PM SHRI KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32
SAMPLE PAPER TEST 02 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. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; a, b being prime numbers, then LCM (p, q) is
(a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3

2. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
(a) 5 units (b) 12 units (c) 11 units (d) $(7 + \sqrt{5})$ units

3. The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are
(a) m, m + 3 (b) –m, m + 3 (c) m, – (m + 3) (d) –m, – (m + 3)

4. The area of a quadrant of a circle, whose circumference is 22 cm, is
(a) $\frac{11}{8}$ cm^2 (b) $\frac{77}{8}$ cm^2 (c) $\frac{77}{2}$ cm^2 (d) $\frac{77}{4}$ cm^2

5. The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 10$ is
(a) inconsistent (b) consistent (c) dependent consistent (d) none of these

6. If the circumference of a circle and the perimeter of a square are equal, then
(a) Area of the circle = Area of the square
(b) Area of the circle > Area of the square
(c) Area of the circle < Area of the square
(d) Nothing definite can be said about the relation between the areas of the circle and square.

7. The sum of the lower limit of median class and the upper limit of the modal class of the following data is:

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of students	8	10	12	22	30	18

(a) 70 (b) 80 (c) 90 (d) 100

8. A card is selected at random from a well shuffled deck of 52 cards. The probability of its being a face card is
(a) 3/26 (b) 3/13 (c) 2/13 (d) 1/2

9. In Δ ABC right angled at B, sin A = $\frac{7}{25}$, then the value of cos C is …….

(a) $\frac{7}{25}$ (b) $\frac{24}{25}$ (c) $\frac{7}{24}$ (d) $\frac{24}{7}$

10. The radius of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is
(a) 2.1 cm (b) 4.2 cm (c) 3.1 cm (d) 2.2 cm

11. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere?
(a) 9 units (b) 6 units (c) 4.5 units (d) 18 units

12. In the ΔABC, DE ∥ BC and AD = 3x − 2, AE = 5x − 4, BD = 7x − 5, CE = 5x − 3, then find the value of x
(a) 1 (b) 7/10 (c) both (a) & (b) (d) none of these

13. Two circles touch each other externally at C and AB is common tangent of circles, then ∠ACB is
(a) 70° (b) 60° (c) 100° (d) 90°

14. If 5 tan θ = 4, then the value of $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$ is
(a) 1/6 (b) 1/7 (c) 1/4 (d) 1/5

15. Given that sin α = 1/2 and cos β = 1/2, then the value of (β – α) is
(a) 0° (b) 30° (c) 60° (d) 90°

16. Two identical solid hemispheres of equal base radius are stuck along their bases. The total surface area of the combination is
(a) πr^2 (b) $2\pi r^2$ (c) $3\pi r^2$ (d) $4\pi r^2$

17. Nature of roots of quadratic equation $2x^2 - 4x + 3 = 0$ is
(a) real (b) equal (c) not real (d) none of them

18. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF, then which of the following is not true?
(a) BC. EF = AC. FD (b) AB. EF = AC. DE
(c) BC. DE = AB. EF (d) BC. DE = AB. FD

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

19. Assertion (A): The value of y is 3, if the distance between the points P(2, -3) and Q(10, y) is 10.
Reason (R): Distance between two points is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
(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.

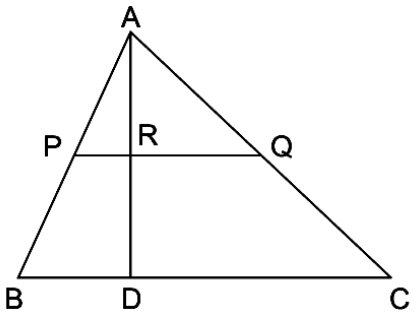
20. Assertion (A): 6^n never ends with the digit zero, where n is natural number.
Reason (R): Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m, n are natural numbers.

(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.

SECTION-B
Questions 21 to 25 carry 2M each

21. For what values of k will the following pair of linear equations have infinitely many solutions? $kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$

22. In the given figure, AP = 3 cm, AR = 4.5 cm, AQ = 6 cm, AB = 5 cm, AC = 10 cm. Find the length of AD



23. 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.

24. If $\sin(A + B) = \sqrt{3}/2$ and $\sin(A - B) = \frac{1}{2}$, $0 \le A + B \le 90°$ and $A > B$, then find A and B.

OR

If $\tan\theta = 3/4$, evaluate $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

25. Find the area of the sector of a circle with radius 4 cm and of angle 30°. Also, find the area of the corresponding major sector. (Use $\pi = 3.14$)

SECTION-C
Questions 26 to 31 carry 3 marks each

26. Four bells toll at an interval of 8, 12, 15 and 18 seconds respectively. All the four begin to toll together. Find the number of times they toll together in one hour excluding the one at the start.

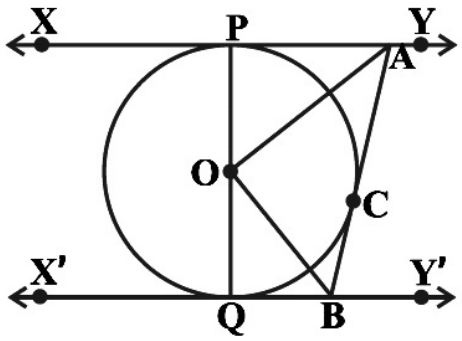
27. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.

OR

Find the quadratic polynomial sum and product of whose zeros are –1 and –20 respectively. Also find the zeroes of the polynomial so obtained.

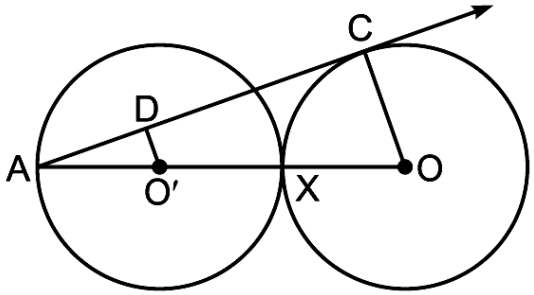
28. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.

29. In the below figure, XY and X′Y′ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X′Y′ at B. Prove that ∠AOB = 90°.



OR

In the below figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. O'D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.



30. Prove that $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \sec\theta + \tan\theta$

31. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is (i) 5? (ii) 10? (iii) at least 9?

SECTION-D
Questions 32 to 35 carry 5M each

32. A motor boat 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.

OR

An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two trains.

33. State and prove Basic Proportional Theorem.

34. If the median of the following distribution is 58 and sum of all the frequencies is 140. What is the value of x and y?

Class	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Frequency	8	10	*x*	25	40	*y*	15	7

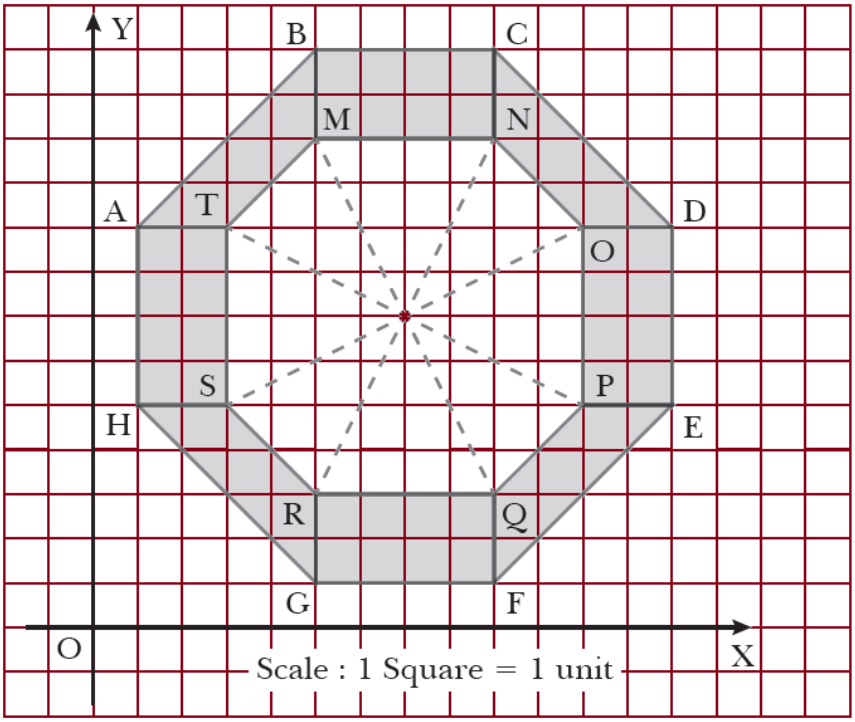
35. A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21 cm and its volume is 2/3 of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.

OR

A vessel full of water is in the form of an inverted cone of height 8 cm and the radius of its top, which is open, is 5 cm. 100 spherical lead balls are dropped into the vessel. One fourth of the water flows out of the vessel. Find the radius of a spherical ball.

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

36. The top of a table is shown in the figure given below:

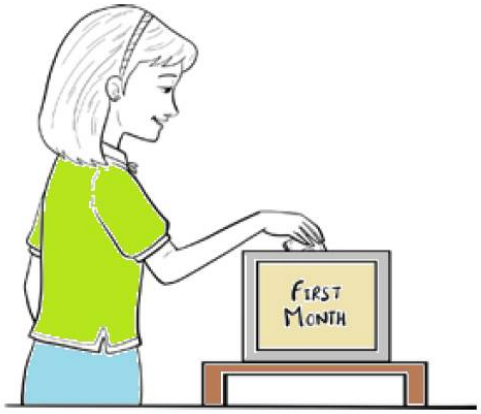


On the basis of above information answer the following questions.
(i) Find the distance between points A and B.
(ii) Write the co-ordinates of the mid point of line segment joining points M and Q.
(iii) If G is taken as the origin, and x, y axis put along GF and GB, then find the point denoted by coordinates (4, 2) and (8, 4).

OR

Find the coordinates of H, G and also find the distance between them.

37. Ananya saves Rs. 24 during the first month Rs. 30 in the second month and Rs. 36 in the third month. She continues to save in this manner.



On the basis of above information answer the following questions.

(i) Whether the monthly savings of Ananya form an AP or not? If yes then write the first term and common difference.

(ii) What is the amount that she will save in 15th month?

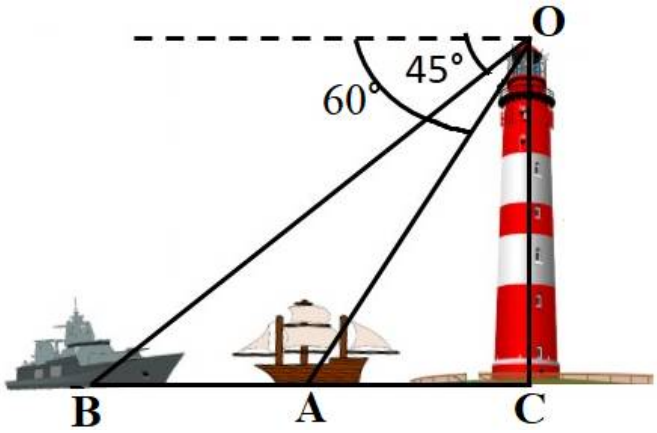
(iii) In which month, will she save Rs. 66?

OR

What is the common difference of an AP whose nth term is 8 – 5n?

38. A person/observer on the sea coast observes two ships in the sea, both the ships are in same straight path one behind the other.

If the observer is on his building of height 20 meters (including observer) and he observes the angle of depression of two ships as 45° and 60° respectively.



On the basis of above information answer the following questions.

(i) If a person observes a ship whose angle of depression is 60° then how much distance is the ship away from the building?

(ii) If a person observes another ship whose angle of depression is 45° then how much distance that ship is away from the building?

(iii) If a person observes the ship whose angle of depression changes from 60° to 30° then how far be ship from the building if the observer is at 20 m of height (including him)?

OR

At a time when a person observes two ships whose angle of depressions are 60° and 45° the distance between the ships is (in meter).