Probability

Question Paper 10

| Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Probability
Sub Topic	
Booklet	Question Paper 10

Time Allowed: **84 minutes**

Score: **/ 70**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1   A die is biased so that the probability of throwing a 5 is 0.75 and the probabilities of throwing a 1, 2, 3, 4 or 6 are all equal.

   (i) The die is thrown three times. Find the probability that the result is a 1 followed by a 5 followed by any even number. [3]

   (ii) Find the probability that, out of 10 throws of this die, at least 8 throws result in a 5. [3]

   (iii) The die is thrown 90 times. Using an appropriate approximation, f nd the probability that a 5 is thrown more than 60 times. [5]

2   Jamie is equally likely to attend or not to attend a training session before a football match. If he attends, he is certain to be chosen for the team which plays in the match. If he does not attend, there is a probability of 0.6 that he is chosen for the team.

   (i) Find the probability that Jamie is chosen for the team. [3]

   (ii) Find the conditional probability that Jamie attended the training session, given that he was chosen for the team. [3]

3   The probability that Henk goes swimming on any day is 0.2. On a day when he goes swimming, the probability that Henk has burgers for supper is 0.75. On a day when he does not go swimming the probability that he has burgers for supper is x. This information is shown on the following tree diagram.
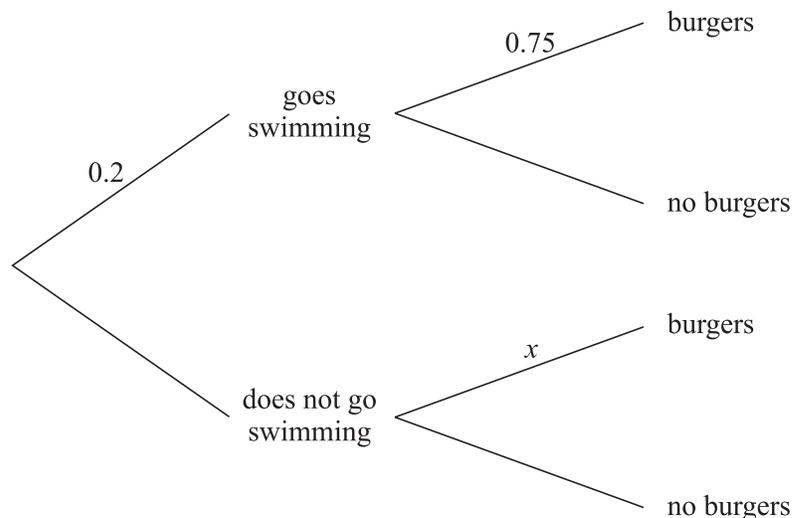
The probability that Henk has burgers for supper on any day is 0.5.

  (i) Find x. [4]

  (ii) Given that Henk has burgers for supper, fin   the probability that he went swimming that day. [2]

4   32 teams enter for a knockout competition, in which each match results in one team winning and the other team losing. After each match the winning team goes on to the next round, and the losing team takes no further part in the competition. Thus 16 teams play in the second round, 8 teams play in the third round, and so on, until 2 teams play in the f nal round.

  (i) How many teams play in only 1 match? [1]

  (ii) How many teams play in exactly 2 matches? [1]

  (iii) Draw up a frequency table for the numbers of matches which the teams play. [3]

  (iv) Calculate the mean and variance of the numbers of matches which the teams play. [4]

5   It is known that, on average, 2 people in 5 in a certain country are overweight. A random sample of

400 people is chosen. Using a suitable approximation, fin   the probability that fewer than 165 people in the sample are overweight.   [5]

6   Data about employment for males and females in a small rural area are shown in the table.

	Unemployed	Employed
Male	206	412
Female	358	305

A person from this area is chosen at random. Let M be the event that the person is male and let E be the event that the person is employed.

   (i) Find P(M).   [2]

   (ii) Find P(M and E).   [1]

   (iii) Are M and E independent events? Justify your answer.   [3]

   (iv) Given that the person chosen is unemployed, f nd the probability that the person is female.   [2]

7   When Don plays tennis, 65% of his firs serves go into the correct area of the court. If the firs serve goes into the correct area, his chance of winning the point is 90%. If his firs serve does not go into the correct area, Don is allowed a second serve, and of these, 80% go into the correct area. If the second serve goes into the correct area, his chance of winning the point is 60%. If neither serve goes into the correct area, Don loses the point.

   (i) Draw a tree diagram to represent this information. [4]

   (ii) Using your tree diagram, f nd the probability that Don loses the point. [3]

   (iii) Find the conditional probability that Don's f rst serve went into the correct area, given that he loses the point. [2]

8   Kamal has 30 hens. The probability that any hen lays an egg on any day is 0.7. Hens do not lay more than one egg per day, and the days on which a hen lays an egg are independent.

   (i) Calculate the probability that, on any particular day, Kamal's hens lay exactly 24 eggs. [2]

   (ii) Use a suitable approximation to calculate the probability that Kamal's hens lay fewer than 20 eggs on any particular day. [5]

9   The people living in 3 houses are classified as children (C), parents (P) or grandparents (G). The numbers living in each house are shown in the table below.

House number 1	House number 2	House number 3
$4C, 1P, 2G$	$2C, 2P, 3G$	$1C, 1G$

   (i) All the people in all 3 houses meet for a party. One person at the party is chosen at random. Calculate the probability of choosing a grandparent. [2]

   (ii) A house is chosen at random. Then a person in that house is chosen at random. Using a tree diagram, or otherwise, calculate the probability that the person chosen is a grandparent. [3]

   (iii) Given that the person chosen by the method in part **(ii)** is a grandparent, calculate the probability that there is also a parent living in the house. [4]