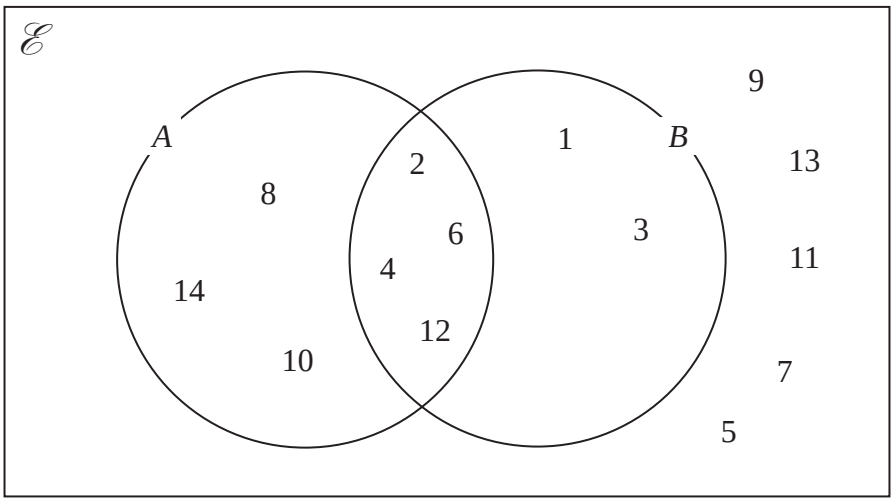
1 The numbers from 1 to 14 are shown in the Venn diagram.



(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 $\mathscr{E}$ = {integers x such that $10 \leqslant x \leqslant 25$}
$A = \{x : x < 18\}$
$B = \{x : 13 \leqslant x < 22\}$

(a) Write down n(A)

.....

(1)

(b) List the members of the set $(A \cup B)'$

.....

(2)

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

.....

(2)

$C \subset A$, $C \subset B$ and n(C) = 5

(d) List the members of the set C

.....

(1)

(Total for Question 2 is 6 marks)

3 B = {b, l, u, e}

G = {g, r, e, y}

W = {w, h, i, t, e}

(a) List all the members of the set

(i) $B \cup G$

.....

(ii) $W \cap G'$

.....

(2)

Serena writes down the statement $B \cap G \cap W = \varnothing$

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

.....

.....

.....

(1)

(Total for Question 3 is 3 marks)

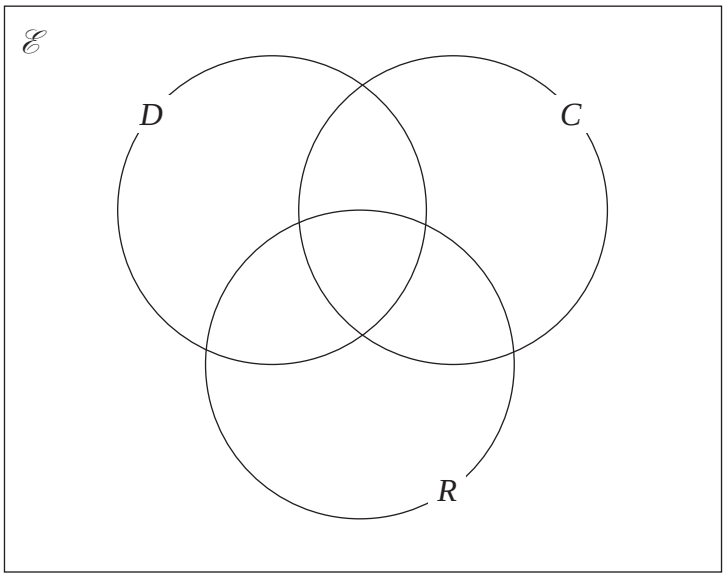
4 Some students in a school were asked the following question.

"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)

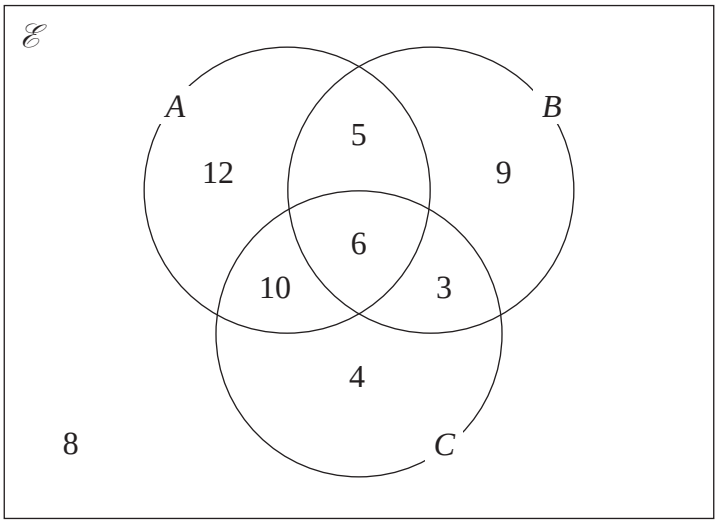
(c) Find $n(C' \cap D')$

.....

(1)

(Total for Question 4 is 6 marks)

5 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 5 is 3 marks)

6 $\mathscr{E}$ = {letters of the alphabet}
B = {b, r, a, z, i, l}
I = {i, r, e, l, a, n, d}

(a) List the members of the set

(i) $B \cup I$

.....

(ii) $B \cap I'$

.....

(2)

K = {k, e, n, y, a}

Cody writes down the statement $B \cap K = \varnothing$
Cody's statement is wrong.

(b) Explain why.

.....

.....

(1)

(Total for Question 6 is 3 marks)

7 $\mathscr{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
$A = \{22, 24, 26, 28, 30\}$
$B = \{21, 24, 27, 30\}$

(a) List the members of the set

(i) $A \cap B$

.....

(ii) A'

.....

(2)

$C = \{23, 25, 29\}$

(b) Using set notation, find an expression for C in terms of A and B.

.....

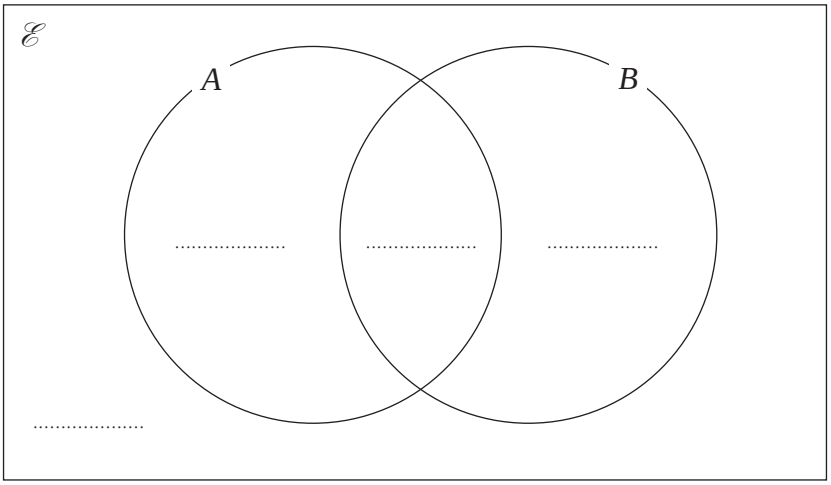
(1)

(Total for Question 7 is 3 marks)

8 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 8 is 5 marks)

9 $\mathscr{E}$ = {20, 21, 22, 23, 24, 25, 26, 27, 28, 29}

A = {odd numbers}
B = {multiples of 3}

List the members of the set

(i) $A \cap B$

.....

(1)

(ii) $A \cup B$

.....

(1)

(Total for Question 9 is 2 marks)

10 Some students were asked the following question.

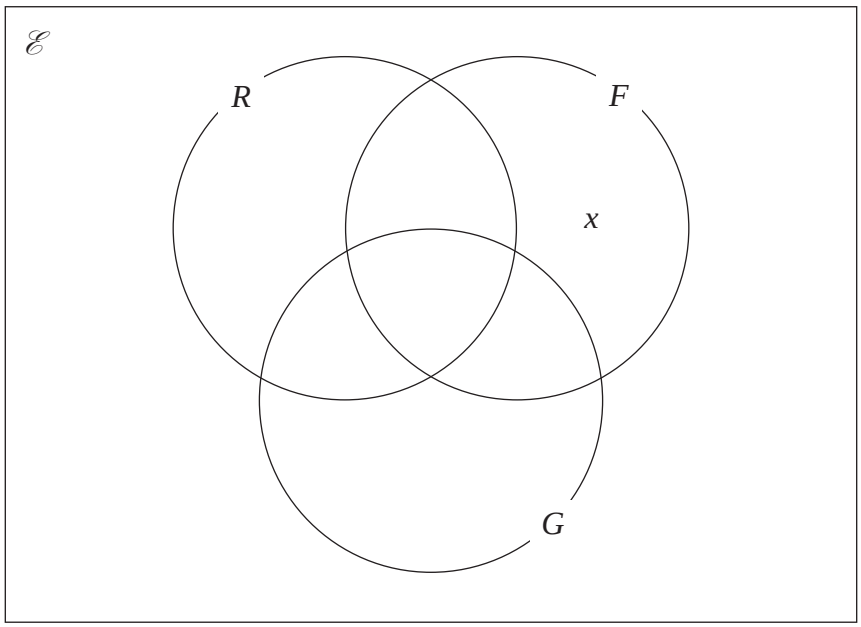
"Which of the subjects Russian (R), French (F) and German (G) do you study?"

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 10 is 6 marks)

11 $\mathscr{E}$ = {9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}
A = {multiples of 3}
B = {odd numbers}

(a) List the members of the set

(i) $A \cap B$

.....

(1)

(ii) $A \cup B$

.....

(1)

(b) Is it true that $24 \in A$?

Tick one of the boxes below.

Yes	No
☐	☐

Give a reason for your answer.

.....

.....

(1)

Set C has 4 members such that $C \cap B' = \{10, 18\}$

(c) List the members of one possible set C

.....

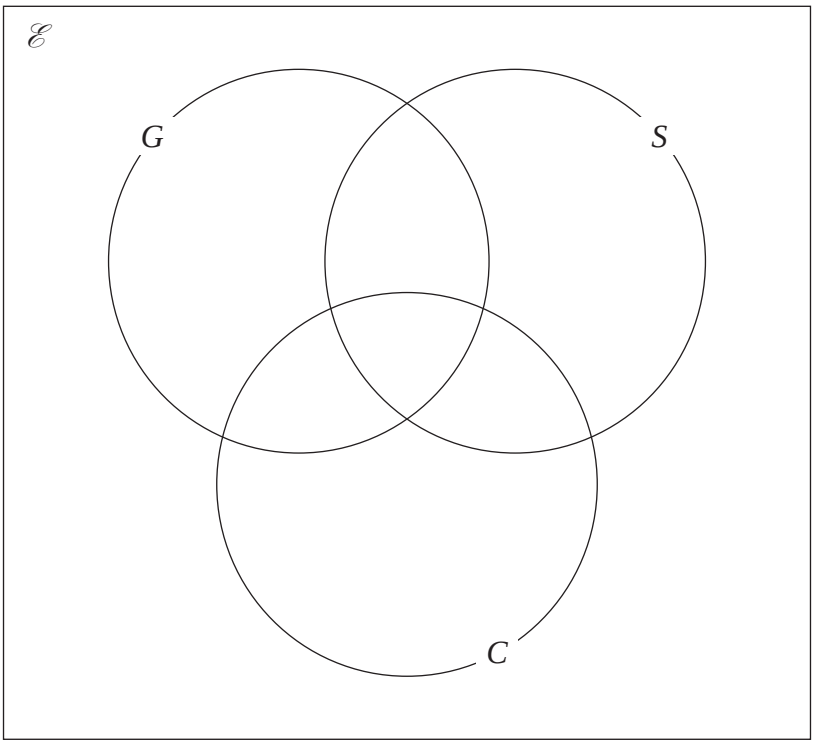
(2)

(Total for Question 11 is 5 marks)

12 100 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.

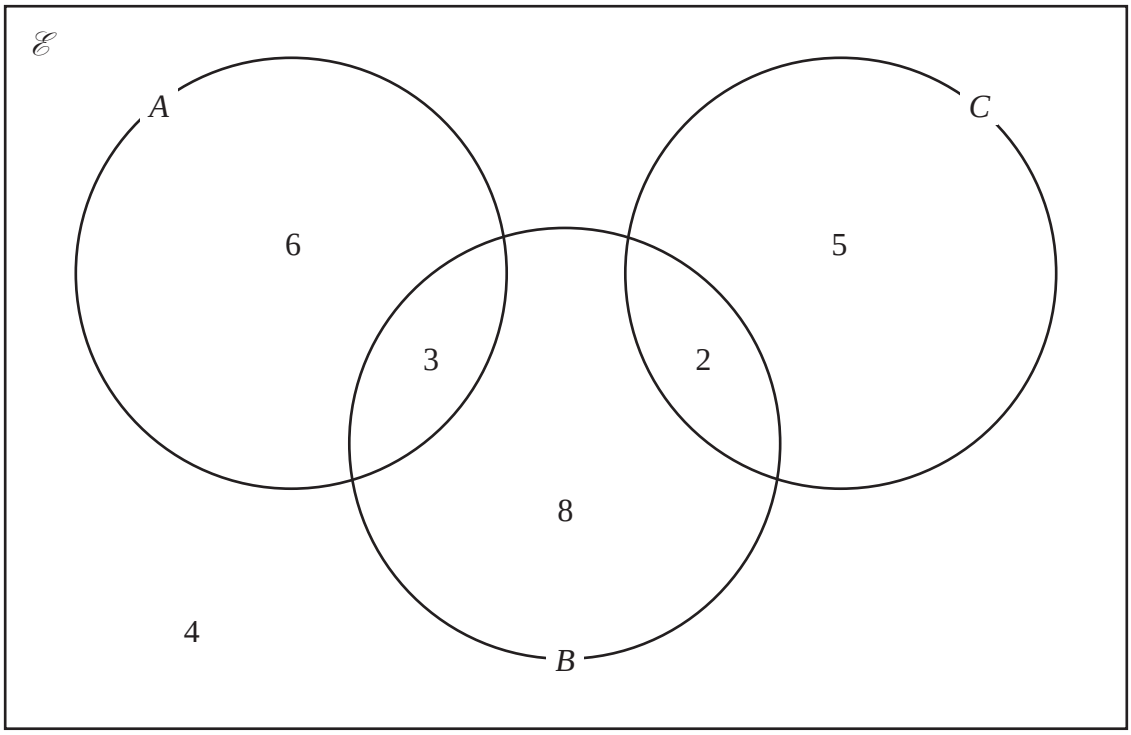
(c) Find the probability that this farmer also has goats.

.....

(2)

(Total for Question 12 is 8 marks)

13 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 13 is 4 marks)

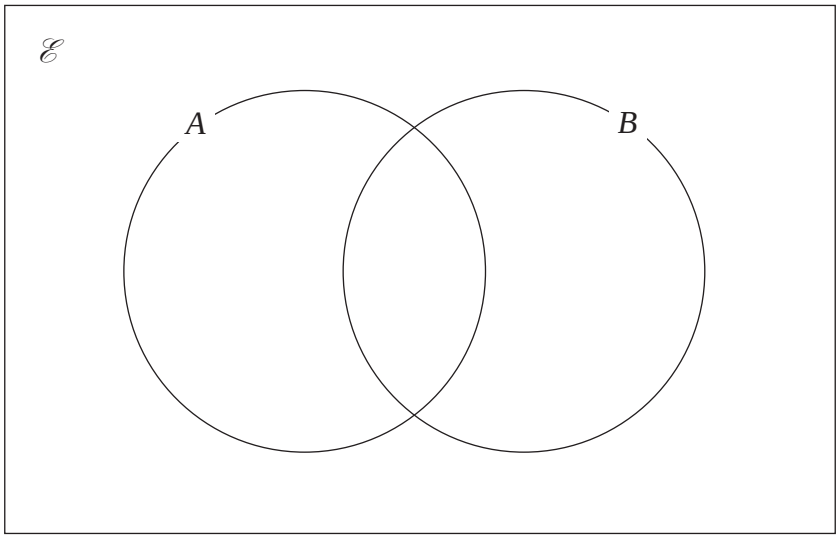
14 $\mathscr{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

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

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

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

Complete the Venn diagram for this information.



(Total for Question 14 is 3 marks)

15 A, B and C are three sets.

$n(A \cap B \cap C) = 5$

$n(A \cap B \cap C') = 2$

$n(A \cap C) = 5$

$n(A) = 17$

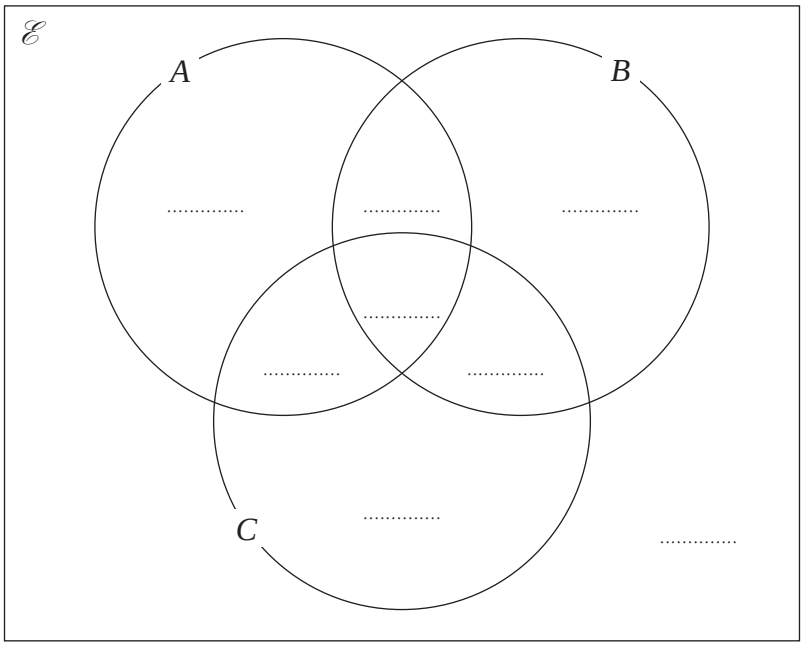
$n\left([A \cup B \cup C]'\right) = 3$

$n(A' \cap B \cap C') = 6$

$n(B \cap C) = 7$

$n(C) = 14$

Complete the Venn diagram to show the number of elements in each region.

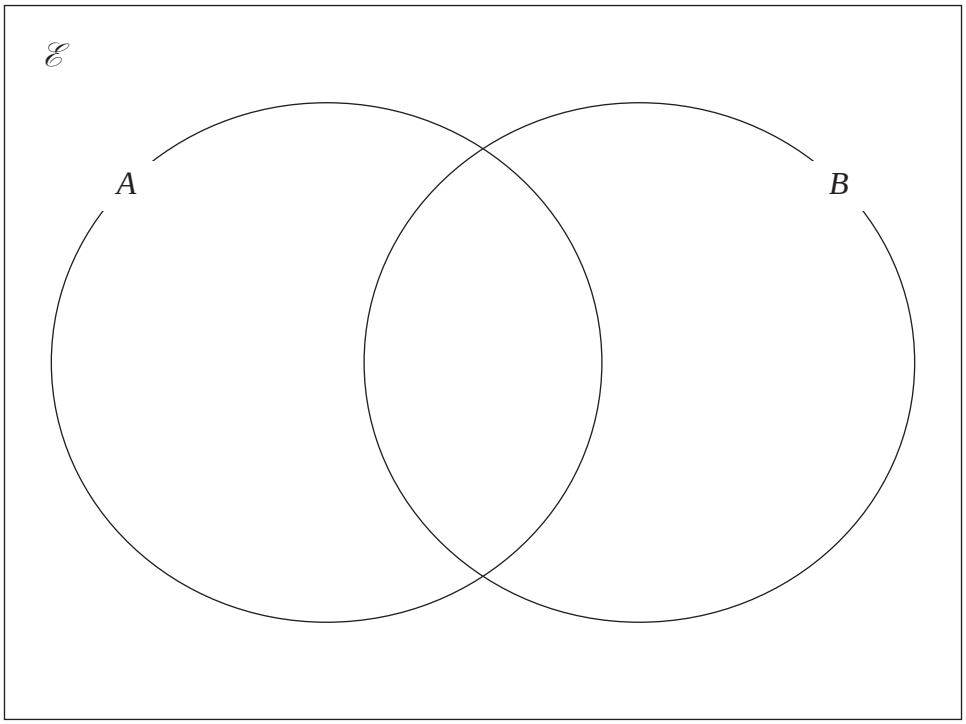


(Total for Question 15 is 4 marks)

16 $\mathscr{E}$ = {11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

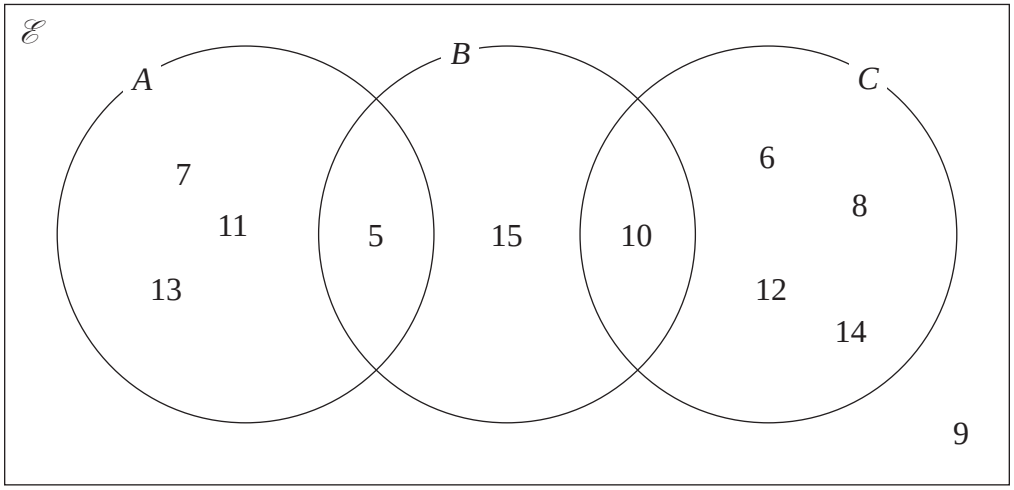
A = {even numbers}
$A \cap B$ = {12, 16, 20}
$(A \cup B)'$ = {17, 19}

Complete the Venn diagram for the sets $\mathscr{E}$, A and B



(Total for Question 16 is 3 marks)

17 Here is a Venn diagram.



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

(i) A

.....

(1)

(ii) $B \cup C$

.....

(1)

Dominic writes down $9 \notin C$

(b) Explain why Dominic is correct.

.....

.....

(1)

(Total for Question 17 is 3 marks)

18 30 adults booked to stay in a hotel.

19 adults booked breakfast
15 adults booked dinner
4 adults did not book breakfast or dinner

Some adults booked breakfast **and** dinner.

Meihui chooses at random two of the 30 adults.

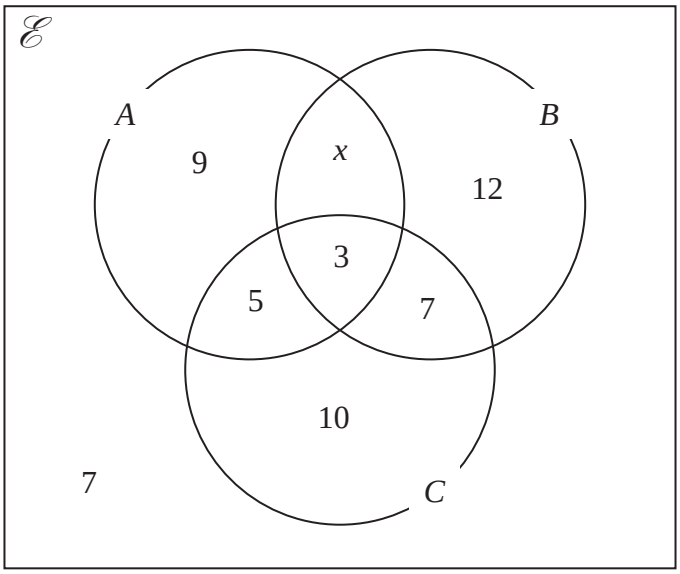
Work out the probability that these two adults each booked breakfast **and** dinner.

.....

(Total for Question 18 is 4 marks)

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

The numbers and the letter x represent **numbers** of elements.



Given that $n(A \cup B) = 42$

(a) find the value of x

$x =$ .....

(1)

(b) Find $n(A')$

.....

(1)

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

.....

(1)

(Total for Question 19 is 3 marks)