

## PERMUTATIONS

Permutations involving:

1. Alphabet (vowels/consonants)
2. Numbers (focus on zeros)
3. People
4. Items (beads, flags, etc.)

1. How many different 5 letter arrangements can be made from:

- a) vowels
- b) consonants
- c) first two are vowels and the last three are consonants
- d) the first, third and fifth are consonants and the second and fourth are vowels
- e) the first, third and fifth must be consonants and the remaining can be any other letter
- f) the first letter must be "a" and the fourth must be "t"
- g) the word must end with the letter "z"
- h) the word contains exactly 2 vowels that must always be together
- i) the word is made of consonants from the first half of the alphabet

2. Using the digits 2, 3, 6, 8 and 9,

- a) how many three digit can be formed?
- b) how many four digit numbers can be formed ?
- c) how many three digit numbers are odd?
- d) how many three digit numbers are even?

3. Using the digits 0, 1, 2,... 9,

- a) how many five digit numbers can be formed?
- b) how many four digit numbers can be formed that are odd?
- c) how many six digit numbers can be formed that are divisible by 2?
- d) how many four digit numbers can be formed that are divisible by five?
- e) how many 6 digit numbers can be formed in which the digits 3, 4 and 5 must be together in the number and must exist in the number in that order?
- f) how many five digit numbers can be formed in which the digits 6 and 7 must be together in the number?

4. Eight people attend a concert and sit in the front row which has exactly 8 seats:

- a) in how many ways can these people be seated?
- b) in how many ways can they be seated if a certain person must sit in the left aisle seat?
- c) in how many ways can they be seated if a certain person must sit the left aisle seat while another person must sit in the right aisle seat?

- d) in how many ways can they be seated in two people must sit in the aisle seats?
  - e) in how many ways can they be seated if two people must sit together?
  - f) in how many ways can they be seated if four people must sit together?
  - g) in how many ways can they be seated in five people must be seated together?
5. Six people (3 males and 3 female) attend a show and sit in six available seats on the left aisle:
- a) in how many ways can these six people be seated?
  - b) in how many ways can they be seated so that a boy sits in the aisle seat?
  - c) in how many ways can they be seated so that male and females alternate with a female at the aisle seat?
  - d) in how many ways can they be seated so that male and female alternate?
6. Five texts, an algebra, a science, a social, a French, and an English are to be arranged on a shelf
- a) in how many ways can these books be arranged on a shelf?
  - b) in how many ways can they be arranged so that they are in alphabetic order?
  - c) in how many ways can they be arranged so that the French text is on the left?
  - d) in how many ways can they be arranged so that the algebra and science are together all the time?
  - e) in how many ways can they be arranged so that the social text is on the right and the algebra text is on the left?
7. Five algebra texts, all different, three science texts, all different, and four social texts, all different, are to be arranged on a shelf
- a) in how many ways can the texts be arranged on a shelf?
  - b) in how many ways can they be arranged in the order of algebra, science and social?
  - c) in how many ways can they be arranged so that all the social texts will be on the left?
  - d) in how many ways can they be arranged so that the categories of texts will remain together?