MOTION

SAMPLE PAPER – 1
CBSE BOARD
CLASS - X
MATHS

Time : 3 Hours **Max. Marks : 80**

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 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 2 and 1 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of section E.

SECTION – A

1. The ratio of HCF to LCM of the least composite number and the least prime number is:
(A) 1:2 (B) 2:1 (C) 1:1 (D) 1:3

2. The roots of the equation $x^2 + 3x - 10 = 0$ are:
(A) 2, –5 (B) –2, 5 (C) 2, 5 (D) –2, –5

3. The number of quadratic polynomials having zeroes –5 and –3 is -
(A) 1 (B) 2 (C) 3 (D) more than 3

4. The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by
(A) (0, –3) (B) (0, 3) (C) (2, 0) (D) (–2, 0)

5. The circumference of two circles are in the ratio 4:5. What is the ratio of their radii ?
(A) 16:25 (B) 25:16 (C) 2: $\sqrt{5}$ (D) 4:5

6. If α and β are the zeroes of the polynomial $x^2 - 1$, then the value of $(\alpha+\beta)$ is -
(A) 2 (B) 1 (C) –1 (D) 0

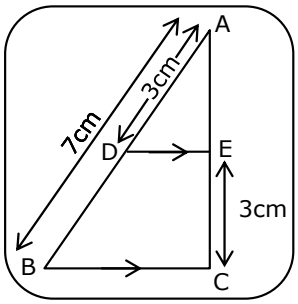
7. $\frac{\cos^2\theta}{\sin^2\theta} - \frac{1}{\sin^2\theta}$, in simplified form:
(A) $\tan^2\theta$ (B) $\sec^2\theta$ (C) 1 (D) –1

8. If α, β are zeroes of the polynomial $x^2 - 4$, then value of $\alpha\beta$ is:
(A) 2 (B) 1 (C) –1 (D) –4

9. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to -

(A) $\frac{-b}{2a}$ (B) $\frac{b}{2a}$ (C) $\frac{-b^2}{4a}$ (D) $\frac{b^2}{4a}$

10. In the given figure, DE||BC. If AD = 3cm, AB = 7cm and EC = 3cm, then the length of AE is –



(A) 2 cm (B) 2.25 cm (C) 3.5 cm (D) 4 cm

11. A bag contains 5 pink, 8 blue and 7 yellow balls. One ball is drawn at random from the bag. What is the probability of getting neither a blue nor a pink ball ?

(A) $\frac{1}{4}$ (B) $\frac{2}{5}$ (C) $\frac{7}{20}$ (D) $\frac{13}{20}$

12. The volume of a right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm, is:

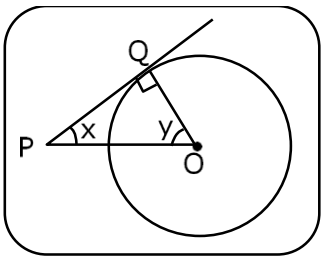
(A) 2496 cm^3 (B) 1248 cm^3 (C) 1664 cm^3 (D) 416 cm^3

13. 3 chairs and 1 table cost ₹ 900; whereas 5 chairs and 3 tables cost ₹ 2,100. If the cost of 1 chair is ₹ x and the cost of 1 table is ₹ y, then the situation can be represented algebraically as

(A) 3x + y = 900, 3x + 5y = 2100 (B) x + 3y = 900, 3x + 5y = 2100

(C) 3x + y = 900, 5x + 3y = 2100 (D) x + 3y = 900, 5x + 3y = 2100

14. In the given figure, PQ is a tangent to the circle with centre O. If ∠OPQ = x, ∠POQ = y, then x + y is:



(A) 45° (B) 90° (C) 60° (D) 180°

15. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability of getting a face card is –

(A) $\frac{1}{2}$ (B) $\frac{3}{13}$ (C) $\frac{4}{13}$ (D) $\frac{1}{13}$

16. If θ is an acute angle of a right angled triangle, then which of the following equation is not true ?

(A) $\sin\theta \cot\theta = \cos\theta$ (B) $\cos\theta \tan\theta = \sin\theta$

(C) $\text{cosec}^2\theta - \cot^2\theta = 1$ (D) $\tan^2\theta - \sec^2\theta = 1$

17. If α, β are the zeroes of the polynomial $p(x) = 4x^2 - 3x - 7$, then $\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$ is equal to:

(A) $\frac{7}{3}$ (B) $\frac{-7}{3}$ (C) $\frac{3}{7}$ (D) $\frac{-3}{7}$

18. A card is drawn at random from a well-shuffled pack of 52 cards. The probability that the card drawn is not an ace is:

(A) $\frac{1}{13}$ (B) $\frac{9}{13}$ (C) $\frac{4}{13}$ (D) $\frac{12}{13}$

Directions: In the question number 19-20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option out of the following:

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true but Reason (R) is false.

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

19. **Assertion (A):** The probability that a leap year has 53 Sunday is $\frac{2}{7}$.

Reason (R): The probability that a non-leap year has 53 Sunday is $\frac{5}{7}$.

20. **Assertion (A):** For $0 < \theta \leq 90°$, $\text{cosec}\,\theta - \cot\theta$ and $\text{cosec}\,\theta + \cot\theta$ are reciprocal of each other.

Reason (R): $\text{cosec}^2\theta - \cot^2\theta = 1$

SECTION - B

21. Two numbers are in the ratio 2:3 and their LCM is 180. What is the HCF of these numbers ?

22. If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k.

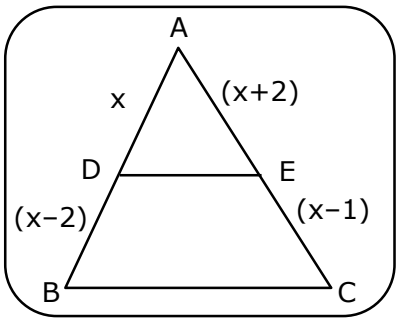
23. (A) Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$.

OR

(B) Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the nature of roots of the equation.

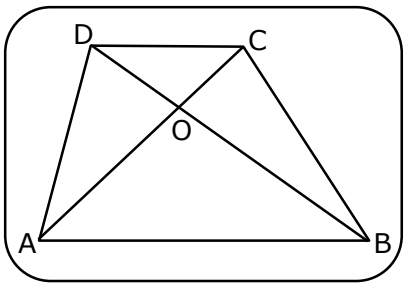
24. If a fair coin is tossed twice, find the probability of getting 'atmost one head'.

25. (A) In the given figure, ABC is a triangle in which DE||BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, then find the value of x.



OR

(B) Diagonals AC and BD of trapezium with AB||DC intersect each other at point O. Show that $\frac{OA}{OC} = \frac{OB}{OD}$.



SECTION - C

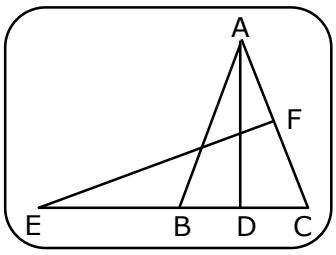
26. Find the ratio in which the line segment joining the points A(6, 3) and B(–2, –5) is divided by x-axis.

27. (A) Find the HCF and LCM of 26, 65 and 117 using prime factorization.

OR

(B) Prove that $\sqrt{2}$ is an irrational number.

28. In the given figure, E is a point on the side CB produced of an isosceles triangle ABC with AB = AC. If AD $\perp$ BC and EF $\perp$ AC, them prove that $\Delta ABD \sim \Delta ECF$.



29. (A) Prove that: $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$.

OR

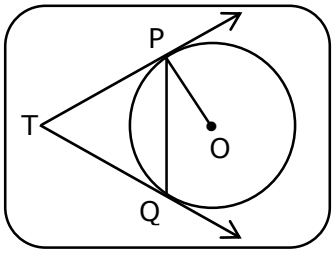
(B) Prove that sec A(1 – sin A)(sec A + tan A) = 1.

30. Prove that: $\frac{1+\sec A}{\sec A} = \frac{\sin^2 A}{1-\cos A}$.

31. Find the value of 'p' for which the quadratic equation $px(x - 2) + 6 = 0$ has two equal real roots.

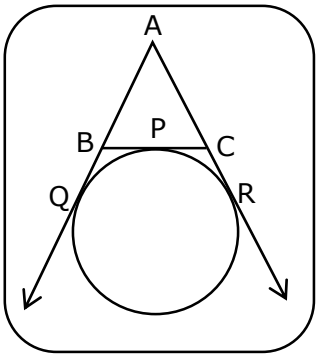
SECTION - D

32. (A) Two tangents TP and TQ are drawn to a circle with center O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



OR

(B) A circle touches the side BC of a ΔABC at a point P and touches AB and AC when produced at Q and R respectively. Show that $AQ = \frac{1}{2}$ (Perimeter of ΔABC)



33. A solid is in the shape of a right-circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid.

34. (A) The ratio of the 11^{th} term to the 18^{th} term of an A.P. is 2:3. Find the ratio of the 5^{th} term to the 21^{st} term. Also, find the ratio of the sum of first 5 term to the sum of first 21 terms.

OR

(B) If the sum of first 6 terms of an A.P. is 36 and that of the first 16 terms is 256, find the sum of first 10 terms.

35. The monthly expenditure on milk in 200 families of a Housing Society is given below:

Monthly Expenditure (in ₹)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of Families	24	40	33	x	30	22	16	7

Find the value of x and also, find the median and mean expenditure on milk.

SECTION - E

36. A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is ₹ 9000 and from batch II is ₹ 26,000. Assume that each poor child pays ₹ x per month and each rich child pays ₹ y per month.

Based on the above information, answer the following questions:

(i) Represent the information given above in terms of x and y.

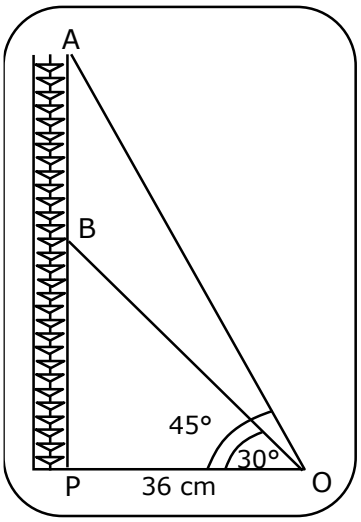
(ii) Find the monthly fee paid by a poor child.

OR

Find the difference in the monthly fee paid by a poor child and a rich child.

(iii) If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II ?

37. 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. 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 36cm. From point O, the angle of elevation of the top of the Section B is 30° and the angle of elevation of the top of Section A is 45°.



Based on the above information, answer the following questions:

(i) Find the length of the wire from the point O to the top of section B.

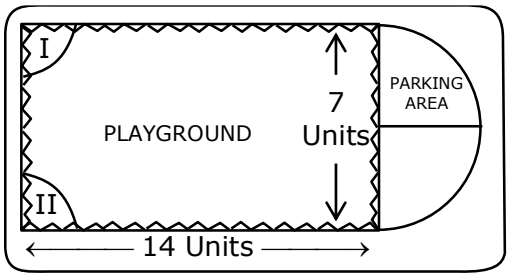
(ii) Find the distance AB.

OR

Find the area of ΔOPB.

(iii) Find the height of the Section A from the base of the tower.

38. Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above information, answer the following questions:

(i) What is the total perimeter of the parking area ?

(ii) (a) What is the total area of the parking and the two quadrant ?

OR

(b) What is the ratio of area of playground to the area of parking area ?

(iii) Find the cost of fencing the playground and parking area at the rate of ₹ 2 per unit.