

Permutations and Combinations QP

W21 P51

compiled by
Ahmed Gul

- 5 Raman and Sanjay are members of a quiz team which has 9 members in total. Two photographs of the quiz team are to be taken.

For the first photograph, the 9 members will stand in a line.

- (a) How many different arrangements of the 9 members are possible in which Raman will be at the centre of the line? [1]
- (b) How many different arrangements of the 9 members are possible in which Raman and Sanjay are not next to each other? [3]

For the second photograph, the members will stand in two rows, with 5 in the back row and 4 in the front row.

- (c) In how many different ways can the 9 members be divided into a group of 5 and a group of 4? [2]
- (d) For a random division into a group of 5 and a group of 4, find the probability that Raman and Sanjay are in the same group as each other. [4]



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W21 P52

2 A group of 6 people is to be chosen from 4 men and 11 women.

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(a) In how many different ways can a group of 6 be chosen if it must contain exactly 1 man? [2]

Two of the 11 women are sisters Jane and Kate.

(b) In how many different ways can a group of 6 be chosen if Jane and Kate cannot both be in the group? [3]



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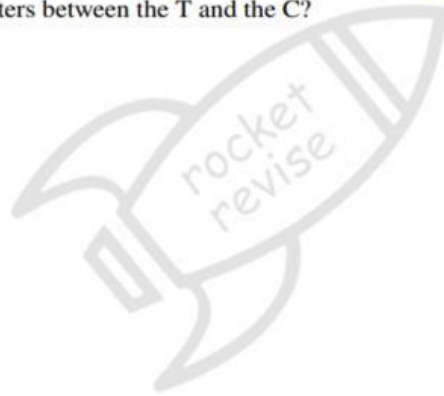
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W21 P52

- 4 (a) In how many different ways can the 9 letters of the word TELESCOPE be arranged? [2]
- (b) In how many different ways can the 9 letters of the word TELESCOPE be arranged so that there are exactly two letters between the T and the C? [4]

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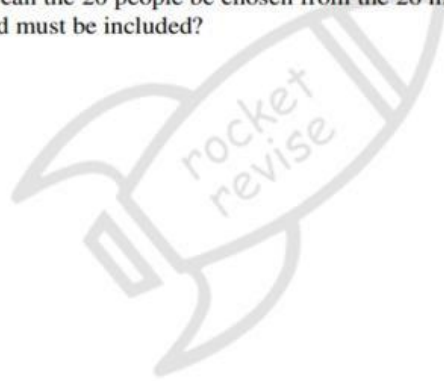


W21 P53

- 1 The 26 members of the local sports club include Mr and Mrs Khan and their son Abad. The club is holding a party to celebrate Abad's birthday, but there is only room for 20 people to attend.

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In how many ways can the 20 people be chosen from the 26 members of the club, given that Mr and Mrs Khan and Abad must be included? [2]



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W21 P53 Q5ab

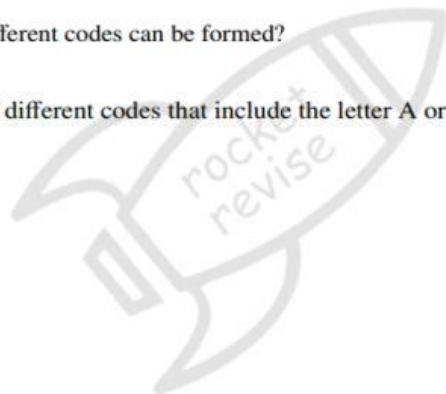
- 5 A security code consists of 2 letters followed by a 4-digit number. The letters are chosen from {A, B, C, D, E} and the digits are chosen from {1, 2, 3, 4, 5, 6, 7}. No letter or digit may appear more than once. An example of a code is BE3216.

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- (a) How many different codes can be formed? [2]
- (b) Find the number of different codes that include the letter A or the digit 5 or both. [3]



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- 1 A bag contains 12 marbles, each of a different size. 8 of the marbles are red and 4 of the marbles are blue.

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How many different selections of 5 marbles contain at least 4 marbles of the same colour?

[4]



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S21 P51

3 (a) How many different arrangements are there of the 8 letters in the word RELEASED? [1]

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(b) How many different arrangements are there of the 8 letters in the word RELEASED in which the letters LED appear together in that order? [3]

(c) An arrangement of the 8 letters in the word RELEASED is chosen at random.

Find the probability that the letters A and D are not together.

[4]



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- 5 Every day Richard takes a flight between Astan and Bejin. On any day, the probability that the flight arrives early is 0.15, the probability that it arrives on time is 0.55 and the probability that it arrives late is 0.3.

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- (a) Find the probability that on each of 3 randomly chosen days, Richard's flight does not arrive late. [1]
- (b) Find the probability that for 9 randomly chosen days, Richard's flight arrives early at least 3 times. [3]
- (c) 60 days are chosen at random.

Use an approximation to find the probability that Richard's flight arrives early at least 12 times. [5]

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- 6 (a) Find the total number of different arrangements of the 8 letters in the word TOMORROW. [2]

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- (b) Find the total number of different arrangements of the 8 letters in the word TOMORROW that have an R at the beginning and an R at the end, and in which the three Os are not all together. [3]

Four letters are selected at random from the 8 letters of the word TOMORROW.

- (c) Find the probability that the selection contains at least one O and at least one R. [5]



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S21 P53

- 6 (a) How many different arrangements are there of the 11 letters in the word REQUIREMENT? [2]
- (b) How many different arrangements are there of the 11 letters in the word REQUIREMENT in which the two Rs are together and the three Es are together? [1]
- (c) How many different arrangements are there of the 11 letters in the word REQUIREMENT in which there are exactly three letters between the two Rs? [3]

Five of the 11 letters in the word REQUIREMENT are selected.

- (d) How many possible selections contain at least two Es and at least one R? [4]

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FM2021

- 6 (a) Find the total number of different arrangements of the 11 letters in the word CATERPILLAR. [2]
- (b) Find the total number of different arrangements of the 11 letters in the word CATERPILLAR in which there is an R at the beginning and an R at the end, and the two As are not together. [4]
- (c) Find the total number of different selections of 6 letters from the 11 letters of the word CATERPILLAR that contain both Rs and at least one A and at least one L. [4]

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W20 P51

- 7 (a) Find the number of different ways in which the 10 letters of the word SHOPKEEPER can be arranged so that all 3 Es are together. [2]
- (b) Find the number of different ways in which the 10 letters of the word SHOPKEEPER can be arranged so that the Ps are not next to each other. [4]
- (c) Find the probability that a randomly chosen arrangement of the 10 letters of the word SHOPKEEPER has an E at the beginning and an E at the end. [2]

Four letters are selected from the 10 letters of the word SHOPKEEPER.

- (d) Find the number of different selections if the four letters include exactly one P. [3]

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- 6** Mr and Mrs Ahmed with their two children, and Mr and Mrs Baker with their three children, are visiting an activity centre together. They will divide into groups for some of the activities.

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(a) In how many ways can the 9 people be divided into a group of 6 and a group of 3? [2]

5 of the 9 people are selected at random for a particular activity.

(b) Find the probability that this group of 5 people contains all 3 of the Baker children. [3]

All 9 people stand in a line.

(c) Find the number of different arrangements in which Mr Ahmed is not standing next to Mr Baker. [3]

(d) Find the number of different arrangements in which there is exactly one person between Mr Ahmed and Mr Baker. [3]



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W20 P53

3 A committee of 6 people is to be chosen from 9 women and 5 men.

- (a) Find the number of ways in which the 6 people can be chosen if there must be more women than men on the committee. [3]

The 9 women and 5 men include a sister and brother.

- (b) Find the number of ways in which the committee can be chosen if the sister and brother cannot both be on the committee. [3]

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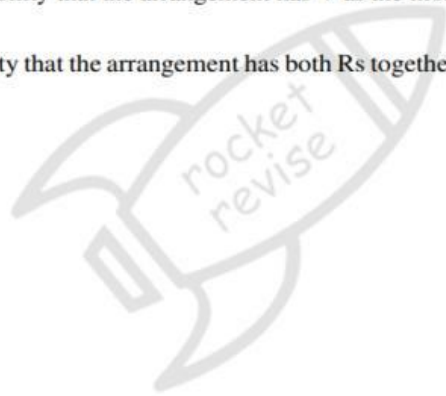


W20 P53

5 The 8 letters in the word RESERVED are arranged in a random order.

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- (a) Find the probability that the arrangement has V as the first letter and E as the last letter. [3]
- (b) Find the probability that the arrangement has both Rs together given that all three Es are together. [4]



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