

- 6 (a) Calculate the number of different 6-digit numbers which can be formed using the digits 0, 1, 2, 3, 4, 5 without repetition and assuming that a number cannot begin with 0. [2]
- (b) A committee of 4 people is to be chosen from 4 women and 5 men. The committee must contain at least 1 woman. Calculate the number of different committees that can be formed. [4]
- 7 Obtain
- (i) the expansion, in ascending powers of x , of $(2 - x^2)^5$,
- (ii) the coefficient of x^6 in the expansion of $(1 + x^2)^2(2 - x^2)^5$. [6]
- 3 (i) Find the first 3 terms in the expansion, in ascending powers of x , of $(2 - x)^5$. [3]
- (ii) Hence find the value of the constant k for which the coefficient of x in the expansion of $(k + x)(2 - x)^5$ is -8 . [2]
- 1 Given that $4x^4 - 12x^3 - b^2x^2 - 7bx - 2$ is exactly divisible by $2x + b$,
- (i) show that $3b^3 + 7b^2 - 4 = 0$, [2]
- (ii) find the possible values of b . [5]
- 7 (i) Find the number of different arrangements of the letters of the word MEXICO.
- Find the number of these arrangements
- (ii) which begin with M,
- (iii) which have the letter X at one end and the letter C at the other end. [5]
- Four of the letters of the word MEXICO are selected at random. Find the number of different combinations if
- (iv) there is no restriction on the letters selected,
- (v) the letter M must be selected. [3]
- 9 (a) Calculate the term independent of x in the binomial expansion of $\left(x - \frac{1}{2x^5}\right)^{18}$. [3]
- (b) In the binomial expansion of $(1 + kx)^n$, where $n \geq 3$ and k is a constant, the coefficients of x^2 and x^3 are equal. Express k in terms of n . [4]
- 2 A student has a collection of 9 CDs, of which 4 are by the Beatles, 3 are by Abba and 2 are by the Rolling Stones. She selects 4 of the CDs from her collection. Calculate the number of ways in which she can make her selection if
- (i) her selection must contain her favourite Beatles CD, [2]
- (ii) her selection must contain 2 CDs by one group and 2 CDs by another. [3]

- 4** An artist has 6 watercolour paintings and 4 oil paintings. She wishes to select 4 of these 10 paintings for an exhibition.
- (i) Find the number of different selections she can make. [2]
- (ii) In how many of these selections will there be more watercolour paintings than oil paintings? [3]
- 2** A committee of 5 people is to be selected from 6 men and 4 women. Find
- (i) the number of different ways in which the committee can be selected, [1]
- (ii) the number of these selections with more women than men. [4]
- 2** (i) Find the first 3 terms of the expansion, in ascending powers of x , of $(1 + 3x)^6$. [2]
- (ii) Hence find the coefficient of x^2 in the expansion of $(1 + 3x)^6(1 - 3x - 5x^2)$. [3]
- 3** Find the set of values of k for which the equation $x^2 + (k - 2)x + (2k - 4) = 0$ has real roots. [5]
- 10** A music student needs to select 7 pieces of music from 6 classical pieces and 4 modern pieces. Find the number of different selections that she can make if
- (i) there are no restrictions, [1]
- (ii) there are to be only 2 modern pieces included, [2]
- (iii) there are to be more classical pieces than modern pieces. [4]

- 9** A musician has to play 4 pieces from a list of 9. Of these 9 pieces 4 were written by Beethoven, 3 by Handel and 2 by Sibelius. Calculate the number of ways the 4 pieces can be chosen if
- (i) there are no restrictions, [2]
 - (ii) there must be 2 pieces by Beethoven, 1 by Handel and 1 by Sibelius, [3]
 - (iii) there must be at least one piece by each composer. [4]
- 2** In a singing competition there are 8 contestants. Each contestant sings in the first round of this competition.
- (i) In how many different orders could the contestants sing? [1]
- After the first round 5 contestants are chosen.
- (ii) In how many different ways can these 5 contestants be chosen? [2]
- These 5 contestants sing again and then First, Second and Third prizes are awarded to three of them.
- (iii) In how many different ways can the prizes be awarded? [2]
- 8**
- (a) (i) Write down the first 4 terms, in ascending powers of x , of the expansion of $(1 - 3x)^7$. [3]
 - (ii) Find the coefficient of x^3 in the expansion of $(5 + 2x)(1 - 3x)^7$. [2]
 - (b) Find the term which is independent of x in the expansion of $\left(x^2 + \frac{2}{x}\right)^9$. [3]

where n is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$.