

Plk brilliants

RELATIONS AND FUNCTIONS

UNIT TEST

CLASS: 10**SUB: MATHS****I. Choose the correct answer:****MARKS:50****TIME: 1.30 Hrs.****7 x 1 = 7**

- The range of the relation $R = \{(x, x^2) / x \text{ is a prime number less than } 13\}$ is
(A) $\{2,3,5,7\}$ (B) $\{2,3,5,7,11\}$ (C) $\{4,9,25,49,121\}$ (D) $\{1,4,9,25,49,121\}$
- 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 identify function, then the value of a and b are respectively
(A) $(8,6)$ (B) $(8,8)$ (C) $(6,8)$ (D) $(6,6)$
- If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$ then fg is
(A) $\frac{3}{2x^2}$ (B) $\frac{2}{3x^2}$ (C) $\frac{2}{9x^2}$ (D) $\frac{1}{6x^2}$
- Let f and g be two functions given by $f = \{(0,1), (2,0), (3,-4), (4,2), (5,7)\}$, $g = \{(0,2), (1,0), (2,4), (-4,2), (7,0)\}$ then the range of $f \circ g$ is
(A) $\{0,2,3,4,5\}$ (B) $\{-4,1,0,2,7\}$ (C) $\{1,2,3,4,5\}$ (D) $\{0,1,2\}$
- Let $f(x) = \sqrt{1+x^2}$ then
(A) $f(xy) = f(x) \cdot f(y)$ (B) $f(xy) \geq f(x) \cdot f(y)$ (C) $f(xy) \leq f(x) \cdot f(y)$ (D) None of these
- $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is
(A) Linear (B) cubic (C) reciprocal (D) quadratic

II. Answer any five questions: (Q.No.14 is compulsory)**7 x 2 = 14**

- Let $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$ find A and B .
- Let $A = \{1,2,3,\dots,45\}$ and R be the relation defined as "is square of a number" on A . Write R as a subset of $A \times A$. Also, find the domain and range of R .
- Let $X = \{3,4,6,8\}$. Determine whether the relation $R = \{(x, f(x)) | x \in X, f(x) = x^2 + 1\}$ is a function from X to N ?
- An open box is to be made from a square piece of material, 24cm on a side, by cutting equal squares from the corners and turning up the sides. Express the volume V of the box as a function of x .
- Show that the function $f: N \rightarrow N$ defined by $f(x) = 2x-1$ is one-one but not onto.
- Represent the function $f(x) = \sqrt{2x^2 - 5x + 3}$ as a composition of two functions.
- Find the value of k such that $f \circ g = g \circ f$: $f(x) = 3x+2$, $g(x) = 6x-k$.

III. Answer any five questions: (Q.No.21 is compulsory)**7 x 5 = 35**

- 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 (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$

Let f be a function $f: N \rightarrow N$ be defined by $f(x) = 3x+2$ $x \in N$ (i) Find the images of 1,2,3

- (ii) Find the pre-images of 29, 53 (iii) Identify the type of function.

- If the function f is defined by $f(x) = \begin{cases} x+2; & x > 1 \\ 2; & -1 \leq x \leq 1 \\ x-1; & -3 < x < -1 \end{cases}$ find the values of (i) $f(3)$ (ii) $f(0)$ (iii) $f(-1.5)$ (iv) $f(2)+f(-2)$

- Let $f: A \rightarrow B$ be function defined by $f(x) = \frac{x}{2} - 1$ where $A = \{2,4,6,10,12\}$, $B = \{0,1,2,4,5,9\}$.

Represent f by (i) set of ordered pairs (ii) a table (iii) an arrow diagram (iv) a graph.

- If $f(x) = 2x-1$, $g(x) = \frac{x+1}{2}$, show that $f \circ g = g \circ f = x$.

- If $f(x) = 2x+3$, $g(x) = 1-2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$.

- Let $A = \{3,4,7,8\}$ and $B = \{1,7,10\}$. Which of the following sets are relations from A to B ?

(i) $R_1 = \{(3,7), (4,7), (7,10), (8,1)\}$ (ii) $R_2 = \{(3,1), (4,12)\}$ (iii) $R_3 = \{(3,7), (4,10), (7,7), (7,8), (8,11), (8,7), (8,10)\}$ **IV. Answer all the question:****1 x 8 = 8**

- 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)

A bus travelling at a uniform speed of 50km/hr. Draw the distance-time graph and hence find (i) the constant of variation (ii) how far will it travel in 90 minutes?

(iii) the time required to cover a distance of 300km from the graph.

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