

## COUNTING & PROBABILITY (Q 6, PAPER 2)

2008

- 6 (a) Evaluate  $5! + 6!$
- (b) One shelf of a school library has 70 books. The books are on poetry and on drama and are either hardback or paperback. The following table shows the number of each type.

	Hardback	Paperback
Poetry	23	17
Drama	14	16

A student selects one book at random from the shelf.

Find the probability that the book selected is

- (i) a paperback poetry book
  - (ii) a hardback book
  - (iii) a poetry book
  - (iv) not a paperback drama book.
- (c) There are 6 junior-cycle students and 5 senior-cycle students on the student council in a particular school. A committee of 4 students is to be selected from the students on the council. In how many different ways can the committee be selected if
- (i) there are no restrictions
  - (ii) a particular student must be on the committee
  - (iii) the committee must consist of 2 junior-cycle students and 2 senior-cycle students.

The committee of 4 students is chosen at random.

- (iv) Find the probability that all 4 students are junior-cycle students.

### SOLUTION

6 (a)

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$\therefore 5! + 6! = 120 + 720 = 840$$

**CALCULATOR:** Calculate  $5! + 6!$

5 SHIFT x! +

6 SHIFT x! =

Math
$5! + 6!$
840

6 (b)

	Hardback	Paperback
Poetry	23	17
Drama	14	16

Total number of books = 70

Total number of poetry books = 40

Total number of drama books = 30

Total number of hardback books = 37

Total number of paperback books = 33

$$p(E) = \frac{\text{Number of desired outcomes}}{\text{Total possible number of outcomes}} \dots\dots \textcircled{4}$$

6 (b) (i)

$$p(\text{Picking a paperback poetry book}) = \frac{\text{No. of paperback poetry books}}{\text{No. of books}} = \frac{17}{70}$$

6 (b) (ii)

$$p(\text{Picking a hardback book}) = \frac{\text{No. of hardback books}}{\text{No. of books}} = \frac{37}{70}$$

6 (b) (iii)

$$p(\text{Picking a poetry book}) = \frac{\text{No. of poetry books}}{\text{No. of books}} = \frac{40}{70} = \frac{4}{7}$$

6 (b) (iv)

$$p(\text{Picking a book that is not a paperback drama book}) \\ = \frac{\text{No. of non paperback drama books}}{\text{No. of books}} = \frac{54}{70} = \frac{27}{35}$$

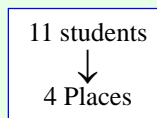
6 (c)

The number of selections of  $n$  different objects taking  $r$  at a time =  ${}^n C_r = \binom{n}{r}$  .....  $\textcircled{1}$

6 (c) (i)

In how many ways can 4 people be selected from 11 people?

$${}^{11}C_4 = \frac{11 \times 10 \times 9 \times 8}{4 \times 3 \times 2 \times 1} = 330$$

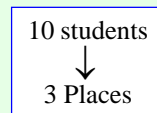


**CALCULATOR:** Calculate  ${}^{11}C_4$ .

11 SHIFT nCr 4 = 11C4 330

**6 (c) (ii)**

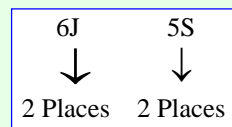
If one student is already on the committee you need to find out in how many ways 3 people can be selected from 10 people?



$${}^{10}C_3 = \frac{10 \times 9 \times 8}{3 \times 2 \times 1} = 120$$

**6 (c) (iii)**

In how many ways can you pick 2 junior-cycle students from 6 junior-cycle students **AND** 2 senior-cycle students from 5 senior-cycle students?

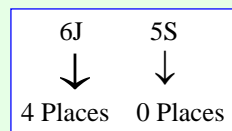


$${}^6C_2 \times {}^5C_2 = \frac{6 \times 5}{2 \times 1} \times \frac{5 \times 4}{2 \times 1} = 150$$

**NOTE:** **AND** means multiply.

**6 (c) (iv)**

In how many ways can you pick 4 junior-cycle students from 6 junior-cycle students **AND** 0 senior-cycle students from 5 senior-cycle students?



$${}^6C_4 \times {}^5C_0 = 15 \times 1 = 15$$

$p$ (A committee made up of junior-cycle students)

$$= \frac{\text{No. of possible committees with junior-cycle students}}{\text{No. of possible committees}} = \frac{15}{330} = \frac{1}{22}$$