Answer **all** the questions.

1 Danish only walks or cycles to school.

The probability that Danish walks to school is 0.6. If he walks to school, the probability that he is late is 0.05. If he cycles to school, the probability that he is late is 0.02.

Find the probability that Danish is **not** late for school.

Answer …… [2]

2 The probability of 3 competitors, Alex, Julie and Desmond, winning a 100 m sprint are $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{12}$ respectively. Only one person can win the race.

(a) Explain why there are more than 3 competitors in the race.

Answer ……..

……

…….. [1]

(b) Find, as a fraction in its simplest form, the probability that neither Alex nor Julie win.

Answer …… [1]

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3 $A = \{x: x \text{ is a letter used to form the word 'rhythm'}\}$
$B = \{x: x \text{ is a vowel}\}$

(a) Draw a Venn diagram to illustrate this information. [2]

(b) Write down $n(A \cap B)$.

Answer …… [1]

4 **(a)** The sets ξ, A and B satisfy the conditions $n(\xi) = 23$, $n(A) = 15$ and $n(B) = 11$.

Find the largest possible value of $n(A \cup B)'$.

Answer ..... [1]

(b) A group of 40 students were surveyed. 32 of them have a mobile phone, 19 of them have a laptop, and 3 of them have neither a mobile phone nor a laptop.

Find the number of students in the group who have both a mobile phone and a laptop.

Answer ..... [2]

5 A bag contains 8 red balls, 10 green balls and 2 white balls.

(a) A ball is chosen at random from the bag and is **replaced** in the bag. A second ball is then chosen at random from the bag.

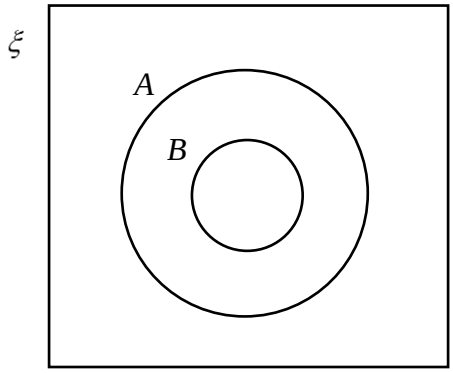
Find, as a fraction in its simplest form, the probability that the second ball is red, given that the first ball is green.

Answer ..... [1]

(b) How many more white balls must be added to the bag so that the probability of choosing a white ball becomes $\frac{1}{4}$?

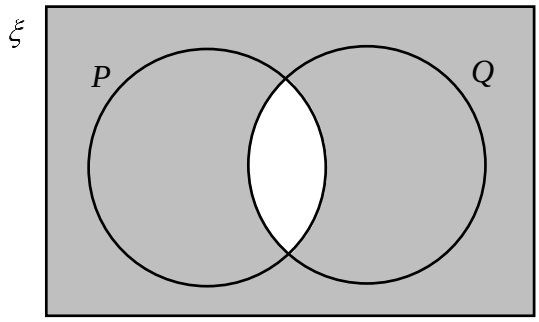
Answer ..... [2]

6 **(a)** On the Venn diagram, shade the region $(A \cap B)'$. [1]



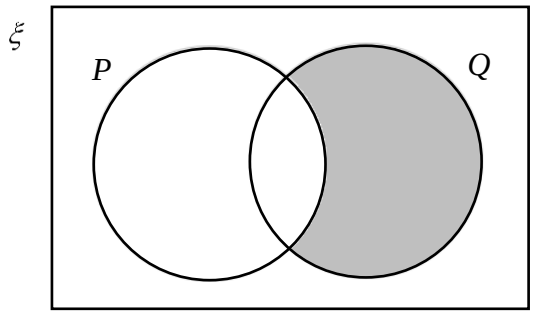
(b) Use set notation to describe the shaded region.

(i)



Answer ..... [1]

(ii)



Answer ..... [1]

7 ξ = {integers x: $1 \leq x < 17$ }

A = {prime numbers}

B = {factors of 12}

C = {multiples of 4}

(a) List the elements in

(i) B,

Answer ..... [1]

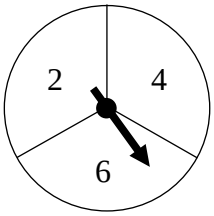
(ii) $A \cap B$.

Answer ..... [1]

(b) Circle the correct statements from the list below.

$17 \notin A$ $\quad$ $A \cap C = \{0\}$ $\quad$ $B \cap C = \{4, 12\}$ $\quad$ $C \subset B$ [2]

8



The diagram shows a spinner with three numbered sectors. Each time the pointer is spun, it is equally likely to stop on any of the sectors.

There is a fair tetrahedral die (4-sided die) with faces labelled 1, 2, 3 and 4.

A game is played in which the pointer is spun once and the tetrahedral dice is rolled once. The player's final score is the smaller number of the two numbers if they are different, and their common number if the two numbers are the same.

(a) Complete the possibility diagram to represent the outcomes of the final score.

		Pointer		
		2	**4**	**6**
tetrahedral die	**1**			
	2			
	3			
	4			

[1]

(b) The player wins the game if the final score is at least 3.

Find, as a fraction in its simplest form, the probability

(i) of a player winning the game,

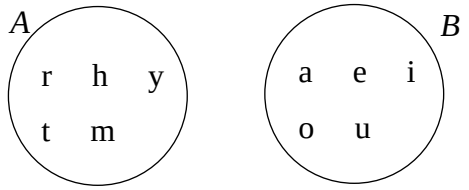
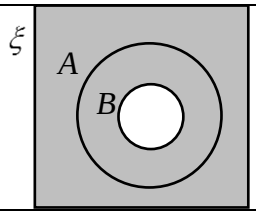
Answer ..... [1]

(ii) that a player will lose at least once in two consecutive games.

Answer ..... [2]

END OF PAPER

Answer Key

1	0.962
2a	P(Alex win) + P(Julie win) + P(Desmond win) = $\frac{1}{2}$ The probability of Alex, Julie and Desmond winning are mutually exclusive events. Since the probability of either one of them winning $\neq 1$, there are more than 3 competitors in the race.
2b	$\frac{7}{12}$
3a	 **3b)** 0
4a	8 **4b)** 14
5a	$\frac{2}{5}$ **5b)** 4
6a	
6bi	$(P \cap Q)'$ or $P' \cup Q'$
6bii	$P' \cap Q$ or $(P \cup Q) \cap P'$ or $(P \cap Q)' \cap Q$
7ai	$B = \{1, 2, 3, 4, 6, 12\}$
7aii	$\{2, 3\}$
7b	$17 \notin A$ $A \cap C = \{0\}$ $B \cap C = \{4, 12\}$ $C \subset B$
8	Pointer tetrahedral die **8bi)** $\frac{1}{3}$ **8bii)** $\frac{8}{9}$

	2	4	6
1	1	1	1
2	2	2	2
3	2	3	3
4	2	4	4