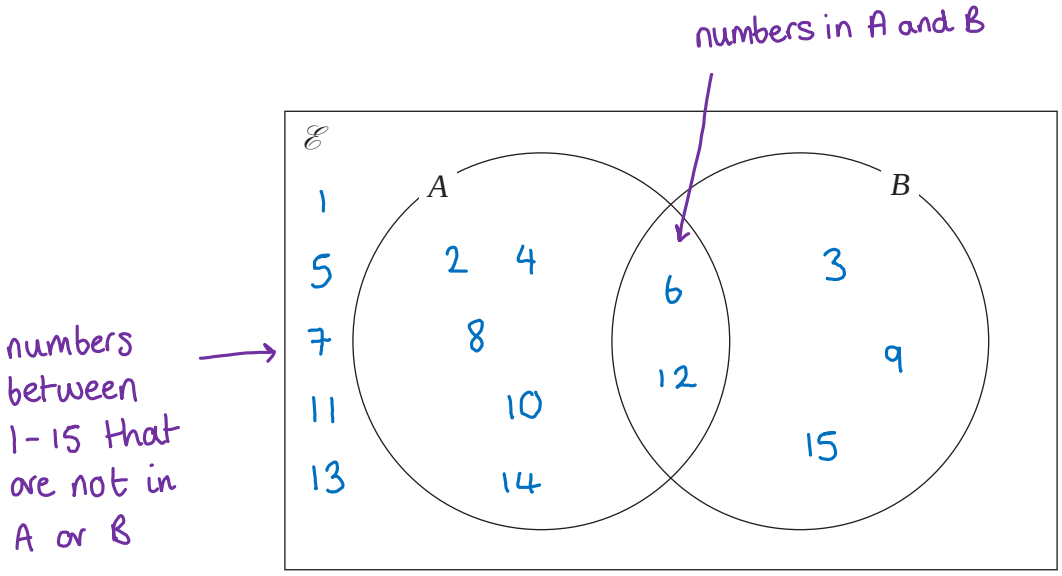
1 $\mathscr{E}$ = {whole numbers from 1 to 15}

A = {even numbers}

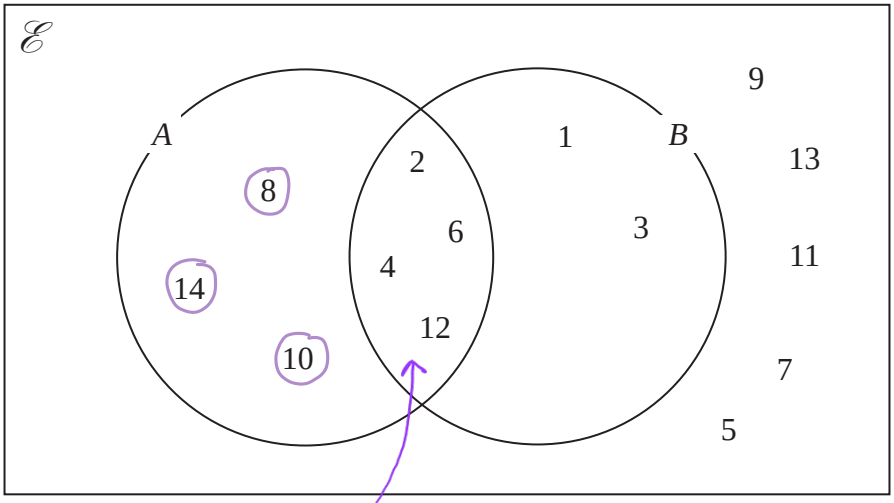
B = {3, 6, 9, 12, 15}

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



(Total for Question 1 is 3 marks)

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



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

2, 4, 6, 12 (1)

.....

(1)

(b) List the members of the set B' → everything but B

5, 7, 8, 9, 10, 11, 13, 14 (1)

.....

(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.

3 numbers out of 14

$\frac{3}{14}$ (2)

.....

(2)

(Total for Question 2 is 4 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) $B \cup G$

$B \cup G = \{b, l, u, e, g, r, y\}$

↑ combine the two sets together

(1)

$\{b, l, u, e, g, r, y\}$

(ii) $W \cap G'$

$G' = \{b, l, u, w, h, i, t\}$

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

$W \cap G' = \{w, h, i, t\}$

(1)

$\{w, h, i, t\}$

(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.

No, Serena is wrong because the letter e appears in all three sets. (1)

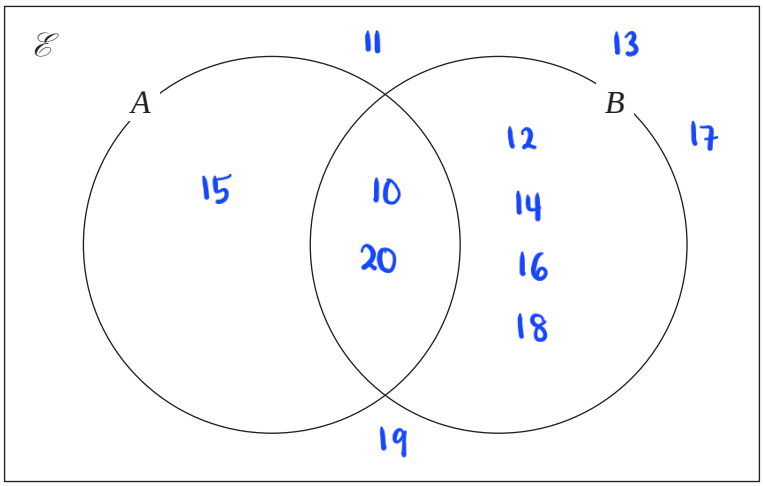
(1)

(Total for Question 3 is 3 marks)

4 $\mathscr{E}$ = {10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

A = {multiples of 5}
B = {even numbers}

Complete the Venn diagram for this information.



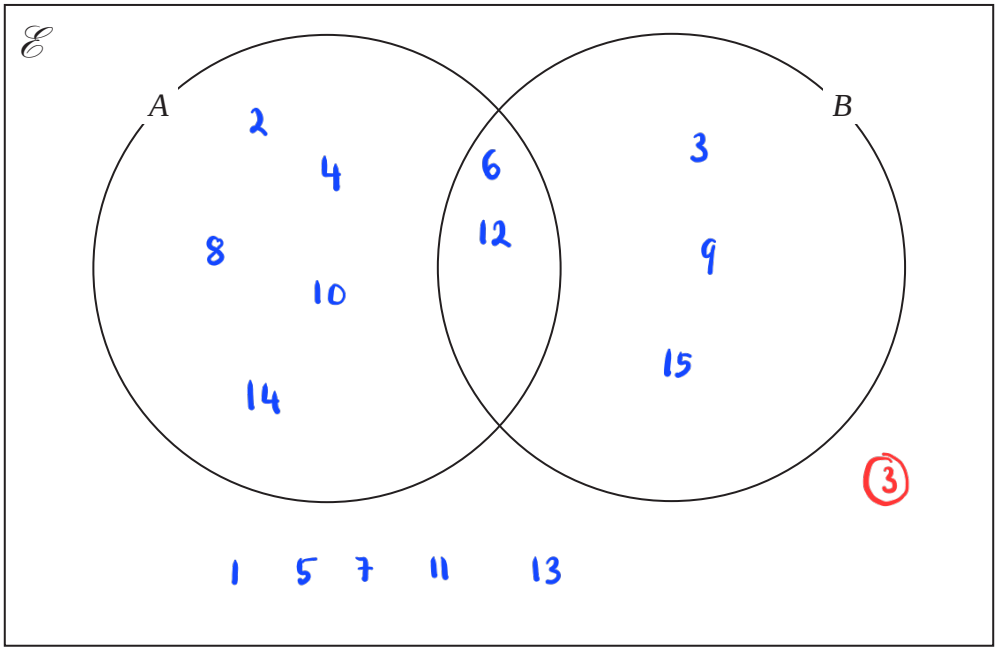
3

(Total for Question 4 is 3 marks)

5 $\mathscr{E}$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15}

A = {even numbers}

B = {multiples of 3}



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

(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) $B \cup I$ - in set B or in set I

b, r, a, z, i, l, e, n, d (1)

(ii) $B \cap I'$ - in set B and not in set I

b, z (1)

(2)

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

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

(b) Explain why.

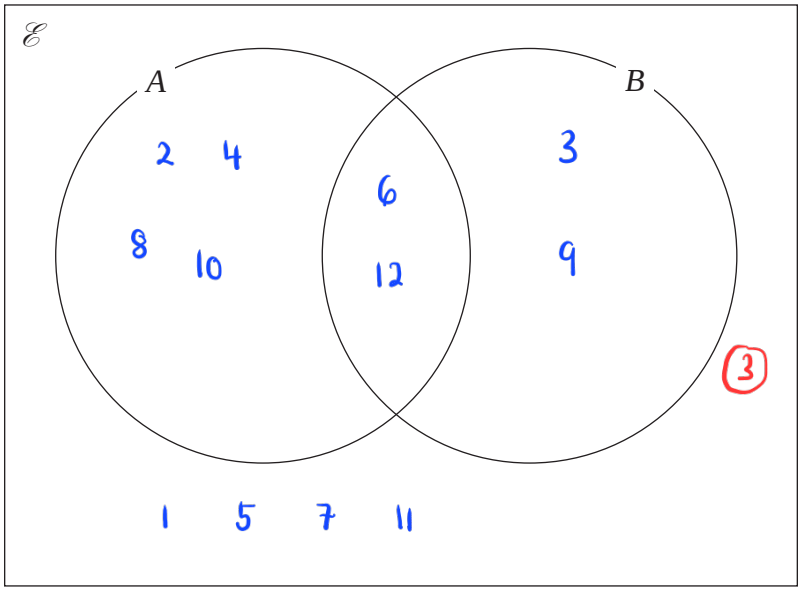
There is letter 'a' in both sets. (1)

(1)

(Total for Question 6 is 3 marks)

7 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
$A = \{2, 4, 6, 8, 10, 12\}$
$B = \{3, 6, 9, 12\}$

(a) Complete the Venn diagram below for the sets $\mathscr{E}$, A and B.



(3)

One of the numbers in $\mathscr{E}$ is to be chosen at random.

(b) Find the probability that this number is not in set A **and** not in set B.

Total numbers : 12

Numbers not in Set A and not in Set B : 4

$\frac{4}{12}$ (2)

(2)

(Total for Question 7 is 5 marks)

8 $\mathscr{E}$ = {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) $A \cap B$ - is in set A AND set B

24, 30 (1)

(ii) A' - not in set A

21, 23, 25, 27, 29 (1)

(2)

C = {23, 25, 29} - all not in set A or set B

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

$(A \cup B)'$ (1)

(1)

(Total for Question 8 is 3 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) $A \cap B$ - an odd number and a multiple of 3

{ 21, 27 }

{ 21, 27 } (1)

(1)

(ii) $A \cup B$ - an odd number or a multiple of 3

{ 21, 23, 24, 25, 27, 29 }

(1)
{ 21, 23, 24, 25, 27, 29 }

(1)

(Total for Question 9 is 2 marks)

10 $\mathscr{E}$ = {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) $A \cap B$ - is in Set A and Set B

9, 15 (1)

(1)

(ii) $A \cup B$ - is in Set A or Set B

9, 11, 12, 13, 15, 17, 18, 19 (1)

(1)

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

Tick one of the boxes below.

Yes	No
	✓

Give a reason for your answer.

24 is not between 9 and 20. (1)

(1)

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

→ is in Set C and not in set B

(c) List the members of one possible set C

not in Set B : 10, 12, 14, 16, 18, 20

Members of C : Any 2 numbers except 12, 14, 16, 20

9, 10, 11, 18 (2)

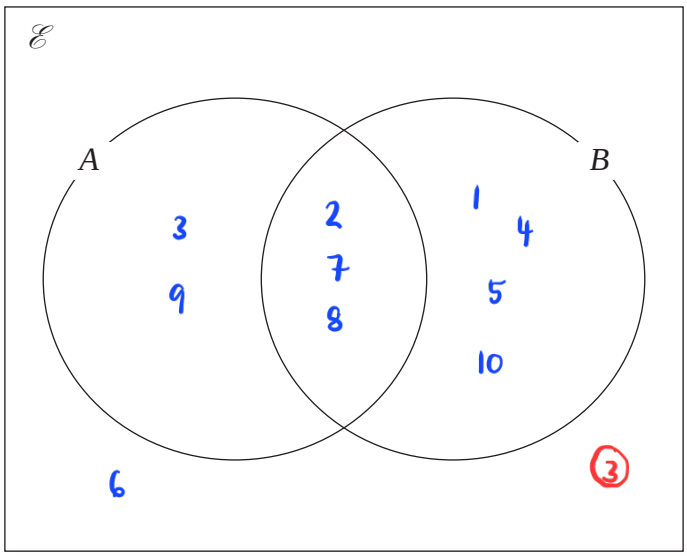
(2)

(Total for Question 10 is 5 marks)

11 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{2, 3, 7, 8, 9\}$
$B = \{1, 2, 4, 5, 7, 8, 10\}$

Complete the Venn diagram for this information.



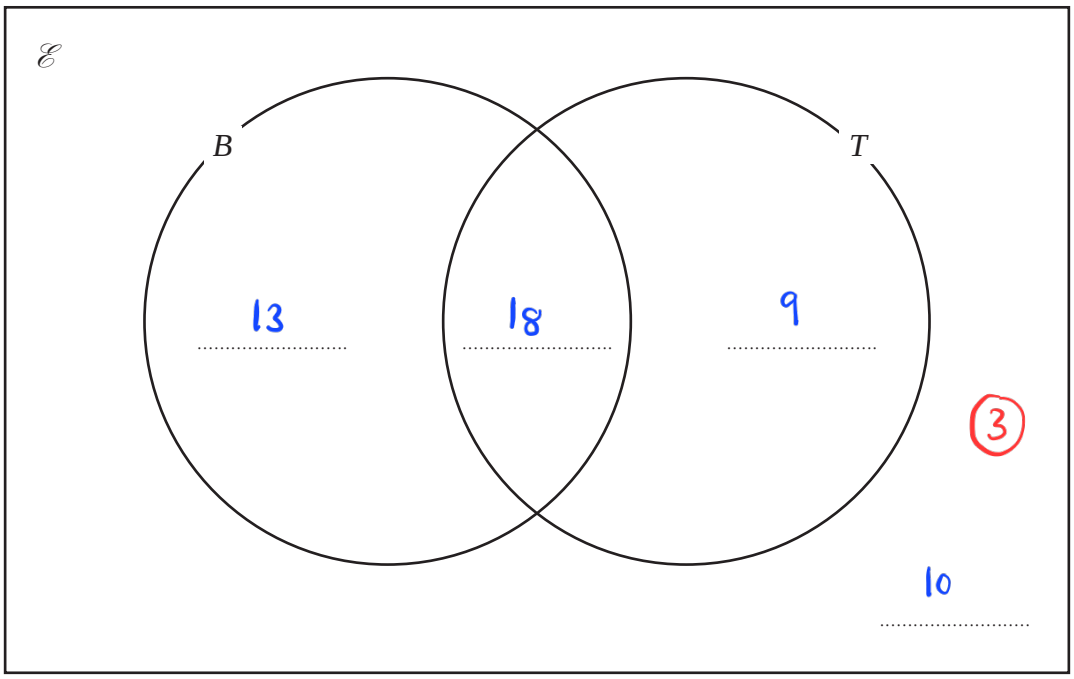
(Total for Question 11 is 3 marks)

12 50 students have lessons at a dance school.
Two of the lessons are ballet lessons (B) and tap lessons (T).

Of the 50 students

31 have ballet lessons
27 have tap lessons
18 have ballet lessons and tap lessons

Complete the Venn diagram for this information.



(Total for Question 12 is 3 marks)

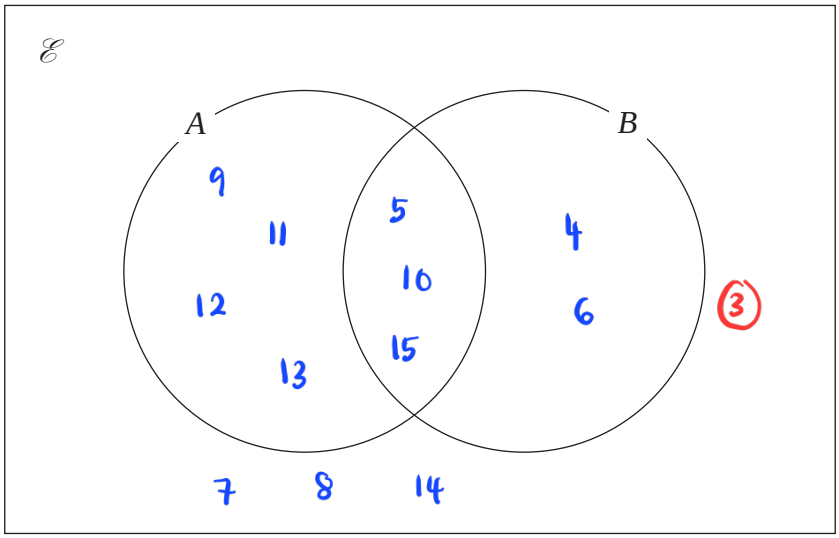
13 $\mathscr{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

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

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

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

Complete the Venn diagram for this information.



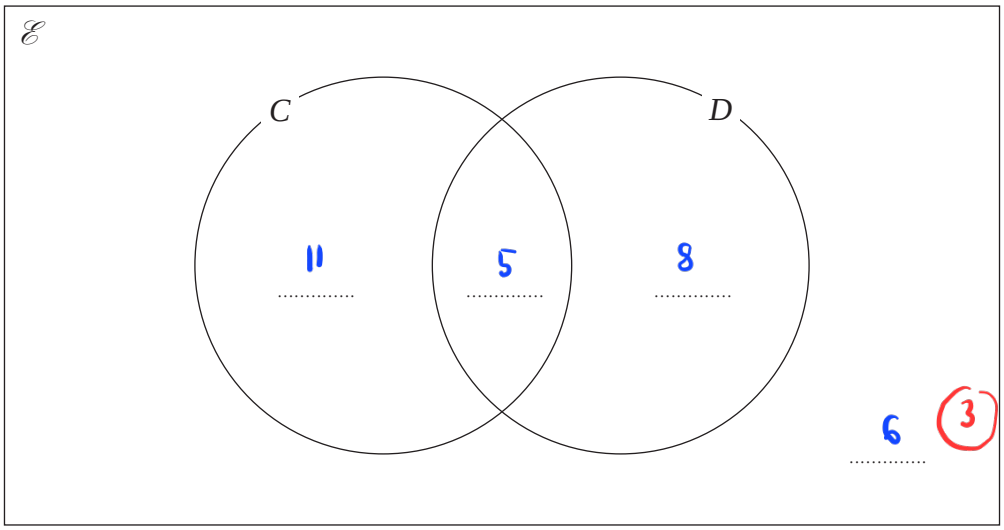
(Total for Question 13 is 3 marks)

14 30 children were asked whether they have a cat (C) or a dog (D)

Of the 30 children

5 have both a cat and a dog
13 have a dog
11 have **only** a cat

(a) Complete the Venn diagram.



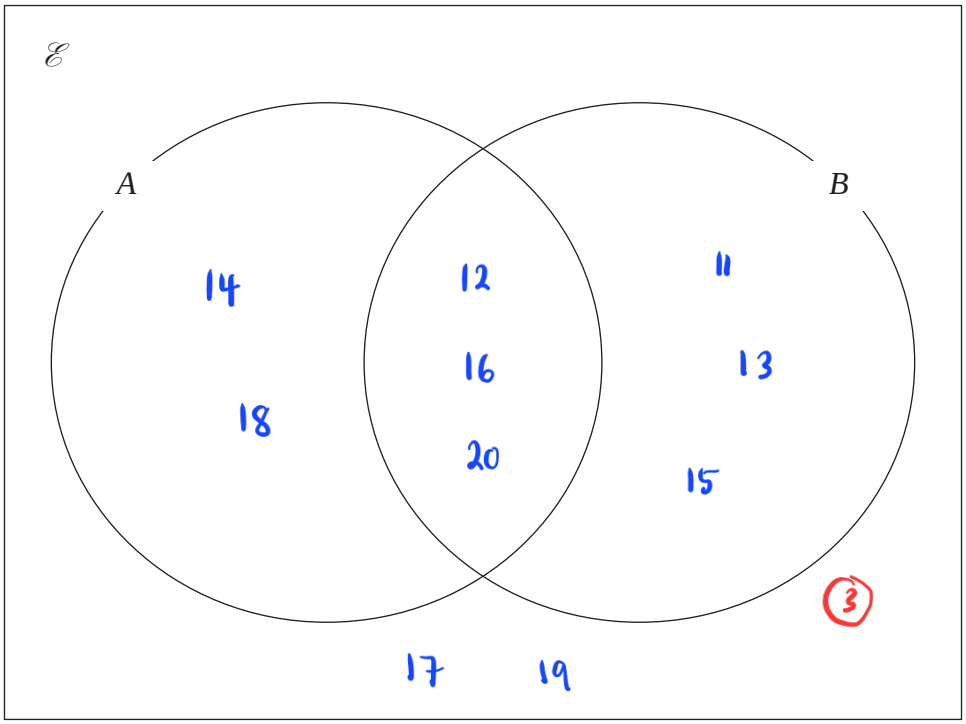
(3)

(Total for Question 14 is 3 marks)

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

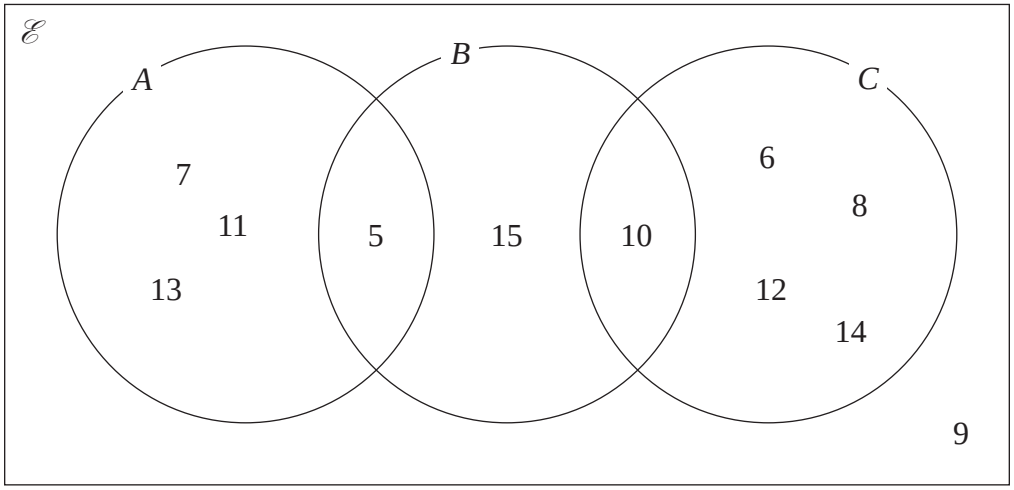
$A = \{\text{even numbers}\}$
$A \cap B = \{12, 16, 20\}$
$(A \cup B)' = \{17, 19\}$

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



(Total for Question 15 is 3 marks)

16 Here is a Venn diagram.



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

(i) A

7, 11, 13, 5 (1)

(1)

(ii) $B \cup C$

5, 6, 8, 10, 12, 14, 15 (1)

(1)

Dominic writes down $9 \notin C$

(b) Explain why Dominic is correct.

9 is not a member of C (1)

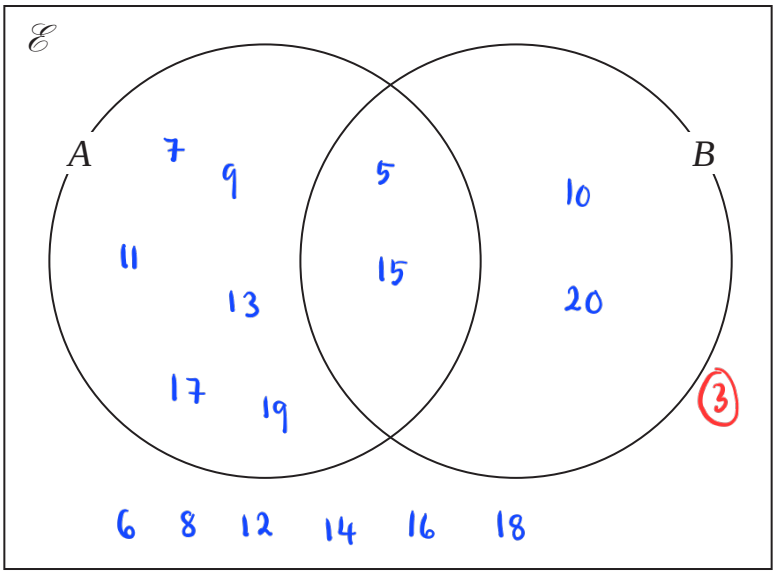
(1)

(Total for Question 16 is 3 marks)

17 $\mathscr{E}$ = {5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

A = {odd numbers}
B = {multiples of 5}

Complete the Venn diagram for this information.



(Total for Question 17 is 3 marks)