PM SHRI KENDRIYA VIDYALAYA KOLLAM

CLASS X – MATHEMATICS (STANDARD)

PRE-BOARD EXAMINATION – I

Maximum Marks: 80 **Time: 3 Hours**

General Instructions:

- This question paper contains 38 questions divided into five Sections: A, B, C, D, and E.
- Section A comprises 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
- Section B comprises 5 Short Answer Type-I (SA-I) questions carrying 2 marks each. Internal choice is provided in 2 questions.
- Section C comprises 6 Short Answer Type-II (SA-II) questions carrying 3 marks each. Internal choice is provided in 2 questions.
- Section D comprises 4 Long Answer (LA) questions carrying 5 marks each. Internal choice is provided in 2 questions.
- Section E comprises 3 Case-Based integrated units of assessment carrying 4 marks each with sub-parts.
- There is no overall choice. However, internal choices are provided where indicated.
- Use of calculators is strictly prohibited.

SECTION A – Multiple Choice Questions (20 × 1 = 20)

1.* In KV Kollam library, 96 books and 404 articles are to be arranged in equal stacks. What is the maximum number of books per stack with no remainder?

A) 2 B) 4 C) 8 D) 16

2. The LCM of 6, 72 and 120 is:

A) 360 B) 720 C) 120 D) 60

3. If the polynomial $x^2 + 7x + 10$ represents the profit of a houseboat in Astamudi Lake, what are the zeroes of that polynomial?

A) $-2, -5$ B) 2, 5 C) -2, 5 D) 2, -5

4.* If $3x + 2y = 5$ and $2x - 3y = 7$ are representing two roads in the City, then the roads are

A) Intersecting B) Parallel
C) Coinciding D) None

5. The equation $(k - 1)x^2 + kx + 1 = 0$ has one root -1. What is the value of k?

A) 0 B) 1 C) 2 D) Any number

6. The first term of an AP in which $a_3 = 16$ and $a_7 = 28$ is:

A) 7 B) 10 C) 13 D) 4

7.* The HighSchool Junction point dividing Chinnakada Junction (0, 0) and Tangassery (6, 8) in the ratio 1 : 2, What is the Co-ordinate of HighSchool Junction ?

A) (2, 8/3) B) (3, 4) C) (2, 2) D) (4, 3)

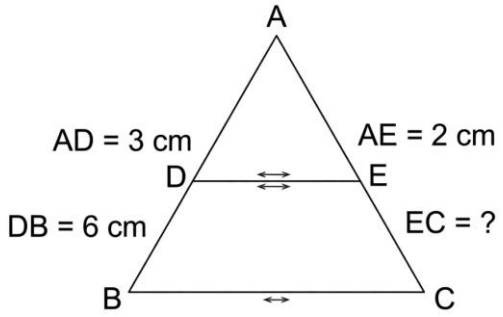
8. The distance between the fishing points Q(1, 2) and R(4, 6) is:

A) 5 B) 4 C) 3 D) 6

9. If $\Delta ABC \sim \Delta DEF$, ar(ABC) = 64, ar(DEF) = 121 and BC = 8, then EF=?

A) 11 B) 8.8 C) 11.5 D) 13.75

10. In a Triangular Park model, DE ∥ BC, AD = 3, DB = 6 and AE = 2. Then EC is:



A) 4 B) 3 C) 5 D) 6

11.* Two concentric circles have radii 5 cm and 13 cm. A chord of the larger circle touches the smaller circle. The length of the chord is:

A) 24 cm B) 12 cm C) 10 cm D) 20 cm

12. At Thirumullavaram Beach, for a coconut tree if $3\cot A = 4$, then sec A is:

A) 5/4 B) 5/3 C) 4/5 D) 3/5

13. If $\sin\theta = 3/5$, then $\cos\theta + \tan\theta$ =:

A) 31/20 B) 7/5 C) 4/5 D) 6/5

14. The value of $\sin^2 60° + 2\tan 45° - \cos^2 30°$ is:

A) 1 B) 2 C) 1.5 D) 2.5

15.* A lighthouse is 20 m high. If the angle of depression of a ship is 30°, the distance of the ship from the lighthouse is:

A) $20\sqrt{3}$ m B) $20/\sqrt{3}$ m C) 20 m D) 40 m

16.* Two cylindrical storage cans have heights in ratio 1:2 and radii in ratio 2:1. The ratio of their volumes:

A) 1 : 1 B) 2 : 1 C) 1 : 2 D) 4 : 1

17.* A cuboid tin of dimensions 20 cm × 10 cm × 10 cm is filled with hemispherical cashew mounds of radius 5 cm. The volume of the tin excluding two hemispheres is:

A) $2000 - 2(250\pi/3)$ cm³ B) 2000 cm³

C) $250\pi/3$ cm³ D) None

18. If α and β are the zeroes of $x^2 - 4x + 3$, then $\alpha + \beta + \alpha\beta$ is:

A) 7 B) 4 C) 3 D) 1

19. Assertion (A): The quadratic $x^2 + 2x + 1$ has equal roots.

Reason (R): D = 0 means equal roots.

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): The lengths of tangents drawn from an external point to a circle are equal.

Reason (R): They subtend equal angles at the centre.

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.

SECTION B – Short Answer Questions (5 × 2 = 10)

21. (A)* A traffic light system at a busy junction resets every 42 seconds for Lane 1 and every 63 seconds for Lane 2. If both lights reset simultaneously at 8:00 AM, at what time will they next reset together?

OR

(B)* Three school bells ring at intervals of 12, 15 and 18 minutes. If they ring together at 8:00 a.m.,when will they ring together again?

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

23. Find the coordinates of the point which divides the line segment joining (−1, 7) and (4, −3) in the ratio 2 : 3 internally.

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

25.* Find the area of one slice Pizza of radius 14 cm. (Assume that the Pizza is divided into 4 slices)

SECTION C – Short Answer Questions (6 × 3 = 18)

26. Prove that $\sqrt{3}$ is irrational. Hence prove that $5 - 2\sqrt{3}$ is irrational.

27. Find the zeroes of $3x^2 - 5x - 2$ and verify the relationship between the zeroes and the coefficients.

28. In ΔABC, DE ∥ BC. Given AD = 2.4 cm, DB = 4 cm and AE = 3.2 cm, find AC.

29. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

30. (A) Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

OR

(B) Two tangents TP and TQ are drawn from an external point T to a circle, each of length 5 cm. If the distance of T from the centre is 13 cm, find the radius.

31. (A) A sector has an angle of 60° and radius 6 cm. Find the areas of the minor and major sectors.

OR

(B) Find the area of a segment of a circle of radius 14 cm subtending an angle of 60° at the centre.

SECTION D – Long Answer Questions (4 × 5 = 20)

32.* A solid consists of a cone surmounted by a hemisphere of radius 3.5 cm. The height of the cone is 12 cm. Find the volume and total surface area of the solid. Also find the cost of painting the hemispherical part only at Rs 20 per cm^2.

34. (A)* From the top of a 60 m tall building, the angles of depression of the top and the base of a transmission tower are 30° and 60° respectively. Find the height of the transmission tower and the distance between the building and the tower.

OR

(B)* A window of a house is h metres above the ground. From the window, the angles of elevation and depression of the top and the bottom of another house situated on the opposite side of the lane are found to be α and β, respectively. Prove that the height of the other house is h (1 + tan α cot β) metres.

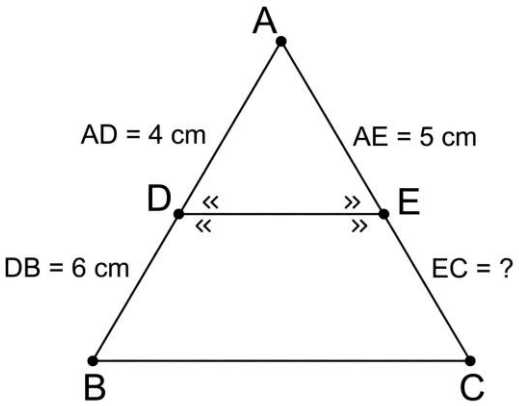
35. (A)*Two water taps together can fill a school tank in 12 hours. The tap of larger diameter takes 10 hours less than the smaller tap to fill the tank alone. Find the time taken by each tap to fill the tank separately.

OR

(B)A motorboat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

33. State and prove the Basic Proportionality Theorem (Thales' theorem).

In ΔABC, D and E lie on AB and AC respectively and DE ∥ BC. If AD = 4 cm, DB = 6 cm and AE = 5 cm, find EC.



SECTION E – Case Study Based Questions (3 × 4 = 12)

36.* Kerala Fishing – AP: At Neendakara harbour, Raju muppan catches 20 kg on Day 1, 25 kg on Day 2, 30 kg on Day 3, and so on, forming an arithmetic progression.



(i) How much does he catch on Day 10? (1)

(ii) Find the total catch in the first 15 days. (1)

(iii) (A) In how many days will the total catch be 650 kg? (2)

OR

(B) If the daily increase is 7 kg starting from 20 kg, after how many days will the total catch be 515 kg? (2)

37.* At Asramam, the new park was marked by three stones — K(0,4) near the banyan tree, L(0,0) at the entrance, and M(3,0) beside the lake view.



(i) Find KL. (1)

(ii) Find the midpoint of KM. (1)

(iii) (A) Is ΔKLM right-angled? Prove. (2)

OR

(B) Find its area and perimeter. (2)

38.* Kollam Cashew Export: In Kollam, known as the Cashew Capital, a factory exports premium cashew powder. The powder is packed in a cylindrical container of radius 14 cm and height 30 cm.



(i) Find the volume of the cylinder. (1)

(ii) Find its curved surface area. (1)

(iii) (A)How many conical packets of radius 2 cm and height 7 cm can be filled from the powder in one cylindrical container? (2)

OR

(B) If the cost of painting the curved surface of the cylindrical container is Rs 3080 at the rate of Rs 5 per cm^2, find its height. (2)

— END OF QUESTION PAPER —