7 **(a)** Find the number of different arrangements of the 10 letters in the word CASABLANCA in which the two Cs are **not** together. [3]

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(b) Find the number of different arrangements of the 10 letters in the word CASABLANCA which have an A at the beginning, an A at the end and exactly 3 letters between the 2 Cs. [3]

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Five letters are selected from the 10 letters in the word CASABLANCA.

(c) Find the number of different selections in which the five letters include at least two As and at most one C. [3]

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7 **(a)** Find the number of different possible arrangements of the 9 letters in the word CELESTIAL. [1]

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(b) Find the number of different arrangements of the 9 letters in the word CELESTIAL in which the first letter is C, the fifth letter is T and the last letter is E. [2]

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(c) Find the probability that a randomly chosen arrangement of the 9 letters in the word CELESTIAL does not have the two Es together. [4]

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5 letters are selected at random from the 9 letters in the word CELESTIAL.

(d) Find the number of different selections if the 5 letters include at least one E and at most one L. [3]

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3 **(a)** Find the number of different arrangements of the 9 letters in the word DAFFODILS in which there is a D at each end and the two Fs are **not** next to each other. [3]

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(b) Find the probability that a randomly chosen arrangement of the 9 letters in the word DAFFODILS has exactly 4 letters between the two Ds. [3]

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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.

(a) How many different codes can be formed? [2]

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(b) Find the number of different codes that include the letter A or the digit 5 or both. [3]

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A security code is formed at random.

(c) Find the probability that the code is DE followed by a number between 4500 and 5000. [3]

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

(a) Find the probability that the arrangement has V as the first letter and E as the last letter. [3]

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(b) Find the probability that the arrangement has both Rs together given that all three Es are together. [4]

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7 A group of 15 friends visit an adventure park. The group consists of four families.

- Mr and Mrs Kenny and their four children
- Mr and Mrs Lizo and their three children
- Mrs Martin and her child
- Mr and Mrs Nantes

The group travel to the park in three cars, one containing 6 people, one containing 5 people and one containing 4 people. The cars are driven by Mr Lizo, Mrs Martin and Mr Nantes respectively.

(a) In how many different ways can the remaining 12 members of the group be divided between the three cars? [3]

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The group enter the park by walking through a gate one at a time.

(b) In how many different orders can the 15 friends go through the gate if Mr Lizo goes first and each family stays together? [3]

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In the park, the group enter a competition which requires a team of 4 adults and 3 children.

(c) In how many ways can the team be chosen from the group of 15 so that the 3 children are all from different families? [2]

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(d) In how many ways can the team be chosen so that at least one of Mr Kenny or Mr Lizo is included? [3]

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7 A set of friends consists of 7 men and 4 women. Three of the men are brothers: Ali, Ben and Charlie.

(a) Find the number of different arrangements of the 7 men in a line in which Ali and Ben do **not** stand next to each other. [3]

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(b) Find the number of different arrangements of the 7 men and 4 women in a line in which all the men stand together and all the women stand together. [3]

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(c) In how many ways can the 7 men and 4 women be divided into a group of 6, a group of 3 and a group of 2 if there are no restrictions? [2]

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(d) The 7 men and 4 women are divided at random into a group of 6, a group of 3 and a group of 2.

Find the probability that Ali, Ben and Charlie are all in the same group. [4]

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2 The Splash Club has 26 members, of whom 16 are swimmers and 10 are divers. No member is both a swimmer and a diver. The club committee consists of 6 of these 26 members.

In how many ways can the club committee be selected if it must include at least 2 swimmers and at least 2 divers? [4]

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