# Sri Vinayaga Tuition centre 

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## WEEKLY TEST II (CH 1) <br> MATHEMATICS

Total Marks: 100
Marks
Duration: 3 Hrs
Class: 10

## SEC I

CHOOSE THE CORRECT ANSWERS

$$
14 \times 1=14
$$

1. Let f and g be two functions given by

$$
\mathrm{f}=\{(0,1),(2,0),(3,-4),(4,2),(5,7)\}
$$

$g=\{(0,2),(1,0),(2,4),(-4,2),(7,0)\}$ 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) $\{0,1,2\}$
2. 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
3. The range of the relation $R=\left\{\left(x, x^{2}\right) \mid x\right.$ 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) $\{1,4,9,25,49,121\}$
4. 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) $(6,6)$
5. $f(x)=(x+1)^{3}-(x-1)^{3}$ represents a function which is
a) linear
b) cubic
c) reciprocal
d) quadratic
6. $\mathrm{A}=\{\mathrm{a}, \mathrm{b}, \mathrm{p}\}, \mathrm{B}=\{2,3\}, \mathrm{C}=\{\mathrm{p}, \mathrm{q}, \mathrm{r}, \mathrm{s}\}$ then $\mathrm{n}[(\mathrm{A} \cup \mathrm{B}) \times \mathrm{B}]$ is
a) 8
b) 20
c) 12
d) 16
7. If the ordered pairs $(a+2,4)$ and $(5,2 a+b)$ are equal then $(a, b)$ is
a) $(2,-2)$
b) $(5,1)$
c) $(2,3)$
d) $(3,-2)$
8. If $A=\{1,2\}, B=\{1,2,3,4\}, C=\{5,6\}$ and $D=\{5,6,7,8\}$ then state which of the following statement is true.
a) $(\mathrm{A} \times \mathrm{C}) \subset(\mathrm{B} \times \mathrm{D})$
b) $(\mathrm{B} \times \mathrm{D}) \subset(\mathrm{A} \times \mathrm{C})$
c) $(\mathrm{A} \times \mathrm{B}) \subset(\mathrm{A} \times \mathrm{D})$
d) $(\mathrm{D} \times \mathrm{A}) \subset(\mathrm{B} \times \mathrm{A})$
9. Let $A=\{1,2,3,4\}$ and $B=\{4,8,9,10\}$. $A$ function $f: A \rightarrow B$ given by $f=\{(1,4),(2,8)$, $(3,9),(4,10)\}$ is a
a) Many-one function
b) Identity function
c) One-to-one function
d) Into function
10. 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) $\mathrm{m}^{\mathrm{n}}$
b) $n^{m}$
c) $2^{\mathrm{mn}}-1$
d) $2^{\mathrm{mn}}$
11. Let $f(x)=\sqrt{1+x^{2}}$ then
a) $f(x y)=f(x) \cdot f(y)$
b) $f(x y) \geq f(x) \cdot f(y)$
c) $f(x y) \leq f(x) \cdot f(y)$
d) None of these
12. Find $k$ if $f \circ f(k)=5$ where $f(k)=2 k-1$ ?
a) 1
b) 2
c) 3
d) 4
13. A function $f: R \rightarrow R$ defined by $f(x)=a x^{2}+b x+c,(a \neq 0)$ is called a
a) Linear Functions
b) Quadratic Functions
c) Cubic Functions
d) Reciprocal Functions
14. If $\mathrm{f}(\mathrm{x})=\mathrm{x}^{2}+5$, then $\mathrm{f}(-4)=$ $\qquad$ .
a) 26
b) 21
c) 20
d) -20

Answer any 10 questions (Q.no 28 compulsory)
$10 \times 2=20$
15. A function $f$ is defined by $f(x)=2 x-3$
find $\frac{f(0)-f(1)}{2}$.
16. Find $\mathrm{A} \times \mathrm{B}, \mathrm{A} \times \mathrm{A}$ and $\mathrm{B} \times \mathrm{A}$
$\mathrm{A}=\{\mathrm{m}, \mathrm{n}\} ; \mathrm{B}=\phi$
17. The functions f and g are defined by $\mathrm{f}(\mathrm{x})=6 \mathrm{x}+8 ; g(x)=\frac{x-2}{3}$

Calculate the value of $g g\left(\frac{1}{2}\right)$
18. A function $f$ is defined by $f(x)=2 x-3$
find $x$ such that $f(x)=f(1-x)$.
19. Find $A \times B, A \times A$ and $B \times A$
$A=\{2,-2,3\}$ and $B=\{1,-4\}$
20. Represent the function $\mathrm{f}=\{(1,2),(2,2),(3,2),(4,3),(5,4)\}$ through an arrow diagram.
21. Let
$A=\{x \in \mathbb{N} \mid 1<x<4\}, B=\{x \in \mathbb{W} \mid 0 \leq x<2\}$ and $C=\{x \in \mathbb{R}$
Then verify that
$\mathrm{A} \times(\mathrm{B} \cup \mathrm{C})=(\mathrm{A} \times \mathrm{B}) \cup(\mathrm{A} \times \mathrm{C})$
22. If $A=\{1,3,5\}$ and $B=\{2,3\}$ then

Show that $n(A \times B)=n(B \times A)=n(A) \times n(B)$
23. Given $\mathrm{f}(\mathrm{x})=2 \mathrm{x}-\mathrm{x}^{2}$,
find (i) $f(x+1)$ (iii) $f(x)+f(1)$
24. Given the function $f: x \rightarrow x^{2}-5 x+6$, evaluate $f(x-1)$
25. A function $f$ is defined by $f(x)=3-2 x$. Find $x$ such that $f\left(x^{2}\right)=(f(x))^{2}$.
26. If $f(x)=3 x-2, g(x)=2 x+k$ and if $f \circ g=g \circ f$, then find the value of $k$.
27. Let $A=\{1,2,3,4\}$ and $B=\mathbb{N}$. Let $f: A \rightarrow B$ be defined by $f(x)=x^{3}$ then, Identify the type of function
28. 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?

SEC III
Answer any 10 questions (Q.no 42 compulsory) $10 \times 5=50$
29. Consider the functions $f(x), g(x), h(x)$ as given below. Show that $(f \circ g) \circ h=f \circ(g \circ$ h) in each case.
$\mathrm{f}(\mathrm{x})=\mathrm{x}-1, \mathrm{~g}(\mathrm{x})=3 \mathrm{x}+1$ and $\mathrm{h}(\mathrm{x})=\mathrm{x}^{2}$
30. Let $\mathrm{A}=\{1,2,3,4\}$ and $\mathrm{B}=\{2,5,8,11,14\}$ be two sets. Let $\mathrm{f}: \mathrm{A} \rightarrow \mathrm{B}$ be a function given by $\mathrm{f}(\mathrm{x})=3 \mathrm{x}-1$. Represent this function
(i) by arrow diagram (ii) in a table form
(iii) as a set of ordered pairs (iv) in a graphical form
31.

If the function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x)= \begin{cases}2 x+7, & x<-2 \\ x^{2}-2, & -2 \leq x<3 \\ 3 x-2, & x \geq 3\end{cases}$
then find the values of
(i) $\mathrm{f}(4)$
(ii) $\mathrm{f}(-2)$ (iii) $\mathrm{f}(4)+2 \mathrm{f}(1)$ (iv) $\frac{f(1)-3 f(4)}{f(-3)}$
32. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide 10,000,
$25,000,50,000$ and $1,00,000$ as salaries to the people who work in the categories $\mathrm{A}, \mathrm{C}, \mathrm{M}$ and E respectively. If $\mathrm{A}_{1}, \mathrm{~A}_{2}, \mathrm{~A}_{3}, \mathrm{~A}_{4}$ and $\mathrm{A}_{5}$ were Assistants; $\mathrm{C}_{1}$, $C_{2}, C_{3}, C_{4}$ were Clerks; $M_{1}, M_{2}, M_{3}$ were managers and $E_{1}, E_{2}$ were Executive officers and if the relation $R$ is defined by $x R y$, where $x$ is the salary given to person $y$, express the relation $R$ through an ordered pair and an arrow diagram.
33. In each of the following cases state whether the function is bijective or not. Justify your answer.
(i) $f: \mathbb{R} \rightarrow \mathbb{R}$. defined by $\mathrm{f}(\mathrm{x})=2 \mathrm{x}+1$ (ii) $f: \mathbb{R} \rightarrow \mathbb{R}$. defined by $\mathrm{f}(\mathrm{x})=3-4$ $x^{2}$
34. Given $\mathrm{A}=\{1,2,3\}, \mathrm{B}=\{2,3,5\}, \mathrm{C}=\{3,4\}$ and $\mathrm{D}=\{1,3,5\}$, check if $(\mathrm{A} \cap \mathrm{C}) \times(\mathrm{B} \cap$ $D)=(A \times B) \cap(C \times D)$ is true?
35. Let f be a function $f: \mathbb{N} \rightarrow \mathbb{N}$ be defined by $\mathrm{f}(\mathrm{x})=3 \mathrm{x}+2, \mathrm{x} \in \mathbb{N}$
(i) Find the images of $1,2,3$
(ii) Find the pre-images of 29,53
(iii) Identify the type of function
36. Show that the function $f: \mathbb{N} \rightarrow \mathbb{N}$ defined by $\mathrm{f}(\mathrm{m})=\mathrm{m}^{2}+\mathrm{m}+3$ is one-one function.
37. Consider the functions $f(x), g(x), h(x)$ as given below. Show that $(f \circ g) \circ h=f \circ(g \circ$ h) in each case.
$f(x)=x-4, g(x)=x^{2}$ and $h(x)=3 x-5$
38. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible.
$\{(\mathrm{x}, \mathrm{y}) \mid \mathrm{x}=2 \mathrm{y}, \mathrm{x} \in\{2,3,4,5\}, \mathrm{y} \in\{1,2,3,4\}$
39. Let $A=\{x \in \mathbb{W} \mid x<2\}, B=\{x \in \mathbb{N} \mid 1 \leq x<4\}$ and $C=\{3,5\}$. Then verify that
$(A \cup B) \times C=(A \times C) \cup(B \times C)$
40. A Relation $R$ is given by the set $\{(x, y) / y=x+3, x \in\{0,1,2,3,4,5\}\}$. Determine its domain and range.
41. Let
$A=\{x \in \mathbb{N} \mid 1<x<4\}, B=\{x \in \mathbb{W} \mid 0 \leq x<2\}$ and $C=\{x \in \mathbb{N}$ Then verify that
(i) $\mathrm{A} \times(\mathrm{B} \cup \mathrm{C})=(\mathrm{A} \times \mathrm{B}) \cup(\mathrm{A} \times \mathrm{C})$
(ii) $\mathrm{A} \times(\mathrm{B} \cap \mathrm{C})=(\mathrm{A} \times \mathrm{B}) \cap(\mathrm{A} \times \mathrm{C})$
42. A function $\mathrm{f}:[-7,6] \rightarrow 4 \mathrm{R}$ is defined as follows.
$f(x)= \begin{cases}x^{2}+2+1 & -7 \leq x<-5 \\ x+5 & -5 \leq x \leq 2 \\ x-1 & 2<x<6\end{cases}$
find (i) $2 \mathrm{f}(-4)+3 \mathrm{f}(2)$ (ii) $\mathrm{f}(-7)-\mathrm{f}(-3) \mathrm{f}(-3)$

## sec IV

ANSWER THE FOLLOWING QUESTIONS $2 \times 8=16$
43. 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 $\frac{7}{4}>1$ ).
44. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{2}{3}<1$ ).

