

Permutations and combinations

(Past Year Topical Questions 2012-2017)

May/June 2012 (11)

4.
(a) Arrangements containing 5 different letters from the word AMPLITUDE are to be made.
Find

(i) the number of 5-letter arrangements if there are no restrictions, [1]

(ii) the number of 5-letter arrangements which start with the letter A and end with the letter E. [1]

(b) Tickets for a concert are given out randomly to a class containing 20 students. No student is given more than one ticket. There are 15 tickets.

(i) Find the number of ways in which this can be done. [1]

There are 12 boys and 8 girls in the class. Find the number of different ways in which

(ii) 10 boys and 5 girls get tickets, [3]

(iii) all the boys get tickets. [1]

Oct/Nov 2012 (13)

3.

A committee of 7 members is to be selected from 6 women and 9 men. Find the number of different committees that may be selected if

- (i) there are no restrictions, [1]
- (ii) the committee must consist of 2 women and 5 men, [2]
- (iii) the committee must contain at least 1 woman. [3]

May/June 2013 (11)

3.

A committee of 6 members is to be selected from 5 men and 9 women. Find the number of different committees that could be selected if

(i) there are no restrictions, [1]

(ii) there are exactly 3 men and 3 women on the committee, [2]

(iii) there is at least 1 man on the committee. [3]

May/June 2013 (12)

2.

A 4-digit number is to be formed from the digits 1, 2, 5, 7, 8 and 9. Each digit may only be used once. Find the number of different 4-digit numbers that can be formed if

(i) there are no restrictions, [1]

(ii) the 4-digit numbers are divisible by 5, [2]

(iii) the 4-digit numbers are divisible by 5 and are greater than 7000. [2]

Oct/Nov 2013 (11)

7.

(a) (i) Find how many different 4-digit numbers can be formed from the digits 1, 3, 5, 6, 8 and 9 if each digit may be used only once. [1]

(ii) Find how many of these 4-digit numbers are even. [1]

(b) A team of 6 people is to be selected from 8 men and 4 women. Find the number of different teams that can be selected if

(i) there are no restrictions, [1]

(ii) the team contains all 4 women, [1]

(iii) the team contains at least 4 men. [3]

May/June 2014 (11)

10.

- (a) How many even numbers less than 500 can be formed using the digits 1, 2, 3, 4 and 5? Each digit may be used only once in any number. [4]

- (b) A committee of 8 people is to be chosen from 7 men and 5 women. Find the number of different committees that could be selected if

- (i) the committee contains at least 3 men and at least 3 women, [4]

- (ii) the oldest man or the oldest woman, but not both, must be included in the committee. [2]

May/June 2014 (12)

8.

- (a) (i) How many different 5-digit numbers can be formed using the digits 1, 2, 4, 5, 7 and 9 if no digit is repeated? [1]
- (ii) How many of these numbers are even? [1]
- (iii) How many of these numbers are less than 60 000 and even? [3]
- (b) How many different groups of 6 children can be chosen from a class of 18 children if the class contains one set of twins who must not be separated? [3]

May/June 2014 (13)

7.

(a) A 5-character password is to be chosen from the letters *A, B, C, D, E* and the digits 4, 5, 6, 7. Each letter or digit may be used only once. Find the number of different passwords that can be chosen if

(i) there are no restrictions,

[1]

(ii) the password contains 2 letters followed by 3 digits.

[2]

(b) A school has 3 concert tickets to give out at random to a class of 18 boys and 15 girls. Find the number of ways in which this can be done if

(i) there are no restrictions,

[1]

(ii) 2 of the tickets are given to boys and 1 ticket is given to a girl,

[2]

(iii) at least 1 boy gets a ticket. [2]

Oct/Nov 2014 (11)

10.

(a) (i) Find how many different 4-digit numbers can be formed using the digits 1, 2, 3, 4, 5 and 6 if no digit is repeated. [1]

(ii) How many of the 4-digit numbers found in part **(i)** are greater than 6000? [1]

(iii) How many of the 4-digit numbers found in part **(i)** are greater than 6000 and are odd? [1]

(b) A quiz team of 10 players is to be chosen from a class of 8 boys and 12 girls.

(i) Find the number of different teams that can be chosen if the team has to have equal numbers of girls and boys. [3]

(ii) Find the number of different teams that can be chosen if the team has to include the youngest and oldest boy and the youngest and oldest girl. [2]

May/June 2015 (12)

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 S.

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]

Oct/Nov 2015 (11)

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]

Oct/Nov 2015 (13)

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]

Oct/Nov 2016 (13)

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]

May/June 2017 (12)

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]

Oct/Nov 2017 (11)

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]

Oct/Nov 2017 (13)

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]