

**DISCRETE MATHS (Q 6 & 7, PAPER 2)**

**2001**

6 (a) (i) How many different sets of three books or of four books can be selected from six different books?

(ii) How many of the above sets contain one particular book?

6 (b) Solve the difference equation  $u_{n+2} - 8u_{n+1} + 11u_n = 0$ , where  $n \geq 0$ , given that  $u_0 = 0$  and  $u_1 = 2\sqrt{15}$ .

6 (c) A box contains four silver coins, two gold coins and  $x$  copper coins. Two coins are picked at random, and without replacement, from the box.

(i) Write down an expression in  $x$  for the probability that the two coins are copper.

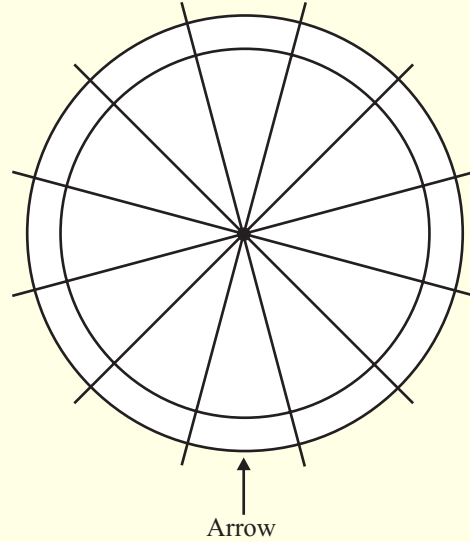
If it is known that the probability of picking two copper coins is  $\frac{4}{13}$ ,

(ii) how many coins are in the box and

(iii) what is the probability that neither of the two coins picked is copper?

- 7 (a) (i) In how many different ways can four of the letters of the word FRIDAY be arranged if each letter is used no more than once in each arrangement?
- (ii) How many of the above arrangements begin with the letter D and end with a vowel?

- 7 (b) To play a game a player spins a wheel. The wheel is fixed to a wall. It spins freely around its centre point. Its rim is divided equally into twelve regions. Three of the regions are coloured red. Four are coloured blue. Five are coloured green. When the wheel stops an arrow fixed to the wall points to one of the regions. All the regions are equally likely to stop at the arrow. The colour of this region is the outcome of the game. When the game is played twice, calculate the probability that



- (i) both outcomes are green  
(ii) both outcomes are the same colour  
(iii) the first outcome is red and the second is green  
(iv) one outcome is green and the other is blue.

- 7 (c) Consider the numbers  $1, k, 3k - 2, 9$  where  $k \in \mathbf{Z}$ . The mean of these numbers is  $\bar{x}$ . The standard deviation is  $\sigma$ .

- (i) Express  $\bar{x}$  in terms of  $k$ .
- (ii) Given that  $\sigma = \sqrt{20}$ , find the value of  $k$ .

**ANSWERS**

6 (a) (i) 35                      (ii) 20

6 (b)  $u_n = \sqrt{3}(4 + \sqrt{5})^n - \sqrt{3}(4 - \sqrt{5})^n$

6 (c) (i)  $\frac{x(x-1)}{(x+6)(x+5)}$                       (ii) 14                      (iii)  $\frac{15}{91}$

7 (a) (i) 360                      (ii) 24

7 (b) (i)  $\frac{25}{144}$                       (ii)  $\frac{25}{72}$                       (iii)  $\frac{5}{48}$                       (iv)  $\frac{5}{18}$

7 (c) (i)  $\bar{x} = k + 2$                       (ii)  $k = 5$