PM SHRI KENDRIYA VIDYALAYA GACHIBOWLI,GPRA CAMPUS,HYD-32
SAMPLE PAPER TEST 12 FOR BOARD EXAM 2024

SUBJECT: MATHEMATICS **MAX. MARKS : 80**
CLASS : X **DURATION : 3 HRS**

General Instruction:

1. This Question Paper has 5 Sections A-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 $\pi = 22/7$ wherever required if not stated.

SECTION – A
Questions 1 to 20 carry 1 mark each.

1. The next term of the A.P.: $\sqrt{6}$, $\sqrt{24}$, $\sqrt{54}$ is:
(a) $\sqrt{60}$ (b) $\sqrt{96}$ (c) $\sqrt{72}$ (d) $\sqrt{216}$

2. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to
(a) $-b/2a$ (b) $b/2a$ (c) $-b^2/4a$ (d) $b^2/4a$

3. The distance of the point (–6, 8) from x-axis is
(a) 6 units (b) – 6 units (c) 8 units (d) 10 units

4. 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

5. The circumferences of two circles are in the ratio 4 : 5. What is the ratio of their radii ?
(a) 16 : 25 (b) 25 : 16 (c) 2 : 5 (d) 4 : 5

6. The empirical relation between the mode, median and mean of a distribution is:
(a) Mode = 3 Median – 2 Mean (b) Mode = 3 Mean – 2 Median
(c) Mode = 2 Median – 3 Mean (d) Mode = 2 Mean – 3 Median

7. 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)

8. If a and b are the zeroes of the polynomial $x^2 – 1$, then the value of (ab) is
(a) 2 (b) 1 (c) – 1 (d) 0

9. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then sun's elevation is:
(a) 60° (b) 45° (c) 30° (d) 90°

10. $\frac{\cos^2\theta}{\sin^2\theta} - \frac{1}{\sin^2\theta}$, in simplified form is:
(a) $\tan^2\theta$ (b) $\sec^2\theta$ (c) 1 (d) – 1

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) 1/4 (b) 2/5 (c) 7/20 (d) 13/20

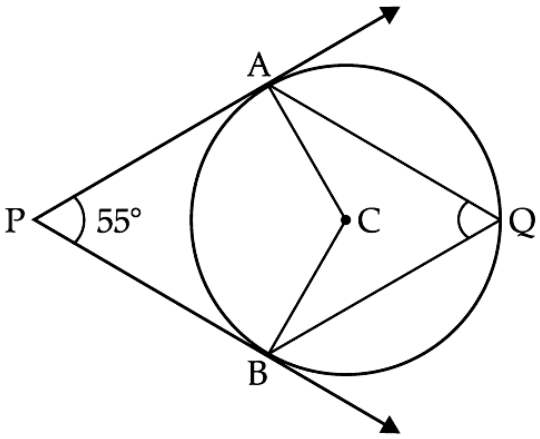
12. If ΔPQR ~ ΔABC; PQ = 6 cm, AB = 8 cm and the perimeter of ΔABC is 36 cm, then the perimeter of ΔPQR is

(a) 20.25 cm (b) 27 cm (c) 48 cm (d) 64 cm

13. The distance of the point (–6, 8) from origin is:

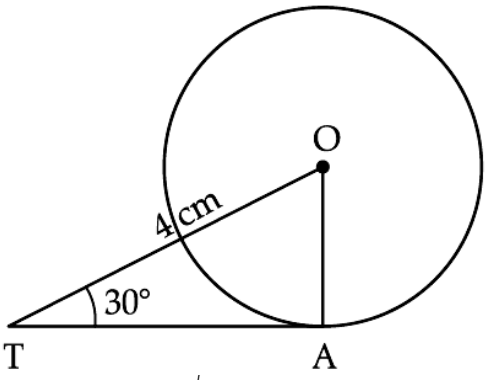
(a) 6 (b) – 6 (c) 8 (d) 10

14. In the given figure, PA and PB are tangents from external point P to a circle with centre C and Q is any point on the circle. Then the measure of ∠AQB is



(a) 62½° (b) 125° (c) 55° (d) 90°

15. In the given figure, TA is a tangent to the circle with centre O such that OT = 4 cm, ∠OTA = 30°, then length of TA is:



(a) $2\sqrt{3}$ cm (b) 2 cm (c) $2\sqrt{2}$ cm (d) 3 cm

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

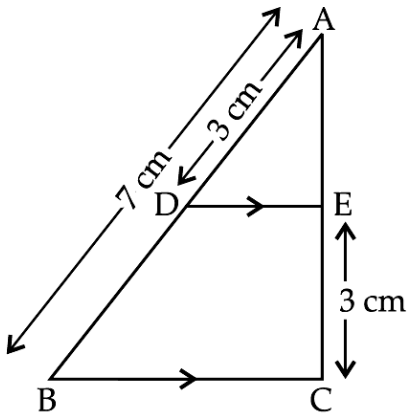
(a) 7/3 (b) −7/3 (c) 3/7 (d) −3/7

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

(a) 1/2 (b) 3/13 (c) 4/13 (d) 1/13

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

(a) 2 cm (b) 2.25 cm (c) 3.5 cm (d) 4 cm



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

(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 but 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): a, b, c are in A.P. if only if $2b = a + c$.
Reason (R): The sum of first n odd natural numbers is n^2.

20. Assertion (A): The probability that a leap year has 53 Sunday is 2/7.
Reason (R): The probability that a non-leap year has 53 Sunday is 5/7.

SECTION-B
Questions 21 to 25 carry 2M each

21. Show that 6^n cannot end with digit 0 for any natural number 'n'.

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

OR

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

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

24. Find the length of the shadow on the ground of a pole of height 18 m when angle of elevation θ of the sun is such that $\tan\theta = 6/7$.

OR

If A and B are acute angles such that $\sin(A - B) = 0$ and $2\cos(A + B) - 1 = 0$, then find angles A and B.

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

SECTION-C
Questions 26 to 31 carry 3 marks each

26. Find the HCF and LCM of 26, 65 and 117, using prime factorisation.

OR

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

27. Prove that the angle between the two tangents drawn from an external to circle is supplementary to the angle subtended by the line joining the points of contact at the centre.

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

29. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

30. The sum of two numbers is 15. If the sum of their reciprocals is 3/10, find the two numbers.

31. How many terms are there in an A.P. whose first and fifth terms are –14 and 2, respectively and the last term is 62.

OR

Which term of the A.P.: 65, 61, 57, 53, ... is the first negative term?

SECTION-D
Questions 32 to 35 carry 5M each

32. D is a point on the side BC of a triangle ABC such that ∠ADC = ∠BAC, prove that $CA^2 = CB.\ CD$

OR

If AD and PM are medians of triangles ABC and PQR respectively where ΔABC ~ ΔPQR, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

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. 250 apples of a box were weighted and the distribution of masses of the apples is given in the following table:

Mass (in grams)	80 – 100	100 – 120	120 – 140	140 – 160	160 – 180
Number of apples	20	60	70	*x*	60

(i) Find the value of x and the mean mass of the apples.
(ii) Find the modal mass of the apples.

35. A straight highway leads to the foot of a tower. A man standing on the top of the 75 m high tower observes two cars at angles of depression of 30° and 60°, which are approaching the foot of the tower. If one car is exactly behind the other on the same side of the tower, find the distance between the two cars. (Use $\sqrt{3} = 1.73$)

OR

From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.

SECTION-E (Case Study Based Questions)
Questions 36 to 38 carry 4M each

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 Rs. 9000 and from batch II is Rs. 26,000. Assume that each poor child pays Rs. x per month and each rich child pays Rs. y per month.

Based on the above information, answer the following questions:

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

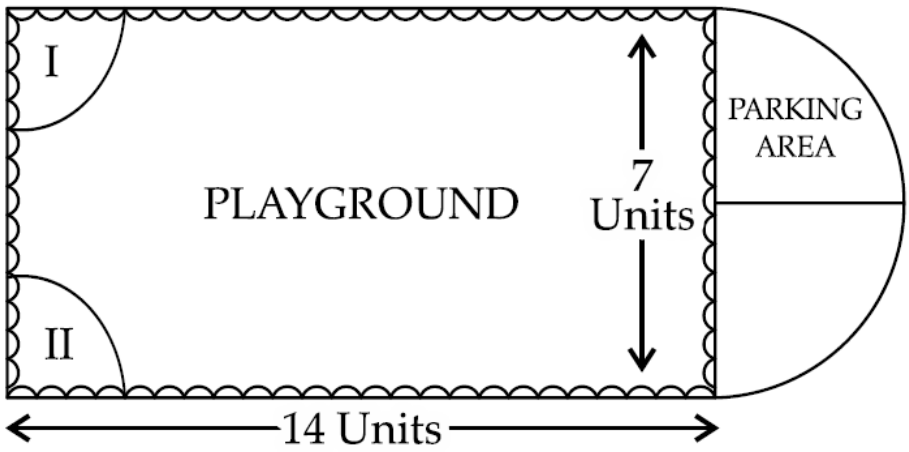
(ii) Find the monthly fee paid by a poor child.

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. 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 are 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?

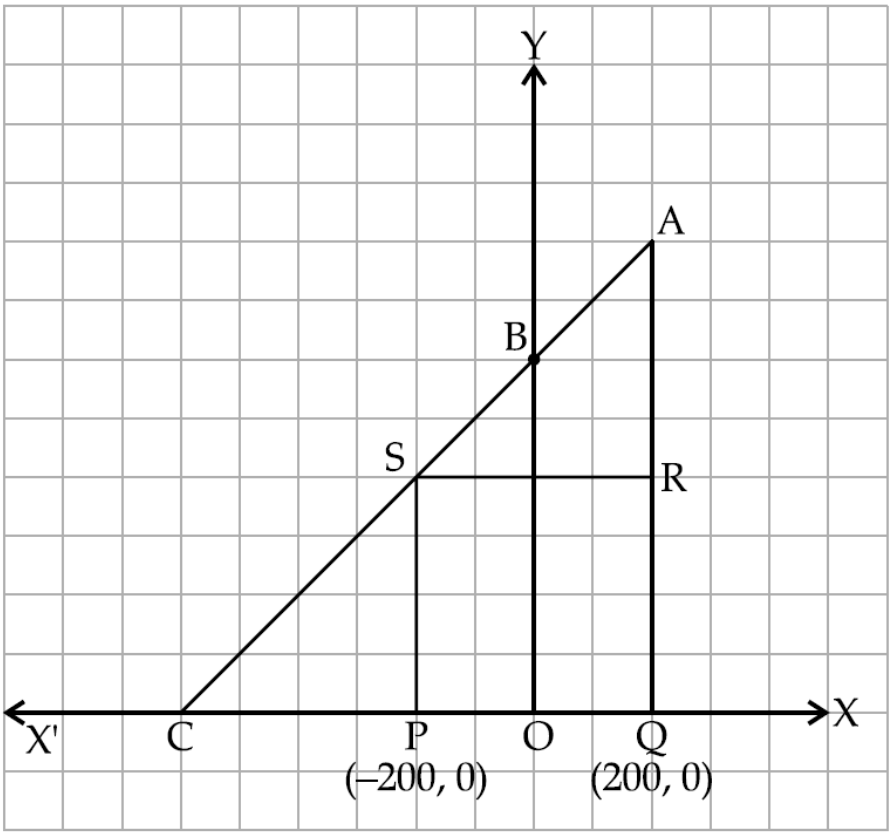
(ii) (a) What is the total area of parking and the two quadrants?

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 Rs. 2 per unit.

38. Jagdhish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field from growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O.



Based on the above information, answer the following questions:

(i) Taking O as origin, coordinates of P are (–200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?

(ii) (a) What is the area of square PQRS ?

OR

(b) What is the length of diagonal PR in square PQRS?

(iii) If S divides CA in the ratio K : 1, what is the value of K, where point A is (200, 800) ?