Probability

Question Paper 8

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Probability
Sub Topic	
Booklet	Question Paper 8

Time Allowed: **58 minutes**

Score: **/ 48**

Percentage: **/100**

Grade Boundaries:

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

1 The possible values of the random variable X are the 8 integers in the set $\{-2, -1, 0, 1, 2, 3, 4, 5\}$. The probability of X being 0 is $\frac{1}{10}$. The probabilities for all the other values of X are equal. Calculate

   (i) $P(X < 2)$, [2]

   (ii) the variance of X, [3]

   (iii) the value of a for which $P(-a \leqslant X \leqslant 2a) = \frac{17}{35}$. [1]

2 **(a)**   **(i)** Find the probability of getting at least one 3 when 9 fair dice are thrown. [2]

     (ii) When n fair dice are thrown, the probability of getting at least one 3 is greater than 0.9. Find the smallest possible value of n. [4]

  (b) A bag contains 5 green balls and 3 yellow balls. Ronnie and Julie play a game in which they take turns to draw a ball from the bag at random without replacement. The winner of the game is the f rst person to draw a yellow ball. Julie draws the f rst ball. Find the probability that Ronnie wins the game. [4]

3 A biased die was thrown 20 times and the number of 5s was noted. This experiment was repeated many times and the average number of 5s was found to be 4.8. Find the probability that in the next 20 throws the number of 5s will be less than three. [4]

4   Tim throws a fair die twice and notes the number on each throw.

   (i) Tim calculates his f nal score as follows. If the number on the second throw is a 5 he multiplies the two numbers together, and if the number on the second throw is not a 5 he adds the two numbers together. Find the probability that his f nal score is

   (a) 12,   [1]

   (b) 5.   [3]

   (ii) Events A, B, C are def ned as follows.

         A: the number on the second throw is 5

         B: the sum of the numbers is 6

         C: the product of the numbers is even

   By calculation f nd which pairs, if any, of the events A, B and C are independent.   [5]

5   The probability that Sue completes a Sudoku puzzle correctly is 0.75.

   (i) Sue attempts n Sudoku puzzles. Find the least value of n for which the probability that she completes all n puzzles correctly is less than 0.06.   [3]

Sue attempts 14 Sudoku puzzles every month. The number that she completes successfully is denoted by X.

   (ii) Find the value of X that has the highest probability. You may assume that this value is one of the two values closest to the mean of X.   [3]

   (iii) Find the probability that in exactly 3 of the next 5 months Sue completes more than 11 Sudoku puzzles correctly.   [5]

6   In the holidays Martin spends 25% of the day playing computer games. Martin's friend phones him once a day at a randomly chosen time.

   (i) Find the probability that, in one holiday period of 8 days, there are exactly 2 days on which Martin is playing computer games when his friend phones.   [2]

   (ii) Another holiday period lasts for 12 days. State with a reason whether it is appropriate to use a normal approximation to f nd the probability that there are fewer than 7 days on which Martin is playing computer games when his friend phones.   [1]

   (iii) Find the probability that there are at least 13 days of a 40-day holiday period on which Martin is playing computer games when his friend phones.   [5]