Question 1   **(25 marks)**

An experiment consists of throwing two fair, standard, six-sided dice and noting the sum of the two numbers thrown. If the sum is 9 or greater it is recorded as a "win" (W). If the sum is 8 or less it is recorded as a "loss" (L).

(a) Complete the table below to show all possible outcomes of the experiment.

		Die 2					
		1	2	3	4	5	6
Die 1	1		L				
	2						
	3						
	4						
	5						W
	6						

(b) **(i)** Find the probability of a win on one throw of the two dice.

      (ii) Find the probability that each of 3 successive throws of the two dice results in a loss. Give your answer correct to four decimal places.

(c) The experiment is repeated until a total of 3 wins occur. Find the probability that the third win occurs on the tenth throw of the two dice. Give your answer correct to four decimal places.

Question 1 **(25 marks)**

An experiment consists of throwing two fair, standard, six-sided dice and noting the sum of the two numbers thrown. If the sum is 9 or greater it is recorded as a "win" (W). If the sum is 8 or less it is recorded as a "loss" (L).

(a) Complete the table below to show all possible outcomes of the experiment.

		Die 2					
		1	2	3	4	5	6
Die 1	1	L	L	L	L	L	L
	2	L	L	L	L	L	L
	3	L	L	L	L	L	W
	4	L	L	L	L	W	W
	5	L	L	L	W	W	W
	6	L	L	W	W	W	W

(b) **(i)** Find the probability of a win on one throw of the two dice.

$$P(W) = \frac{10}{36} = \frac{5}{18}$$

(ii) Find the probability that each of 3 successive throws of the two dice results in a loss. Give your answer correct to four decimal places.

$$P(L,L,L) = \left(\frac{13}{18}\right)^3 = 0 \cdot 3767$$

(c) The experiment is repeated until a total of 3 wins occur. Find the probability that the third win occurs on the tenth throw of the two dice. Give your answer correct to four decimal places.

$$P(2 \text{ wins in } 9) = \binom{9}{2}\left(\frac{5}{18}\right)^2\left(\frac{13}{18}\right)^7$$

$$P(3 \text{ wins, 3rd on 10th throw}) = \binom{9}{2}\left(\frac{5}{18}\right)^2\left(\frac{13}{18}\right)^7\left(\frac{5}{18}\right) = 0 \cdot 0791$$

Question 1 (25 marks)

(a) **Scale 10C (0, 4, 8, 10)**
Low *Partial Credit:*
- At least one other correct entry
- Partially correct table with at least 5 correct totals or couples

High Partial Credit:
- Five or more correct entries including at least one other loss and one other win
- Table correctly completed with totals or couples but no indication of W or L

(b)(i)(ii) Scale 10C (0, 4, 8, 10)
Low *Partial Credit:*
- Favourable outcomes identified
- (i) correct only ($\frac{10}{36}, \frac{5}{18}$, $0 \cdot 2\dot{7}$, $0 \cdot 28$, $0 \cdot 3$)

High Partial Credit:
- (i) omitted or of no merit but (ii) $\left(\frac{13}{18}\right)^3$

(c) **Scale 5C (0, 2, 4, 5)**
Low *Partial Credit:*
- Relevant binomial formula with some substitution
- Identifies p^7 or $(1-p)^3$ or $(1-p)^2$ or $1-p$
- Listing at least any two of the ten throws

High Partial Credit
- Probability of two wins in nine throws