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X - A
Roll no. 22

THE INDIAN SCHOOL
PERIODIC TEST-II (2023-24)
MATHEMATICS (041)
CLASS-X
SET- A

Time allowed: 2.5 hours **Maximum Marks: 60**
No of printed pages: 5

General Instructions:

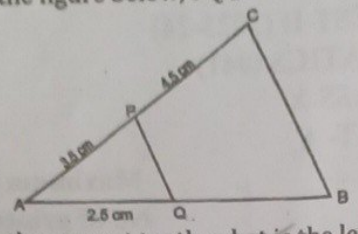
- This question paper consists of 33 questions divided into 5 sections A, B, C, D and E.
- Section A comprises of 20 questions carrying 1 mark each including Multiple Choice questions, Assertion and Reasoning based questions.
- Section B comprises of 5 questions carrying 2 marks each.
- Section C comprises of 4 questions carrying 3 marks each.
- Section D comprises of 2 questions carrying 5 marks each.
- Section E comprises of 2 case study - based question of 4 marks each.
- All questions are compulsory. However internal choices have been provided in Q22, Q26 and Q31.
- Draw neat figures wherever required.

SECTION-A

Q 1 to Q 18 are multiple choice questions. Choose the correct option for each of the following questions:

1. Which of the following equations has no real roots?
   A. $x^2 - 4x + 3\sqrt{2} = 0$ B. $x^2 + 4x - 3\sqrt{2} = 0$
   C. $x^2 - 4x - 3\sqrt{2} = 0$ D. $3x^2 + 4\sqrt{3}x + 4 = 0$
2. p and q are the zeroes of the polynomial $4y^2 - 4y + 1$. What is the value of $\frac{1}{p} + \frac{1}{q} + pq$?
   A. $-\frac{15}{4}$ B. $-\frac{3}{4}$ C. $-\frac{5}{4}$ D. $\frac{17}{4}$
3. Which term of the A.P. 21, 42, 63, 84 ... is 210?
   A. 9^{th} B. 10^{th} C. 11^{th} D. 12^{th}
4. Given that $\Delta ABC \sim \Delta DFE$, with $\angle A = 30^0$, $\angle C = 50^0$, AB = 5 cm, AC = 8 cm, and DF = 7.5 cm, which of the following statements is true?
   A. DE = 12 cm, $\angle F = 50^0$ B. DE = 12 cm, $\angle F = 100^0$
   C. EF = 12 cm, $\angle D = 100^0$ D. EF = 12 cm, $\angle D = 30^0$
5. The ratio in which x-axis divides the line segment joining A(2, −3) and B(5, 6) is
   A. 3 : 5 B. 1 : 2 C. 2 : 1 D. 2 : 3
6. For what values of k, the roots of the quadratic equation $3x^2 + 2kx + 27 = 0$ are real and equal?
   A. $k = \pm 4$ B. $k = \pm 3$ C. $k = \pm 6$ D. $k = \pm 9$
7. Two APs have the same common difference. The first term of one of these is −1 and that of the other is − 8. Then the difference between their 4th term is
   A. 1 B. 7 C. −7 D. 9

8. In the figure below, PQ ∥ CB.



To the nearest tenth, what is the length of QB?

A. 1.4 cm B. 3.2 cm C. 1.7 cm D. 2.2 cm

9. If the LCM of p and 18 is 36 and the HCF of p and 18 is 2 then p is equal to

A. 2 B. 3 C. 4 D. 1

10. If $\tan x + \sin x = m$ and $\tan x - \sin x = n$, then $m^2 - n^2$ is equal to

A. $4\sqrt{mn}$ B. $\sqrt{mn}$ C. $2\sqrt{mn}$ D. none of these

11. The sum of exponents of prime factors in the prime factorisation of 196 is

A. 3 B. 4 C. 5 D. 2

12. Which of the following is the polynomial whose zeroes are $\frac{1}{3}$ and $-\frac{3}{4}$?

A. $12x^2 + 5x - 3$ B. $12x^2 - 5x - 3$

C. $12x^2 + 13x + 3$ D. $12x^2 - 13x - 3$

13. The zeros of the quadratic polynomial $x^2 + kx + k, k \neq 0$

A. cannot both be positive B. cannot both be negative

C. are always equal D. are always unequal

14. The value of k for which the system of equations $2x + ky = 12, x + 3y - 4 = 0$ are inconsistent is

A. $\frac{21}{4}$ B. $\frac{1}{6}$ C. 6 D. $\frac{4}{21}$

15. If the points (1, x), (5, 2) and (9, 5) are collinear then the value of x is

A. $\frac{5}{2}$ B. $-\frac{5}{2}$ C. -1 D. 1

16. What is the value of $\frac{3 - \sin^2 60°}{\tan 30° \tan 60°}$?

A. $2\frac{1}{4}$ B. $3\frac{1}{4}$ C. $2\frac{3}{4}$ D. $3\frac{3}{4}$

17. If (a, b) is the mid point of the line segment joining the points A (10, − 6) and B (k, 4) and $a - 2b = 18$, the values of k is

A. 30 B. 22 C. 4 D. 40

18. What would be the last term of an AP with 10 terms whose second term is −23 and the third term is −35?

A. − 119 B. 119 C. − 650 D. 350

In the question number 19 and 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):** In a right angled triangle, if $\tan\theta = \frac{3}{4}$ then $\sin\theta = \frac{3}{5}$

Reason (R): $\sin 60^\circ = \frac{1}{2}$

20. **Assertion (A):** If the equation $8x^2 + 3kx + 2 = 0$ has equal roots then the value of k is $\pm\frac{8}{3}$.

Reason (R): The equation $ax^2 + bx + c = 0$ has equal roots if $D = b^2 - 4ac = 0$.

SECTION-B

21. In a canteen, there are 144 cartons of Coke cans and 90 cartons of Pepsi cans that need to be stacked. If each stack needs to have the same number of cartons and contain only one type of drink, what is the maximum number of cartons that each stack can have?

22. If $\tan\theta = \frac{3}{4}$, find the value of $\left(\frac{1-\cos^2\theta}{1+\cos^2\theta}\right)$

OR

22. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.

23. Solve for x: $4x^2 - 4a^2x + (a^4 - b^4) = 0$.

24. The present age of a father is three years more than three times the age of his son. Three years hence the father's age will be 10 years more than twice the age of the son. Determine their present ages.

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

SECTION-C

26. Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x-axis. Find the area of the shaded region.

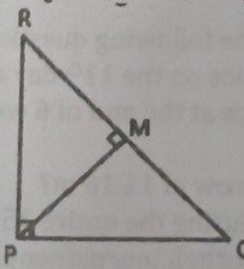
OR

26. The students of a class are made to stand in rows. If there is one student extra in each row, there would be 2 less rows. Alternatively, if there is one student less in each row, there would be 3 more rows. Determine the total number of students in the class.

27. Prove that $\sqrt{7}$ is an irrational number.

28. Find the zeros of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between zeros and the coefficients.

29. In the following figure, ΔPQR is right-angled at P. M is a point on QR such that PM is perpendicular to QR. Show that $PQ^2 = QM \times QR$.



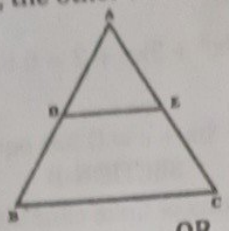
SECTION-D

30. Prove the following:

(i) $\frac{1}{(\text{cosec } x + \cot x)} - \frac{1}{\sin x} = \frac{1}{\sin x} - \frac{1}{(\text{cosec } x - \cot x)}$

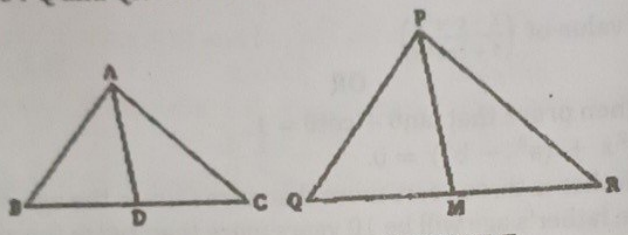
(ii) $\frac{(1+\cot\theta+\tan\theta)(\sin\theta-\cos\theta)}{\sec^3\theta - \text{cosec}^3\theta} = \sin^2\theta\cos^2\theta$

31. Prove that, if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.



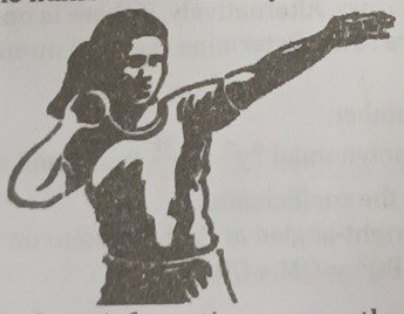
OR

31. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR Show that Δ ABC ~ Δ PQR.



SECTION-E

32. Manpreet Kaur holds the national record for women in the shot-put discipline, with her throw of 18.86 meters at the 2017 Asian Grand Prix standing as the farthest distance achieved by an Indian female athlete. Inspired by Kaur's achievements, Sanjitha is determined to one day secure a gold medal in the Olympics. Initially, her shot-put throw only reached a distance of 7.56 meters. While she was a school athlete, she diligently practiced both in the mornings and evenings, managing to improve her throwing distance by 9 centimeters every week.
During a special 15-day training camp, she began with 40 throws. Every day, she increased the number of throws by 12 to achieve this remarkable progress.



Based on the above information, answer the following questions:

(i) How many throws did Sanjitha practice on the 11th day of the camp? 160

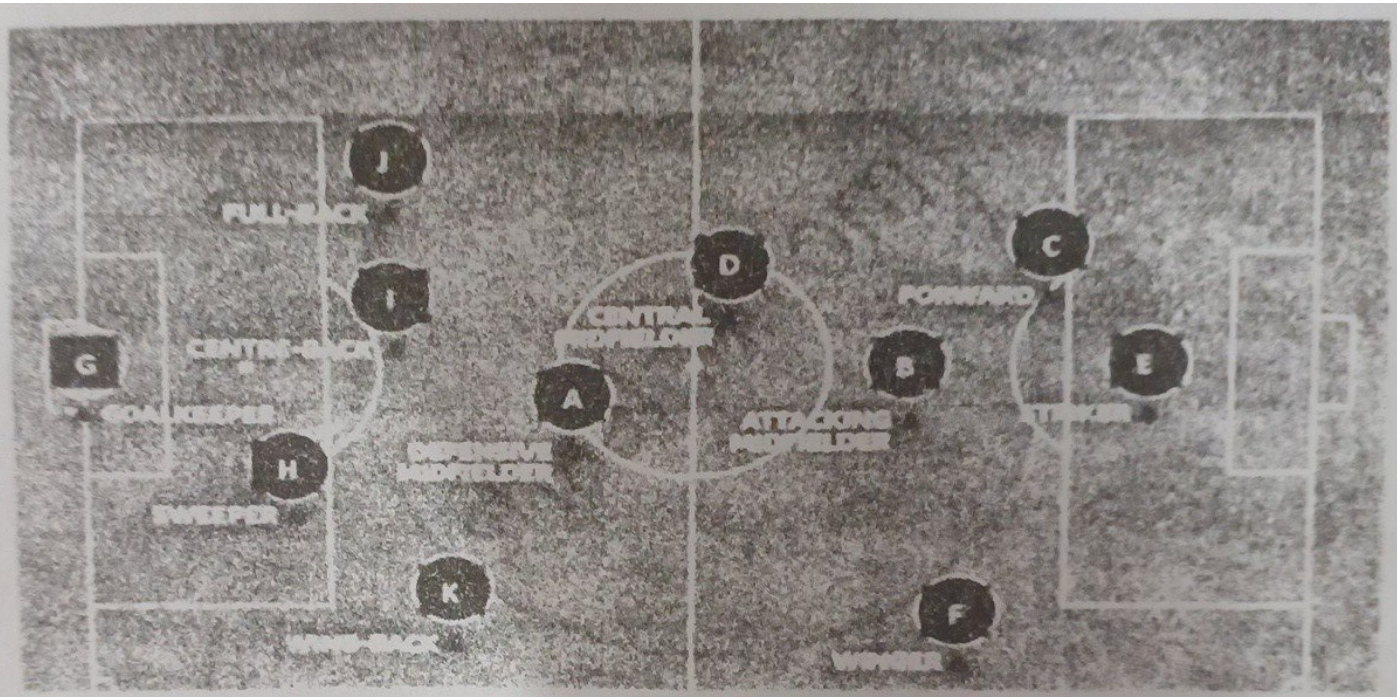
(ii) What will be Sanjitha's throw distance at the end of 6 weeks? 8.01 m

OR

(ii) When will she be able to achieve a throw of 11.16 m?

(iii) How many throws did she perform during the entire 15 day camp?

33. "Tharunya was thrilled to learn that the football tournament had been scheduled within a monthly time frame, from July 20th to August 20th, 2023. For the first time in the history of the FIFA Women's World Cup, the event is co-hosted by two nations across 10 venues. Her father believed that the game could be better understood if the positions of players were represented as points on a coordinate plane."



Based on the above image, answer the following questions:

(i) At a certain instance. the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed a parallelogram are A(l, 2), B(4, 3) and C(6, 6).

(ii) Determine whether the positions of the Goal keeper G(−3, 5), Sweeper H(3, 1), and Wing-back K(0, 3) lie on a same straight line.

OR

(ii) Determine whether the Full-back J(5, −3) and centre-back I(−4, 6) are equidistant from forward C (0, 1) and whether C is the mid-point of line segment IJ.

(iii) If Defensive midfielder A(1, 4), Attacking midfielder B(2, −3) and Striker E(a, b) lie the on the same straight line and B is equidistant from A and E, then determine the position of E.