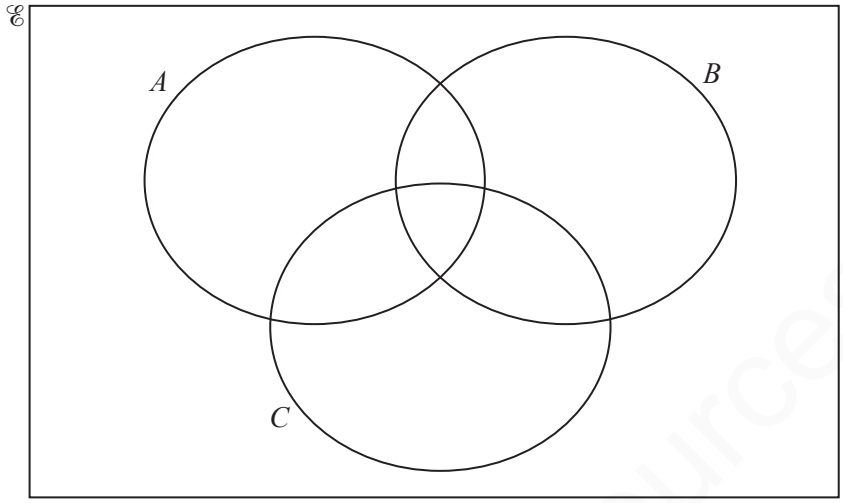
1 $\mathscr{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
$A = \{ x : x \text{ is a multiple of } 3\}$
$B = \{ x : x \text{ is prime}\}$
$C = \{ x : x \leqslant 25\}$

(a) Complete the Venn diagram.



[4]

(b) Use set notation to complete the statements.

(i) 26 ..... B [1]

(ii) $A \cap B =$ ..... [1]

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

..... [2]

(d) Find

(i) n(C),

..... [1]

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

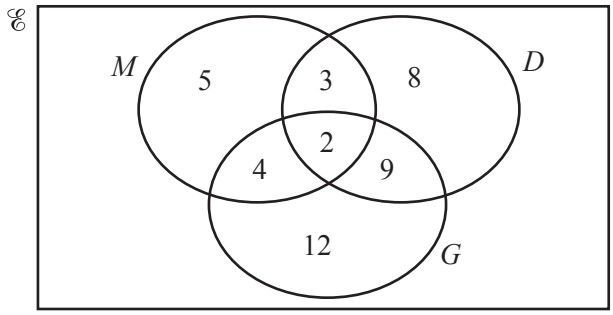
..... [1]

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

Complete this statement using set notation.

$(A \cap C)$ ..... $(A \cup C)$ [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)** $\mathscr{E} = \{x : x \text{ is an integer and } 1 \leqslant x \leqslant 10\}$

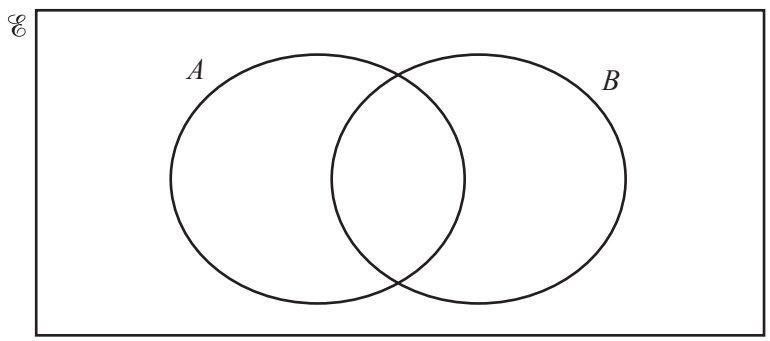
$A = \{x : x \text{ is even}\}$

$4 \in A \cap B$

$\mathrm{n}(A \cap B) = 1$

$(A \cup B)' = \{1, 7, 9\}$

Complete the Venn diagram below using this information.



[4]

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

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

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.

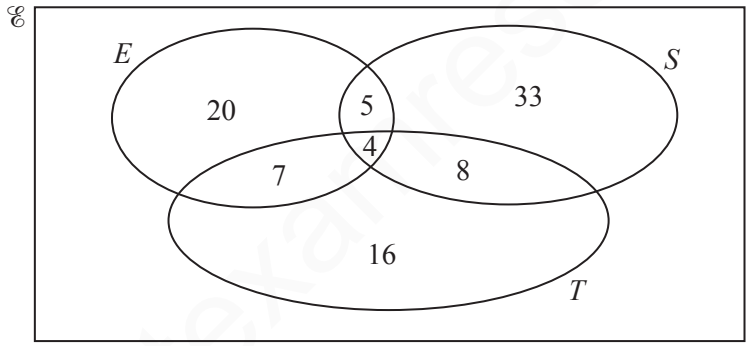
\$ ..... [3]

(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 $\mathrm{n}(T \cap (E \cup S))$.

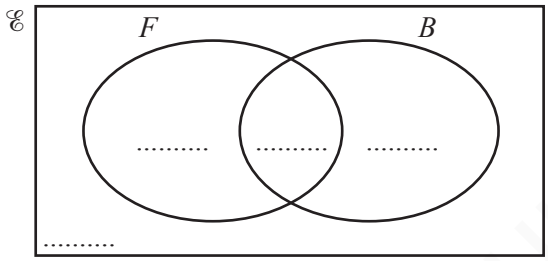
..... [1]

4 $\mathscr{E}$ = {students in a school}
F = {students who play football}
B = {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]