Probability distribution table
Question Paper 6

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Descrete random variables
Sub Topic	Probability distribution table
Booklet	Question Paper 6

Time Allowed: 63 minutes

Score: / 52

Percentage: /100

Grade Boundaries:

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

1   Set A consists of the ten digits 0, 0, 0, 0, 0, 0, 2, 2, 2, 4.

Set B consists of the seven digits 0, 0, 0, 0, 2, 2, 2.

One digit is chosen at random from each set. The random variable X is def ned as the sum of these two digits.

   (i) Show that $P(X = 2) = \frac{3}{7}$. [2]

   (ii) Tabulate the probability distribution of X. [2]

   (iii) Find $E(X)$ and $Var(X)$. [3]

   (iv) Given that $X = 2$, f nd the probability that the digit chosen from set A was 2. [2]

2   Gohan throws a fair tetrahedral die with faces numbered 1, 2, 3, 4. If she throws an even number then her score is the number thrown. If she throws an odd number then she throws again and her score is the sum of both numbers thrown. Let the random variable X denote Gohan's score.

   (i) Show that $P(X = 2) = \frac{5}{16}$. [2]

   (ii) The table below shows the probability distribution of X.

x	2	3	4	5	6	7
$P(X = x)$	$\frac{5}{16}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$

   Calculate $E(X)$ and $Var(X)$. [4]

3 Every day Eduardo tries to phone his friend. Every time he phones there is a 50% chance that his friend will answer. If his friend answers, Eduardo does not phone again on that day. If his friend does not answer, Eduardo tries again in a few minutes' time. If his friend has not answered after 4 attempts, Eduardo does not try again on that day.

   (i) Draw a tree diagram to illustrate this situation. [3]

   (ii) Let X be the number of unanswered phone calls made by Eduardo on a day. Copy and complete the table showing the probability distribution of X. [4]

x	0	1	2	3	4
$P(X = x)$		$\frac{1}{4}$			

   (iii) Calculate the expected number of unanswered phone calls on a day. [2]

4 A vegetable basket contains 12 peppers, of which 3 are red, 4 are green and 5 are yellow. Three peppers are taken, at random and without replacement, from the basket.

   (i) Find the probability that the three peppers are all different colours. [3]

   (ii) Show that the probability that exactly 2 of the peppers taken are green is $\frac{12}{55}$. [2]

   (iii) The number of **green** peppers taken is denoted by the discrete random variable X. Draw up a probability distribution table for X. [5]

5 A fair dice has four faces. One face is coloured pink, one is coloured orange, one is coloured green and one is coloured black. Five such dice are thrown and the number that fall on a green face are counted. The random variable X is the number of dice that fall on a green face.

  (i) Show that the probability of 4 dice landing on a green face is 0.0146, correct to 4 decimal places.
  [2]

  (ii) Draw up a table for the probability distribution of X, giving your answers correct to 4 decimal places.
  [5]

6 Two fair dice are thrown. Let the random variable X be the smaller of the two scores if the scores are different, or the score on one of the dice if the scores are the same.

  (i) Copy and complete the following table to show the probability distribution of X.   [3]

x	1	2	3	4	5	6
P($X = x$)						

  (ii) Find E(X).   [2]

7 A box contains 10 pens of which 3 are new. A random sample of two pens is taken.

  (i) Show that the probability of getting exactly one new pen in the sample is $\frac{7}{15}$.   [2]

  (ii) Construct a probability distribution table for the number of new pens in the sample.   [3]

  (iii) Calculate the expected number of new pens in the sample.   [1]