

1

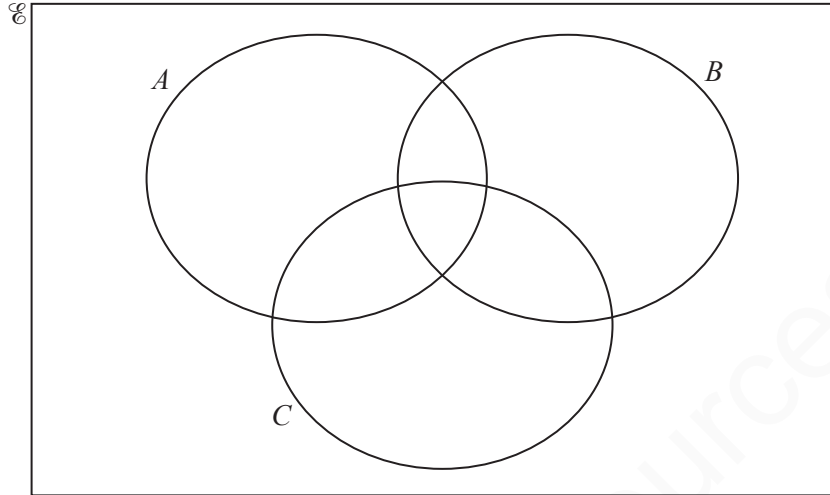
$\mathcal{U} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$

$A = \{x : x \text{ is a multiple of } 3\}$

$B = \{x : x \text{ is prime}\}$

$C = \{x : x \leq 25\}$

(a) Complete the Venn diagram.



[4]

(b) Use set notation to complete the statements.

(i) 26 B

[1]

(ii) $A \cap B = \dots\dots\dots$

[1]

(c) List the elements of $B \cup (C \cap A)$.

..... [2]

(d) Find

(i) $n(C)$,

..... [1]

(ii) $n(B' \cup (B \cap C))$.

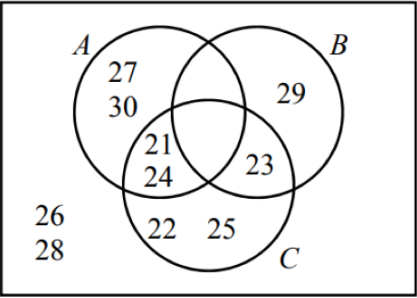
..... [1]

(e) $(A \cap C)$ is a subset of $(A \cup C)$.

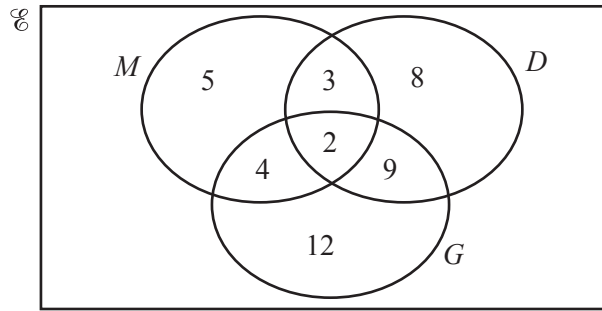
Complete this statement using set notation.

$(A \cap C) \dots\dots\dots (A \cup C)$ [1]

MARKING SCHEME:

(a)		4	All 8 regions correct M3 for 6 or 7 regions correct M2 for 4 or 5 regions correct M1 for 3 regions correct
(b)(i)	\notin	1	
(b)(ii)	\emptyset	1	
(c)	21, 23, 24, 29	2FT	Correct or FT SC1 for 1 omission or 4 correct and 1 extra
(d)(i)	5	1FT	Correct or FT if less than 10
(d)(ii)	9	1FT	Correct or FT if less than 10
(e)	\subset or \subseteq	1	

2 (a)



The Venn diagram above shows information about the number of students who study Music (M), Drama (D) and Geography (G).

(i) How many students study Music? [1]

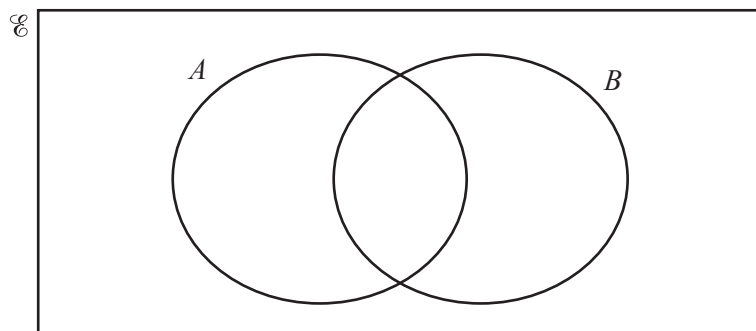
(ii) How many students study exactly two subjects? [1]

(iii) Two students are chosen at random from those who study Drama.
Calculate the probability that they both also study Music.
..... [3]

(iv) In the Venn diagram above, shade $M \cap D'$. [1]

- (b) (i) $E = \{x : x \text{ is an integer and } 1 \leq x \leq 10\}$
 $A = \{x : x \text{ is even}\}$
 $4 \in A \cap B$
 $n(A \cap B) = 1$
 $(A \cup B)' = \{1, 7, 9\}$

Complete the Venn diagram below using this information.

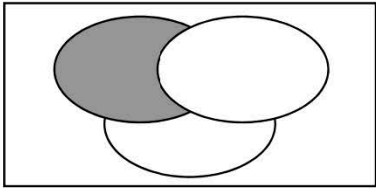
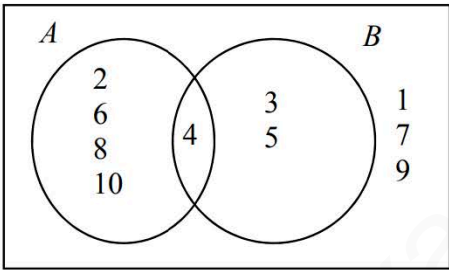


[4]

(ii) Use your Venn diagram to complete the statement.

$B = \{\dots\dots\dots\}$ [1]

MARKING SCHEME:

(a)(i)	14	1	
(a)(ii)	16	1	
(a)(iii)	$\frac{20}{462}$ oe	3	M2 for $\frac{5}{22} \times \frac{4}{21}$ or M1 for $\frac{5}{22}$ seen
(a)(iv)	Correct shading 	1	
(b)(i)	Fully correct Venn diagram 	4	B1 for each correct region
(b)(ii)	3 4 5	1	FT their (b)(i)

- 3** (a) In 2017, the membership fee for a sports club was \$79.50 .
This was an increase of 6% on the fee in 2016.

Calculate the fee in 2016.

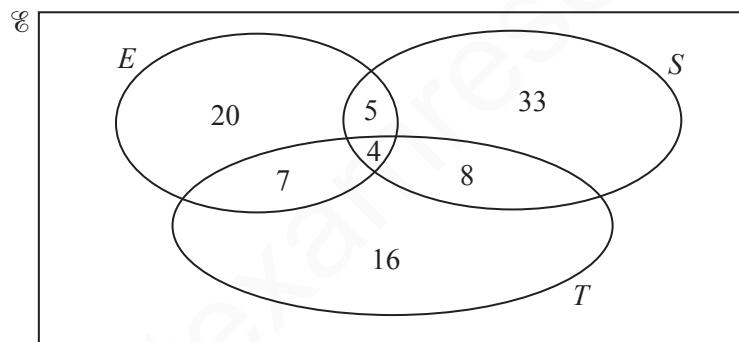
\$ [3]

- (b) On one day, the number of members using the exercise machines was 40, correct to the nearest 10.
Each member used a machine for 30 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the number of minutes the exercise machines were used on this day.

..... min [2]

- (c) On another day, the number of members using the exercise machines (E), the swimming pool (S) and the tennis courts (T) is shown on the Venn diagram.



- (i) Find the number of members using only the tennis courts.

..... [1]

- (ii) Find the number of members using the swimming pool.

..... [1]

- (iii) A member using the swimming pool is chosen at random.

Find the probability that this member also uses the tennis courts and the exercise machines.

..... [2]

- (iv) Find $n(T \cap (E \cup S))$.

..... [1]

MARKING SCHEME:

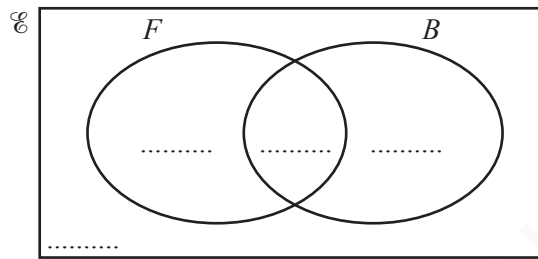
(a)	75	3	M2 for $79.5 \div 1.06$ oe or M1 for 79.5 associated with 106 [%]
(b)	962.5 cao	2	B1 for 35 or 27.5 seen
(c)(i)	16	1	
(c)(ii)	50	1	
(c)(iii)	$\frac{4}{50}$ oe	2	FT <i>their (c)(ii)</i> for 1 or 2 marks B1 for $\frac{4}{k}$, $k > 4$ or $\frac{k}{\text{their}50}$, $k < 50$
(c)(iv)	19	1	

- 4** $\mathcal{E} = \{\text{students in a school}\}$
 $F = \{\text{students who play football}\}$
 $B = \{\text{students who play baseball}\}$

There are 240 students in the school.

- 120 students play football
- 40 students play baseball
- 90 students play football but not baseball.

(a) Complete the Venn diagram to show this information.



[2]

(b) Find $n(F' \cap B')$.

..... [1]

(c) A student in the school is chosen at random.

Find the probability that this student plays baseball but not football.

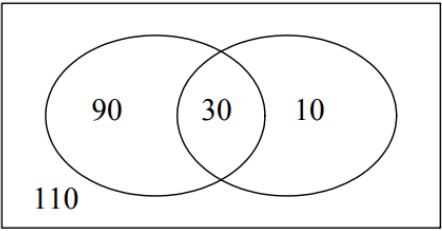
..... [1]

(d) Two students who play baseball are chosen at random.

Find the probability that they both also play football.

..... [3]

MARKING SCHEME:

(a)		2	B1 for any one correct
(b)	110	1	FT <i>their</i> 110 in Venn diagram
(c)	$\frac{10}{240}$ oe	1	FT $\frac{\textit{their}10}{240}$
(d)	$\frac{870}{1560}$ oe	3	<p>M2 for $\frac{\textit{their}30}{40} \times \frac{\textit{their}30-1}{39}$</p> <p>or M1 for $\frac{p}{q} \times \frac{p-1}{q-1}$ $p < q$ or for $\frac{\textit{their}30}{40}$</p> <p>soi</p>