**MAT 1830 Permutations and combinations -Practice questions**

1. A bookshelf has 3 dictionaries, 5 volumes of an encyclopaedia and 3 novels. How many different ways can these be arranged if
2. there are no restrictions,
3. the dictionaries have to be together,
4. the dictionaries have to be together and the volumes of the encyclopaedia have to be together,
5. the dictionaries have to be together or the volumes of encyclopaedia have to be together.
6. The car registration number plates in a country are required to have exactly six characters, three letters of the alphabet followed by three digits such as UVW654. How many different number plates are possible if there are
7. no further restrictions?
8. no repetitions of either letters or digits?
9. three consecutive letters in alphabetical order followed by three consecutive digits in descending order, as in the sample registration plate shown?
10. A team of five, consisting of three boys and two girls line up for a photograph, the boys standing together and the girls standing together, the games teacher places himself at one end of the line. How many different arrangements are possible?
11. A team of three children plus a captain is required for a school chess competition. A particular school has ten children who can play chess of whom only three are qualified to act as captain. In how many ways can a team be selected assuming that the three children qualified as captain are also eligible to play chess?
12. Eight cards each have a single digit written on them. The digits are 2, 2, 4, 5, 7, 7, 7, 7 respectively. Find the number of different 7-digit numbers that can be formed by placing seven of the cards side by side.
13. The digits of the number 314152 are rearranged so that the resulting number is odd. Find the number of ways in which this can be done.
14. A typist has six envelopes and six letters. In how many ways can one letter be placed in each envelope without every letter in the right envelope?
15. Find how many even numbers between 3000 and 7000 can be formed using the digits 1, 3, 6 and 8 if
16. repetition of digits is allowed,
17. no digit can occur more than once in any number
18. How many ordered sets of 3 even numbers are there that will add up to 60?
19. How many different ways are there for Mary to choose any combination of 6 fruits from a store that sells papayas, oranges, apples and persimmons?
20. The 8 sopranos in a choir are asked to stand in a line, but Nandinii and Ivy refuse to stand next to one another. How many different arrangements can there be?

Worked answers for Permutations and Combinations

1. (i) 39916800 (ii) 2177280 (iii) 86400 (iv) 2695680

2. (i) 17576000 (ii) 11232000 (iii) 192

3. 48

4. 252

5. 840

6. 240

7. 719

8. (i) 64 (ii) 6

9, 10, 11 Show confidence in your answers, eh?