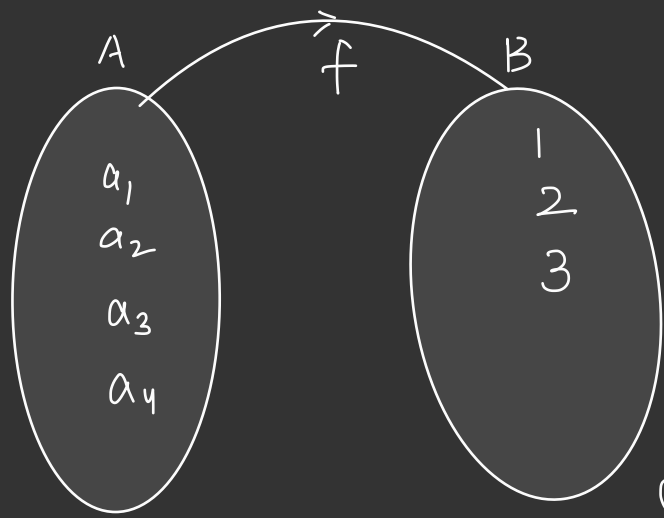
Q



Find number of :

(i) one - one fns from A to B

(ii) Many one " "

(iii) Onto fns "

(iv) Into fns "

Solⁿ

Total number of functions from A to B $= 3^4 = 81.$

" " " one-one fns " " " $= 0.$

" " " Many-one " " " " $= 81 - 0$

$= 81.$

(iii) No. of onto fns from A to B :

3 students → 4 books (such that no. student is empty handed)

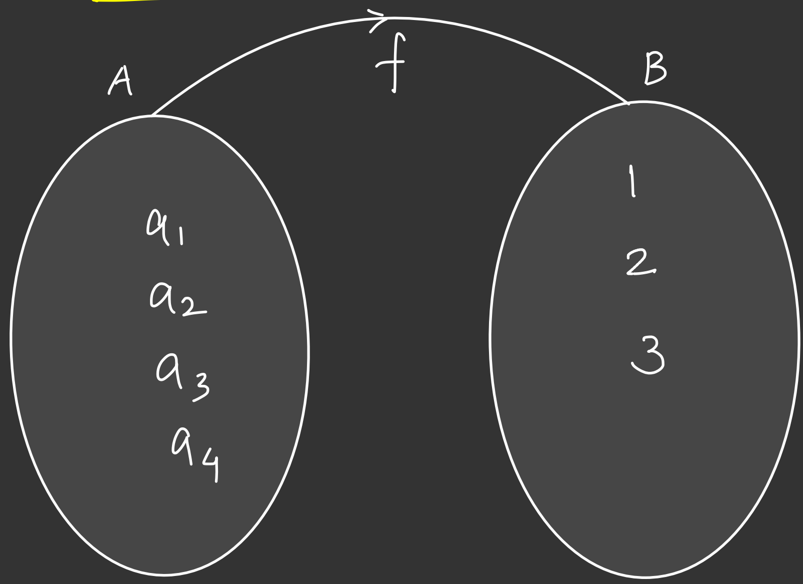
Groups : 1, 1, 2

$$\frac{4!}{(1!\,1!\,2!)\,2!} \times 3! = \frac{\cancel{24}^{6} \times 6}{\cancel{4}} = 36.$$

(iv) No. of into fns from A to B $= 81 - 36$

$= 45.$

(iii/iv) **Alt:**



Total no. of fns from A to B $= 3^4 = 81$.

Total no. of onto from A to B $= 3^4 -$ (No. of into fns from A to B)

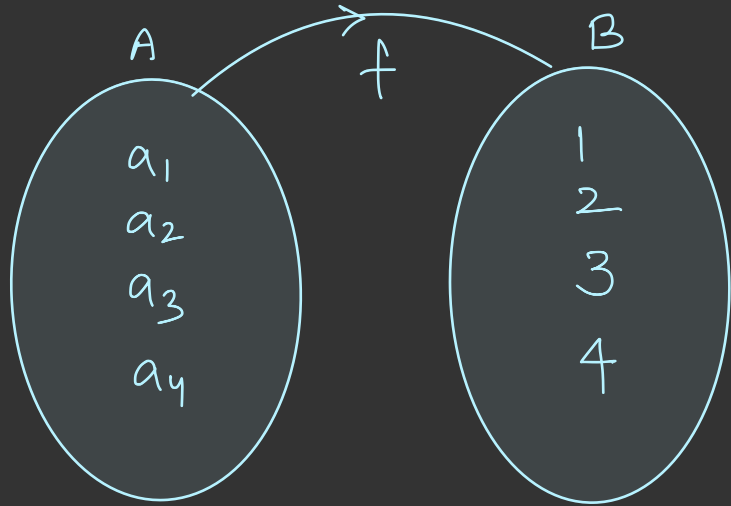
$$= 3^4 - \left({}^3C_1 \times 2^4 - {}^3C_2 \cdot 1\right)$$

$$= 81 - (3 \times 16 - 3)$$

$$= 81 - 45$$

$$= 36.$$

Q2



① Total no. of fns $= 4^4$.

② " " " one-one from A to B $= {}^4C_4 \cdot 4!$

$= 24$

③ " " " Many-one " " " $= 256 - 24$

④ Total no. of onto-fns from A to B

$\Rightarrow \quad 1, \; 1, \; 1, \; 1$

$$\frac{\cancel{4!}}{(1!)^4 \cdot \cancel{4!}} \times 4! = 24$$

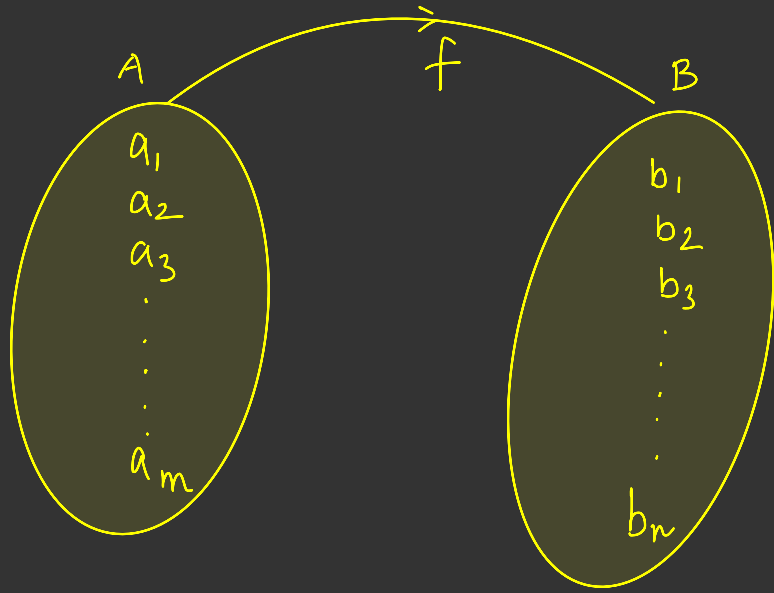
⑤ No. of into fns from A to B $= 4^4 - 24 = 232$

Alt:

$$4^4 - \left({}^4C_1 \times 3^4 - {}^4C_2 \cdot 2^4 + {}^4C_3 \cdot 1 \right)$$

$$256 - (4 \times 81 - 6 \times 16 + 4) = 256 - 232$$

Q



where $n > m$

Total no. of function from A to B $= n^m$.

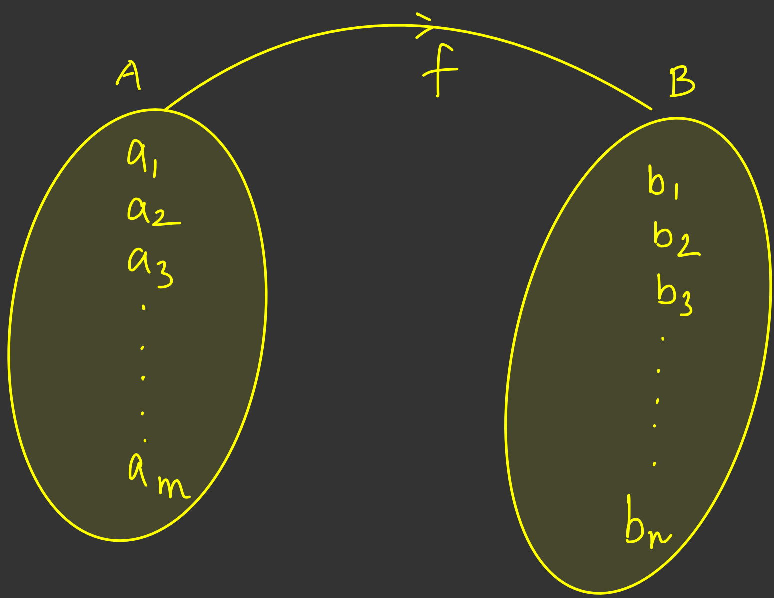
" " " one-one " " " " $= {}^nC_m \cdot m!$

" " " many-one " " " " $= n^m - {}^nC_m \cdot m!$

" " " onto - fns " " $= 0$.

" " " into - " " " $= n^m$.

Q



where $n < m$

Total no. of function from A to B $= n^m$.

" " " one-one " " " " $= 0$

" " " many-one " " " " $= n^m$

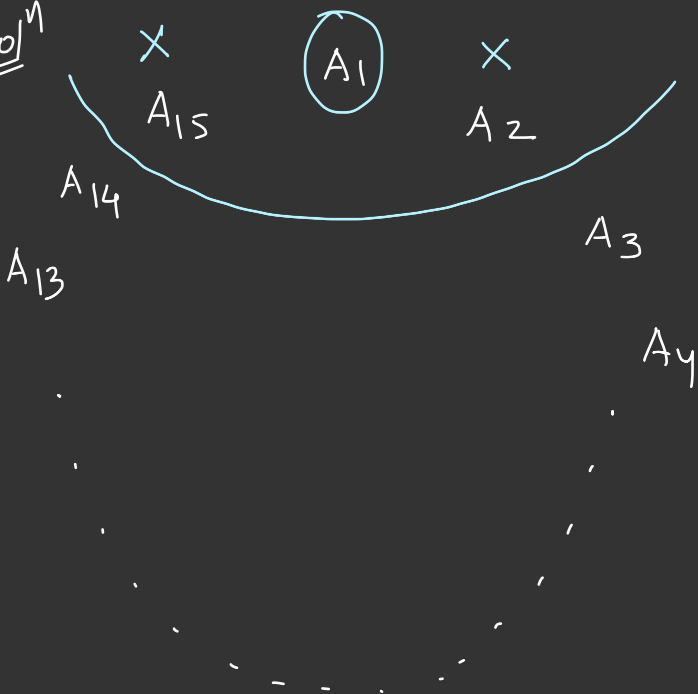
" " " onto - fns " " $=$

$$n^m - \left({}^nC_1 \cdot (n-1)^m - {}^nC_2 (n-2)^m + {}^nC_3 (n-3)^m \right.$$

$$\left. \ldots\ldots\ldots (-1)^{n-1} \cdot {}^nC_n (n-n)^m \right)$$

Q How many hexagons can be contructed by joining the vertices of quindecagon (15 sides) if none of the sides of hexagon is also side of quindecagon.

Sol^n



$$\boxed{\frac{{}^{15}C_1 \times {}^{8}C_5}{6}}$$

$\boxed{A_1}$ A_3 A_6 A_{10} A_{12} A_{14}

$\boxed{A_3}$ A_1 A_6 A_{10} A_{12} A_{14}

$\boxed{A_6}$ A_1 A_3 A_{10} A_{12} A_{14}

$\boxed{A_{10}}$ — — — — —

$\boxed{A_{12}}$ — — — — —

$\boxed{A_{14}}$ — — — — —

M-2

A_{14} A_{15} A_1 A_2 A_3 A_4 . . . . A_{12} A_{13}

A_1 A_2 A_3 A_4 A_5 A_6 A_7 . . . . . . A_{11} A_{12} A_{13} A_{14} A_{15}

${}^{10}C_6$ — (No. of ways when A_1 & A_{15} are getting selected)

✓ A_1 $\underset{\times}{A_2}$ $\overbrace{A_3 \; A_4 \; \cdots\cdots \; A_{12} \; A_{13}}^{8}$ $\underset{\times}{A_{14}}$ A_{15} ✓

$$\boxed{{}^{10}C_6 - {}^{8}C_4}$$