Probability distribution table
Question Paper 1

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Descrete random variables
Sub Topic	Probability distribution table
Booklet	Question Paper 1

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 Sharik attempts a multiple choice revision question on-line. There are 3 suggested answers, one of which is correct. When Sharik chooses an answer the computer indicates whether the answer is right or wrong. Sharik f rst chooses one of the three suggested answers at random. If this answer is wrong he has a second try, choosing an answer at random from the remaining 2. If this answer is also wrong Sharik then chooses the remaining answer, which must be correct.

    (i) Draw a fully labelled tree diagram to illustrate the various choices that Sharik can make until the computer indicates that he has answered the question correctly. [4]

    (ii) The random variable X is the number of attempts that Sharik makes up to and including the one that the computer indicates is correct. Draw up the probability distribution table for X and f nd $E(X)$. [4]

2 In Marumbo, three quarters of the adults own a cell phone.

    (i) A random sample of 8 adults from Marumbo is taken. Find the probability that the number of adults who own a cell phone is between 4 and 6 inclusive. [3]

    (ii) A random sample of 160 adults from Marumbo is taken. Use an approximation to f nd the probability that more than 114 of them own a cell phone. [5]

    (iii) Justify the use of your approximation in part **(ii)**. [1]

3 A box contains 2 green apples and 2 red apples. Apples are taken from the box, one at a time, without replacement. When both red apples have been taken, the process stops. The random variable X is the number of apples which have been taken when the process stops.

    (i) Show that $P(X = 3) = \frac{1}{3}$. [3]

    (ii) Draw up the probability distribution table for X. [3]

Another box contains 2 yellow peppers and 5 orange peppers. Three peppers are taken at random from the box without replacement.

    (iii) Given that at least 2 of the peppers taken from the box are orange, f nd the probability that all 3 peppers are orange. [5]

4   James has a fair coin and a fair tetrahedral die with four faces numbered 1, 2, 3, 4. He tosses the coin once and the die twice. The random variable $;$ is define as follows.

- If the coin shows a **head** then X is the **sum** of the scores on the two throws of the die.
- If the coin shows a **tail** then X is the score on the **f rst throw** of the die only.

(i) Explain why $X = 1$ can only be obtained by throwing a tail, and show that $P(X = 1) = \frac{1}{8}$.   [2]

(ii) Show that $P(X = 3) = \frac{3}{16}$.   [4]

(iii) Copy and complete the probability distribution table for X.   [3]

x	1	2	3	4	5	6	7	8
$P(X = x)$	$\frac{1}{8}$		$\frac{3}{16}$		$\frac{1}{8}$		$\frac{1}{16}$	$\frac{1}{32}$

Event Q is 'James throws a tail'. Event R is 'the value of X is 7'.

(iv) Determine whether events Q and R are exclusive. Justify your answer.   [2]

5   Dayo chooses two digits at random, without replacement, from the 9-digit number 113 333 555.

(i) Find the probability that the two digits chosen are equal.   [3]

(ii) Find the probability that one digit is a 5 and one digit is not a 5.   [3]

(iii) Find the probability that the f rst digit Dayo chose was a 5, given that the second digit he chose is not a 5.   [4]

(iv) The random variable X is the number of 5s that Dayo chooses. Draw up a table to show the probability distribution of X.   [3]