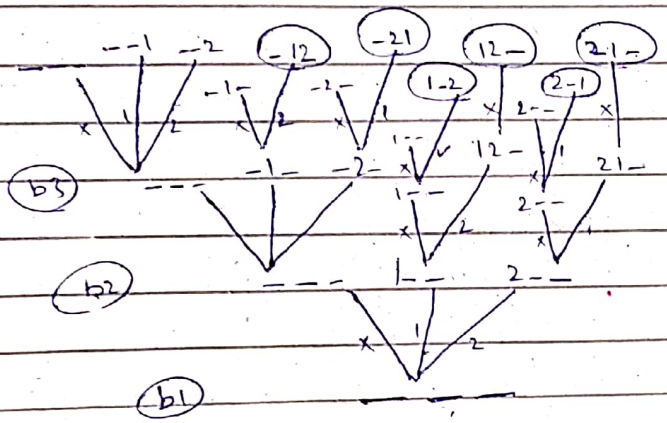
$$^nP_r = \frac{n!}{(n-r)!} = n \times (n-1) \times (n-2) \times \ldots (n-(r-1))$$

i) Permutation 1 to place 2 non-identical items in 3 boxes

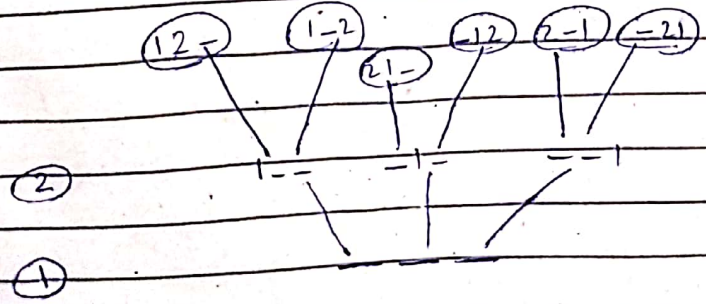
Method 1 ⟶ Taking boxes on Levels



Note :-
Here in each case there are 3 options, either to place nothing in that box, or place first item or place second item.
In the end the answers in which both items are present are our answers.

ii) Permutation 2 to place 2 non-identical items in 3 boxes.

Method 2 :- ⟶ Placing items on Levels



Note :- Here each item has 3 choices either to get placed in box 1 or 2 or 3.

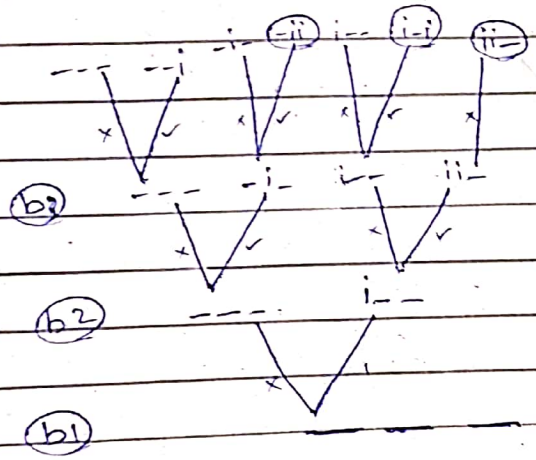
Answers:
1 2 _
1 _ 2
2 1 _
_ 1 2
2 _ 1
_ 2 1

$${}^nC_r = \frac{n!}{r!(n-r)!}$$

$$2^n = {}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_r$$
$$2^4 = {}^4C_0 + {}^4C_1 + {}^4C_2 + {}^4C_3 + {}^4C_4$$
$$= 1 + 4 + 6 + 4 + 1$$

(*) Combination 1 to place 2 identical items in 3 boxes.

Method 1 ⟶ Taking boxes on levels



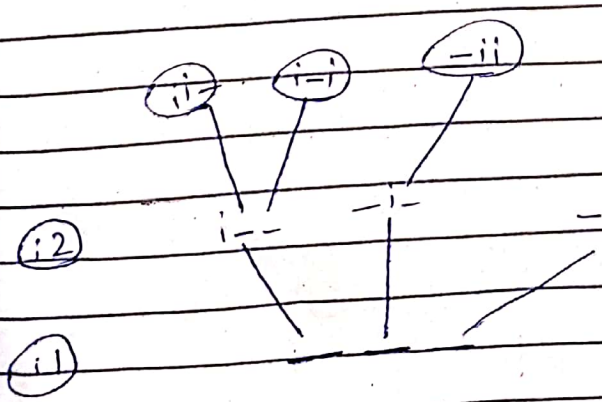
Note:-
From this choose only the boxes which has two items placed. i.e with a circle

Answers:-

–ii
i–i
ii–

(*) Combination 2 to place 2 identical items in 3 boxes.

Method 2 ⟶ Taking items on levels.



Note :-
The thing is we dont want arrangements; we only want representation as in case of 12–, 21– is different but here if I replace one i with other the answer is same.

Call will only be made if the box is empty (after) Top the first item.

Answers ⟶ | ii– i–i –ii |