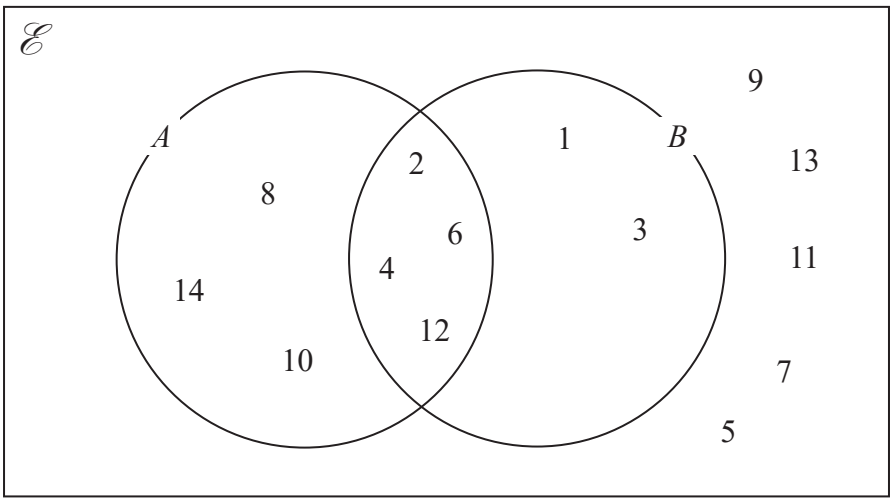
**1** The numbers from 1 to 14 are shown in the Venn diagram.




(a) List the members of the set $A \cap B$

.....

**(1)**

(b) List the members of the set $B'$

.....

**(1)**

A number is picked at random from the numbers in the Venn diagram.

(c) Find the probability that this number is in set $A$ but is **not** in set $B$.

.....

**(2)**

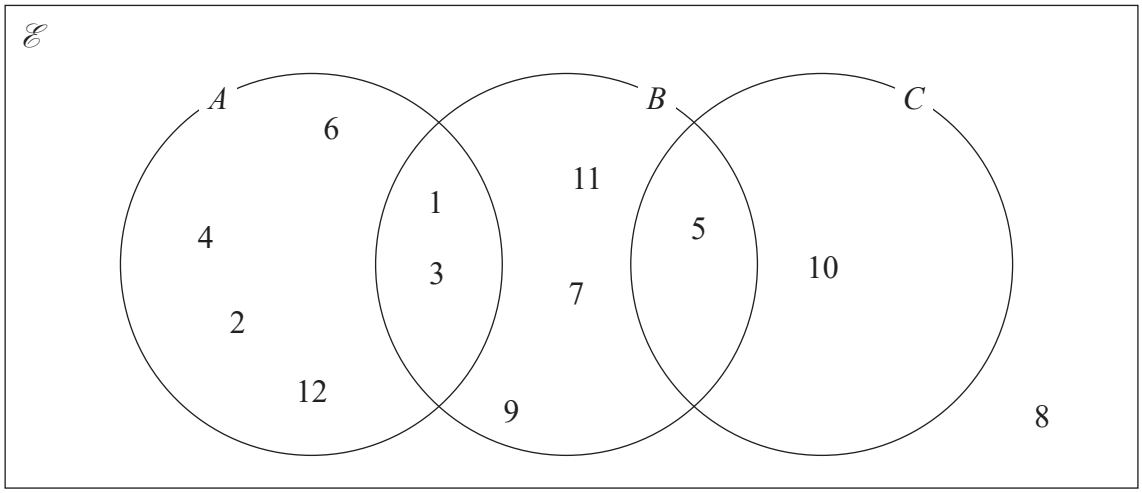
**(Total for Question 1 is 4 marks)**

**2** $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
$A = \{\text{odd numbers}\}$
$A \cap B = \{1, 3\}$
$A \cup B = \{1, 2, 3, 4, 5, 6, 7, 9, 11, 12\}$

Draw a Venn diagram to show this information.


**(Total for Question 2 is 4 marks)**

**3** Here is a Venn diagram.




(a) Write down the numbers that are in the set

(i) $A$

.....

(ii) $B \cup C$

.....

**(2)**

Brian writes down the statement $A \cap C = \emptyset$

(b) Is Brian's statement correct?
You must give a reason for your answer.

.....

.....

**(1)**

One of the numbers in the Venn diagram is picked at random.

(c) Find the probability that this number is in set $C'$

.....

**(2)**

**(Total for Question 3 is 5 marks)**

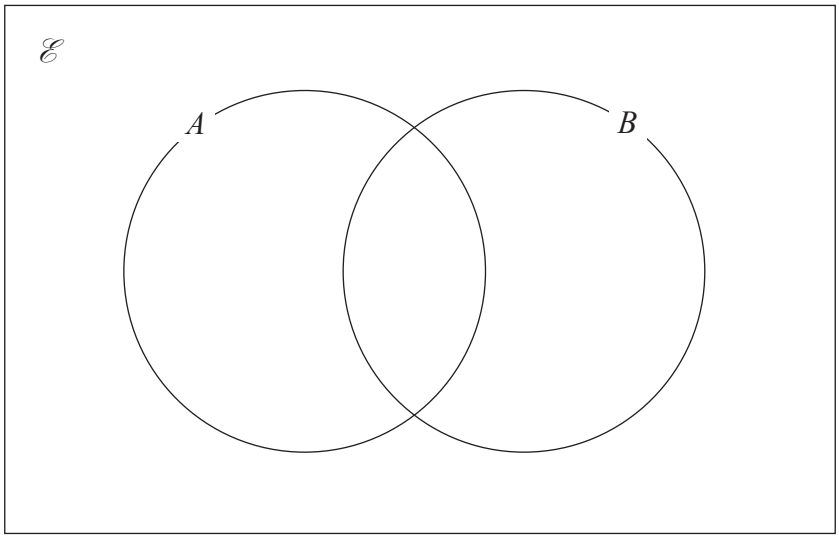
**4** $\mathscr{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

$A \cap B = \{5, 10, 15\}$

$B' = \{7, 8, 9, 11, 12, 13, 14\}$

$A' = \{4, 6, 7, 8, 14\}$

Complete the Venn diagram for this information.



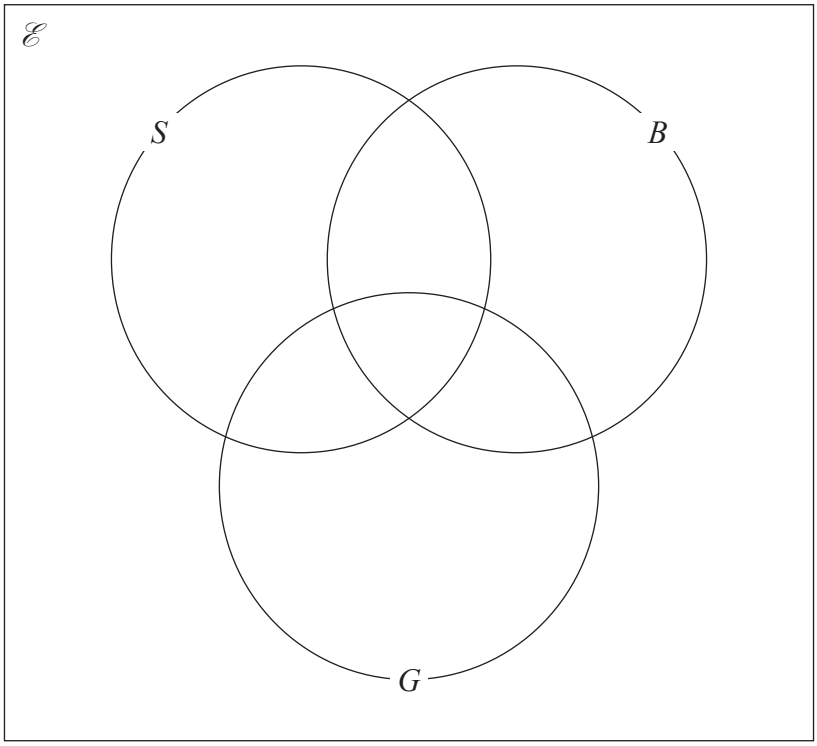

**(Total for Question 4 is 3 marks)**

**5** 120 people who visited a sports centre were asked if they went swimming ($S$), played basketball ($B$) or used the gym ($G$).

Their answers showed that

28 people went swimming
16 people played basketball
27 people used the gym
3 people went swimming and played basketball
5 people played basketball and used the gym
7 people went swimming and used the gym
2 people went swimming, played basketball and used the gym

(a) Using this information, complete the Venn diagram to show the number of people in each region of the Venn diagram.




**(3)**

One of the people who went swimming is chosen at random.

(b) Find the probability that this person also played basketball.

**(1)**

**(Total for Question 5 is 4 marks)**

**6** Some students were asked the following question.

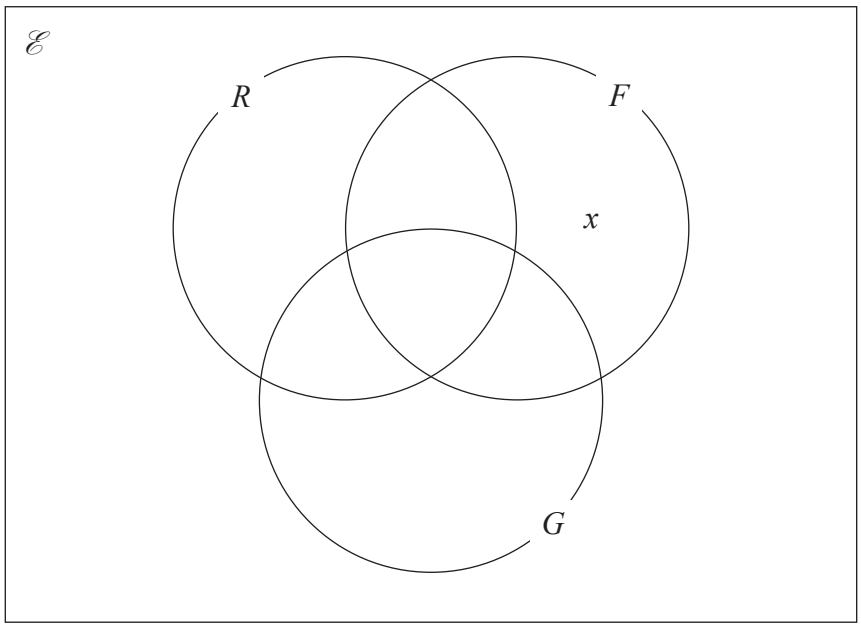
"Which of the subjects Russian ($R$), French ($F$) and German ($G$) do you study?"

Of these students

4 study all three of Russian, French and German
10 study Russian and French
13 study French and German
6 study Russian and German
24 study German
11 study none of the three subjects
the number who study Russian only is twice the number who study French only.

Let $x$ be the number of students who study French only.

(a) Show all this information on the Venn diagram, giving the number of students in each appropriate subset, in terms of $x$ where necessary.




**(3)**

Given that the number of students who were asked the question was 80

(b) work out the number of these students that study Russian.

.....

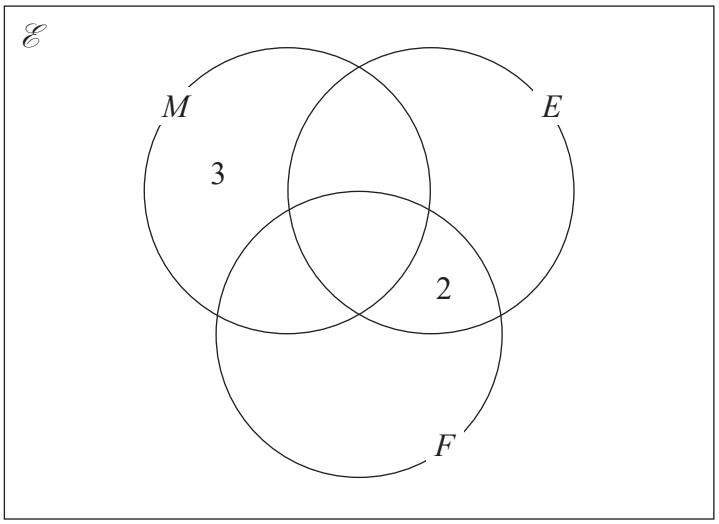
**(3)**

**(Total for Question 6 is 6 marks)**

**7** There are 32 students in a class.
In one term these 32 students each took a test in Maths ($M$), in English ($E$) and in French ($F$).

25 students passed the test in Maths.
20 students passed the test in English.
14 students passed the test in French.
18 students passed the tests in Maths and English.
11 students passed the tests in Maths and French.
4 students failed all three tests.
$x$ students passed all three tests.

The incomplete Venn diagram gives some more information about the results of the 32 students.

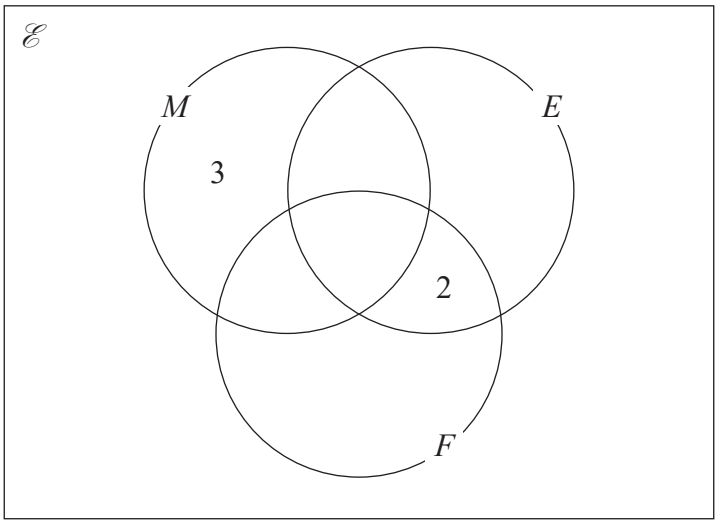



(a) Use all the given information about the results of students who passed the test in Maths to find the value of $x$.

$x$ = .....

**(2)**

(b) Use your value of $x$ to complete the Venn diagram to show the number of students in each subset.




**(2)**

A student who passed the test in Maths is chosen at random.

(c) Find the probability that this student failed the test in French.

.....

**(1)**

**(Total for Question 7 is 5 marks)**

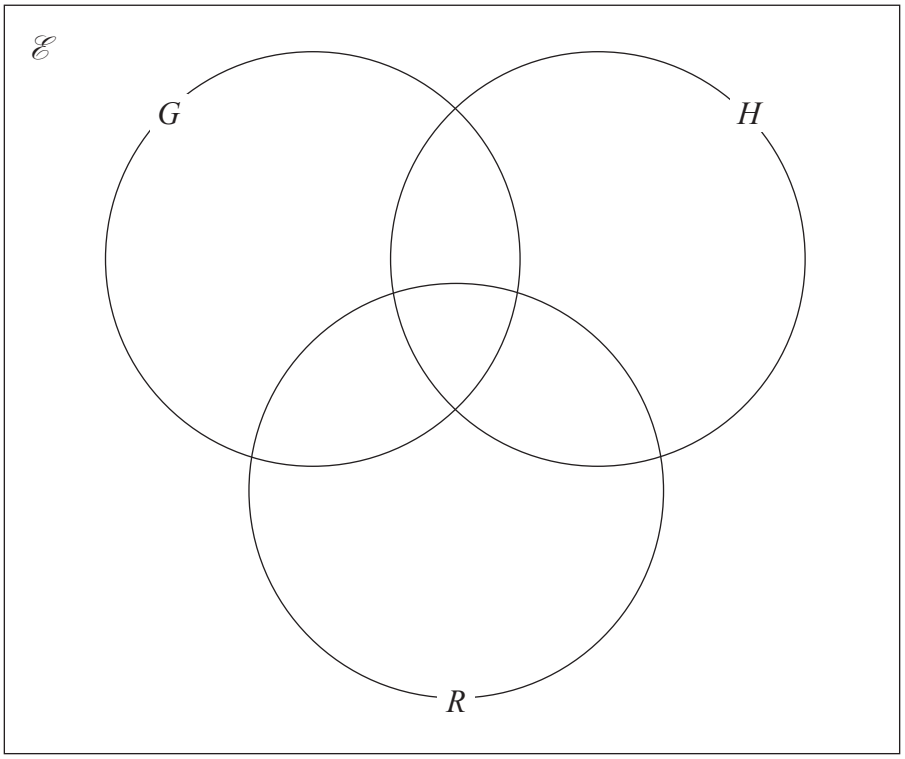
**8** All the students in Year 11 at a school must study at least one of Geography ($G$), History ($H$) and Religious Studies ($R$).

In Year 11 there are 65 students.

Of these students

15 study Geography, History and Religious Studies
21 study Geography and History
16 study Geography and Religious Studies
30 study Geography
18 study only Religious Studies
37 study Religious Studies

(a) Using this information, complete the Venn diagram to show the number of students in each region of the Venn diagram.




**(3)**

A student in Year 11 who studies both History and Religious Studies is chosen at random.

(b) Work out the probability that this student does **not** study Geography.

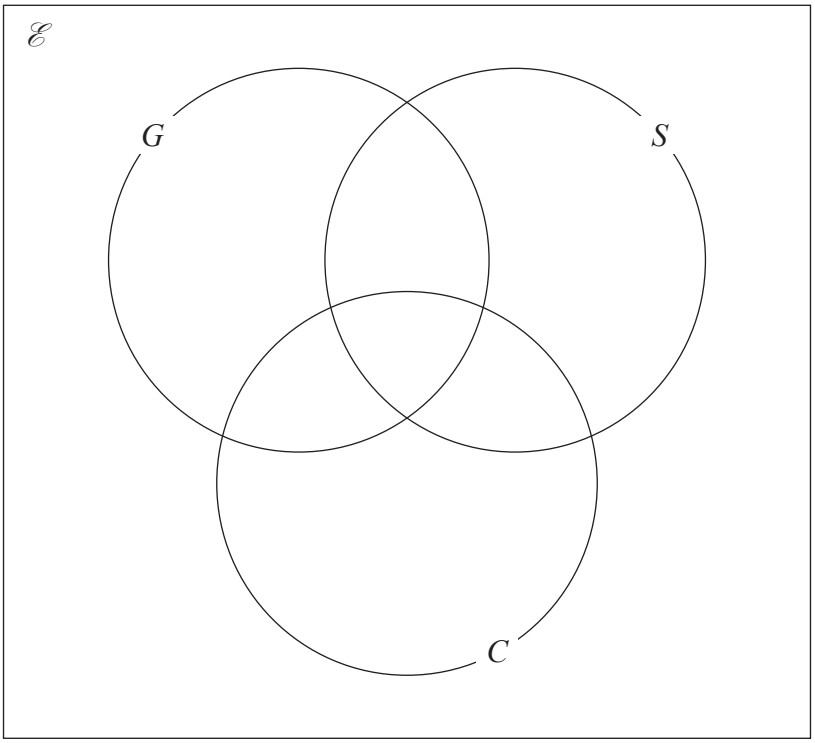
**(2)**

**(Total for Question 8 is 5 marks)**

**9** 100 farmers are asked if they have goats ($G$), sheep ($S$) or chickens ($C$) on their farms.

Of these farmers
- 31 have sheep
- 53 have chickens
- 6 have goats, sheep and chickens
- 11 have sheep and goats
- 17 have sheep and chickens
- 18 have goats and chickens
- 20 do not have any goats, sheep or chickens

(a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.




**(3)**

(b) Find

(i) $n(G)$

.....

**(1)**

(ii) $n([G \cup S]')$

.....

**(1)**

(iii) $n(G' \cap C)$

.....

**(1)**

One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

.....

**(2)**

**(Total for Question 9 is 8 marks)**

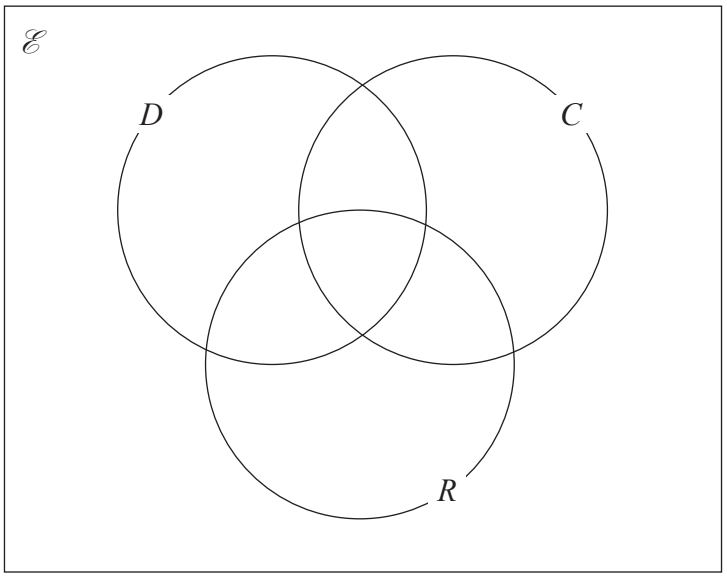
**10** Some students in a school were asked the following question.

"Do you have a dog ($D$), a cat ($C$) or a rabbit ($R$)?"

Of these students

28 have a dog
18 have a cat
20 have a rabbit
8 have both a cat and a rabbit
9 have both a dog and a rabbit
$x$ have both a dog and a cat
6 have a dog, a cat and a rabbit
5 have not got a dog or a cat or a rabbit

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.
Give the numbers in terms of $x$ where necessary.




**(3)**

Given that a total of 50 students answered the question,

(b) work out the value of $x$.

$x =$ .....

**(2)**

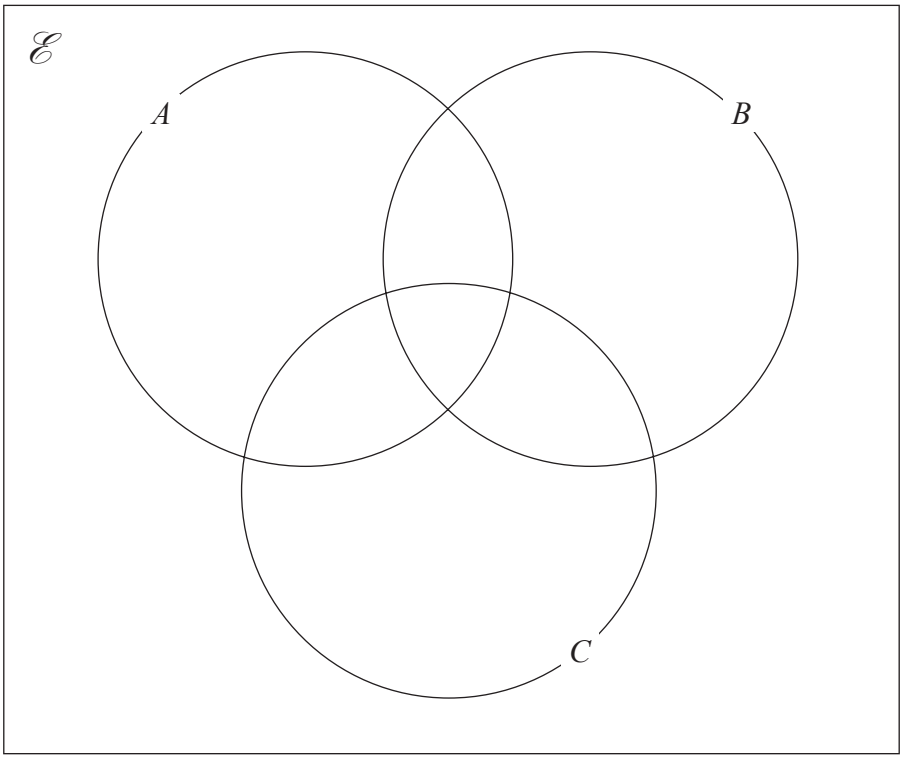
(c) Find $n(C' \cap D')$

.....

**(1)**

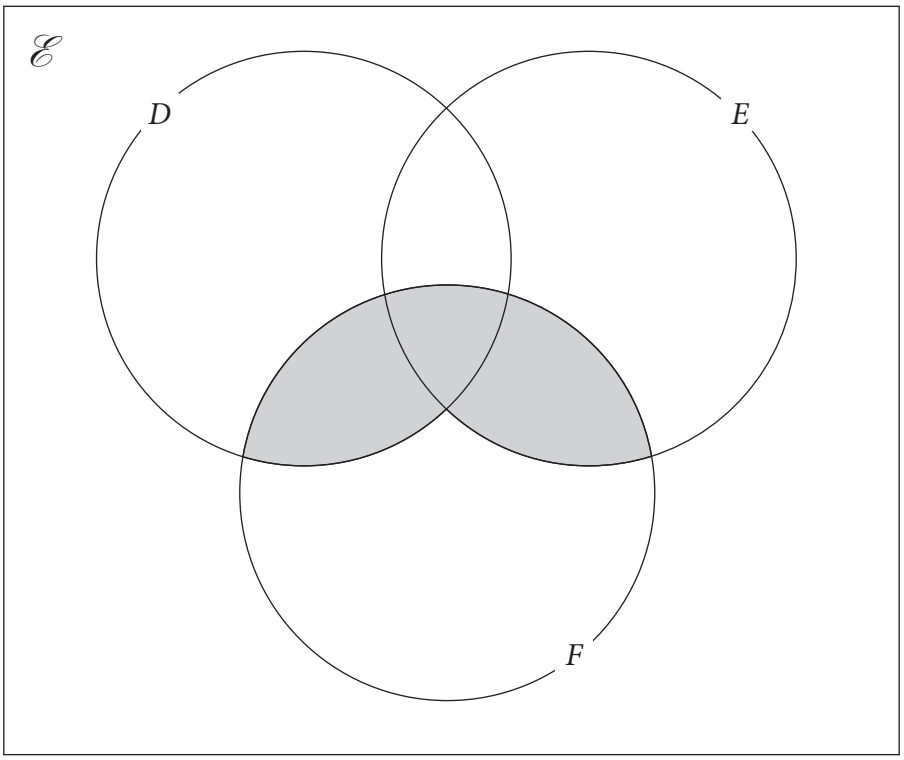
**(Total for Question 10 is 6 marks)**

**11** (a) On the Venn diagram, shade the set $(A \cup B)' \cap C$




**(1)**

(b) Use set notation to describe the shaded region in the Venn diagram below.

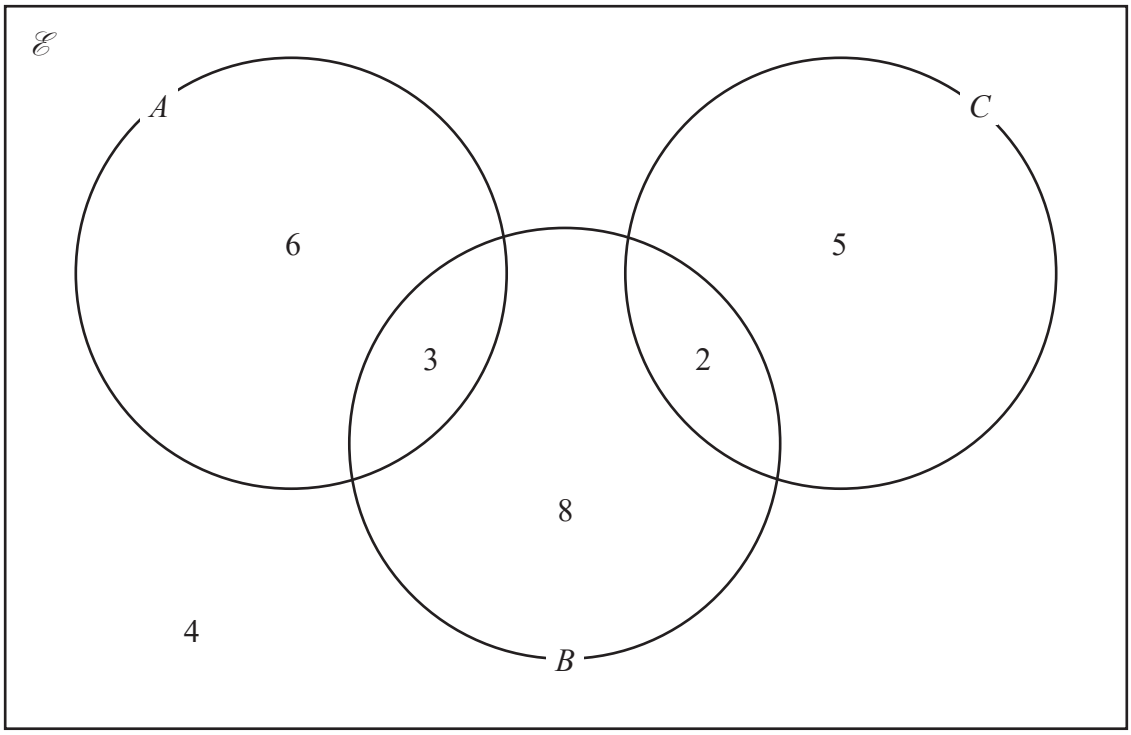



.....

**(1)**

**(Total for Question 11 is 2 marks)**

**12** The Venn diagram shows a universal set $\mathscr{E}$ and three sets $A$, $B$ and $C$.




6, 3, 8, 2, 5 and 4 represent the **numbers** of elements.

Find

(i) $n(A \cup B)$

.....

**(1)**

(ii) $n(A \cap C)$

.....

**(1)**

(iii) $n(B \cap C')$

.....

**(1)**

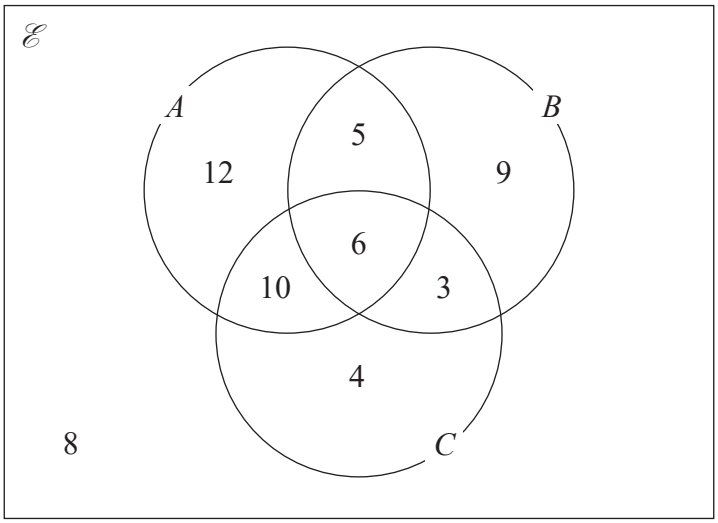
(iv) $n(A' \cup B' \cup C')$

.....

**(1)**

**(Total for Question 12 is 4 marks)**

**13** The Venn diagram shows a universal set, $\mathscr{E}$ and sets $A$, $B$ and $C$.




12, 5, 9, 10, 6, 3, 4 and 8 represent the **numbers** of elements.

Find

(i) $n(A \cup B)$

.....

**(1)**

(ii) $n(A' \cap B')$

.....

**(1)**

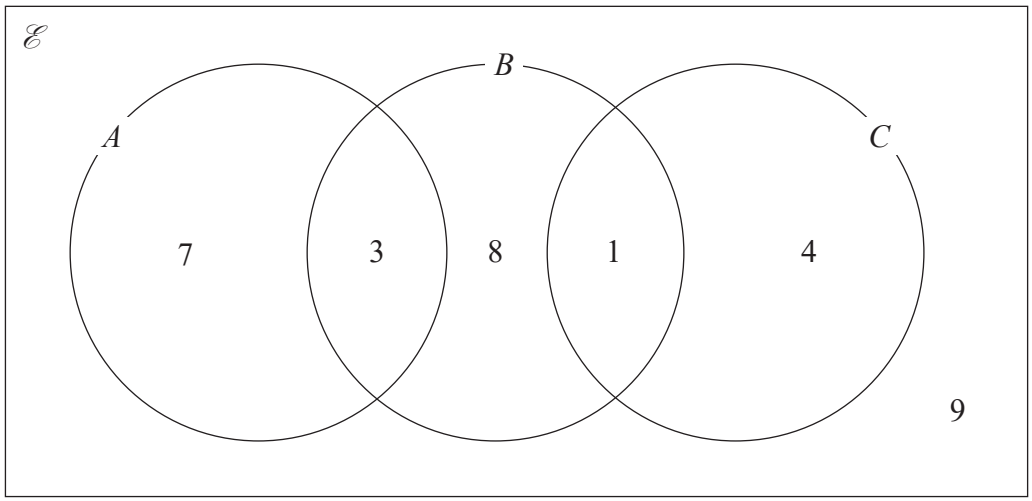
(iii) $n([A \cap B] \cup C)$

.....

**(1)**

**(Total for Question 13 is 3 marks)**

**14** The Venn diagram shows a universal set, $\mathscr{E}$, and sets $A$, $B$ and $C$.




7, 3, 8, 1, 4 and 9 represent the **numbers** of elements.

Find

(i) $n(A \cup B)$

.....

(ii) $n(A' \cap C)$

.....

(iii) $n(A' \cup B')$

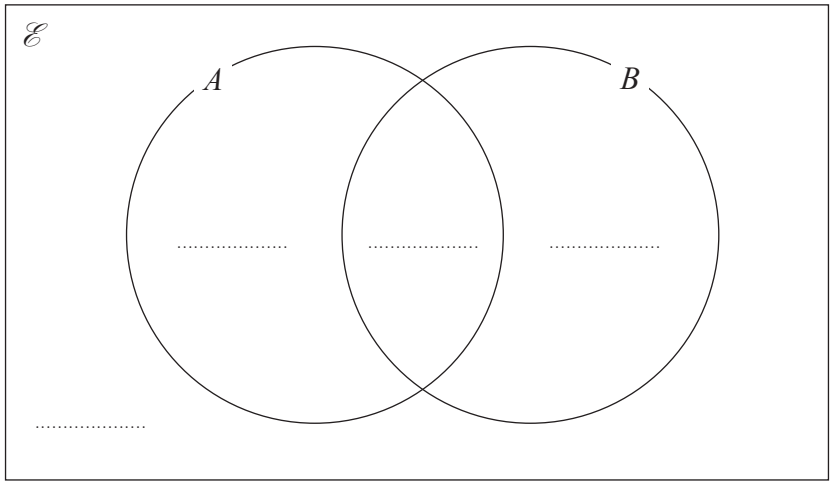
.....

**(Total for Question 14 is 3 marks)**

**15** Two events $A$ and $B$ are such that $n(A) = 62$ $n(B) = 30$ and $n(A \cup B) = 68$

Given that $n(\mathscr{E}) = 80$

(a) complete the Venn diagram to show the number of elements in each region.




**(2)**

An element is chosen at random from $\mathscr{E}$.

(b) Using the Venn diagram, find the probability that this element is in

(i) $A \cap B$

.....

**(1)**

(ii) $A \cup B'$

.....

**(2)**

**(Total for Question 15 is 5 marks)**