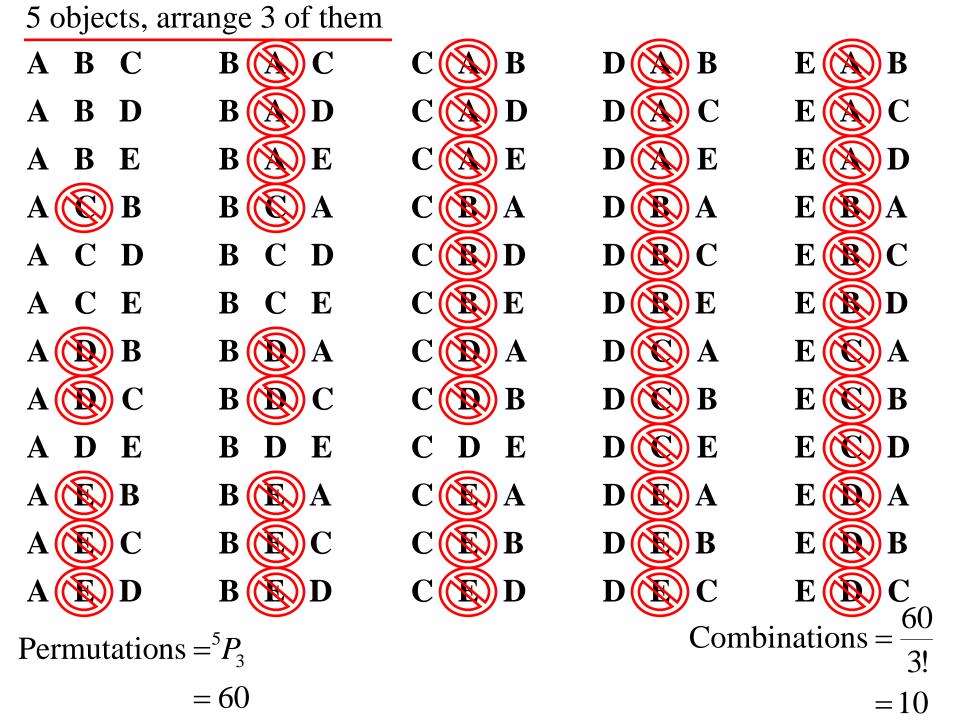
## **Combinations**

A combination is a set of objects where the order that they are arranged is not important.

If we arrange objects in a line, and the order is not important then;

A B is the same arrangement as B A e.g. 5 objects, arrange 2 of them

A B B C B C B D C B Permutations = 
$${}^5P_2$$
 Combinations =



If we have *n* different objects, and we arrange *k* of them and are not concerned about the order;

Number of Arrangements = 
$$\frac{{}^{n}P_{k}}{k!}$$
  
=  $\frac{n!}{(n-k)!k!}$   
=  ${}^{n}C_{k}$ 

e.g. (i) How many ways can 6 numbers be chosen from 45 numbers?

Ways = 
$${}^{45}C_6$$
  
= 8145060

Note: at 40 cents per game, \$3 258 024 = amount of money you have to spend to guarantee a win in Lotto.

(ii) Committees of five people are to be obtained from a group of seven men and four women.

How many committees are possible if;

a) there are no restrictions?

Committees = 
$${}^{11}C_5$$
  
=  $462$ 

With no restrictions, choose 5 people from 11, gender does not matter

b) the committee contains only males?

Committees = 
$${}^{7}C_{5}$$
  
= 21

By restricting it to only males, there is only 7 people to choose from

c) the committee contains at least one woman?

$$Committees = 462 - 21$$
$$= 441$$

easier to work out male only and subtract from total number of committees

- (iii) A hand of five cards is dealt from a regular pack of fifty two cards.
- a) What is the number of possible hands?

Hands = 
$${}^{52}C_5$$
  
= 2598960

b) What is the probability of getting "three of a kind"?

choose which number has

"three of a kind"

those cards

Hands = 
$${}^{13}C_1 \times {}^4C_3 \times {}^{48}C_2$$

choose remaining

two cards from the rest

$$P(\text{three of a kind}) = \frac{58656}{2598960}$$
$$= \frac{94}{2915} \qquad (=3.2)$$

## 2004 Extension 1 HSC Q2e)

A four person team is to be chosen at random from nine women and seven men.

(i) In how many ways can this team be chosen?

Teams = 
$${}^{16}C_4$$
  
= 1820

With no restrictions, choose 4 people from 16, gender does not matter

(ii) What is the probability that the team will consist of four women?

Teams = 
$${}^{9}C_{4}$$
  
= 126

By restricting it to only women, there is only 9 people to choose from

$$P(4 \text{ women team}) = \frac{126}{1820}$$
  
=  $\frac{9}{130}$ 

Exercise 10G; odd (not 19, 27)