Relation & function

Ex:- $\wedge$ on the set $A = \{1, 2, 3, 4, 5\}$

defined by:- $a \wedge b = \min\{a, b\}$

write the operation table of $\wedge$

$\wedge$	1	2	3	4	5
1	1	1	1	1	1
2	1	2	2	2	2
3	1	2	3	3	3
4	1	2	3	4	4
5	1	2	3	4	5

$\to a$

Ans

Ans

i) Compute:- $(2 \wedge 3) \wedge 4$ & $2 \wedge (3 \wedge 4)$

ii) $(2 \wedge 3) \wedge (4 \wedge 5) = 2 \wedge 4 = 2$ Ans

Ex:- $*$ on set $\{1, 2, 3, 4, 5\}$

$a * b =$ HCF of a & b.

$1 * 1 = 1$

$1 * 2 = 1$

$1 * 3 = 1$

$2 * 1 = 1$

$2 * 2 = 2$

$\boxed{2 * 3 = 1}$

$2 * 4 = 2$

$2 * 5 = 1$

$2 * 6 = 2$

2×1 $\quad$ $2 \times 3 \times 1$

$2 \times 1 = 2$

Relation & function

Ex:- $*$ on N :→ $a*b$ = LCM of a & b

i) $5*7$ → $5*7$ = LCM of 5 & 7 = 35

ii) $20*16$ → $20*16$ = LCM of 20 & 16 = 80

iii) Comm. ? ✓

iv) identity element of $*$ in N.

$\Rightarrow \quad a*e = a$

LCM of a & e = 20

$a \downarrow 20$, $e \downarrow 1$

$*$ → {1, 2, 3, 4, 5}, $a*b$ = LCM of a & b

$*$	1	2	3	4	5
1					
2			6		
3			3		
4					
5				20	5

Relation & function

Ex! - $a * b = a^2 + b^2$ ✓

→ $(a*b)*c = (a^2+b^2)*c$

$(a^2+b^2)^2 + c^2$

$256 \leftarrow 4 \quad 4 + 1 = 257$

→ $a*(b*c) = a*(b^2+c^2)$

$= a^2 + (b^2+c^2)^2$

$4 \quad (4+1)^2$

$4 + 25 = 29$

Ex! $a * b = \frac{ab}{4}$

$b*a = \frac{ba}{4}$

$\frac{ab}{4} * c = \frac{\frac{ab}{4} \times c}{4} = \frac{abc}{16}$ ✓

$b*c = \frac{bc}{4} \Rightarrow a*\frac{bc}{4} = \frac{a \times \frac{bc}{4}}{4} = \frac{abc}{16}$

$\frac{a \times \frac{bc}{4}}{4} \rightarrow \frac{N}{D}$

$\Rightarrow \frac{abc}{4} \times \frac{1}{4} = \frac{abc}{16}$ ✓

Ex!- $a * b = ab^2$

Comm.

asso →

Relation & function

Ex:- let $f(x)=x^2$, $g(x)=2^x$

then the soln set of $\boxed{fog(x)=gof(x)}$ is

A) R (B) {0} (C) = {0, 2} , (D) none

Soln:- $f(x)=x^2$; $g(x)=2^x$

$\because fog(x)=f[g(x)]=f[2^x]=(2^x)^2$

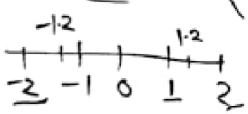
✓ $fog(x)=\boxed{2^{2x}}$

→ $gof(x)=g[f(x)]=g[x^2]=2^{x^2}$

so: $2^{2x}=2^{x^2} \Rightarrow 2x=x^2 \Rightarrow x^2-2x=0$

$x=0$ $x=2$

Soln:- {0, 2}



$[x]=[1.0]=1$

$[-1.5]=-2$ $[1.2]=1$

$[-1.9]=-2$ $[-1.2]=-2$

$[-1.0]=-1$

Q. $f(x)=\begin{cases}-1 & ; x<0\\ 0 & ; x=0\\ 1 & ; x>0\end{cases}$

$\boxed{g(x)}=1+x-[x]$ → greatest int. fun.

find $f[g(x)]=?$

A) x (B) 1 (C) $f(x)$ (D) $g(x)$

Soln:- $f[g(x)]$

$f[1+x-[x]]$

Here $1+x-[x]$ is always +ive.

So: $f(+ive) \Rightarrow f(x>0)=1$ Ans

$1+x-[x] \Rightarrow x=1.5 \Rightarrow 1+1.5-[1.5]=2.5-1=1.5$

$x=-1.5 \Rightarrow 1+(-1.5)-[-1.5]=1-1.5-(-2)$

$=1-1.5+2=3-1.5=1.5$