



PERMUTATIONS AND COMBINATIONS

Practice Questions (2015-2018)

1. 0606/21 October/November 2018 Qn. 6

A 5-digit code is to be formed from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9. Each digit can be used once only in any code. Find how many codes can be formed if

(i) the first digit of the code is 6 and the other four digits are odd, [2]

(ii) each of the first three digits is even, [2]

(iii) the first and last digits are prime. [2]

2. 0606/22 October/November 2018 Qn. 6

- (a) A 5-character code is to be formed from the 13 characters shown below. Each character may be used once only in any code.

Letters : A, B, C, D, E, F

Numbers: 1, 2, 3, 4, 5, 6, 7

Find the number of different codes in which no two letters follow each other and no two numbers follow each other. [3]

- (b) A netball team of 7 players is to be chosen from 10 girls. 3 of these 10 girls are sisters. Find the number of different ways the team can be chosen if the team does not contain all 3 sisters. [3]

3. 0606/23 October/November 2018 Qn. 7

A squad of 20 boys, which includes 2 sets of twins, is available for selection for a cricket team of 11 players. Calculate the number of different teams that can be selected if

(i) there are no restrictions, [1]

(ii) both sets of twins are selected, [2]

(iii) one set of twins is selected but neither twin from the other set is selected, [2]

(iv) exactly one twin from each set of twins is selected. [2]

4. 0606/21 May/June 2018 Qn. 3

A 7-character password is to be selected from the 12 characters shown in the table. Each character may be used only once.

	Characters			
Upper-case letters	A	B	C	D
Lower-case letters	e	f	g	h
Digits	1	2	3	4

Find the number of different passwords

(i) if there are no restrictions, [1]

(ii) that start with a digit, [1]

(iii) that contain 4 upper-case letters and 3 lower-case letters such that all the upper-case letters are together and all the lower-case letters are together. [3]

5. 0606/22 May/June 2018 Qn. 5

(a) Four parts in a play are to be given to four of the girls chosen from the seven girls in a drama class. Find the number of different ways in which this can be done. [2]

(b) Three singers are chosen at random from a group of 5 Chinese, 4 Indian and 2 British singers. Find the number of different ways in which this can be done if

(i) no Chinese singer is chosen, [1]

(ii) one singer of each nationality is chosen, [2]

(iii) the three singers chosen are all of the same nationality. [2]

6. 0606/22 February/March 2018 Qn. 3

A group of five people consists of two women, Alice and Betty, and three men, Carl, David and Ed.

- (i) Three of these five people are chosen at random to be a chairperson, a treasurer and a secretary. Find the number of ways in which this can be done if the chairperson and treasurer are both men. [2]

These five people sit in a row of five chairs. Find the number of different possible seating arrangements if

- (ii) David must sit in the middle, [1]

- (iii) Alice and Carl must sit together. [2]

7. 0606/11 October/November 2017 Qn. 8

(a) 10 people are to be chosen, to receive concert tickets, from a group of 8 men and 6 women.

- (i) Find the number of different ways the 10 people can be chosen if 6 of them are men and 4 of them are women. [2]

The group of 8 men and 6 women contains a man and his wife.

- (ii) Find the number of different ways the 10 people can be chosen if both the man and his wife are chosen or neither of them is chosen. [3]

(b) Freddie has forgotten the 6-digit code that he uses to lock his briefcase. He knows that he did not repeat any digit and that he did not start his code with a zero.

(i) Find the number of different 6-digit numbers he could have chosen. [1]

Freddie also remembers that his 6-digit code is divisible by 5.

(ii) Find the number of different 6-digit numbers he could have chosen. [3]

Freddie decides to choose a new 6-digit code for his briefcase once he has opened it. He plans to have the 6-digit number divisible by 2 and greater than 600 000, again with no repetitions of digits.

(iii) Find the number of different 6-digit numbers he can choose. [3]

8. 0606/22 October/November 2017 Qn. 5

Naomi is going on holiday and intends to read 4 books during her time away. She selects these books from 5 mystery, 3 crime and 2 romance books. Find the number of ways in which she can make her selection in each of the following cases.

(i) There are no restrictions. [1]

(ii) She selects at least 2 mystery books. [3]

(iii) She selects at least 1 book of each type. [3]

9. 0606/13 October/November 2017 Qn. 9

(a) A 6-digit number is to be formed using the digits 1, 3, 5, 6, 8, 9. Each of these digits may be used only once in any 6-digit number. Find how many different 6-digit numbers can be formed if

(i) there are no restrictions, [1]

(ii) the number formed is even, [1]

(iii) the number formed is even and greater than 300 000. [3]

(b) Ruby wants to have a party for her friends. She can only invite 8 of her 15 friends.

(i) Find the number of different ways she can choose her friends for the party if there are no restrictions. [1]

Two of her 15 friends are twins who cannot be separated.

(ii) Find the number of different ways she can now choose her friends for the party. [3]

10. 0606/21 May/June 2017 Qn. 8

(a) A football club has 30 players. In how many different ways can a captain and a vice-captain be selected at random from these players? [1]

(b) A team of 11 teachers is to be chosen from 2 mathematics teachers, 5 computing teachers and 9 science teachers. Find the number of different teams that can be chosen if

(i) the team must have exactly 1 mathematics teacher, [2]

(ii) the team must have exactly 1 mathematics teacher and at least 4 computing teachers. [4]

11. 0606/12 May/June 2017 Qn. 8

(a) A 5-digit number is to be formed from the seven digits 1, 2, 3, 5, 6, 8 and 9. Each digit can only be used once in any 5-digit number. Find the number of different 5-digit numbers that can be formed if

(i) there are no restrictions, [1]

(ii) the number is divisible by 5, [1]

(iii) the number is greater than 60 000, [1]

(iv) the number is greater than 60 000 and even. [3]

(b) Ranjit has 25 friends of whom 15 are boys and 10 are girls. Ranjit wishes to hold a birthday party but can only invite 7 friends. Find the number of different ways these 7 friends can be selected if

(i) there are no restrictions, [1]

(ii) only 2 of the 7 friends are boys, [1]

(iii) the 25 friends include a boy and his sister who cannot be separated. [3]

12. 0606/23 May/June 2017 Qn. 5

(a) How many 5-digit numbers are there that have 5 different digits and are divisible by 5? [3]

(b) A committee of 8 people is to be selected from 9 men and 5 women. Find the number of different committees that can be selected if the committee must have at least 4 women. [3]

13. 0606/12 February/March 2017 Qn. 6

(a) The letters of the word THURSDAY are arranged in a straight line. Find the number of different arrangements of these letters if

(i) there are no restrictions, [1]

(ii) the arrangement must start with the letter T and end with the letter Y, [1]

(iii) the second letter in the arrangement must be Y. [1]

(b) 7 children have to be divided into two groups, one of 4 children and the other of 3 children. Given that there are 3 girls and 4 boys, find the number of different ways this can be done if

(i) there are no restrictions, [1]

(ii) all the boys are in one group, [1]

(iii) one boy and one girl are twins and must be in the same group. [3]

14. 0606/21 October/November 2016 Qn. 11

Mr and Mrs Coldicott have 5 sons and 4 daughters. All 11 members of the family play tennis. Six members of the family enter a tennis competition where teams consist of 4 males and 2 females.

Find the number of different teams of 4 males and 2 females that could be selected if

(i) there are no further restrictions, [2]

(ii) Mr and Mrs Coldicott must both be in the team, [2]

(iii) either Mr or Mrs Coldicott is in the team but not both. [3]

15. 0606/13 October/November 2016 Qn. 9

(a) A team of 5 students is to be chosen from a class of 10 boys and 8 girls. Find the number of different teams that may be chosen if

(i) there are no restrictions, [1]

(ii) the team must contain at least one boy and one girl. [4]

- (b) A computer password, which must contain 6 characters, is to be chosen from the following 10 characters:

Symbols	?	!	*	
Numbers	3	5	7	
Letters	W	X	Y	Z

Each character may be used once only in any password. Find the number of possible passwords that may be chosen if

- (i) there are no restrictions, [1]

- (ii) each password must start with a letter and finish with a number, [2]

- (iii) each password must contain at least one symbol. [3]

16. 0606/21 May/June 2016 Qn. 10

(a) (i) Find how many 5-digit even numbers can be made using each of the digits 1, 2, 3, 4, 5 once only. [2]

(ii) Find how many different 3-digit numbers can be made using the digits 1, 2, 3, 4, 5 if each digit can be used once only. [2]

(b) A man and two women are to sit in a row of five empty chairs. Calculate the number of ways they can be seated if

(i) the two women must sit next to each other, [2]

(ii) all three people must sit next to each other. [2]

17. 0606/22 May/June 2016 Qn. 3

A team of 3 people is to be selected from 7 women and 6 men. Find the number of different teams that could be selected if there must be more women than men on the team. [3]

18. 0606/12 February/March 2016 Qn. 5

(a) A 6-character password is to be chosen from the following 9 characters.

letters	A	B	E	F
numbers	5	8	9	
symbols	*	\$		

Each character may be used only once in any password.

Find the number of different 6-character passwords that may be chosen if

(i) there are no restrictions, [1]

(ii) the password must consist of 2 letters, 2 numbers and 2 symbols, in that order, [2]

(iii) the password must start and finish with a symbol. [2]

(b) An examination consists of a section A, containing 10 short questions, and a section B, containing 5 long questions. Candidates are required to answer 6 questions from section A and 3 questions from section B. Find the number of different selections of questions that can be made if

(i) there are no further restrictions, [2]

(ii) candidates must answer the first 2 questions in section A and the first question in section B. [2]

19. 0606/11 October/November 2015 Qn. 4

(a) 6 books are to be chosen from 8 different books.

(i) Find the number of different selections of 6 books that could be made. [1]

A clock is to be displayed on a shelf with 3 of the 8 different books on each side of it. Find the number of ways this can be done if

(ii) there are no restrictions on the choice of books, [1]

(iii) 3 of the 8 books are music books which have to be kept together. [2]

(b) A team of 6 tennis players is to be chosen from 10 tennis players consisting of 7 men and 3 women. Find the number of different teams that could be chosen if the team must include at least 1 woman. [3]

20. 0606/13 October/November 2015 Qn. 9

(a) Five different books are to be arranged on a shelf. There are 2 Mathematics books and 3 History books. Find the number of different arrangements of books if

(i) the Mathematics books are next to each other, [2]

(ii) the Mathematics books are not next to each other. [2]

(b) To compete in a quiz, a team of 5 is to be chosen from a group of 9 men and 6 women. Find the number of different teams that can be chosen if

(i) there are no restrictions, [1]

(ii) at least two men must be on the team. [3]

21. 0606/21 May/June 2015 Qn. 5

- (a) A lock can be opened using only the number 4351. State whether this is a permutation or a combination of digits, giving a reason for your answer. [1]

- (b) There are twenty numbered balls in a bag. Two of the balls are numbered 0, six are numbered 1, five are numbered 2 and seven are numbered 3, as shown in the table below.

Number on ball	0	1	2	3
Frequency	2	6	5	7

Four of these balls are chosen at random, without replacement. Calculate the number of ways this can be done so that

- (i) the four balls all have the same number, [2]

- (ii) the four balls all have different numbers, [2]

- (iii) the four balls have numbers that total 3. [3]

22. 0606/12 May/June 2015 Qn. 5

(a) A security code is to be chosen using 6 of the following:

- the letters A, B and C
- the numbers 2, 3 and 5
- the symbols * and \$.

None of the above may be used more than once. Find the number of different security codes that may be chosen if

(i) there are no restrictions, [1]

(ii) the security code starts with a letter and finishes with a symbol, [2]

(iii) the two symbols are next to each other in the security code. [3]

(b) Two teams, each of 4 students, are to be selected from a class of 8 boys and 6 girls. Find the number of different ways the two teams may be selected if

(i) there are no restrictions, [2]

(ii) one team is to contain boys only and the other team is to contain girls only. [2]

23. 0606/22 February/March 2015 Qn. 2

(a) Jean has nine different flags.

(i) Find the number of different ways in which Jean can choose three flags from her nine flags. [1]

(ii) Jean has five flagpoles in a row. She puts one of her nine flags on each flagpole. Calculate the number of different five-flag arrangements she can make. [1]

(b) The six digits of the number 738925 are rearranged so that the resulting six-digit number is even. Find the number of different ways in which this can be done. [2]