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GMAT

Quant Section Test

[PERMUTATION AND COMBINATION] - Solutions

1. **Solution:**

Topic: Data Analysis

Concept Tested: Permutation and Combination

Type of Question: Problem Solving (PS)

Given: There are total 10 guests. 6 men and 4 women.

Approach:

6 men can be arranged in 6! number of ways.

Consider one particular arrangement of these men and empty slots as follows:

$$-m-m-m-m-m-m-$$

Now, if we place 4 women in either of 4 slots out of 7 then no two women will be together.

So, ${}^{7}C_{4}$ is the # of ways to choose in which 4 slots out of 7 these women will be placed and 4! is # of arrangements of them in these slots.

So, the total arrangements is = 6! * ${}^{7}C_{4}$ * 4!, which is same as 6! * ${}^{7}P_{4}$

= 6! * $\frac{7!}{3!}$ = 720 * 840 = 604,800

Hence, the answer is E.

2. Solution:

Topic: Data Analysis

Concept Tested: Permutation and Combination

Type of Question: Problem Solving (PS)

Given: Mary's mother doesn't want to stand next to Michael's father. There are 10 members to be arranged.

Approach: Find total ways without any condition and then subtract the constraint given**.**

In how many ways Michael's father and Mary's mother can stand together?

Consider them as one unit: {F, M}. So, we'd have 9 units {F, M}, 1, 2, 3, 4, 5, 6, 7, 8, which can be arranged in 9! ways. Michael's father and Mary's mother within their unit can be arranged in 2! ways. Therefore, Michael's father and Rachel's mother can stand together in 9!*2! ways.

Therefore; (# of ways Michael's father and Mary's mother **will not** stand together) = (Total number ways of arrangement - # of ways Michael's father and Mary's mother **will** stand together)

= 10! – (9!*2!)

= 9! (10 - 2!)

= 8*9!

Hence, the answer is A.

3. Solution:

Topic: Data Analysis

Concept Tested: Permutation and Combination

Type of Question: Problem Solving (PS)

Given: Alexander received a gift of six different countries' flags, including Italy and Russia.

He has space in his study room to display only four flags in a row.

Question: Find the number of possible arrangements if he cannot display the Italy and Russia flags at the same time?

Approach:

The total number of ways to choose and arrange 4 flags out of 6 is ${}^6C_4 * 4! = 360$ (or directly ${}^6P_4$).
We cannot have Italy and Russia flags at the same time. The number of ways to have and arrange Italy and Russia at the same time

$= {}^4C_2 * 4! = 144$ (choosing 2 flags out of 4 remaining, without Italy and Russia, and then arranging 4 flags with 4!);

(# of arrangements the Italy and Russia NOT at the same time) = (Total # of arrangements) – (# of arrangements the Italy and Russia at same time)

= 360 - 144 = 216.

Hence, the answer is C.

4. **Solution:**

Topic: Data Analysis

Concept Tested: Permutation and Combination

Type of Question: Data Sufficiency (DS)

Question: How many different 3- different teams can be formed from a group of ‘a’ individuals. So basically we have to find the value of ‘a’ here.

Statement I is sufficient:

$^{(a+4)}C_4 = 210$.

There is only one possible value for ‘a+4’ that would yield a value of 210. So, don't bother trying to find out what it is. ☺

Note: The only non-unique solution will be for the "r" in $^{n}C_r$ Example. ($^{8}C_3 = {}^{8}C_5$) but for n not equal to m, $^{n}C_r$ can never be equal to $^{m}C_r$.

Therefore, Statement I by itself is sufficient to answer the question asked.

So, eliminate B, C and E.

The answer is either A or D.

Statement II is sufficient:

$^{(a+2)}C_2 = 45$.

Again, you should be able to see that there can be only one value of ‘a+2’ that would yield a value of 45. Why bother to finding out what the value is? As long as we have an equation in one variable, we can find a value.

Therefore, Statement II by itself is sufficient to answer the question asked.

So, eliminate A.

Hence, the answer is D.

5. **Solution:**

Topic: Data Analysis

Concept Tested: Permutation and Combination

Type of Question: Data Sufficiency (DS)

Given: Salsa dancers' group from Latin America, Columbia and United States includes at least three Salsa dancers from each country.

Question: How many same country pairs of Salsa dancers can be selected?

Statement I is insufficient:

Given: The group consists of 11 Salsa dancers.
Now the question is how the 11 are split among 3 countries: (3, 3, 5) or (3, 4, 4). The number of pairs of same country will be different in these two cases - 4 for (3, 3, 5) and 5 for (3, 4, 4).

Therefore, Statement I by itself is insufficient to answer the question asked.

So, eliminate A and D.

The answer is either B, C or E.

Statement II is insufficient:
Given: The group consists of an equal number of Latin America and Columbia Salsa dancers.
We don't know how many Salsa dancers are actually there - all we know is that each country has at least 3.

Therefore, Statement II by itself is insufficient to answer the question asked.

So, eliminate B.

The answer is either C or E.
Combine both Statements:
Latin America and Columbia could have 3 - 3 Salsa dancers or they could have 4 - 4 Salsa dancers. So we still don't know how many pairs we can form.

Therefore, even after combining the two statements, it is insufficient to answer the question asked.

So, eliminate C.

Hence, the answer is E.

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