

1. [TPJC 16 Prelims]

A group of 5 girls and 7 boys play ice breaker games to get to know each other.

- (a) The group stands in a line.
 - i. Find the number of different possible arrangements. [1]
 - ii. The girls have names that start with different letters. Find the number of different possible arrangements in which all the girls are separated, with the girls names in alphabetical order. [2]
- (b) The group forms two circles of 6, with one circle inside the other, such that each person in the inner circle stands facing a person in the outer circle. Find the number of different possible arrangements. [2]
- (c) The group has to split into a group of 3, a group of 4, and a group of 5. Find the number of possible ways in which the groups can be chosen if there is no girl in at least one of the groups. [4]

2. [CJC 16 Prelims]

A group of 9 friends, including Albert and Ben, are having dinner at Alberts house. They sit in two groups: a row of 4 on a couch and a group of 5 at a round dining table with 5 identical seats. Find the number of ways they can sit if

- (a) there are no restrictions, [2]
- (b) Albert and Ben sit beside each other, [3]
- (c) Albert and Ben both sit on the couch or both sit at the round table, but they do not sit beside each other. [3]

3. [IJC 16 Prelims]

A class of twenty four pupils consists of 11 girls and 13 boys. To form the class committee, four of the pupils are chosen at random as 'Chairperson', 'Vice Chairperson', 'Treasurer' and 'Secretary'. 'Treasurer' and 'Secretary'.

- (a) Find the probability that the committee will consist of at least one girl and at least one boy. [3]
- (b) Find the probability that the 'Treasurer' and 'Secretary' are both girls. [3]

4. [JJC 16 Prelims]

A group of 11 people consists of 6 men and 5 women, 3 of whom are sisters. A committee consisting of six people is to be selected. Find the number of ways the committee can be formed if

- (a) it consists of exactly two men, [1]
- (b) it includes at least one of the sisters. [2]

Given that the chosen committee consists of 2 sisters, Sue and Suzy, together with 3 other men, Muthu, Mark, Michael and 1 other woman, Wina. They are seated at a round table meant for six people. Find the number of possible arrangements if

- (c) one of the men is to be seated between the two sisters, [2]
- (d) the two sisters are sitting directly opposite each other. [2]

5. [NYJC 15 Prelims]

A briefcase is fitted with two combination locks, one each for the left and right clasps. Each lock consists of 3 rotary digital counters. To unlock each lock, the correct combination of 3 digits (0 to 9) must be dialled. Find the total number of possible combinations that can be set for the 2 locks if

- (a) there are no restrictions, [1]
- (b) the code for the left lock must have 3 identical digits and the code for the right lock must have 3 identical digits but different from that for the left lock, [2]
- (c) the access codes have digits that are all different and include the digits of the owner's birth year which is 1970, [3]
- (d) no digit for the code for the left lock can be used for the code for the right lock. [4]

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1. (a) i. 479 001 600.
ii. 282 240.
(b) 79 833 600.
(c) 7 070.
 2. (a) 72 576.
(b) 16 128.
(c) 16 128.
 3. (a) 0.902.
(b) 0.199.
 4. (a) 75.
(b) 434.
(c) 36.
(d) 24.
 5. (a) 1 000 000.
(b) 90.
(c) 10 800.
(d) 392 490.