

## Ten Quickies Pg 2

1. How many ways are there to pick 1 student from 6 boys and 8 girls?

$$\text{total students} = 6 + 8 = 14$$

$$\therefore {}^{14}C_1 = 14$$

note: according to the conventions people are always distinguishable.

2. How many ways are there to pick 1 piece of fruit from 6 oranges and 8 apples?

6 oranges & 8 apples

fruits are indistinguishable

$\therefore$  practically pick 1 fruit among two types

The problem boils down to.

$${}^2C_1 = \boxed{2}$$

3. How many ways are there to pick 1 letter from 3 A's, 5 B's, and 7 C's?

practically only 3 type of letters.

$$\therefore {}^3C_1 = 3$$

4. How many ways are there to pick 2 letters from 3 B's and 3 G's?

⊗ Same Letters are indistinguishable

reference

<https://doubleroot.in/lessons/permutations-combinations/combinations-identical-objects/>

practically only 2 types of

Lets go for case based analysis

$$\text{AU 2 from 3B's} = 1$$

$$\text{AU 2 from 3G's} = 1$$

$$1 \text{ from 3B's \& 1 from 3G's} = 1 \times 1 = 1$$

} ∴ ③

5. How many ways are there to pick 2 students from 3 boys and 3 girls?

NOTE:- People/Students are distinguishable

⊗ Case Based analysis.

$${}^3C_2 + {}^3C_1 \times {}^3C_1 + {}^3C_2$$

$$3 + 3 \times 3 + 3 = \boxed{15}$$

6. How many ways are there to pick 5 oranges from 6 oranges?

Same fruits are indistinguishable

∴ 1 way.

7. How many ways are there to pick 5 girls from 6 girls?

$${}^6C_5 = 6$$

8. How many ways are there to pick 1 girl from 6 girls?

$${}^6C_1 = 6$$

~~the choice was not mentioned 5, 15, 6, 8~~ 7 & 8. These are 2 ways of stating the same question and this is a very important principle: Whenever you select  $r$  from  $n$  distinguishable objects, you are automatically selecting  $n - r$  of the objects as well. ~~8, 6, 6, 6, 6, 6~~

imp

$$\begin{aligned} nC_r &= nC_{n-r} \\ \frac{n!}{r!(n-r)!} &= \left( \frac{n!}{(n-r)!(n-n+r)!} = \frac{n!}{r!(n-r)!} \right) \\ \text{L.H.S} &= \text{R.H.S} \end{aligned}$$

9. How many ways are there to pick 5 pieces of fruit from 7 oranges and 8 apples?

case based analysis

7 oranges      8 apples  
└──┬──┘      └──┬──┘  
Lot 1      Lot 2

$$5\text{Lot1} + 4\text{Lot1} \times 1\text{Lot2} + 3\text{Lot1} \times 2\text{Lot2} + 2\text{Lot1} \times 3\text{Lot2} + 1\text{Lot1} \times 4\text{Lot2} + 5\text{Lot2}$$

$$\begin{aligned} &= 1 + 1 \times 1 + 1 \times 1 + 1 \times 1 + 1 \times 1 + 1 \\ &= 6 \end{aligned}$$

10. How many ways are there to pick some pieces of fruit from 9 oranges and 6 apples if at least 1 piece is picked?

9 oranges      6 apples

$(\{1 \text{ from } 9 \dots 9 \text{ from } 9\} + 0 \text{ from } 9) \times (\{1 \text{ from } 6 \dots 6 \text{ from } 6\} + 0 \text{ from } 6)$

- Case where 0  
from both are  
picked  
∴ at least 1 piece  
should be picked.

$$\therefore (9+1)(6+1) - 1 = \boxed{69}$$