

COMBINATORIES:

SLOT METHOD:

- Used when an “ And” situation is present in the problem.
- You have to choose on of these AND one of those.

1st Step: Create a SLOT for each decision you have to make.

2nd Step: Fill in each Slot with the number of options.

3rd Step: Multiply

4th Step: *(If order does not matter).*

Example:

A 5 letter CODE must be chosen from FLORIDA?

No repetitions allowed.

How many codes can be chosen?

Q: Does the order matter?

Order means that if you interchange or scramble the chosen elements, do you get a different outcome?

In this case, yes.

We can illustrate this better with this example:

3 of 10 contestants are to be chosen for gold, silver and bronze → Order matters

3 of 10 workers are to be chosen to work on a committee → Order does not matter.

We will analyse the order thing a little more.

An advertiser wants to pick 5 pages in a symphony program, in which place pages he should place the ads? (The pages are numbered 1-16)

Does order matter?

Operative Q: If I scramble the elements, do I get a different outcome?

1,3,7,8,11

3,11,7,1,8

Both of the above cases are the same outcomes, hence order doesn't matter. We can be tricked as we see the page numbers.

Now, its also possible for order not to matter within some subsets.

In the same question as above if the advertiser has to pick 5 pages for a symphony program with the following restriction:

On three pages will be $\frac{1}{2}$ page ads

On two pages will be $\frac{1}{4}$ page ads.

In this case within the 3 pages chosen for $\frac{1}{2}$ page ads order doesn't matter and within the 2 pages chosen for $\frac{1}{4}$ page ads too.

But, this is not a set of 5 elements in which order doesn't matter.

Now, back to FLORIDA question:

Order matters as we are choosing CODES.

FLRIA and IFALR are different.

Step 1: --- --- --- --- ---

Step 2: 3 4 5 6 7 (No repetition allowed)

Step 3: Multiply

$$7 \times 6 \times 5 \times 4 \times 3 = 2520$$

Now the same, question with first and last letters must be consonants.

1. --- --- --- --- ---
 2. 3 3 4 5 4 (Here we fill the first and last place first)
 3. Multiply
- Answer = 720

Takeaway: You must pick the elements in an order such that the number of options is always the same.

Q. A SET of 5 letters has to be chosen from FLORIDA.

No repetition allowed.

How many sets can be formed?

Important here is that SETS are different from CODES.

GMAT: The default meaning of SET is that order doesn't matter.

♀ There are n! different ways to scramble the elements in a set of "n" thing.

Example:

FLORI

.

.

.

.

.

.IROLF

So we can conclude that for every set there are 5! Different codes.

Hence, the number of codes (in which order matters)= $7 \times 6 \times 5 \times 4 \times 3$

Therefore,

$$\text{Number of sets in which order doesn't matter} = \frac{7 \times 6 \times 5 \times 4 \times 3}{5!}$$

So now we apply the step 4- Divide

Step 4: If order doesn't matter,

- You take the number of items within which the order doesn't matter.
- Take the factorials of those numbers.
- Then divide.

Now, choose a set of 3 consonants and 2 vowels from FLORIDA. How many sets can be chosen? No repetition allowed.

1. --- --- --- --- ---
2. {4 3 2} {3 2}

3. Multiply
 4. Now here order doesn't matter within two subsets.
- So answer = $\frac{4 \times 3 \times 2}{3!} \times \frac{3 \times 2}{2!}$

Q. GMAT Prep

A committee of three people is to be chosen from four married couples. What is the number of different committees that can be chosen if two people who are married to each other cannot serve on the committee?

1. --- --- ---
2. 4 6 8 (The number of choice for each place shall reduce by two as two people married to each other cannot serve on the committee)
3. Multiply
4. Divide (As order doesn't matter. It would have mattered if the ranks for the committee were mentioned)

Answer = $\frac{8 \times 6 \times 4}{3!}$

Now, what is the answer if the restrictions are same, but one person is to be chosen as a President?

1. --- --- ---
2. 8 6 4
3. Multiply
4. Divide (Order doesn't matter for two places, as one place is fixed with the President)

Answer = $\frac{8 \times 6 \times 4}{2!}$

Q. GMAT Prep

A certain law firm consists of 4 senior partners and 6 junior partners. How many different groups of 3 partners can be formed in which atleast one member is a senior partner? (Two groups are considered different if atleast one member of group is different)

Now here, there can be many possibilities.

1 Senior, 2 junior (Order doesn't matter between the juniors)	OR	2 senior, 1 junior (Order doesn't matter between the seniors)	OR	3 seniors Order doesn't matter at all.
Answer = $\frac{4 \times 6 \times 5}{2!}$		Answer = $\frac{4 \times 3 \times 6}{2!}$		Answer = $\frac{4 \times 3 \times 2}{3!}$

Total = Addition of above three answers.

Another way to look at this solution is as follows:

With probability, you can subtract from 1 to find the probability of opposite event. Similar approach can be used here.

Possibility that we don't want= All juniors= $\frac{6 \times 5 \times 4}{3!} = 20$

Total number of possibilities w/o any restriction = $\frac{10 \times 9 \times 8}{3!} = 120$

So, we can arrive at the answer of the above by subtracting 20 from 120.