CONTOUREDUCATION

VCE Specialist Mathematics ½
Combinatorics I [5.1]
Homework

Admin Info & Homework Outline:

Student Name	
Questions You Need Help For	
Compulsory Questions	Pg 2-Pg 10

Section A: Compulsory Questions

Sub-Section [5.1.1]: Permutations and Combinations (Tech-Free)
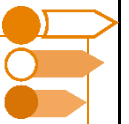
Question 1

a. Calculate $^5P_2$.

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b. Calculate $^6C_3$.

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c. Calculate $\binom{5}{3}$.

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Space for Personal Notes

Question 2

a. In how many ways can a president, vice president, and secretary be chosen from a committee of 8 people?

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b. How many distinct hands of 3 cards can be dealt from a specific set of 10 cards?

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c. How many ways can 4 different books be arranged on a shelf?

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Space for Personal Notes

Question 3

Given that, $^kP_2 = 30$. Find the value of k.

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Space for Personal Notes

Sub-Section [5.1.2]: Permutations and Combinations with Restrictions/Composite (Tech-Active)

Question 4

a. How many ways can a committee of 4 people be chosen from 6 men and 5 women if there must be exactly 2 men?

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b. How many ways can 7 people be seated around a circular table?

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c. A team of 3 is chosen from 5 boys and a team of 2 is chosen from 4 girls. How many ways can the two separate teams be chosen?

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Space for Personal Notes

Question 5

a. How many distinct arrangements are there of the letters in the word 'ENGINEERING'?

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b. A student must select 5 books from a reading list of 10 books. However, 2 specific books are mandatory. How many selections are possible?

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c. From a group of 9 students, how many ways can two committees be formed if one committee has 4 students and the other has 3 students, and no student can be on both committees?

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Question 6 (6 marks)

a. How many ways can 4 distinct physics books and 3 distinct chemistry books be arranged on a shelf if all the physics books must be kept together?

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b. A group of 5 men and 4 women are forming a subcommittee of 4 people. How many ways can this be done if the subcommittee must contain at least 2 women?

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c. How many ways can a president and vice president be chosen from 10 people, and then a separate committee of 3 chosen from the remaining 8 people?

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Question 7

Consider arrangements of the letters in the word 'STATISTICS'.

a. How many distinct arrangements are there?

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b. How many arrangements begin with 'S' and end with 'T'?

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c. How many arrangements have all the vowels (A, I, I) together?

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d. How many arrangements have no two vowels adjacent?

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e. How many arrangements have all the 'S' letters together AND all the 'T' letters together?

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f. How many arrangements have exactly two 'S' letters adjacent?

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Space for Personal Notes

Question 8

A committee of 5 people is to be selected from 6 physicists, 5 chemists, and 4 mathematicians.

a. How many ways can the committee be selected if there are no restrictions?

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b. How many ways can the committee be selected if it must have exactly 2 physicists and exactly 2 chemists?

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c. How many ways can the committee be selected if it must have at least 3 mathematicians?

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d. How many ways can the committee be selected if two specific physicists, Dr Alpha and Dr Beta, refuse to serve on the committee together?

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e. How many ways can the committee be selected if it must contain exactly 3 people from the same profession?

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f. How many ways can the committee be selected if it must contain more physicists than chemists?

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