Probability distribution table
Question Paper 3

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Descrete random variables
Sub Topic	Probability distribution table
Booklet	Question Paper 3

Time Allowed: **60 minutes**

Score: **/ 50**

Percentage: **/100**

Grade Boundaries:

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

1 The random variable X takes the values -2, 0 and 4 only. It is given that $P(X = -2) = 2p$, $P(X = 0) = p$ and $P(X = 4) = 3p$.

  (i) Find p. [2]

  (ii) Find $E(X)$ and $Var(X)$. [4]

2 Box A contains 5 red paper clips and 1 white paper clip. Box B contains 7 red paper clips and 2 white paper clips. One paper clip is taken at random from box A and transferred to box B. One paper clip is then taken at random from box B.

  (i) Find the probability of taking both a white paper clip from box A and a red paper clip from box B. [2]

  (ii) Find the probability that the paper clip taken from box B is red. [2]

  LLL Find the probability that the paper clip taken from box A was red, given that the paper clip taken from box B is red. [2]

  YL The random variable X denotes the number of times that a red paper clip is taken. Draw up a table to show the probability distribution of X. [4]

3 The discrete random variable X has the following probability distribution.

x	0	1	2	3	4
$P(X = x)$	0.26	q	$3q$	0.05	0.09

  (i) Find the value of T. [2]

  (ii) Find $E(;)$ and $Var(;)$. [3]

4   In a competition, people pay $1 to throw a ball at a target. If they hit the target on the fi st throw they receive $5. If they hit it on the second or third throw they receive $3, and if they hit it on the fourth or fi th throw they receive $1. People stop throwing after the f rst hit, or after 5 throws if no hit is made. Mario has a constant probability of $\frac{1}{5}$ of hitting the target on any throw, independently of the results of other throws.

   (i) Mario misses with his f rst and second throws and hits the target with his third throw. State how much profi he has made.   [1]

   (ii) Show that the probability that Mario's profi is $0 is 0.184, correct to 3 signif cant figu es.   [2]

   (iii) Draw up a probability distribution table for Mario's prof t.   [3]

   (iv) Calculate his expected prof t.   [2]

5   A box contains fi e balls numbered 1, 2, 3, 4, 5. Three balls are drawn randomly at the same time from the box.

   (i) By listing all possible outcomes (123, 124, etc.), f nd the probability that the sum of the three numbers drawn is an odd number.   [2]

The random variable L denotes the largest of the three numbers drawn.

   (ii) Find the probability that L is 4.   [1]

   (iii) Draw up a table to show the probability distribution of L.   [3]

   (iv) Calculate the expectation and variance of L.   [3]

6   A discrete random variable X has the following probability distribution.

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

   (i) Find the value of the constant c.   [2]

   (ii) Find $E(X)$ and $Var(X)$.   [4]

   (iii) Find $P\big(X > E(X)\big)$.   [2]

7 The discrete random variable X has the following probability distribution.

x	1	3	5	7
P($X = x$)	0.3	a	b	0.25

   (i) Write down an equation satisfied by a and b.   [1]

   (ii) Given that E(X) = 4, find a and b.   [3]