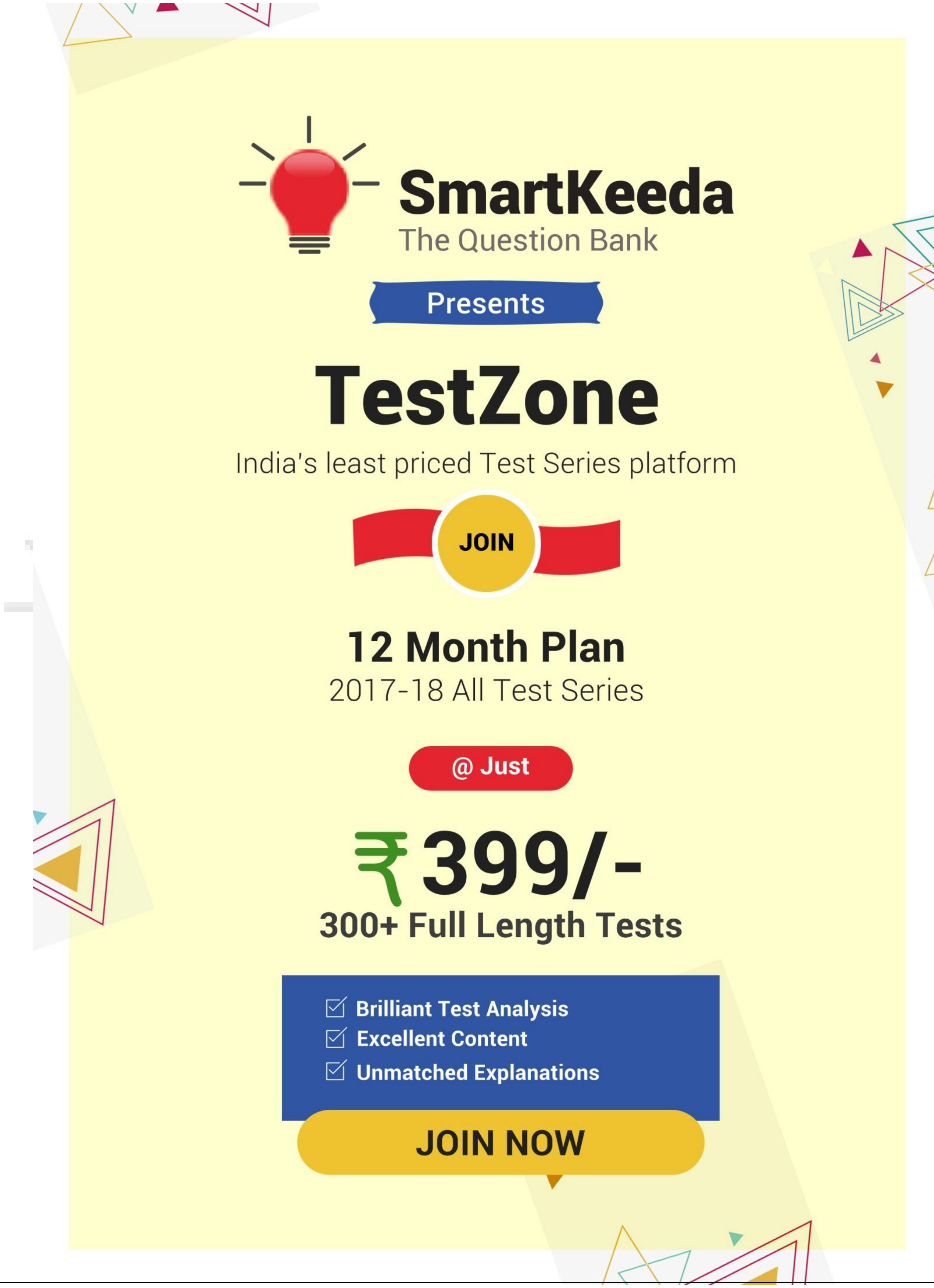

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Permutation and Combination Questions for Bank Exams – P and C Quiz at Smartkeeda.

Permutation and Combination Quiz 1

Directions (Set of 2 Questions): Kindly study the following information carefully and answer the question that follows:

Five students are to be arranged on five chairs for a photograph. Three of these are girls and the rest are boys.
1. Find out the total number of ways in which three girls are together.

A. 36
B. 84
C. 100
D. 120
E. None of these

2. Find out the number of ways in which all three girls do not occupy consecutive seats.

A. 120
B. 36
C. 84
D. 136
E. None of these

Directions (Set of 2 Questions): Kindly study the following information carefully and answer the question that follows:

Using all the letters of the word LINEAR.
3. How many words start with a vowel but end with a consonant?

A. 224
B. 316
C. 212
D. 216
E. None of these

4. How many different words can be formed that start and end with vowel?

A. 126
B. 108
C. 144
D. 216
E. None of these

5. A six letter word is to be formed by using at least two vowels in it. How many such words can be formed (not necessarily meaningful) if all the letters in word are different?

A. 53349120
B. 53439120
C. 53431920
D. 54339120
E. 53493120

6. In a badminton competition involving some men and women of a society, every person had to play exactly one game with every other person. It was found that in 36 games both the players were men and in 78 games both the players were women. Find the number of games in which one player was a man and other was a woman.

A. 127
B. 117
C. 138
D. 146
E. None of these

Directions (Set of 2 Questions): Kindly study the following information carefully and answer the question that follows:

7. A forgetful teacher had the test papers and the marksheets of 5 students. But, he entered someone else's marks for each of the 5 students. In how many ways could he have entered the correct marks for at least one student?

A. 36
B. 44
C. 84
D. 76
E. None of these

8. A forgetful teacher had the test papers and the marksheets of 5 students. But, he entered someone else's marks for each of the 5 students.
In how many different ways could he have made this error?

A. 36
B. 44
C. 84
D. 76
E. None of these

Directions (Set of 2 Questions): Kindly study the following information carefully and answer the question that follows:

There are 5 singers, 8 dancers and 7 actors in a movie. A group of 6 members will be chosen to nominate in an award show.

9. How many combinations of members are possible if the group is to consist of all members of the same profession?

A. 20
B. 25
C. 30
D. 35
E. None of these

10. How many combinations of members are possible if the group is to consist of exactly 3 singers?

A. 5000
B. 4500
C. 4550
D. 6250
E. None of these

Correct Answers:

1	2	3	4	5	6	7	8	9	10
A	C	D	C	B	B	D	B	D	C

Explanations:

1. As per the common explanation, we get

Total number of ways in which three girls are together = 6 × 6 = 36
Hence, option A is correct.

Common Explanation: As per the question, three girls can't occupy consecutive seats but two can. Therefore, if we find the number of ways in which all three girls occupy consecutive seats and subtract this number from the total number of ways in which the five people can be arranged among themselves, we will get the required answer.

5 students can be arranged among themselves in $^5p_5$ ways = 120 ways.

Assume that the 3 girls are one entity. The total number of ways in which they can be arranged among themselves = 3! = 6

Also, the set of three girls and the other students can be arranged among themselves in 3! = 6 ways.

Thus, total number of ways in which three girls are together = 6 × 6 = 36
Thus, number of ways in which all 3 girls will not occupy consecutive seats = 120 – 36 = 84

2. Following the common explanation, we get

Thus, number of ways in which all 3 girls will not occupy consecutive seats = 120 – 36 = 84

Hence, option C is correct.

Common Explanation: As per the question, three girls can't occupy consecutive seats but two can.

Therefore, if we find the number of ways in which all three girls occupy consecutive seats and subtract this number from the total number of ways in which the five people can be arranged among themselves, we will get the required answer.

5 students can be arranged among themselves in $^5p_5$ ways = 120 ways.

Assume that the 3 girls are one entity. The total number of ways in which they can be arranged among themselves = 3! = 6

Also, the set of three girls and the other students can be arranged among themselves in 3! = 6 ways.

Thus, total number of ways in which three girls are together = 6 × 6 = 36
Thus, number of ways in which all 3 girls will not occupy consecutive seats = 120 – 36 = 84

3. Following the common explanation, we get

The number of words that start with a vowel but end with a consonant = 9 × 24 = 216.

Hence, option D is correct.

Common Explanation:

The word LINEAR has three vowels - I, E and A. If a word starts and ends with a vowel, the two letters to occupy the first and the last positions can be selected and arranged in $^3P_2 = 6$ ways.

The remaining 4 letters can be arranged among themselves in $^4P_4 = 4! = 24$ ways.

∴ The number of words that start and end with a vowel = 24 × 6 = 144.

If a word starts with a vowel but ends with a consonant, its first letter can be selected from I, E and A in 3 ways. Its last letter can be selected from L, N and R in 3 ways. The remaining three letters can be arranged in 4! ways.

∴ The number of words that start with a vowel but end with a consonant = 3 × 3 × 4! = 9 × 24 = 216.

4. Following the common explanation, we get
The number of words that start and end with a vowel = 144.
Hence, option C is correct.

Common Explanation:
The word LINEAR has three vowels - I, E and A. If a word starts and ends with a vowel, the two letters to occupy the first and the last positions can be selected and arranged in $^3P_2 = 6$ ways.

The remaining 4 letters can be arranged among themselves in $^4P_4 = 4! = 24$ ways.
∴ The number of words that start and end with a vowel = 24 × 6 = 144.
If a word starts with a vowel but ends with a consonant, its first letter can be selected from I, E and A in 3 ways. Its last letter can be selected from L, N and R in 3 ways. The remaining three letters can be arranged in 4! ways.
∴ The number of words that start with a vowel but end with a consonant = 3 × 3 × 4! = 9 × 24 = 216.

5. Six letter words with at least two vowels can have 2, 3, 4 or 5 vowels as no letters can be repeated.

There are 21 consonants and 5 vowels.
All possible cases:
2 vowels and 4 consonants
3 vowels and 3 consonants
4 vowels and 2 consonants
5 vowels and 1 consonant

∴ Number of ways in which this can be done = ${}^5C_2 \times {}^{21}C_4 + {}^5C_3 \times {}^{21}C_3 + {}^5C_4 \times {}^{21}C_2 + {}^5C_5 \times {}^{21}C_1$
= 10 × 5985 + 10 × 1330 + 5 × 210 + 1 × 21 = 74221
In each of these cases, chosen 6 letters can arrange themselves in 6! Ways.
∴ Total number of ways in which this can be done = 6! × 74221 = 720 × 74221 = 53439120
Hence, option B is correct.

6. Let the number of men be x and women be y
In badminton two person can play at a time,
Therefore, no of games played between men is ${}^xC_2=36$

$$\frac{x(x-1)}{2} = 36$$

$x(x-1) = 72$
$x = 9$
Which means total number of men playing badminton are 9
Now, no of games played between women is ${}^yC_2=78$

$$\frac{y(y-1)}{2} = 78$$

$y(y-1) = 156$
$y = 13$
Which means total number of women playing badminton are 13
Therefore, no of games in which one player is man and one is woman is,
${}^9C_1 \times {}^{13}C_1=117$
Hence, option (B) is correct.

7. Following the common explanation, we get

The number of ways in which he could have entered correct marks for at least one student = 120 – 44 = 76.
Hence, option D is correct.

Common Explanation:
Applying the derangement formula, the number of ways in which this error could have been done is given by:

$$D_5 = 5! \times \left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!}\right)$$

$$\Rightarrow 120 \times \left(\frac{1}{2} - \frac{1}{6} + \frac{1}{24} - \frac{1}{120}\right)$$

$$\Rightarrow 120 \times \left(\frac{44}{120}\right) = 44$$

The teacher could have made this error in 44 different ways.
Total number of ways in which 5 mark sheets can be given to 5 students = ${}^5P_5$ = 5! = 120 ways.
Of these, in 44 ways, all the marks enetred would be incorrect.
So, the number of ways in which he could have entered correct marks for at least one student = 120 – 44 = 76.

8. Following the common explanation, we get
The teacher could have made this error in 44 different ways.
Hence, option B is correct.
Common Explanation:

Applying the derangement formula, the number of ways in which this error could have been done is given by:

$D_5 = 5! \times (\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!})$

$\Rightarrow 120 \times (\frac{1}{2} - \frac{1}{6} + \frac{1}{24} - \frac{1}{120})$

$\Rightarrow\ 120 \times (\frac{44}{120}) = 44$
The teacher could have made this error in 44 different ways.
Total number of ways in which 5 mark sheets can be given to 5 students = ${}^5P_5$ = 5! = 120 ways.
Of these, in 44 ways, all the marks entered would be incorrect.
So, the number of ways in which he could have entered correct marks for at least one student = 120 – 44 = 76.

9. Here we want 6 singers or 6 dancers or 6 actors.

The group cannot be of all singers since there are only 5 singers.
Therefore, the group can be a group of 6 dancers or 6 actors.
Number of groups of dancers = ${}^8C_6$ =28
Number of groups of actors = ${}^7C_6$ =7
Since we want the number of groups of 6 dancers or 6 actors, we want the sum of each of these possibilities:
= 28 + 7 = 35
Hence, option (D) is correct.

10. Here we need the number of possible combinations of 3 out of 5 singers, ${}^5C_3$, and the number of possible combinations of 3 out of the 15 dancers and actors ,${}^{15}C_3$.

Note that we want 3 singers and 3 members from the other profession.
Therefore, we multiply the number of possible groups of 3 of the 5 singers times the number of possible groups of 3 of the 15 members from the other profession.
${}^5C_3 \times {}^{15}C_3 = 4550$

Hence, option (C) is correct.