COUNTING & PROBABILITY (Q 6, PAPER 2)

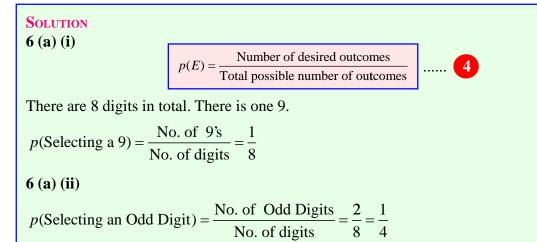
2003

- 6 (a) I write down today's date as 09062003 and then select one of the digits at random.(i) What is the probability that I select the 9?
 - (ii) What is the probability that I select an odd digit?
 - (b) Two women, Ann and Bríd, and two men, Con and Declan, sit in a row for a photograph.
 - (i) How many different arrangements of the four people are possible?
 - (ii) Write out the four possible arrangements that have the two women in the middle.
 - (iii) If the arrangement of the four people is chosen at random from all of the possible arrangements, what is the probability that the two women will be in the middle?
 - (c) In a certain school the examination subjects for senior students are grouped as follows:

Compulsory Subjects	Block A	Block B	Block C
Irish English mathematics	French German	biology home economics construction studies accounting	business organisation history physics

As well as taking all three of the compulsory subjects, each student must choose *one* subject from Block A, *two* from Block B and *one* from Block C.

- (i) In choosing two subjects from Block B, how many different selections are possible?
- (ii) In choosing the full range of subjects, how many different selections are possible?
- (iii) One student has already decided to do German and construction studies. How many different selections of the remaining subjects are possible for this student?
- (iv) If the student referred to in part (iii) selects her remaining subjects at random, what is the probability that she will select both biology and physics?



6 (b) (i)

You can do this question the long way by writing out all the possibilities or the shorter way by using some formulae.

Long way:

A B C D	B A C D	C B A D	D B C A
A B D C	B A D C	C B D A	D B A C
A C B D	B C A D	C A B D	D C B A
A C D B	B C D A	C A D B	D C A B
A D B C	B D A C	C D B A	D A B C
A D C B	B D C A	C D A B	D A C B

You can see there are 24 arrangements of 4 people.

Short way:

The number of arrangements of *n* different objects taking *r* at a time with no repeats $= {}^{n}P_{r}$ 2

How many ways can you arrange 4 different objects, all taken, no repeats (order is important)?

 ${}^{4}P_{3} = 4 \times 3 \times 2 \times 1 = 24$

4 (b) (ii)

(Con, Ann, Brid, Declan), (Declan, Ann, Brid, Con), (Con, Brid, Ann, Declan), (Declan, Brid, Ann, Con)

4 (b) (iii)

$$p(E) = \frac{\text{Number of desired outcomes}}{\text{Total possible number of outcomes}} \dots$$

$$p(2 \text{ women in the middle}) = \frac{4}{24} = \frac{1}{6}$$

