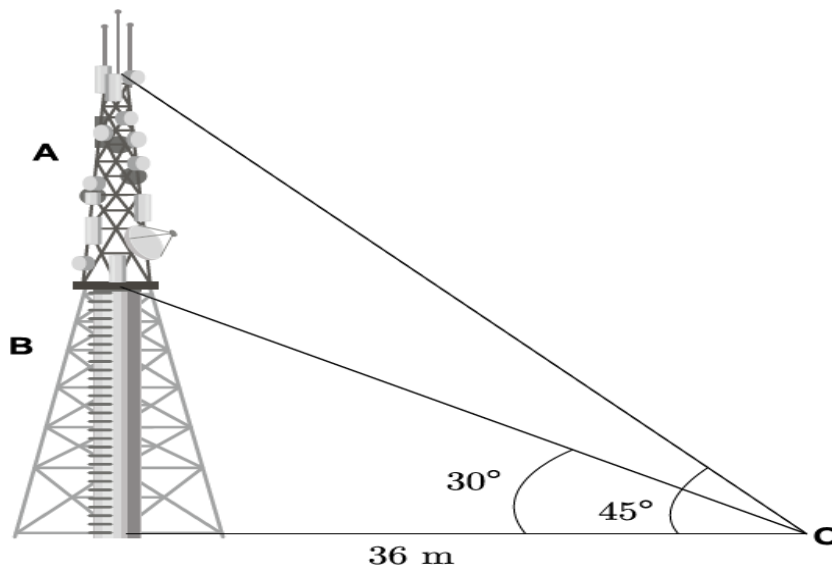
- (i) Which society is nearest to the office? (1)
- (ii) What is the distance between A and C? (1)
- (iii) Find the least distance between AB, OA and BC? (2)

OR

(iii) If Bina and Charvin planned to meet at a club situated at the mid-point of the line joining the points B and C, find the coordinates of this point.

38. 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° .



- (i) What is the height of the section B? (1)
- (ii) What is the height of the section A? (1)
- (iii) What is the length of the wire structure from the point O to the top of section A? (2)

OR

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