NAME: _____   **DATE:** _____

1. Bag A contains 2 red balls and 3 green balls. Two balls are chosen at random from the bag without replacement. Let *X* denote the number of red balls chosen. The following table shows the probability distribution for *X*

X	0	1	2
P(*X* = *x*)	$\dfrac{3}{10}$	$\dfrac{6}{10}$	$\dfrac{1}{10}$

(a)   Calculate E(*X*), the mean number of red balls chosen.

(3)

Bag B contains 4 red balls and 2 green balls. Two balls are chosen at random from bag B.

(b)   (i)   Draw a tree diagram to represent the above information, including the probability of each event.

(ii)   Hence find the probability distribution for *Y*, where *Y* is the number of red balls chosen.

(8)

A standard die with six faces is rolled. If a 1 or 6 is obtained, two balls are chosen from bag A, otherwise two balls are chosen from bag B.

(c)   Calculate the probability that two red balls are chosen.

(5)

(d)   Given that two red balls are obtained, find the conditional probability that a 1 or 6 was rolled on the die.

(3)
(Total 19 marks)

2. The probability distribution of the discrete random variable X is given by the following table.

x	1	2	3	4	5
P($X = x$)	0.4	p	0.2	0.07	0.02

(a) Find the value of p.

(b) Calculate the expected value of X.

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(Total 6 marks)

3. Three students, Kim, Ching Li and Jonathan each have a pack of cards, from which they select a card at random. Each card has a 0, 3, 4, or 9 printed on it.

(a) Kim states that the probability distribution for her pack of cards is as follows.

x	0	3	4	9
P($X = x$)	0.3	0.45	0.2	0.35

Explain why Kim is incorrect.

(2)

(b) Ching Li correctly states that the probability distribution for her pack of cards is as follows.

x	0	3	4	9
P($X = x$)	0.4	k	$2k$	0.3

Find the value of k.

(2)

(c) Jonathan correctly states that the probability distribution for his pack of cards is given by P($X = x$) $= \dfrac{x+1}{20}$. One card is drawn at random from his pack.

(i) Calculate the probability that the number on the card drawn is 0.

(ii) Calculate the probability that the number on the card drawn is greater than 0.

(4)
(Total 8 marks)

4. Two fair **four**-sided dice, one red and one green, are thrown. For each die, the faces are labelled 1, 2, 3, 4. The score for each die is the number which lands face down.

(a) Write down

    (i) the sample space;

    (ii) the probability that two scores of 4 are obtained.

(4)

Let X be the number of 4s that land face down.

(b) **Copy** and complete the following probability distribution for X.

x	0	1	2
$P(X = x)$			

(3)

(c) Find E(X).

(3)
(Total 10 marks)

5. A discrete random variable X has a probability distribution as shown in the table below.

x	0	1	2	3
$P(X = x)$	0.1	a	0.3	b

(a) Find the value of $a + b$.

(2)

(b) Given that E(X) =1.5, find the value of a and of b.

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(4)
(Total 6 marks)

6. The following table shows the probability distribution of a discrete random variable X.

x	-1	0	2	3
$P(X = x)$	0.2	$10k^2$	0.4	$3k$

(a) Find the value of k.

(4)

(b) Find the expected value of X.

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(3)
(Total 7 marks)