

QUARTERLY EXAMINATION - 2023

CLASS : 10

TIME : 3.00 Hrs.

MATHEMATICSReg. No. :

MAX. MARKS : 100

I. Choose the best Answer.**14x1=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) 8 d) 4
- Let $n(A) = m$ and $n(B) = n$, then the total number of non-empty relations that can be defined from A to B is
a) m^n b) n^m c) $2^{mn} - 1$ d) 2^{mn}
- If $f : A \rightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
a) 7 b) 49 c) 1 d) 14
- The sum of the exponents of the prime factors in the prime factorization of 1729 is
a) 1 b) 2 c) 3 d) 4
- Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
a) 3 b) 5 c) 8 d) 11
- The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
a) 14400 b) 14200 c) 14280 d) 14520
- 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
- $\frac{a^2}{a^2 - b^2} + \frac{b^2}{b^2 - a^2} =$
a) a-b b) a+b c) $a^2 - b^2$ d) 1
- Graph of a linear equation is a
a) straight line b) Circle c) Parabola d) Hyperbola
- If in triangle ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar when
a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle E$
- In a ΔABC , AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm, and $DC = 3$ cm. The length of the side AC is
a) 6 cm b) 4 cm c) 3 cm d) 8 cm
- If (5,7), (3,p) and (6,6) are collinear, then the value of P is
a) 3 b) 6 c) 9 d) 12
- The slope of the line which is perpendicular to a line joining the points (0,0) and (-8, 8) is
a) -1 b) 1 c) 1/3 d) -8

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14. (2,1) is the point of intersection of two lines.

a) $x - y - 3 = 0; 3x - y - 7 = 0$

b) $x + y = 3, 3x + y = 7$

c) $3x + y = 3; x + y = 7$

d) $x + 3y - 3 = 0; x - y - 7 = 0$

II. Answer any 10 questions. (Q. No. 28 is compulsory)

10x2=20

15. Let $A = \{1, 2, 3\}$ and $B = \{x : x, \text{ is a prime number less than } 10\}$ find $A \times B$ and $B \times A$.

16. Let $X = \{1, 2, 3, 4\}$, and $Y = \{2, 4, 6, 8, 10\}$ and $R = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$ show that R is a function and find its domain, co-domain and range?

17. Find K if $f \circ f(K) = 5$, where $f(K) = 2K - 1$.

18. Show that the square of an odd integer is of the form $4q + 1$; for some integer q .

19. Find the least number that is divisible by the first ten natural numbers.

20. Compute x , such that $10^4 \equiv x \pmod{19}$

21. If $3 + K, 18 - K, 5K + 1$ are in A.P. then find K .

22. Find the excluded values, if any of the following expression $\frac{y}{y^2 - 25}$.

23. Simplify $\frac{5t^3}{4t - 8} \times \frac{6t - 12}{10t}$

24. Determine the nature of the roots for the quadratic equation $\sqrt{2}t^2 - 3t + 3\sqrt{2} = 0$.

25. In $\triangle ABC$, D and E are points on the sides AB and AC , such that $DE \parallel BC$. If $AD = 8x - 7, DB = 5x - 3, AE = 4x - 3$ and $EC = 3x - 1$ find the value of x .

26. Show that the given points are collinear $(-3, -4), (7, 2)$ and $(12, 5)$.

27. Find the equation of a line passing through the point $(3, -4)$ and having slope $-\frac{5}{7}$.

28. A function f is defined by $f(x) = 3 - 2x$ find x such that $f(x^2) = (f(x))^2$.

III. Answer any 10 questions. (Q.No.42 is compulsory)

10x5=50

29. Let $A = \{x \in N / 1 < x < 4\}$, $B = \{x \in W / 0 \leq x < 2\}$ and $C = \{x \in N / x < 3\}$ Then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

30. If the function f is defined by $f(x) = \begin{cases} x + 2 & ; x > 1 \\ 2 & ; -1 \leq x < 1 \\ x - 1 & ; -3 < x < -1 \end{cases}$ find the value of

i) $f(3)$ ii) $f(0)$ (iii) $f(-1.5)$ (iv) $f(2) + f(-2)$

31. Consider $f(x) = x^2, g(x) = 2x, h(x) = x + 4$ show that $(f \circ g) \circ h = f \circ (g \circ h)$.

32. If $p_1^{x_1} \times p_2^{x_2} \times p_3^{x_3} \times p_4^{x_4} = 113400$ where p_1, p_2, p_3, p_4 are primes in ascending order and x_1, x_2, x_3, x_4 are integers find the value of p_1, p_2, p_3, p_4 and x_1, x_2, x_3, x_4 .

33. Find the sum of all natural numbers between 300 and 600. Which are divisible by 7.

34. Rckha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, 24 cm. How much arca can be decorated with these colourpapers?
35. Solve : $x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$
36. If $A = \frac{2x+1}{2x-1}$, $B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2 - B^2}$.
37. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$.
38. A girl is twice as old as her sister. Five years hence, the product of their ages (in years) will be 375. Find their present ages.
39. State and Prove Basic Proportionality Theorem.
40. Find the area of the quadrilateral whose vertices are at (-9, -2), (-8,-4), (2,2), (1,-3).
41. A(-3,0), B(10,-2), and C(12,3) are the vertices of $\triangle ABC$. Find the equation of the attitude through A and B.
42. The product of three consecutive terms of a Geometric progression is 343 and their sum is $\frac{91}{3}$. Find the three terms.

IV. Answer the following questions.

2x8=16

43. Construct a triangle similar to a given triangle $\triangle PQR$ with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$)
(or)
Construct a $\triangle PQR$ which the base PQ=4.5 cm, $\angle R = 35^\circ$ and the median RG from R to PQ is 6 cm.
44. Graph the following linear function $y = \frac{1}{2}x$ Identify the constant of variation and verify it with th graph also (i) Find y when x=9 (ii) Find x when y=7.5
(or)
Draw the graph of $xy = 24$, $x, y > 0$ using the grapt find (i) y when $x = 3$ (ii) x when y=12.

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