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## MATHS

# BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH) 

## RELATION AND MAPPING

Examples

1. If $(3 x+2 y, 12)=(5,2 x-3 y)$, find the value of $x$ and $y$.

O
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2. If $A=\{1,2,3\}$, find
$A \times A$
3. If $A=\{1,2,3\}$, find
$A \times A \times A$.

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4. If $A=\{1,3\}, B=\{3,5\}$ and $C=\{5,10\}$, show that,
$A \times(B \cup C)=(A \times B) \cup(A \times C)$

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5. If $A=\{1,3\}, B=\{3,5\}$ and $C=\{5,10\}$, show that,
$A \times(B \cap C)=(A \times B) \cap(A \times C)$

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6. If $A=\{1,2,3\}, B=\{2,3,4\}, C=\{1,3,4\}$ and $D=\{2,4,5\}$, show that, $(A \times B) \cap(C \times D)=(A \cap C) \times(B \cap D)$

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7. Let $P=\{x: x$ is a prime natural number is less than 9$\}$ and $Q=\{2,4\}$, then find $P \times Q$.

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8. The cartesian product $A \times A$ has 16 elements and its three terms are $(1,2),(2,3)$ and $(3,4)$, find $A$.

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9. If $\mathbb{R}$ is the set of all real numbers, what does the cartesian product $\mathbb{R} \times \mathbb{R}$ represent?

## - Watch Video Solution

10. If $\mathbb{R}$ is the set of all real numbers. What does the cartesian product $\mathbb{R} \times \mathbb{R} \times \mathbb{R}$ represent?

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11. If $A=\{1,2,3,4,5\}$ and $B=\{1,2,3,7,8,9\}$, find the value of $n\{(A \times B) \cap(B \times A)\}$.

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12. If $X \times Y=\{(1,2),(4,3),(5,2),(1,4),(4,2),(5,4),(1,3),(4,4),(5,3)\}$, find X and Y .
13. If $n(A \times B)=8$ and four terms of cartesian product $A \times B$ are (1,
4),(3, 5),(4, 4),(2, 4), find the remaining four terms of $A \times B$.

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14. If $n(A \times A)=9$ and two terms of the set $A \times A$ are ( 1,2 ) and (3,1), then determine the remaining terms of $A \times A$.

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15. If A is a non-empty set and $A \times B=A \times C$, then prove that, $\mathrm{B}=\mathrm{C}$.

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16. If $A \times B \subseteq C \times D$ and $A \times B \neq \phi$, then show that, $A \subseteq C$ and $B \subseteq D$.
17. 

$A=\{x: x \in \mathbb{N} \wedge x \leq 2\}$ and $B=\{x: x \in \mathbb{Z} \wedge-1<x<3\}$, find $A \times B$.

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18. Let $A=\{a, b, c\}$ and $B=\{1,2,3\}$ be two sets. State with reasons which of the following is a relation form A to B :
$R=\{(a, 2),(a, 3),(b, 1),(c, 3),(b, 2)\}$

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19. Let $A=\{a, b, c\}$ and $B=\{1,2,3\}$ be two sets. State with reasons which of the following is a relation form A to B :
$S=\{(a, 3),(b, 1),(c, 2),(2, a)\}$
20. Let $A=\{3,4,5,6,7\}$ and $B=\{8,9,10,11,12\}$ be two given sets and $R$ be the relation from A to B defined by, $(x, y) \in R \Rightarrow x$ divides y . Write R as a set of ordered pairs. Also find its domain and range.

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21. $A$ relation $R$ from the set $A=\{3,4,5,6\}$ to the set $B=\{2,6,7,10\}$ is defined as follows:
$(x, y) \in R \Rightarrow x$ is relatively prime to Y
Find $R$ and $R^{-1}$ as sets of ordered pairs.

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22. A relation $R$ is defined from set $A=\{1,2,3,4\}$ to set $B=\{5,6,7,8\}$ as follows:
$x R y \Rightarrow x+y=8$

Find $R^{-1}$, the inverse relation of R . Also find the domain and range of $R^{-1}$.

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23. Let $R$ be the relation on the set $A$ of first twelve natural numbers defined by,
$R=\{(x, y): x+2 y=12$ and $x, y \in A\}$
Find $R$ as the set of ordered pairs. Also find its domain and range.

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24. Let $R$ be the relation defined on the set of natural numbers $\mathbb{N}$ by,
$(x, y) \in R \Rightarrow 2 x+3 y=20$ and $x, y \in \mathbb{N}$
Find $R$ and $R^{-1}$, the inverse relation of R , as sets of ordered pairs.

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25. Find the range and domain of the relation $R$ defined below:
$R=\{(2 x-5, x-3): x$ is an even natural number less than 12$\}$

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26. Let $\mathbb{Z}$ be the set of integers and let $R$ be the relation on $\mathbb{Z}$ defined as
$R=\left\{(x, y) \mid x, y \in \mathbb{Z}\right.$ and $\left.x^{2}+y^{2}=100\right\}$
Find R as the set of ordered pairs. Also find its domain and range.

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27. Let $A=\{1,2,3,4\}$ and $B=\{3,6,9\}$. If $f$ is the rule associating elements of $A$ to elements of $B$, such that $f(1)=3, f(3)=6, f(4)=3$. Examine whether $f$ defines a mapping or not.

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28. Let $X=\{1,3,5,7\}$ and $Y=\{2,4,6,8\}$. If $f$ be the rule associating elements of $X$ to elements of $Y$, such that $f(1)=4, f(3)=2, f(5)=8, f(3)=6$, $f(7)=4$. State whether $f$ defines a function of $X$ into $Y$ or not.

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29. Let $A=\{-1,0,1\}$ and $B=\{1,2,3,4\}$. If $f$ is the rule associating elements of $A$ to elements of $B$, such that $f(-1)=2, f(0)=1$ and $f(1)=4$. Does $f$ define a mapping?

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30. Let $\mathrm{A}=\{-1,0,1,2,3\}$ and $f: A \rightarrow \mathbb{Z}$ be given by $f(x)=x^{2}-5 x+7$, where $\mathbb{Z}$ is the set of integers. Find the range of f .

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31. Let $\mathrm{A}=\{-1,0,1,2,3\}$ and $f: A \rightarrow Z$ be given by $f(x)=x^{2}-5 x+7$, where $Z$ is the set of integers. Find pre-images of 1,4 and 7 under $f$.

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32. Functions $f$ and $g$ are defined as follows:
$f: R-\{1\} \rightarrow \mathbb{R}$, where $f(x)=\frac{x^{2}-1}{x-1}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$,
Where $g(x)=x+1, \mathbb{R}$ being the set of real numbers. Is $f=g$ ? Give reasons
for your answer.

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33. 

Let
$A=\left\{-1,-2,0,1, \frac{5}{2}, 3\right\}, B=\{-6,-5,0,1,4,9\}$ and $f: A \rightarrow B$ defined by $f(x)=2 x^{2}-3 x-5$. Find $\mathrm{f}(\mathrm{A})$. Is $\mathrm{f}(\mathrm{A})=\mathrm{B}$ ?
34. Let $\mathbb{Q}$ be the set of rational numbers and $f: \mathbb{Q} \rightarrow \mathbb{Q}$, be defined by, $f(x)=2 x^{2}-11 x+16$. Find $\{x: f(x)=4\}$.

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35. If $A=\{1,2,3,4,5,6\}$, show that the relation
$f=\{(x, y): x+y=7\}$, for all $x, y \in A$
defines $a$ mapping from $A$ to itself but the relation $g=\{(x, y): x+y>8\}$ does not define a mapping in set A.

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36. Let $\mathrm{A}=\{1,2,3,4\}$ and $\mathbb{R}$ be the set of real numbers. If $f: A \rightarrow \mathbb{R}$ be defined by $f(x)=x^{2}-1$, find f as a set of ordered pairs and determine its range.
37. Show that, $f=\{(1,-6),(2,-1),(3,4),(4,9)\}$ defines a mapping. If this mapping is described by the rule $f(x)=a x+b$, then what values should be assigned to $a$ and $b$ ?

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38. Let $\mathbb{Z}$ be the set of integers and $f$ be a subset of $\mathbb{Z} \times \mathbb{Z}$, such that,
$f=\{(x y, x+y): x, y \in \mathbb{Z}\}$
Is $f$ a function from $\mathbb{Z}$ into $\mathbb{Z}$ ? Give reasons for your answer.

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39. Let $\mathbb{R}$ and $\mathbb{Q}$ be the set of real numbers and rational numbers respectively and $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as follows:
$f(x)= \begin{cases}5, & \text { when } x \in \mathbb{Q} \\ -5, & \text { when } x \notin \mathbb{Q}\end{cases}$
Find $f(3), f(\sqrt{3}), f(3.6), f(\pi), f(e)$ and $f(3.36)$,
40. Let $\mathbb{R}$ and $\mathbb{Q}$ be the set of real numbers and rational numbers respectively and $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as follows: $f(x)=x^{2}$ Find pre-image of (9).

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41. Let $\mathbb{R}$ be the set of real numbers and $f: \mathbb{R} \rightarrow \mathbb{R}$ be given by, $f(x)=\log _{e} x$. Does f define a function ?

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42. Let $\mathbb{R}$ and $\mathbb{R}^{+}$be the sets of real numbers and positive real numbers respectively. If $f: \mathbb{R}^{+} \rightarrow \mathbb{R}$ be defined by $f(x)=\log _{e} x$, find
(a) range of $\mathrm{f}(\mathrm{b})\{x: f(x)=1\}$.

Also show that, $f(x y)=f(x)+f(y)$.
43. Find the image set of the domain of each of the following functions
:
$f: \mathbb{R} \rightarrow \mathbb{R}$ given by, $f(x)=\sin x$, for all $x \in \mathbb{R}$,

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44. Find the image set of the domain of each of the following functions
$g: \mathbb{R} \rightarrow \mathbb{R}$ defined by, $g(x)=x^{2}+2$, for all $x \in \mathbb{R}$, where $\mathbb{R}$ is the set of real numbers.

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45. Does the equation $y=2 x-9$ represent $y$ as a function of $x$ ? If so, find the domain of definition and range of the function.
46. If $f(x)=x^{2}-5 x+7, \quad$ find $\quad \mathrm{f}(2), \quad \mathrm{f}(-2), \quad \mathrm{f}(\mathrm{x}+\mathrm{h})$,
$f\left(x^{2}+2\right)$ and $\frac{f(x+h)-f(x)}{h}$.

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47. If $F(x)=x+|x-1|$, find $\mathrm{F}(3)$ and $\mathrm{F}(-3)$.

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48. If $f(x)=2|x|-3[x]$ where $[\mathrm{x}]$ denotes greatest integer in x not exceeding the value of $x$, find the value of $f(2.5)$ and $f(-2.5)$.

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49. If $\phi(x)=2^{m x+1}$, show that
$\phi(a) . \phi(b) . \phi(c)=4 . \phi(a+b+c)$.

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50. If $f(x-2)=2 x^{2}+3 x-5$, find $\mathrm{f}(\mathrm{x})$ and prove that $\mathrm{f}(-1)=0$.

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51. If $4 f(x)+3 f(-x)=7-3 x$, find $f(x)$.

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52. If $f(x)=e^{x+a}, g(x)=x^{b^{2}}$ and $h(x)=e^{b^{2} x}$, find the value of $\frac{g[f(x)]}{h(x)}$.
53. If $y=f(x)=\frac{l x+m}{n x-l}$, express $\mathrm{f}(\mathrm{y})$ in the simplest form in x .

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54. If $f(x)=\frac{1-x}{1+x}$, prove that
$f\left\{f\left(\frac{1}{x}\right)\right\}=\frac{1}{x}[x \neq 0]$

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55. If $f(x)=\frac{1-x}{1+x}$, prove that
$f\left[f\left\{f\left(\frac{1}{x}\right)\right\}\right]=-f(x)$

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56. A function $F(x)$ is defined as follows:
$F(x)= \begin{cases}1+2 x & \text { when } x \leq 1 \\ 3-2 x & \text { when } x>1\end{cases}$

Determine $\mathrm{F}(0), \mathrm{F}(-1.5), \mathrm{F}(1), \mathrm{F}(2.6)$ and $\mathrm{F}(\mathrm{x}+2)$.

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57. If $f(x) f(y)=f(x)+f(y)+f(x y)-2$ for all real values of $x$ and $y$ and $f(2)=5$, find $\mathrm{f}(4)$ and $f\left(\frac{1}{4}\right)$.

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58. Find the domain of definition of the following functions:
$\frac{x^{2}+x+5}{x^{2}-6 x+8}$

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59. Find the domain of definition of the following functions:
$\sqrt{x^{2}+x-12}$
60. Find the domain of definition of the following functions:
$\frac{1}{\sqrt{x^{2}-4 x}}$

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61. Find the domain of definition of the following functions :
$\frac{\sin x}{x}$

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62. Find the domain of definition of the following functions:

$$
\frac{x}{\log (1+x)}
$$

63. Find the domain of definitions of each of the following functions :
$f(x)=\cos ^{-1} 2 x$

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64. For what values of x is the function $f(x)=\frac{\sin x}{\cos x-\sin x}$ not defined?

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65. If $f(x)=\frac{|x|}{x}$ and $c$ be a non-zero real number, show that $|f(c)-f(-c)|=2$.

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66. Find the domain of definition of $f(x)=\log _{e} \cdot \frac{1-x}{1+x}$. Further show that,
$f\left(x_{1}\right)+f\left(x_{2}\right)=f\left(\frac{x_{1}+x_{2}}{1+x_{1} x_{2}}\right), x_{1}, x_{2} \in(-1,1)$

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67. Find the ranges of the following functions:
$\cos x\left(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}\right)$

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68. Find the ranges of the following functions:
$\frac{1}{2-\sin 3 x}$

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69. Find the ranges of the following functions:
$y=\frac{x}{1+x^{2}}$
70. Find the domain of definition of the function $y(x)$ given by the equation $2^{x}+2^{y}=2$

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71. Find the domain and range of the function $f(x)={ }^{9-x} P_{x-1}$

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72. If $f(x)$ is a quadratic function and $f(2)=1, f(3)=6$ and $f(-1)=10$, find $f(x)$ and show that, $f(1)=0$.

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73. The taxi fare is Rs. 3.50 for 1 km or less from start and Rs. 1.50 per km or any fraction thereof, for additional distance. If the fare be Rs. Y for a
distance of $x \mathrm{~km}$, express y as a function of x .

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74. Find the domain of definition of
$f(x)=\sqrt{x-1}+\sqrt{2-x}$

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75. Find the domain of definition of
$\log _{e} \cdot \frac{2+x}{2-x}$

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76. Find the sum and difference of identify function and modulus function.
77. The function $f$ satisfies the equation, $f(x+y)=f(x)+f(y)$. Show that
(a) $f(0)=0$
(b) $f(x)$ os an odd function
(c) If $x$ is an integer and $f(1)=a$ then, $f(x)=a x$.

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78. Let $f(x)=A x^{2}+B x+C$ where $\mathrm{A}, \mathrm{B}, \mathrm{C}$ are three real constants, if $f(x)$ is integer for integral values of $x$, then prove that each of $2 A,(A+B)$ and $C$ is an integer. Conversely, if each of $2 A,(A+B), C$ is an integer then $f(x)$ will be integer for integral values of $x$.

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79. Determine the product function of the identify function and modulus function.
80. Find the quotient function of dividing the identify function by the modulus function.

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81. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions:
f+g

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82. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions:
ff
83. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions :
gg

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84. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions:
f-g

- Watch Video Solution

85. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions:
fg

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86. Two real function $f$ and $g$ are defined respectively by $f(x)=\sqrt{x-3}$ and $g(x)=\sqrt{x^{2}-9}$. Find each of the following functions:

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87. Two real functions $f:[5, \infty) \rightarrow \mathbb{R}$ and $g:[-5, \infty) \rightarrow \mathbb{R}$ are defined respectively by $f(x)=\sqrt{x-5}$ and $g(x)=\sqrt{x+5}$, find the function $\mathrm{f}+\mathrm{g}$ and $\mathrm{f}-\mathrm{g}$.

## (D) Watch Video Solution

88. Two real valued functions $f$ and $g$ are defined respectively by $f(x)=\log _{e}(1-x)$ and $g(x)=[x]$, find the following functions: f+g

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89. Two real valued functions $f$ and $g$ are defined respectively by $f(x)=\log _{e}(1-x)$ and $g(x)=[x]$, find the following functions : f-g

## - Watch Video Solution

90. Two real valued functions $f$ and $g$ are defined respectively by $f(x)=\log _{e}(1-x)$ and $g(x)=[x]$, find the following functions :
fg
91. Two real valued functions $f$ and $g$ are defined respectively by $f(x)=\log _{e}(1-x)$ and $g(x)=[x]$, find the following functions:

## (D) Watch Video Solution

92. Two real valued functions $f$ and $g$ are defined respectively by $f(x)=\log _{e}(1-x)$ and $g(x)=[x]$, find the following functions:
$\frac{g}{f}$

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93. If $f(x)=e^{x}$ and $g(x)=\log _{e} x$, then find $(\mathrm{f}+\mathrm{g})(1)$ and $\mathrm{fg}(1)$.

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94. Find the domain of domain of definitions of the real function $f(x)$ defined below:
$f(x)=\frac{1}{\sqrt{x+[x]}}$

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95. Find the domain of domain of definitions of the real function $\mathrm{g}(\mathrm{x})$ defined below:
$g(x)=\frac{1}{\sqrt{x-[x]}}$

## (D) Watch Video Solution

96. Find the range of each of the following functions:
$3-|x-3|$
97. Find the range of each of the following functions:
$\frac{1}{\sqrt{x-[x]}}$

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98. Find the range of each of the following functions:
$\phi(x)=\frac{|x-2|}{x-2}$

## (D) Watch Video Solution

99. Draw the graph of the constant function, $f(x)=c$ (here $c$ is a fixed real constant).

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100. Draw the graph of the identity function, $\mathrm{I}(\mathrm{x})=\mathrm{x}$, for all $x \in \mathbb{R}$.
101. Draw the graph of the function, $f(x)=2 x-5$.

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102. Draw the graph of the function, $f(x)=x^{2}$.

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103. Draw the graph of the function, $f(x)=\frac{1}{x}$.

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104. Draw the graph of the function, $f(x)=\sqrt{x}(x \geq 0)$.
105. Sketch the graph of the function :

$$
y=f(x)= \begin{cases}-x, & \text { when } x \leq 0 \\ x, & \text { when } x>0\end{cases}
$$

From the graph examine the continuity of $f(x)$ at $x=0$.

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106. Draw the graph of the function

$$
y=f(x)= \begin{cases}\frac{|x|}{x}, & \text { when } x \neq 0 \\ 0, & \text { when } x=0\end{cases}
$$

From the graph examine the continuity of $f(x)$ at $x=0$.

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107. A function $f(x)$ is defined as follows:
$f(x)= \begin{cases}1, & \text { when } \mathrm{x} \text { is an integer } \\ 0, & \text { when } \mathrm{x} \text { is not an integer }\end{cases}$
Draw the graph of the function and from the graph find its points of discontinuity (if any).
108. Draw the graph of the function defined below and from the graph find its point of discontinuity (if any) :

$$
f(x)= \begin{cases}2 x+6, & \text { when }-3 \leq x \leq 0 \\ 6, & \text { when } 0<x<2 \\ 2 x-6, & \text { when } 2 \leq x \leq 5\end{cases}
$$

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109. Draw the graph of the function $f(x)=\frac{x^{2}-1}{x-1}$ and from the graph examine whether $f(x)$ is continuous at $x=1$ and $x=2$.

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110. A function $f(x)$ is defined as follows:

$$
f(x)= \begin{cases}x-1, & \text { when } x>0 \\ -\frac{1}{2}, & \text { when } x=0 \\ x+1, & \text { when } x<0\end{cases}
$$

Draw the graph of the function $f(x)$. From the graph find the value of $\mathrm{f}(\mathrm{x})$ at $x=-\frac{1}{2}$ and examine whether $\mathrm{f}(\mathrm{x})$ is continuous at $\mathrm{x}=0$.

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111. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(f \circ g)(x)$

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112. Draw the graph of the function $y=[x]$, where $[x]$ denotes the greatest integer not greater than x .

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113. Draw the graph of the function, $f(x)=e^{x}$.
114. Draw the graph of the function, $f(x)=\log _{e} x(x>0)$.

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115. Draw the graph of the function, $f(x)=\sin x$.

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116. Draw the graph of the function $f(x)=\cos x$.

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117. Draw the graph of the function, $\mathrm{f}(\mathrm{x})=\tan \mathrm{x}$.

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1. If $(a+b, 3 a-2 b)=(-9,-2)$, then $a$ and $b$ are $\qquad$
A. 2 and 1 respectively
B. -1 and 2 respectively
C. 1 and 2 respectively
D. -4 and -5 respectively

## Answer: D

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2. If $\mathrm{A}=\{1,2,4\}, \mathrm{B}=\{2,4,5\}, \mathrm{C}=\{2,5\}$, then $(A-B) \times(B-C)$ is $\qquad$
A. $\{(1,4)\}$
B. $\{(1,2),(1,5),(2,5)\}$
C. $(1,4)$
D. none of these

Answer: A

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3. If $\mathrm{n}(\mathrm{A})=3, \mathrm{n}(\mathrm{B})=4$ then $n(A \times A \times B)=$
A. 12
B. 48
C. 36
D. 10

## Answer: C

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4. If $\mathrm{A}=\{\mathrm{a}, \mathrm{b}\}$ and $\mathrm{B}=\{1,2,3\}$ then $(A \times B) \cap(B \times A)=$
A. $\{(a, 1),(a, 2),(b, 3)\}$
B. $\{(b, 1),(b, 2),(b, 3)\}$
C. $\{(a, 1),(b, 1),(a, 3)\}$
D. $\phi$

Answer: D

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5. Let $A$ and $B$ be two sets containing respectively $m$ and $n$ distinct elements. Then number of different relations can be defined from set $A$ to set $B$ is $\qquad$
A. $2^{m+n}$
B. $2^{n^{m}}$
C. $2^{m^{n}}$
D. $2^{m n}$
6. If $R=\{(3,9),(3,12),(4,8),(4,12),(5,10),(6,12)\}$ be a given relation, then domain of $R=$
A. $\{3,4,5,6\}$
B. $\{8,9,10,12\}$
C. $\{3,5\}$
D. none of these

## Answer: A

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7. If $R=\{(3,9),(3,12),(4,8),(4,12),(5,10),(6,12)\}$ be a given relation, then range of $R=$
A. $\{3,4,5,6\}$
B. $\{8,9,10,12\}$
C. $\{3,10,12\}$
D. none of these

## Answer: B

## (D) Watch Video Solution

8. 

If
R
is
a relation
on
the
set
$A=\{1,2,3,4,5,6,7,8,9\}$ given by $x R y \Leftrightarrow y=3 x$, then $\mathrm{R}=$
A. $\{(3,1),(6,2),(8,2),(9,3)\}$
B. $\{(3,1),(6,2),(9,3)\}$
C. $\{(3,1),(2,6),(3,9)\}$
D. none of these
9. Let $R$ be a relation from set $A$ do a set $B$, then $\qquad$
A. $R=A \cup B$
B. $R=A \cap B$
C. $R \subseteq A \times B$
D. $R \subseteq B \times A$

## Answer: C

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10. Total number of relations that can be defined on set $A=\{a, b, c\}$ is
A. $2^{9}$
B. $2^{6}$
C. $2^{8}$
D. $2^{3}$

## Answer: A

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11. State which of the following is the total number of relations from set $A=\{1,2,3\}$ to set $B=\{4,5\}$ ?
A. $2^{3}$
B. $2^{4}$
C. $2^{5}$
D. $2^{6}$

## Answer: D

12. Let the relation $R$ on set $A=\{1,2,3,4,5\}$ be defined as follows:
$R=\{(1,2),(2,1),(2,2),(3,3),(4,1),(2,4),(4,2),(1,5),(5,1),(5,5)\}$
Then state which one is true in each of the following two cases
A. 5 R 2
B. $2 \not{ }^{\prime} 2$
C. 1 R 3
D. 1 R 2

## Answer: D

## - Watch Video Solution

13. Let the relation $R$ on set $A=\{1,2,3,4\}$ be defined as follows:

$$
R=\{(1,2),(2,1),(2,2),(3,3),(4,1),(2,4),(4,2)\}
$$

Then state which one is true in each of the following two cases viz
B. 3 R 2
C. $1 \nless / 4$
D. 4 R 3

## Answer: C

## - Watch Video Solution

14. Let $\mathbb{R}$ be the set of real numbers and the mapping $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x)=\sin x$ (for all $x \in \mathbb{R}$ ), then the range of f is $\qquad$
A. $\{f(x) \in \mathbb{R}:-\infty \leq f(x) \leq \infty\}$
B. $\{f(x) \in \mathbb{R}:-\infty \leq f(x) \leq 1\}$
C. $\{f(x) \in \mathbb{R}:-1<f(x)<1\}$
D. $\{f(x) \in \mathbb{R}:-1 \leq f(x) \leq 1\}$

## Answer: D

15. The total number of relation from the set $\{p, q\}$ to the set $\{e, f\}$ is-
A. 16
B. 32
C. 56
D. 4

## Answer:

16. Let $A=\{0,1,2,3,4\}$ and $\mathbb{Z}$ be the set of integers. If the mapping $f: A \rightarrow \mathbb{Z}$ be defined by $f(x)=x^{2}-5 x+2$, state which of the following is the pre-image of 2?
A. 5
B. there is no pre-image of 2
C. 1 and 4
D. 0

Answer: D

## - Watch Video Solution

17. If $A=\{-2,1,0,-1,2\}, B=\{-6,-5,-3,0,3\}$ and the mapping $f: A \rightarrow B$ is defined by $f(x)=2 x^{2}+x-6$, state which of the following is the image of ( -2 ) ?
A. 0
B. 3
C. -3
D. -5
18. Let, $\mathbb{Z}$ be the set of integers and the mapping $f: \mathbb{Z} \rightarrow \mathbb{Z}$ be given by
$f(x)=2 x-1$, state which of the following sets is equal to the set
$\{x: f(x)=3\} ?$
A. $\{3\}$
B. $\{2\}$
C. $\{0\}$
D. $\{-1\}$

## Answer: B

## - Watch Video Solution

19. If $f(x+2)=2 x^{2}-3 x+5$ then $\mathrm{f}(1)=$
A. 2
B. 5
C. 10
D. none of these

Answer: C
(D) Watch Video Solution
20. If $f(x)=4^{x}$ then $f\left(\log _{4} x\right)=$
A. 4
B. $x$
C. $4^{x}$
D. $x^{4}$

## Answer: B

21. The total number of relation from the set $\{1,6,7\}\}$ to the set $\{1,5\}$ is-
A. 66
B. 64
C. 32
D. 16

## Answer:

## - Watch Video Solution

22. State for which of the following, the two functions $f(x)=x$ and $\phi(x)=+\sqrt{x^{2}}$ are identical.
A. $0<x<\infty$
B. $-\infty<x<\infty$
C. $0 \leq x<\infty$
D. $-\infty<x \leq 0$

## Answer: C

## - Watch Video Solution

23. If $f(x)=3 x-9$, state which of the following is the value of $f\left(x^{2}-1\right):$
A. $3 x^{2}-9$
B. $3 x^{2}-12$
C. $x^{2}-10$
D. $3 x^{2}-10$

## Answer: B

24. If $f(x-1)=7 x-5$ find $f(x)$ and $f(x+2)$.
A. $7 x+2$
B. $7 x-12$
C. $8 x-4$
D. $7(x+1)$

## Answer: A

## - Watch Video Solution

25. If $2 f(x)+3 f(-x)=15-4 x$, state which of the following is the
value of $[f(1)+f(-1)]$.
A. 5
B. 7
C. -6
D. 6

## Answer: D

## - Watch Video Solution

26. If $3 f(x)+2 f(-x)=5(x-2)$, state which of the following is the value of $f(0)$ :
A. 0
B. -2
C. 2
D. 1

## Answer: B

27. If $f(x)=\log _{3} x$ and $\phi(x)=x^{2}$, state which of the following is the value of $f\{\phi(3)\}$ :
A. 0
B. 1
C. 2
D. 3

## Answer: C

## - Watch Video Solution

28. The domain of definition of the function $f(x)=\sqrt{x+3}$ is :
A. $(-\infty, 3)$
B. $(-\infty, 3]$
C. $(3, \infty)$
D. $[-3, \infty)$

## Answer: D

## - Watch Video Solution

## Very Short Answer Type Questions

1. Define and write the cartesian product of two sets $P=(a, b, c)$ and $Q=$ $\{2,3\}$. Is $P \times Q=Q \times P$ true?

## - Watch Video Solution

2. If $A=\{2,3\}, B=\{3,4\}$ and $C=\{4,6\}$, find
$(A \times B) \cup(B \times C)$
(D) Watch Video Solution
3. If $A=\{2,3\}, B=\{3,4\}$ and $C=\{4,6\}$, find $(A \times B) \cap(B \times C)$

## - Watch Video Solution

4. If $A=\{1,4\}, B=\{4,3\}$, and $C=\{3,6\}$, show that,
$A \times(B \cup C)=(A \times B) \cup(A \times C)$

## - Watch Video Solution

5. If $A=\{1,2,3\}, B=\{2,3,4\}, S=\{1,3,4\}$ and $T=\{2,4,5\}$, then verify that, $(A \times B) \cap(S \times T)=(A \cap S) \times(B \cap T)$.

## (D) Watch Video Solution

6. If $A=\{a, b\}, B=\{m, n\}$ and $C=\{p, q\}$, show that,
$A \times(B \cap C)=(A \times B) \cap(A \times C)$
7. If $A=(0,1)$, find
$A \times A$

## - Watch Video Solution

8. If $A=(0,1)$, find
$A \times A \times A$

## - Watch Video Solution

9. The total number of relation from the set $\{7,8\}$ to the set $\{2,3,6,5\}$ is-
A. 6
B. 256
C. 16
D. 64

## Answer:

## D Watch Video Solution

10. Find all the relations from the set $A=\{1,2\}$ to the set $B=\{3\}$.

## D Watch Video Solution

11. If $R$ is the relation "is greater than" from $A=\{1,2,3,4,5\}$ to $B=\{1,3,4\}$, write R as the set of ordered pairs. Also find $R^{-1}$.
12. Let $S=\{a, b, c, d, e\}$ and $R$ be a relation on $S$ defined by,
$R=\{(b, a),(b, d),(d, b),(d, d),(e, b)\}$,
find the domain

## - Watch Video Solution

13. Let $S=\{a, b, c, d, e\}$ and $R$ be a relation on $S$ defined by,
$R=\{(b, a),(b, d),(d, b),(d, d),(e, b)\}$,
find the range.

## (D) Watch Video Solution

14. Let $S=\{a, b, c, d, e\}$ and $R$ be a relation on $S$ defined by,
$R=\{(b, a),(b, d),(d, b),(d, d),(e, b)\}$,
find the inverse of R .
15. A relation $R$ is defined on the set $A=\{2,3,4,6\}$ as follows:
$(x, y) \in R \Rightarrow x$ and $y$ are relatively prime.
Write R as a set of ordered pairs. Also find Dom. $(R)$ and Range $(R)$.

## - Watch Video Solution

16. Find $R^{-1}$ in each of the following cases:
$R=\{(1,2),(1,3),(2,4),(2,3),(3,2),(4,3)\}$

## - Watch Video Solution

17. Find $R^{-1}$ in each of the following cases :
$R=\{(x, y): x \in \mathbb{N}, y \in \mathbb{N}$ and $2 x+y=10\}$

## - Watch Video Solution

18. Let $A=\{2,3,4,5\}$ and $B=\{8,9,10,11\}$ and let $R$ be a relation from $A$ to $B$ defined by, $x R y \Rightarrow$ "x divides y ". Find R as a set of ordered pairs and also find its domain and range.

## - Watch Video Solution

19. Let $f: R \rightarrow R$ and $g: R \rightarrow R \quad$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(g \circ f)(x)$

## - Watch Video Solution

20. What is the difference between a mapping and a relation? Is every relation a mapping?

## - Watch Video Solution

21. Let, the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by,
$f(x)=\left\{\begin{array}{ll}1 & \text { when } x \in \mathbb{Q} \\ -1 & \text { when } x \notin \mathbb{Q}\end{array}\right.$ Find
$f(2), f(\sqrt{2}), f(\pi), f(2.23), f(e)$

## - Watch Video Solution

22. Let, the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by,
$f(x)=\left\{\begin{array}{ll}1 & \text { when } \\ -1 & \text { when } \\ x \notin \mathbb{Q}\end{array}\right.$ find
range of $f$

## Watch Video Solution

23. Let, the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by,
$f(x)=\left\{\begin{array}{ll}1 & \text { when } x \in \mathbb{Q} \\ -1 & \text { when } \\ x \notin \mathbb{Q}\end{array}\right.$ find
pre-image of 1 and (-1)
24. Find the domain for which the function $f(x)=3 x^{2}-2 x$ and $\mathrm{g}(\mathrm{x})=$ $9 x-6$ are equal.

## - Watch Video Solution

25. Let $C$ be the set of complex numbers and the function $f: \mathbb{R} \rightarrow \mathbb{R}, g: C \rightarrow C$ be defined by $f(x)=x^{2}$ and $g(x)=x^{2}$ state with reason whether $\mathrm{f}=\mathrm{g}$ or not.

## - Watch Video Solution

26. Functions $f$ and $g$ are defined as follows:
$f: \mathbb{R}-\{2\} \rightarrow \mathbb{R}$, where $f(x)=\frac{x^{2}-4}{x-2}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$, where $g(\mathrm{x})$ $=x+2$.

State with reasons whether $\mathrm{f}=\mathrm{g}$ or not.
27. Let f be a subset of $\mathbb{Z} \times \mathbb{Z}$ such that $f=\{(x y, x-y): x, y \in \mathbb{Z}\}$ Is fa mapping from $\mathbb{Z}$ into $\mathbb{Z}$. Give reasons for your answer.

## - Watch Video Solution

28. 

$$
\begin{aligned}
& \text { 28. } A=\{-2,-1,0,1,2\}, B=\{5,7,11\} \\
& f: A \rightarrow B, \text { where } f(x)=x^{2}-x+5 \text {,then find the image of } 2 .
\end{aligned}
$$

and

## - Watch Video Solution

29. Let $\mathrm{A}=\{-2,-1,0,1,2\}$ and $f: A \rightarrow \mathbb{Z}$ be defined by $\mathrm{f}(\mathrm{x})=2 \mathrm{x}+1$ for all $x \in A$. Find f as a set of ordered pairs and find its range.

## - Watch Video Solution

30. Let $\mathrm{A}=\{0,1,2,3,4\}$ and $f: A \rightarrow \mathbb{Z}$ be defined by $f(x)=x^{2}-5 x+2$, find
the range of $f$.

## - Watch Video Solution

31. Let $\mathrm{A}=\{0,1,2,3,4\}$ and $f: A \rightarrow \mathbb{Z}$ be defined by $f(x)=x^{2}-5 x+2$, find
pre-images of (-2), 1 and 2.

## - Watch Video Solution

32. Let $A=\left\{-2,-1,0,1, \frac{3}{2}, 2\right\}, B=\{-6,-5,-3,0,3,4\}$ and $f: A \rightarrow B$ be defined by $f(x)=2 x^{2}+x-6$. Find $\mathrm{f}(\mathrm{A})$. Is $\mathrm{f}(\mathrm{x})=\mathrm{B}$ ?

## - Watch Video Solution

33. Let t the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by,
$f(x)=a^{x}(a>0, a \neq 1)$. Find

## range of $f$

## - Watch Video Solution

34. Let t the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by,
$f(x)=a^{x}(a>0, a \neq 1)$. Find
$\{x: f(x)=1\}$
Also show that, $f(x+y)=f(x) . f(y)$ for all $x, y \in \mathbb{R}$.

## - Watch Video Solution

35. Let $A=\{0,1\}, B=\{2,6\}$, and $f: A \rightarrow B$ be given by, $f(x)=6-4 x$ and $g: A \rightarrow B$ be given by, $g(x)=x^{2}-5 x+6$.

State whether $\mathrm{f}=\mathrm{g}$ or not.

## - Watch Video Solution

36. Find the image set of the domain of each of the following functions :
$f: \mathbb{R} \rightarrow \mathbb{R}$ by $\mathrm{f}(\mathrm{x})=\cos \mathrm{x}$ for all $x \in \mathbb{R}$

## - Watch Video Solution

37. Find the image set of the domain of each of the following functions
$f: \mathbb{R} \rightarrow \mathbb{R}$ defined by, $\mathrm{f}(\mathrm{x})=\operatorname{cosec} \mathrm{x}$ for all $x \in \mathbb{R}$
$(\pi \neq n \pi, n \in \mathbb{Z})$

## - Watch Video Solution

38. Find the image set of the domain of each of the following functions
$f: \mathbb{R} \rightarrow \mathbb{R}$ defined by, $\mathrm{f}(\mathrm{x})=\tan \mathrm{x}$ for all $x \in \mathbb{R}$
39. Find the image set of the domain of each of the following functions :
$g: \mathbb{R} \rightarrow \mathbb{R}$ given by $g(x)=x^{2}+3$ for all $x \in \mathbb{R}$

## - Watch Video Solution

40. Find the image set of the domain of each of the following functions :
$h: \mathbb{R}^{+} \rightarrow \mathbb{R}$ defined by $h(x)=\log _{e} x$, for all $x \in \mathbb{R}^{+}$where $\mathbb{R}^{+}$is the set of positive real numbers.

## - Watch Video Solution

41. Show that, $f=\{(1,1),(-1,-5),(2,4),(3,7)\}$ defines a mapping. If this mapping is described by the rule $f(x)=p x+q$, then what valued should be assigned to $p$ and $q$ ?
42. If the mapping $\{(1,2),(-1,6),(2,3),(3,6)$ is descibed by the rule $f(x)=a x^{2}+b x+c$, then find the assigned values of $\mathrm{a}, \mathrm{b}$ and c .

## - Watch Video Solution

43. Let f be subset of $\mathbb{Z} \times \mathbb{Z}$ such that $f=\{(x y, x-y): x, y \in \mathbb{Z}\}$ is f a mapping from $\mathbb{Z}$ into $\mathbb{Z}$. Give reasons for your answer.

## - Watch Video Solution

44. If $A=\{1,2,3,4,5\}$, show that the relation $f=\{(x, y): x+y=6\}$ for all $x, y \in A$, defines a mapping from A to itself, but the relation $g=\{(x, y): y<x\}$ does not defines a mapping in set A .
45. Let $A=\{1,2,3,4\}$ and $B=\{7,8,9\}$, then which of the following relations is a mapping or not from set A to set B ?

$$
R_{1}=\{(1,7),(2,8),(1,8),(4,9)\}
$$

## - Watch Video Solution

46. Let $A=\{1,2,3,4\}$ and $B=\{7,8,9\}$, then which of the following relations is a mapping or not from set A to set B ?
$R_{2}=\{(1,7),(2,7),(3,7),(4,7)\}$

## - Watch Video Solution

47. Let $A=\{1,2,3,4\}$ and $B=\{7,8,9\}$, then which of the following relations is a mapping or not from set $A$ to set $B$ ?
$R_{3}=\{(1,8),(2,9),(3,8),(4,8)\}$
48. Let $A=\{1,2,3,4\}$ and $B=\{7,8,9\}$, then which of the following relations is a mapping or not from set A to set B ?
$R_{4}=\{(1,7),(2,8),(3,7),(4,8)\}$

## - Watch Video Solution

49. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(g \circ f)(-1)$

## - Watch Video Solution

50. Given $y=4$ for all real values of $x$, Can $y$ be regarded as a function of x ? Give reasons.

## - Watch Video Solution

51. The volume of an open tank with a square base of side xm is $40 \mathrm{~m}^{3}$. Express its total surface area as a function of x .

## - Watch Video Solution

52. Given $\mathrm{f}(\mathrm{x})=3 \mathrm{x}-9$, find $\mathrm{f}(-1), \mathrm{f}(3), \mathrm{f}(\mathrm{x}+\mathrm{h})$ and $f\left(x^{2}-1\right)$.

## - Watch Video Solution

53. If $f(x-1)=7 x-5$ find $f(x)$ and $f(x+2)$.

## - Watch Video Solution

54. If $f(x+3)=2 x^{2}-3 x-1$, find the value of $\mathrm{f}(\mathrm{x}+1)$.

## - Watch Video Solution

55. Given $f(x+2)=x^{2}-6 x+2$, find $\mathrm{f}(0), \mathrm{f}(2), \mathrm{f}(-2)$ and $\mathrm{f}(\mathrm{x})$.

## - Watch Video Solution

56. If $2 f(x)+3 f(-x)=15-4 x$, prove that, $f(x)=3+4 x$.

## - Watch Video Solution

57. If $3 f(x)+2 f(-x)=5(x-2)$ then the value fo $f(1)$ is-

## - Watch Video Solution

58. If $f(x)=2 x^{2}-3 x+5$, find $\mathrm{f}(\mathrm{a}+\mathrm{h})$ and $\frac{f(a+h)-f(a)}{h}$

## - Watch Video Solution

59. If $\phi(x)=\frac{1-x}{1+x}$, show that, $\phi(\cos 2 \theta)=\tan ^{2} \theta$.
60. If $f(x)=5^{x}$, then prove:
$f(x+2)=25 f(x)$

## - Watch Video Solution

61. If $f(x)=5^{x}$, then prove :
$f(x+y)=f(x) . f(y)$

- Watch Video Solution

62. If $f(x)=5^{x}$, then prove:
$\frac{f(x+1)}{f(x-1)}=25$
(D) Watch Video Solution
63. If $f(x)=5^{x}$, then prove:
$f\left(\log _{5} x\right)=x$

## (D) Watch Video Solution

64. If $f(x)=a \cdot \frac{x-b}{a-b}+b \cdot \frac{x-a}{b-a}$, show that,

$$
f(a)+f(b)=f(a+b)
$$

## - Watch Video Solution

65. If $\phi(x)=\log _{e} x$, then show:
$\phi\left(e^{x}\right)=x$

## - Watch Video Solution

66. If $\phi(x)=\log _{e} x$, then show:
$\phi\left(x^{m}\right)=m \phi(x)$
67. If $\phi(x)=\log _{e} x$, then show:
$\phi(x y)=\phi(x)+\phi(y)$

## - Watch Video Solution

68. If $\phi(x)=\log _{e} x$, then show:
$\phi\left(\frac{x}{y}\right)=\phi(x)-\phi(y)$

## - Watch Video Solution

69. If $f(x)=e^{p x+q}$ [p and q are constants], show that,
$f(a) \cdot f(b) \cdot f(c)=f(a+b+c) \cdot e^{2 q}$

Watch Video Solution
70. If $f(x)=|x|-2 x$, find $\mathrm{f}(-1), \mathrm{f}(1)$ and $\mathrm{f}(-\mathrm{h})$.

## - Watch Video Solution

71. If $g(x)=\frac{x-a}{x}+\frac{x}{x-b}$, prove that, $g\left(\frac{a+b}{2}\right)=\frac{4 a b}{a^{2}-b^{2}}$

## - Watch Video Solution

72. If $f(x)=\frac{1}{x^{2}}$, show that $f(x+h)-f(x-h)=-\frac{4 x h}{\left(x^{2}-h^{2}\right)^{2}}$.

## - Watch Video Solution

73. If $g(\theta)=\frac{1-\tan \theta}{1+\tan \theta}$, find the value of $g\left(\frac{\pi}{4}-\theta\right)$.

## - Watch Video Solution

74. If $f(x)=\log _{e} \cdot \frac{1+x}{1-x}$, show that $f\left(\frac{2 x}{1+x^{2}}\right)=2 f(x)$.

## - Watch Video Solution

75. If $f(x)=\log _{e} x$ and $g(x)=e^{x}$, prove that $f\{g(x)\}=g\{f(x)\}$.

## - Watch Video Solution

76. If $f(x)=10 x^{2}-13 x+13$ solve the equation $\mathrm{f}(\mathrm{x})=16$.

## - Watch Video Solution

77. If $f(x)=4[x]-3|x|$, find $\mathrm{f}(3.5)$ and $\mathrm{f}(-3.5)$.

## - Watch Video Solution

78. If $\mathbb{R}$ is the set of real numbers and $f(x)=|x|, g(x)=x$, find the product function fg .
79. Find the value of $[-3]+[-3.6]-|2.6|+|-3|$.

## - Watch Video Solution

80. If $f(x)=\frac{x-1}{x+1}$, then the value of $f(2 x)$ in terms of $f(x)$ is-

## - Watch Video Solution

## Short Answer Type Question

1. If $A \times B=\{(1,2),(3,4),(5,2),(1,4),(3,2),(5,4)\}$, find $B \times A$.
2. If $P \times Q=\{(2,-1),(3,0),(2,1),(3,1),(2,0),(3,-1)\}$, find P and Q .

## (D) Watch Video Solution

3. 

$A=\{x: x \in \mathbb{N} \wedge 1<x \leq 3\}$ and $B=\{x: x \in \mathbb{Z} \wedge-2<x<2\}$, find $B \times A$.

## - Watch Video Solution

4. Let $f: R \rightarrow R$ and $g: R \rightarrow R \quad$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(g \circ f)(-2)$

## - Watch Video Solution

5. Let $A=\{x: x \in \mathbb{Z} \wedge-1<x \leq 1\}, B=\{x: x \in \mathbb{N} \wedge 1<x<5\}$ and $\mathrm{C}=\{\mathrm{x}: \mathrm{x}$ is an odd positive integer x and $1<x \leq 6\}$, then show that, $(A \times B) \cup(A \times C)=A \times(B \cup C)$

## - Watch Video Solution

6. If $\mathrm{A}=\{1,2,3\}$ and $\mathrm{B}=\{6,7\}$ find the number of subsets of the set $A \times B$.

## - Watch Video Solution

7. The cartesian product $P \times P$ has 9 elements, If its two elements are $(-3,-2)$ and $(-2,-1)$, find the remaining terms of $P \times P$.

## - Watch Video Solution

8. Let $A=\{x: x \in \mathbb{N}$ and x is a prime number in $[10,19]\}$ and $\mathrm{B}=\{2,3\}$, find $A \times B$.

## (.) Watch Video Solution

9. Two sets $A$ and $B$ have 4 common elements. If $n(A)=6$ and $n(B)=7$, then find the values of $n(A \times B)$ and $n[(A \times B) \cap(B \times A)]$.

## - Watch Video Solution

10. In each of the following cases state whether the given statement is true or false :

If $\mathrm{A}=\{1,2,3\}, \mathrm{B}=\{4,5\}$, then, $A \times(B \cup \phi)=\phi$ where $\phi$ is the null set.

## - Watch Video Solution

11. In each of the following cases state whether the given statement is true or false :

If $\mathrm{X}=\{\mathrm{a}, \mathrm{b}, \mathrm{c}\}$ and $\mathrm{Y}=\{\mathrm{c}, \mathrm{a}, \mathrm{b}\}$, then $X \times Y=Y \times X$
12. In each of the following cases state whether the given statement is true or false :

If $\mathrm{A}=\{3,4,5\}$ and $\mathrm{B}=\{1,2\}$, then $A \times(B \cap \phi)=\phi$ where $\phi$ is the null set.

## - Watch Video Solution

13. In each of the following cases state whether the given statement is true or false :

If $\mathrm{A}=\{1,0,-1\}$, then the value of $n(A \times A \times A)=9$.

## - Watch Video Solution

14. For any three sets $A, B$ and $C$ prove that, $A \times(B-C)=(A \times B)-(A \times C)$.
15. If $n(A \times B \times C)=60, \mathrm{n}(\mathrm{B})=4, \mathrm{n}(\mathrm{C})=3$, find the value of $\mathrm{n}(\mathrm{A})$.

## - Watch Video Solution

16. Write the following relations as the sets of ordered pairs :

A relation $R$ on the set A of first six natural numbers defined by,
$(x, y) \in R \Rightarrow x$ is relatively prime to y .

## - Watch Video Solution

17. Write the following relations as the sets of ordered pairs :

A relation R defined on the set of natural numbers $\mathbb{N}$ by,
$(x, y) \in R \Rightarrow 2 x+y=10$ for all $x, y \in \mathbb{N}$.

## - Watch Video Solution

18. Write the following relations as the sets of ordered pairs :

A relation $R$ defined on the set $A=\{2,3,4,5,6\}$ by
$a R b \Rightarrow|a-b|$ is divisible by 3.

## - Watch Video Solution

19. A relation R on the set of natural numbers $\mathbb{N}$ is defined as follows:
$R=\{(x, y), x+5 y=20, x, y \in \mathbb{N}\}$, find the domain and range of R.

## - Watch Video Solution

20. Let $A=\{1,2,3,4,5,6,7,8\}$ and a relation R on A is given by,
$R=\{(x, y): x \in A, y \in A$ and $2 x+y=12\}$
Find $R$ and $R^{-1}$ as sets of ordered pairs. Also find domains and ranges of $R$ and $R^{-1}$.

## - Watch Video Solution

21. Find the domain and range of each of the following relations :
$R_{1}=\left\{\left(a, \frac{1}{a}\right): 0<a<5\right.$ and a is an integer $\}$.

## - Watch Video Solution

22. Find the domain and range of each of the following relations:
$R_{2}=\{(x, y): x$ and $y$ are integer and $x y=4\}$

## - Watch Video Solution

23. Find the domain and range of each of the following relations:
$R_{3}=\{(x, y): x \in \mathbb{N}, y \in \mathbb{N}$ and $2 x+y=41\}$

## - Watch Video Solution

24. Find the domain and range of each of the following relations:
$R_{4}=\left\{(x, y): x\right.$ and $y$ are integers and $\left.x^{2}+y^{2}=25\right\}$

## - Watch Video Solution

25. Find the domain and range of each of the following relations: $R_{5}=\{(x-5,2 x-7): x$ is an odd natural number less than 10$\}$

## - Watch Video Solution

26. Find the domain and range of each of the following relations:
$R_{6}=\left\{\left(x, x^{2}-31\right): x\right.$ is a prime number less than 12$\}$

## - Watch Video Solution

27. Find the domain and range of each of the following relations :
$R=\{(x, y): x$ is an integer and $|x|<3$ and $y=|x-3|\}$

## - Watch Video Solution

28. Find the domain and range of each of the following relations :
$S=\{(x, y): x, y \in \mathbb{N}$ and $x+3 y=12\}$.

## - Watch Video Solution

29. A right circular cylinder is inscribed in a sphere of radius r .

Express the volume $v$ of the cylinder as a function of its height $x$.

## - Watch Video Solution

30. A right circular cone is inscribed in a sphere of radius a.

Express the volume $v$ of the cone as a function of its slant height $x$.

## - Watch Video Solution

31. A rectangle of area $\mathrm{cm}^{2}$ is inscribed in a circle of radius 25 cm . If the length of a side of the rectangle be $x \mathrm{~cm}$, find y in terms of x .

## - Watch Video Solution

32. If $F(x)=\frac{(x-b)(x-c)}{(a-b)(a-c)}+\frac{(x-c)(x-a)}{(b-c)(b-a)}+\frac{(x-a)(x-b)}{(c-a)(c-b)}$, show that $\mathrm{F}(0)=1$.

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33. If $f(x)=\frac{x-1}{x+1}$, show that $\frac{f(a)-f(b)}{1+f(a) f(b)}=\frac{a-b}{1+a b}$

## - Watch Video Solution

34. If $f(x)=\frac{1}{1-x}$, show that, $f[f\{f(x)\}]=x$

## - Watch Video Solution

35. If $y=f(x)=\frac{a x-b}{b x-a}$, prove that $f(x) . f\left(\frac{1}{x}\right)$ is independent of X.

## - Watch Video Solution

36. If $y=f(x)=\frac{p x+q}{r x-p}$, show that $\mathrm{x}=\mathrm{f}(\mathrm{y})$.

## - Watch Video Solution

37. If $y=f(x)=\frac{3 x-5}{2 x-m}$ and $f(y)=x$, find the value of $m$.

## - Watch Video Solution

38. If $y=f(x)=\frac{x-3}{2 x+1}$ and $z=f(y)$, express z as a function of x .

## (D) Watch Video Solution

39. If $F(x)=\frac{4 x-5}{3 x-4}$, prove that $\mathrm{F}\{\mathrm{F}(\mathrm{x})\}=\mathrm{x}$.

## - Watch Video Solution

40. If $f(x)=\left(a-x^{n}\right)^{\frac{1}{n}}$, where $a>0$ and n is a positive integer, show that $f[f(x)]=x$.

## - Watch Video Solution

41. If $\phi(x)=\frac{1-x}{1+x}$ prove that
$\phi\{\phi(x)\}=x$

## - Watch Video Solution

42. If $\phi(x)=\frac{1-x}{1+x}$ prove that
$\phi\{\phi(\cot \theta)\}=\cot \theta$
43. If $f(x)=\tan ^{-1} x$, find the relation by which $\mathrm{f}(\mathrm{x}), \mathrm{f}(\mathrm{y})$ and $\mathrm{f}(\mathrm{x}+\mathrm{y})$ are connected.

## - Watch Video Solution

44. The function $\phi(x)$ is defined as follows:
$\phi(x)=4, \quad$ when x is rational ,
$=-4, \quad$ when x is irrational.
Find $\phi(0), \phi(2.4), \phi(\sqrt{3}), \phi(3.6), \phi(\pi), \phi(e)$ and $\phi\left(\sin \left(\frac{\pi}{4}\right)\right)$.

## - Watch Video Solution

45. Let $f(x)=2 x^{2}-3, \quad$ when $x \leq 2$
$=2 x+1$, when $2<x \leq 3$
$=\frac{1}{2 x-1}, \quad$ when $x>3$
Find $f(0), f(3), f(-2), f(4), f(\sqrt{2})$ and $f(e)$.
46. Find the values of x for which the following functions are undefined:
$\frac{x}{x+2}$

## - Watch Video Solution

47. Find the values of $x$ for which the following functions are undefined:
$\sqrt{4 x-4 x^{2}-1}$

## - Watch Video Solution

48. Find the values of $x$ for which the following functions are undefined:
$\frac{x}{\sin x}$

- Watch Video Solution

49. Find the values of $x$ for which the following functions are undefined:

$$
\frac{x^{2}+x-6}{2 x^{2}-x-6}
$$

## - Watch Video Solution

50. Find the values of x for which the following functions are undefined:
$\sqrt{x^{2}-4 x+3}$

## - Watch Video Solution

51. If the maximum and minimum value of $f(x)=a+b \sin x$ be 7 and 1 respectively, find the values of $f\left(\frac{\pi}{6}\right)$.

## - Watch Video Solution

52. If $f(x)=a x^{2}+b x+c$ and $f(x+1)=f(x)+x+1$ is an identify, find the values of $a$ and $b$.

## - Watch Video Solution

53. If $f(x)=x^{2}+a x+b$ and $f(1)=1, f(2)=2$, find the value of $f(3)$.

## - Watch Video Solution

54. If the function $f: \mathbb{R} \rightarrow \mathbb{R}$ is given by $\mathrm{f}(\mathrm{x})=\mathrm{x}$ for all $x \in \mathbb{R}$ and the function

$$
g: \mathbb{R}-\{0\} \rightarrow \mathbb{R}
$$

is given
by
$g(x)=\left(\frac{1}{x}\right)$, for all $x \in \mathbb{R}-\{0\}$, then find the function $\mathrm{f}+\mathrm{g}$ and f g.

## - Watch Video Solution

55. If two real functions $f$ and $g$ are defined respectively by $f(x)=\sqrt{x+1}$ and $g(x)=\sqrt{x-1}$, then the find the values of $\frac{f}{g}(1)$ and $\frac{g}{f}(1)$. Also find the domain of definitions of $\frac{f}{g}$ and $\frac{g}{f}$.
56. Find the range of the function $f(x)=3-|x-3|$.

## - Watch Video Solution

57. 

Find
$f \circ g \circ h, \quad$ if $\quad f(x)=\frac{x}{x+1}, g(x)=x^{10}$ and $h(x)=x+3$.

Watch Video Solution
58. If $f(x)=\frac{4^{x}}{4^{x}+2}$, then show that $f(x)+f(1-x)=1$.

- Watch Video Solution

59. Given $f(x)=\cos (\log x)$, find the value of
$f(x) . f(y)-\frac{1}{2}\left[f\left(\frac{x}{y}\right)+f(x y)\right]$

## - Watch Video Solution

60. If $f(x)=\sin x, g(x)=x^{2}$ and $h(x)=\log x$, find $h[g\{f(x)\}]$.

## - Watch Video Solution

## Long Answer Type Questions

1. Find the domain of definitions of each of the following functions :
$\sqrt{6-x}$

## - Watch Video Solution

2. Find the domain of definitions of each of the following functions :
$\frac{x-2}{x^{2}-3 x+2}$

## - Watch Video Solution

3. Find the domain of definitions of each of the following functions:
$\sqrt{2+x-x^{2}}$

## - Watch Video Solution

4. Find the domain of definitions of each of the following functions :
$\sqrt{12-x-x^{2}}$

## - Watch Video Solution

5. Find the domain of definitions of each of the following functions:
$\frac{x^{2}}{1+x^{2}}$
6. Find the domain of definitions of each of the following functions : $\log _{10} x$

## - Watch Video Solution

7. Find the domain of definitions of each of the following functions :
$f(x)=\frac{x+2}{\sqrt{x^{2}-x-2}}$

## - Watch Video Solution

8. Find the domain of definitions of each of the following functions :
$\frac{1}{\sin x-\cos x}$

## - Watch Video Solution

9. Find the domain of definitions of each of the following functions :
$\frac{1}{\sqrt{(x-2)(3-x)}}$

## - Watch Video Solution

10. Find the domain of definitions of each of the following functions: $\sin ^{-1} 2 x$

## - Watch Video Solution

11. Find the domain of definitions of each of the following functions:
$f(x)=\frac{\sqrt{3 x-7}}{\sqrt[6]{x+1}-2}$

## - Watch Video Solution

12. Find the domain of the following functions:
$f(x)=\log _{100 x} \cdot\left(\frac{2 \log _{10} x+2}{-x}\right)$

## (D) Watch Video Solution

13. Find the ranges of the following functions:
$y=\sqrt{4-x^{2}}[-2 \leq x \leq 2]$

## - Watch Video Solution

14. Find the ranges of the following functions:
$y=\frac{x^{2}}{1+x^{2}}$

## - Watch Video Solution

15. Find the ranges of the following functions:
$y=\sin x[0 \leq x \leq \pi]$

## Watch Video Solution

16. Find the ranges of the following functions :
$y=\frac{x}{x^{2}-5 x+9}$

## - Watch Video Solution

17. Find the ranges of the following functions:
$y=\frac{3 x-5}{x^{2}-1}[x \neq 1]$

## - Watch Video Solution

18. Find the ranges of the following functions:

$$
y=\sin x+\cos x
$$

## D Watch Video Solution

19. Find the ranges of the following functions:
$y=\frac{1}{3-\cos 2 x}$

## - Watch Video Solution

20. Find the ranges of the following functions:
$y=\tan x\left(-\frac{\pi}{2}<x<\frac{\pi}{2}\right)$

## - Watch Video Solution

21. If $f(x)$ is a quadratic function and $f(1)=5, f(-1)=11$ and $f(2)=8$, find the value of $f(-2)$.

## - Watch Video Solution

22. If $\mathrm{P}(\mathrm{x})$ be a quadratic function and roots are $3,5^{`}$ find $\mathrm{P}(\mathrm{x})$.
23. 

$F(x)=\frac{a}{x}+b+c x$ and $F(1)=5, F(-2)=2$ and $F(-1)=-3$ , find the value of $\mathrm{F}(-3)$.

## - Watch Video Solution

24. If $f(n+1)=\frac{2 f(n)+1}{2}, n=1,2,3, \ldots$ and $f(1)=2$ then find the value of $f(101)$.

## - Watch Video Solution

25. The taxi fare is Rs. 3 for 1 km or less from starting point and Rs. 1.20 per km or any fraction thereof, for additional distance. If the fare be Rs. Y for a total journey of x km , express y as a function of x .
26. Find the domain of definition of
$f(x)=\sqrt{x+1}+\sqrt{4-x}$

## - Watch Video Solution

27. Find the domain of definition of
$\phi(x)=\cos ^{-1} \cdot \frac{x-4}{3}+\log (5-x)$

## - Watch Video Solution

28. The function $\mathrm{f}(\mathrm{x})$ is defined in $0 \leq x \leq 1$, find the domain of definition of
$f(2 x-1)$

## - Watch Video Solution

29. The function $\mathrm{f}(\mathrm{x})$ is defined in $0 \leq x \leq 1$, find the domain of definition of
$f\left(x^{2}\right)$

## - Watch Video Solution

30. If two real functions $f(x)$ and $\phi(x)$ are defined respectively by $f(x)=\sqrt{x-2}$ and $\phi(x)=x+3$, then find each of the following functions:
$\frac{1}{f}$

## - Watch Video Solution

31. If two real functions $f(x)$ and $\phi(x)$ are defined respectively by $f(x)=\sqrt{x-2}$ and $\phi(x)=x+3$, then find each of the following functions :

## ( Watch Video Solution

32. If two real functions $f(x)$ and $\phi(x)$ are defined respectively by $f(x)=\sqrt{x-2}$ and $\phi(x)=x+3$, then find each of the following functions:
$f+\phi$

## - Watch Video Solution

33. If two real functions $f(x)$ and $\phi(x)$ are defined respectively by $f(x)=\sqrt{x-2}$ and $\phi(x)=x+3$, then find each of the following functions:
$f \phi$
34. If two real functions $f(x)$ and $\phi(x)$ are defined respectively by $f(x)=\sqrt{x-2}$ and $\phi(x)=x+3$, then find each of the following functions:
$\frac{f}{\phi}$

## - Watch Video Solution

35. Find the domain of definition of the function defined by, $f(x)=\frac{1}{\log _{e}(2-x)}+\sqrt{x+3}$

## Watch Video Solution

36. Find the domain of definition of each of the following functions :
$f(x)=\frac{1}{\sqrt{x+[x]}}$

## - Watch Video Solution

37. Find the domain of definition of each of the following functions:
$g(x)=\frac{1}{\sqrt{x-|x|}}$

## Watch Video Solution

38. Find the domain of definition of each of the following functions :
$h(x)=\sqrt{x+[x]}$

## - Watch Video Solution

39. Find the domain of definition of each of the following functions:
$\phi(x)=\sqrt{x-[x]}$

## - Watch Video Solution

40. Find the range of each of the following functions:
$f(x)=2-|x-2|$
41. Find the range of each of the following functions:
$g(x)=\frac{1}{\sqrt{x+[x]}}$

## - Watch Video Solution

42. Find the range of each of the following functions:
$h(x)=\frac{|x-3|}{x-3}$

## - Watch Video Solution

43. Draw the graphs of the constant functions :
$f(x)+2=0$
44. Draw the graphs of the constant functions :
$f(x)=0$

## (D) Watch Video Solution

45. Draw the graphs of the constant functions :
$f(x)-3=0$
From the drawn graph find in each case the domain and the range of the functions.

## (D) Watch Video Solution

46. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(g \circ f)^{-1}(x)$
47. Sketch the graph of $f(x)=|x|$. From the graph find the domain and range of $f(x)$.

## - Watch Video Solution

48. A function $f(x)$ is defined as follows:

$$
\begin{aligned}
& f(x)=x, \text { when } x>0 \\
& =-x, \quad \text { when } x<0 \\
& =-1, \quad \text { when } x=0
\end{aligned}
$$

Sketch the graph of $f(x)$ and from the graph examine its continuity at $x$ $=0$.

## - Watch Video Solution

49. Sketch the graph of $f(x)=\frac{|x|}{x}, \mathrm{f}(0)=1$. From the graph examine the continuity of $\mathrm{f}(\mathrm{x})$ at $\mathrm{x}=0$.
50. Draw the graph of the function $\frac{x^{2}-4}{x+2}$ and from the graph examine the continuity of the function at $x=-2$.

## - Watch Video Solution

51. Let $f: R \rightarrow R$ and $g: R \rightarrow R \quad$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(f \circ g)(-1)$

## - Watch Video Solution

52. A function $\phi(x)$ is defined as follows :
$\phi(x)=2, \quad$ when x is an integer
$=0, \quad$ when x is not an integer
Draw the graphs of the function and from the graph find the points of discontinuity of $\phi(x)$.
53. Draw the graph of the following signum function :
$f(x)=1$, when $x>0$
$=0$, when $x=0$
$=-1$, when $x<0$
Find the domain and range of $f(x)$ from the graph.

## - Watch Video Solution

54. Sketch the graph of the function $f(x)=\frac{4}{x}$. From the graph examine the continuity of $f(x)$ at $x=0$.

## - Watch Video Solution

55. Draw the graph of the function $f(x)=2 \sqrt{x}(x \geq 0)$.

## - Watch Video Solution

56. A function $f(x)$ is defined as follows :
$f(x)=x, \quad$ when $x<1$
$=x+1$, when $x>1$
$=\frac{3}{2}, \quad$ when $x=1$
Draw the graph of $f(x)$ and examine its continuity at $x=\frac{1}{2}$ and $x=1$.

## - Watch Video Solution

57. A function $f(x)$ is defined as follows :
$f(x)=-x$, when $x<0$
$=2, \quad$ when $0 \leq x<2$
$=4-x, \quad$ when $x \geq 2$
Draw the graph of the function and from the graph examine whether
$f(x)$ is continuous at $x=0$ and $x=2$ or not.

## - Watch Video Solution

58. Draw the graph of the function :

$$
\begin{aligned}
& f(x)=1+2 x, \text { when } x \leq 1 \\
& =3-x, \text { when } x>1
\end{aligned}
$$

From the graph examine whether $f(x)$ is continuous at $x=1$ or not.

## - Watch Video Solution

59. Sketch the graph of the function :

$$
\begin{aligned}
& f(x)=0, \quad \text { when } x<1 \\
& =x-1, \quad \text { when } x \geq 1
\end{aligned}
$$

From the graph examine whether $f(x)$ is continuous at $x=1$ or not.

## - Watch Video Solution

60. Draw the graph of the function $y=x+|x|$ in the interval
$-2 \leq x \leq 2$.
61. Draw the graph of the function $y=|x-1|+|x+1|$ and examine whether $f(x)$ has any point of discontinuity.

## - Watch Video Solution

62. Without using graph paper, draw a sketch graph of the function $y=|x|+|x-2|$ and find its points of discontinuity, if there be any.

## - Watch Video Solution

63. Sketch the graph of $f(x)=|x-4|-2$. From the graph examine whether $f(x)$ is continuous at $x=4$ or not.

## - Watch Video Solution

64. Let $f: R \rightarrow R$ and $g: R \rightarrow R \quad$ is define by
$f(x)=2 x+3$ and $g(x)=3 x-2$, then find $(f \circ g)^{-1}(x)$

## - Watch Video Solution

65. Without using graph paper draw the graph of the following function :
$g(x)=x$, when $x<0$
$=x^{2}, \quad$ when $0 \leq x \leq 1$
1 , when $x>1$
Examine the continuity of $\mathrm{g}(\mathrm{x})$ at $\mathrm{x}=0$ and $\mathrm{x}=1$ from the graph.

## - Watch Video Solution

66. Let $A=\{1,3,5,7\}$ and $B=\{p, q, r\}$.Let R be a relation define by $R=\{(1, p),(3, r),(5, q),(7, p),(7, q)\}$, find the domain and range of $R$.

## - Watch Video Solution

67. 

$$
\begin{aligned}
& \text { 67. } A=\{-2,-1,0,1,2\}, B=\{5,7,11\} \\
& f: A \rightarrow B, \text { wheref }(x)=x^{2}-x+5 \text {,then find the image of } 1 .
\end{aligned}
$$

## - Watch Video Solution

68. Draw the graph of the function $y=x-[x]$,where $[x]$ denotes the greatest integer in x not greater than x . From the graph find the points of discontinuity of the function.

## - Watch Video Solution

69. A function $f$ is define by $f(x)=3 x^{3}+4$. Write the values of $f(-1)$

## - Watch Video Solution

70. 

$$
A=\{-2,-1,0,1,2\}, B=\{5,7,11\}
$$

$f: A \rightarrow B$, wheref $(x)=x^{2}-x+5$,then find the image of 0.

## - Watch Video Solution

71. A function $f$ is define by $f(x)=2 x-3$. Write the values of $f(-2)$

## - Watch Video Solution

72. 

$$
\begin{aligned}
& \text { 72. } A=\{-2,-1,0,1,2\}, B=\{5,7,11\} \\
& f: A \rightarrow B, \text { wheref }(x)=x^{2}-x+5 \text {,then find the image of - } 2 .
\end{aligned}
$$

## - Watch Video Solution

## Multiple Correct Answer Type

1. If $f(x)=x^{2}-3 x+4$, then the value of x which satisfy the relation
$f(x)=f(2 x+1)$ are
A. 2
B. -1
C. $\frac{2}{3}$
D. 0

## Answer: B,C

## - Watch Video Solution

2. If $y=f(x)=\frac{3 x-5}{x^{2}-1}(x \neq-1)$ then the range of function will be
A. $y \leq \frac{1}{2}$
B. $y \leq 2$
C. $y \geq \frac{9}{2}$
D. $y \geq \frac{2}{9}$

## Answer: A,C

## D Watch Video Solution

3. If $f(a)=\frac{a^{2}+a-6}{2 a^{2}-a-6}$ then for what value/values of $\mathrm{a}, \mathrm{f}(\mathrm{a})$ will be undefined?
A. -3
B. 2
C. $\frac{-3}{2}$
D. $-\frac{2}{3}$

## Answer: B,C

4. If $R=\{(x, y): x \in \mathbb{N}, y \in \mathbb{N}$ and $2 x+y=10\}$, then $R^{-1}=$ ?
A. $(8,1)$
B. $(6,2)$
C. $(4,3)$
D. $(2,4)$

## Answer: A,B,C,D

## - Watch Video Solution

5. If $R^{-1}=\{(x, y): x \in \mathbb{N}, y \in \mathbb{N}$ and $x+y=8\}$ then $\mathrm{R}=$ ?
A. $(7,1)$
B. $(6,2)$
C. $(5,3)$
D. $(1,4)$

## Answer: A,B,C

## (D) Watch Video Solution

## Integer Answer Type

1. Let $n(A)=m, n(B)=n$, then the total number of relations between $A$ and B is $K^{m n}$, find K .

## - Watch Video Solution

2. If $R=\{(x, y): x \in \mathbb{N}, y \in \mathbb{N}$ and $x+2 y=8\}$, then the number of elements of $R$ will be $\qquad$

- Watch Video Solution

3. Let $\mathrm{n}(\mathrm{A})=4$ and $\mathrm{n}(\mathrm{B})=2$ onto mapping $A \rightarrow B$ are $\mathrm{A}=\{1,2,4\}, \mathrm{B}=$ $\{2,4,5\}$ and $C=\{2,5\}$, then find the number of terms of $(A-B) \times(B-C)$ are

## - Watch Video Solution

4. Let $n(A)=4$ and $n(B)=5$ and if in the case of one-one mapping $A \rightarrow B \mathrm{n}(\mathrm{A})=3, \mathrm{n}(\mathrm{B})=4$, then the value of $n(A \times A \times B)=6 K$. Find K.

## (D) Watch Video Solution

5. If $A$ and $B$ two finite sets such that $|A|=2$ and $|B|=5$, then the number of mapping $A \rightarrow B$ are $2^{2 \times K}$, find K .

## - Watch Video Solution

1. Two sets $A=\{1,2,3\}$ and $B=\{2,4\}$ find $A \cup B$.

## - Watch Video Solution

2. If $A=\{1,2,3\}$ and $B=\{2,4\}$.Let $R=\{a<b\}$,then write R in roster form.

## - Watch Video Solution

## Comprehension Type

$$
\begin{aligned}
& \text { 1. Let } f: \mathbb{R} \rightarrow \mathbb{R} \text { be } \text { defined }_{\text {by }} \\
& f(x)=-x^{3}+x, g:[-1,1] \rightarrow \mathbb{R} \text { and } h:[-1,1] \rightarrow \mathbb{R} \text { is defined }
\end{aligned}
$$

by $g(x)=\min (f x), 0), h(x)=\max (f(x), 0)$
$f: \mathbb{R} \rightarrow \mathbb{R}$ will be $\qquad$
A. decreasing
B. odd
C. increasing
D. even

## Answer: B

## - Watch Video Solution

2. 

Let
$f: \mathbb{R} \rightarrow \mathbb{R}$
be
defined
by
$f(x)=-x^{3}+x, g:[-1,1] \rightarrow \mathbb{R}$ and $h:[-1,1] \rightarrow \mathbb{R}$ is defined by $g(x)=\min (f x), 0), h(x)=\max (f(x), 0)$

Range of $g(x)$ will be $\qquad$
A. $[-1,-1]$
B. $\left[-\frac{2}{3 \sqrt{3}}, \frac{2}{3 \sqrt{3}}\right]$
C. $\left[-\frac{2}{3 \sqrt{3}}, 0\right]$
D. none of these

## Answer: C

## - Watch Video Solution

3. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by
$f(x)=-x^{3}+x, g:[-1,1] \rightarrow \mathbb{R}$ and $h:[-1,1] \rightarrow \mathbb{R}$ is defined by $\mathrm{g}(\mathrm{x})=\min (\mathrm{fx}), \mathrm{O}), \mathrm{h}(\mathrm{x})=\max (\mathrm{f}(\mathrm{x}), \mathrm{O})$
Number of roots of the $g(x)=-\frac{1}{2}$ is
A. 0
B. 1
C. 2
D. infinite

## - Watch Video Solution

4. 

$$
A=\{-2,-1,0,1,2\}, B=\{5,7,11\}
$$

$f: A \rightarrow B$, where $f(x)=x^{2}-x+5$,then find the image of -1 .

## - Watch Video Solution

5. $\begin{aligned} & \text { Let } \\ & f: \mathbb{R} \rightarrow \mathbb{R} \\ & f(x)=-x^{3}+x, g:[-1,1] \rightarrow \mathbb{R}\end{aligned}$ and $h:[-1,1] \rightarrow \mathbb{R}$ is defined by $\mathrm{g}(\mathrm{x})=\min (\mathrm{fx}), 0), \mathrm{h}(\mathrm{x})=\max (\mathrm{f}(\mathrm{x}), \mathrm{O})$

Which one will be both the odd and even function ?
A. $h(x)+g(x)$
B. $h(x) . g(x)$
C. $h(x)-g(x)$
D. $|\mathrm{h}(\mathrm{x})|-|\mathrm{g}(\mathrm{x})|$

## Answer: B

## - Watch Video Solution

6. $f(x)= \begin{cases}x^{2} & \text { when } x<0 \\ x & \text { when } 0 \leq x<1 \\ \frac{1}{x} & \text { when } x \geq 1\end{cases}$

Value of $f\left(\frac{1}{2}\right)$ is $\qquad$
A. 1
B. $\frac{1}{2}$
C. 2
D. 0

## Answer: B

7. $f(x)= \begin{cases}x^{2} & \text { when } x<0 \\ x & \text { when } 0 \leq x<1 \\ \frac{1}{x} & \text { when } x \geq 1\end{cases}$

Value of $f(\sqrt{3})$ is
A. $\sqrt{3}$
B. 1
C. 0
D. $\frac{1}{\sqrt{3}}$

## Answer: D

## - Watch Video Solution

8. $f(x)= \begin{cases}x^{2} & \text { when } x<0 \\ x & \text { when } 0 \leq x<1 \\ \frac{1}{x} & \text { when } x \geq 1\end{cases}$

Value of $f(-2)$ is $\qquad$
A. 0
B. 1
C. 4
D. 2

## Answer: C

## - Watch Video Solution

9. $f(x)= \begin{cases}x^{2} & \text { when } x<0 \\ x & \text { when } 0 \leq x<1 \\ \frac{1}{x} & \text { when } x \geq 1\end{cases}$

Value of $f(1)$ is $\qquad$
A. 1
B. 2
C. 3
D. none of these
10. $f(x)= \begin{cases}x^{2} & \text { when } x<0 \\ x & \text { when } 0 \leq x<1 \\ \frac{1}{x} & \text { when } x \geq 1\end{cases}$

Value of $f(-\sqrt{3})$ is $\qquad$
A. 3
B. 1
C. $\sqrt{3}$
D. none of these

## Answer: D

## - Watch Video Solution

1. If $f(x+2)=2 x^{2}-3 x+5$, then find $f(2)$

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2. If $f(x)=3 x^{2}+2 x-5$, then find $f(0)$

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