Probability

Question Paper 6

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Probability
Sub Topic	
Booklet	Question Paper 6

Time Allowed: **59 minutes**

Score: **/ 49**

Percentage: **/100**

Grade Boundaries:

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

1 Playground equipment consists of swings (S), roundabouts (R), climbing frames (C) and play-houses (P). The numbers of pieces of equipment in each of 3 playgrounds are as follows.

Playground X	Playground Y	Playground Z
$3S,\ 2R,\ 4P$	$6S,\ 3R,\ 1C,\ 2P$	$8S,\ 3R,\ 4C,\ 1P$

Each day Nur takes her child to one of the playgrounds. The probability that she chooses playground X is $\frac{1}{4}$. The probability that she chooses playground Y is $\frac{1}{4}$. The probability that she chooses playground Z is $\frac{1}{2}$. When she arrives at the playground, she chooses one piece of equipment at random.

(i) Find the probability that Nur chooses a play-house. [4]

(ii) Given that Nur chooses a climbing frame, f nd the probability that she chose playground Y. [4]

2 In a certain country 12% of houses have solar heating. 19 houses are chosen at random. Find the probability that fewer than 4 houses have solar heating. [4]

3 Roger and Andy play a tennis match in which the firs person to win two sets wins the match. The probability that Roger wins the firs set is 0.6. For sets after the first the probability that Roger wins the set is 0.7 if he won the previous set, and is 0.25 if he lost the previous set. No set is drawn.

(i) Find the probability that there is a winner of the match after exactly two sets. [3]

(ii) Find the probability that Andy wins the match given that there is a winner of the match after exactly two sets. [2]

4 Tom and Ben play a game repeatedly. The probability that Tom wins any game is 0.3. Each game is won by either Tom or Ben. Tom and Ben stop playing when one of them (to be called the champion) has won two games.

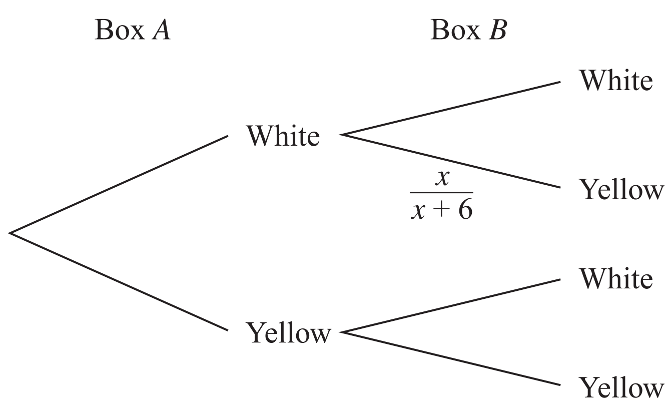
(i) Find the probability that Ben becomes the champion after playing exactly 2 games. [1]

(ii) Find the probability that Ben becomes the champion. [3]

(iii) Given that Tom becomes the champion, f nd the probability that he won the 2nd game. [4]

5 Assume that, for a randomly chosen person, their next birthday is equally likely to occur on any day of the week, independently of any other person's birthday. Find the probability that, out of 350 randomly chosen people, at least 47 will have their next birthday on a Monday. [5]

6 Box A contains 8 white balls and 2 yellow balls. Box B contains 5 white balls and x yellow balls. A ball is chosen at random from box A and placed in box B. A ball is then chosen at random from box B. The tree diagram below shows the possibilities for the colours of the balls chosen.



(i) Justify the probability $\dfrac{x}{x+6}$ on the tree diagram. [1]

(ii) Copy and complete the tree diagram. [4]

(iii) If the ball chosen from box A is white then the probability that the ball chosen from box B is also white is $\frac{1}{3}$. Show that the value of x is 12. [2]

(iv) Given that the ball chosen from box B is yellow, fin the conditional probability that the ball chosen from box A was yellow. [4]

7 Q is the event 'Nicola throws two fair dice and gets a total of 5'. S is the event 'Nicola throws two fair dice and gets one low score (1, 2 or 3) and one high score (4, 5 or 6)'. Are events Q and S independent? Justify your answer. [4]

8 The 12 houses on one side of a street are numbered with even numbers starting at 2 and going up to 24. A free newspaper is delivered on Monday to 3 different houses chosen at random from these 12. Find the probability that at least 2 of these newspapers are delivered to houses with numbers greater than 14. [4]