

QUARTELY MODEL EXAM 2023-24

CLASS- X

Mathematics

Marks: 100

Time: 3 Hrs

SECTION -A

I. Choose the correct answer:

14 x 1 =14

- If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B , then the number of elements in B is
 (A) 3 (B) 2 (C) 4 (D) 8
- If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
 (A) $(2, -2)$ (B) $(5, 1)$ (C) $(2, 3)$ (D) $(3, -2)$
- If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively
 (A) $(8, 6)$ (B) $(8, 8)$ (C) $(6, 8)$ (D) $(6, 6)$
- An A.P. consists of 31 terms. If its 16th term is m , then the sum of all the terms of this A.P. is
 (A) $16m$ (B) $62m$ (C) $31m$ (D) $\frac{31}{2}m$
- The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots$
 (A) $\frac{1}{24}$ (B) $\frac{1}{27}$ (C) $\frac{2}{3}$ (D) $\frac{1}{81}$
- If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
 (A) 4 (B) 2 (C) 1 (D) 3
- If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is
 (A) 0 (B) 6 (C) 7 (D) 13
- If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
 (A) 3 (B) 5 (C) 6 (D) 8
- Graph of a linear equation is a _____
 (A) straight line (B) circle (C) parabola (D) hyperbola
- If $\triangle ABC$ is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5$ cm, then AB is
 (A) 2.5 cm (B) 5 cm (C) 10 cm (D) $5\sqrt{2}$ cm
- Which of the following should be added to make $x^4 + 64$ a perfect square
 (A) $4x^2$ (B) $16x^2$ (C) $8x^2$ (D) $-8x$
- The straight line given by the equation $x = 11$ is
 (A) parallel to X axis (B) parallel to Y axis
 (C) passing through the origin (D) passing through the point $(0, 11)$
- If $5x = \sec\theta$ and $\frac{5}{y} = \tan\theta$ then $x^2 - \frac{1}{y^2}$ is equal to
 (A) 25 (B) $1/25$ (C) 5 (D) 1
- The range of the data 8, 8, 8, 8, 8, ... 8 is
 (A) 0 (B) 1 (C) 8 (D) 3

SECTION-B

II. Answer any 10 questions. Question No.28 is compulsory **10x2=20**

15. If $B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$ find A and B .
16. Let $f(x) = 2x+5$. If $x \neq 0$ then find $\frac{f(x+2)-f(2)}{x}$
17. If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if $f \circ g = g \circ f$, then find the value of k .
18. Find the number of terms in the A.P. 3, 6, 9, 12, ..., 111
19. Find the 19th term of an A.P. -11, -15, -19, ...
20. Find the excluded values $\frac{7p+2}{8p^2+13p+5}$
21. If $13824 = 2^a \times 3^b$ then find a and b
22. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number
23. Solve $2m^2 + 19m + 30 = 0$
24. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$
25. If the area of the triangle formed by the vertices $A(-1, 2)$, $B(k, -2)$ and $C(7, 4)$ (taken in order) is 22 sq.units, find the value of k .
26. Find the equation of a line passing through the point $(3, -4)$ and having slope $\frac{-5}{7}$
27. A boy of height 90cm is walking away from the base of a lamp post at a Speed of 1.2m/sec. If the lamppost is 3.6m.
28. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.

SECTION -C

III. Answer any 10 questions. Question No.42 is compulsory **10x5=50**

29. Let $A =$ The set of all natural numbers less than 8, $B =$ The set of all prime numbers less than 8, $C =$ The set of even prime number. Verify that $(A \cap B) \times C = (A \times C) \cap (B \times C)$
30. If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$
31. If the function $f; R \rightarrow R$ is defined by $f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}$
- then find the values of (i) $f(-2)$ (ii) $f(4) + 2f(1)$ (iii) $\frac{f(1) - 3f(4)}{f(-3)}$
32. The product of three consecutive terms of a Geometric Progression is 343 and their sum is $91/3$. Find the three terms
33. Find the sum to n terms of the series $6 + 66 + 666 + \dots$

34. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, ..., 24 cm. How much area can be decorated with these colour papers?
35. Find the equation of a straight line parallel to Y axis and passing through the point of intersection of the lines $4x + 5y = 13$ and $x - 8y + 9 = 0$.
36. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$.
37. Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) and (-4, 3)
38. If $\frac{\cos^2\theta}{\sin\theta} = p$ and $\frac{\sin^2\theta}{\cos\theta} = q$, then prove that $p^2q^2(p^2 + q^2 + 3) = 1$
39. Find the values of a and b if the following polynomials are perfect squares
 $4x^4 - 12x^3 + 37x^2 + bx + a$
40. State and prove Thales theorem
41. The marks scored by 10 students in a class test are 25, 29, 30, 33, 35, 37, 38, 40, 44, 48. Find the standard deviation..
42. Solve $3x + y - 3z = 1$; $-2x - y + 2z = 1$; $-x - y + z = 2$.

SECTION – D

IV. Answer the following questions.

2x8=16

43.a) Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find,

(i) y when $x = 3$ and (ii) x when $y = 6$.

[OR]

b) Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Ponmozhi, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively. Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.

44.a) Construct a triangle similar to a given triangle PQR with its sides equal to

$\frac{7}{4}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{4} > 1$)

(OR)

b) Construct a triangle ΔPQR such that $QR = 5$ cm, $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2 cm

Model Question Paper

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