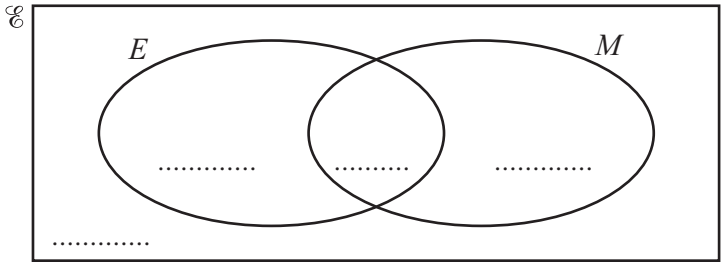
1



50 students are asked if they like English (E) and if they like mathematics (M).
3 say they do not like English and do not like mathematics.
33 say they like English.
42 say they like mathematics.

(a) Complete the Venn diagram. [2]

(b) A student is chosen at random.

Find the probability that this student likes English and likes mathematics.

..... [1]

(c) Two students are chosen at random.

Find the probability that they both like mathematics.

..... [2]

(d) Two students who like English are chosen at random.

Find the probability that they both also like mathematics.

..... [2]

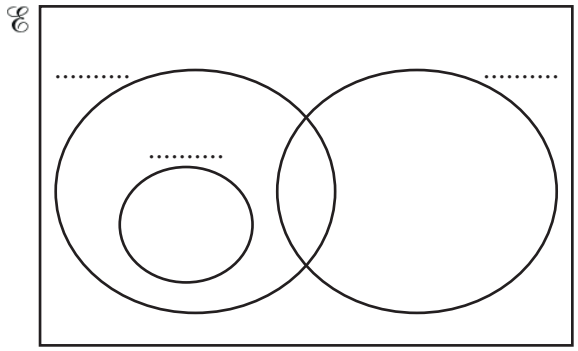
[Total: 7]

2 $\mathscr{E}$ = {integers greater than 2}
A = {prime numbers}
B = {odd numbers}
C = {square numbers}

(a) Describe the type of numbers in the set $B' \cap C$.

..... [1]

(b) Complete the set labels on the Venn diagram.

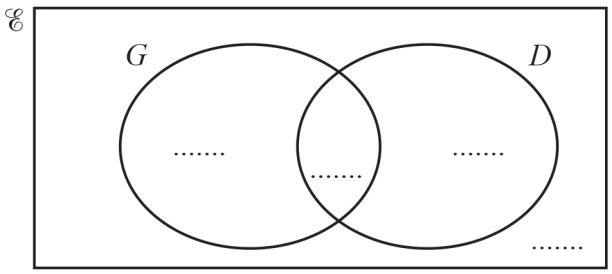


[1]

[Total: 2]

3 In a class of 40 students:

- 28 wear glasses (G)
- 13 have driving lessons (D)
- 4 do not wear glasses and do not have driving lessons.



(a) Complete the Venn diagram. [2]

(b) Use set notation to describe the region that contains a total of 32 students.

..... [1]

[Total: 3]

4 x is an integer.

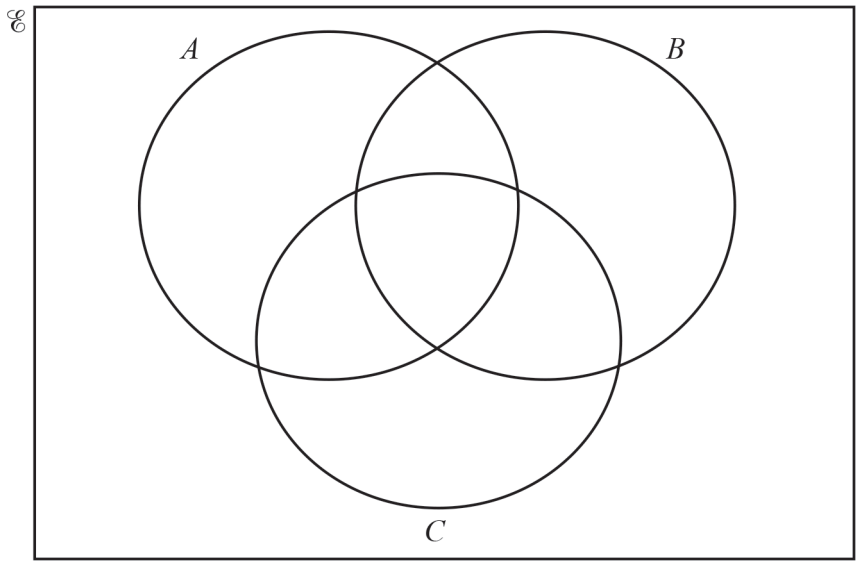
$\mathscr{E}$ = $\{x : 41 \leqslant x \leqslant 50\}$

$A = \{x : x \text{ is an odd number}\}$

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

$C = \{x : x \text{ is a prime number}\}$

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



[3]

(b) List the elements of

(i) $A \cap C$,

..... [1]

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

..... [1]

(c) Find $n(A \cap B \cap C)$.

..... [1]

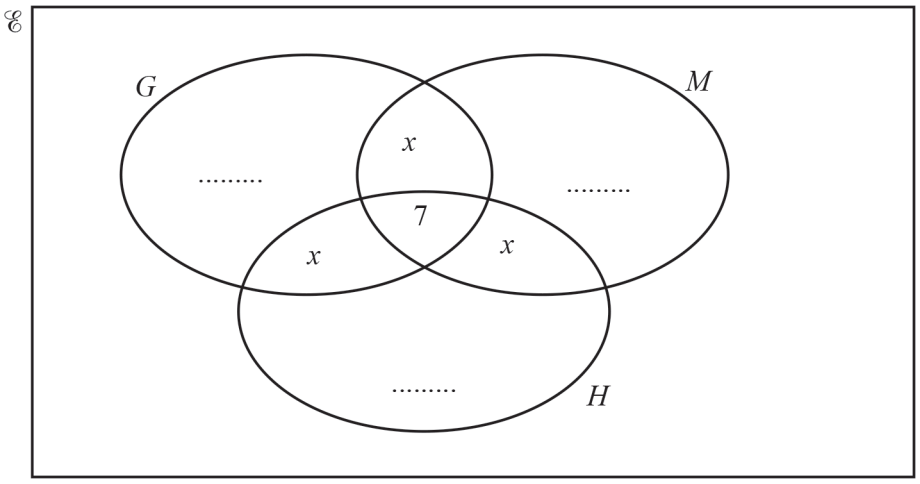
[Total: 6]

5 50 students study at least one of the subjects geography (G), mathematics (M) and history (H).

18 study only mathematics.
19 study two or three of these subjects.

23 study geography.

The Venn diagram below is to be used to show this information.



(a) Show that $x = 4$.

[2]

(b) Complete the Venn diagram. [2]

(c) Use set notation to complete this statement.

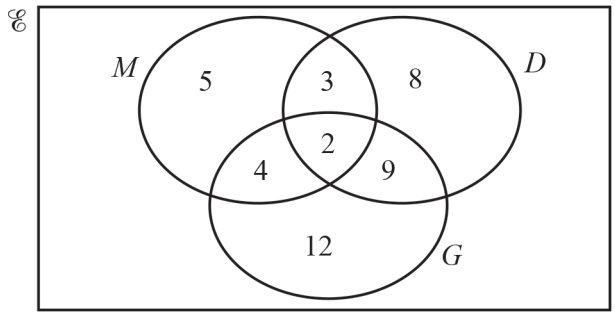
$(G \cup M \cup H)' =$ ..... [1]

(d) Find $\mathrm{n}(G \cap (M \cup H))$.

..... [1]

[Total: 6]

6



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

(a) How many students study Music?

..... [1]

(b) How many students study exactly two subjects?

..... [1]

(c) Two students are chosen at random from those who study Drama.

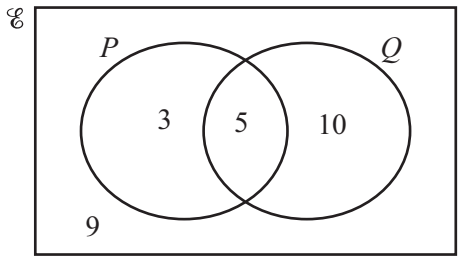
Calculate the probability that they both also study Music.

..... [3]

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

[Total: 6]

7



The Venn diagram shows the number of elements in each set.

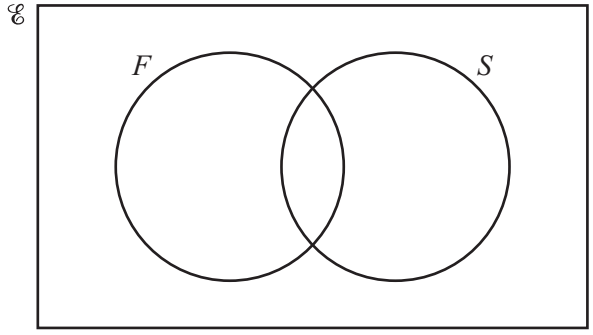
(a) Find $n(P' \cap Q)$.

Answer(a) ..... [1]

(b) Complete the statement n(.....) = 17. [1]

[Total: 2]

8 You may use this Venn diagram to help you answer the questions.



In a class of 30 students, 25 study French (F), 18 study Spanish (S).
One student does not study French or Spanish.

(a) Find the number of students who study French and Spanish.

Answer(a) ..... [2]

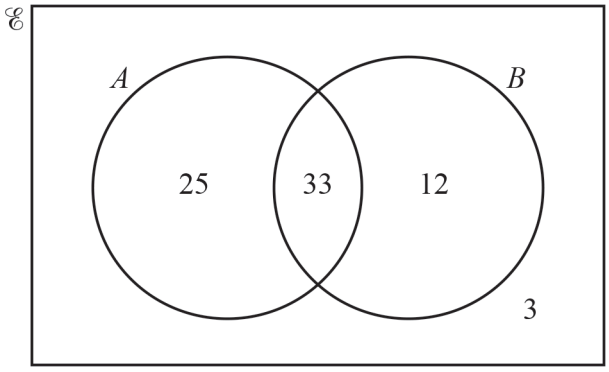
(b) One of the 30 students is chosen at random.

Find the probability that this student studies French but not Spanish.

Answer(b) ..... [1]

[Total: 3]

9



Find $\mathrm{n}(A \cap B)'$.

..... [1]

[Total: 1]

10 $C = \{x : x \text{ is an integer and } 5 < x < 12\}$ $D = \{5, 10\}$

Find $\mathrm{n}(C \cup D)$.

..... [1]

[Total: 1]

11 $C = \{x : x \text{ is an integer and } 5 < x < 12\}$ $D = \{5, 10\}$

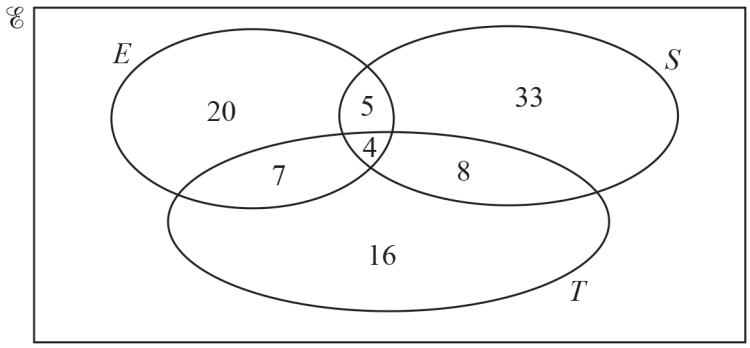
Put a ring around the correct statement from the list below.

$D = \emptyset$ $C \cap D = \{10\}$ $6 \in D$ $D \subset C$

[1]

[Total: 1]

12 One day, the number of members using the exercise machines (E), the swimming pool (S) and the tennis courts (T) at a sports club is shown on the Venn diagram.



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

..... [1]

(b) Find the number of members using the swimming pool.

..... [1]

(c) 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]

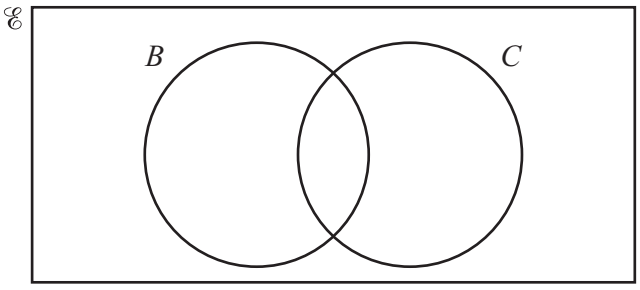
(d) Find $\mathrm{n}\,(T \cap (E \cup S))$.

..... [1]

[Total: 5]

13 140 students choose which subjects they want to study.

- 122 students choose biology (B).
- 55 students choose chemistry (C).
- 2 students do not choose biology and do not choose chemistry.



(a) Complete the Venn diagram.

[2]

(b) One of these students is picked at random.

Find the probability that this student chooses biology and chemistry.

..... [1]

[Total: 3]

14 $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 16\}$

(a) Write down all the square numbers in the universal set, $\mathscr{E}$.

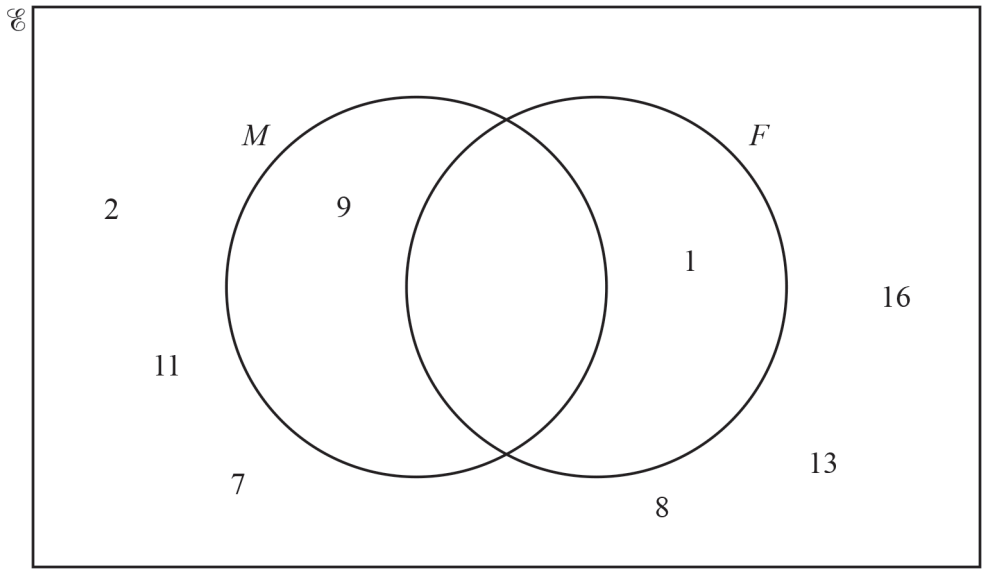
..... [2]

(b) Write down the six prime numbers in the universal set, $\mathscr{E}$.

..... , ... , ... , ... , ... , ... [2]

(c) $M = \{x : x \text{ is a multiple of } 3\}$
$F = \{x : x \text{ is a factor of } 15\}$

(i) Complete the Venn diagram to show the elements of these sets.



[2]

(ii) Write down all the odd numbers that are not in set M and not in set F.

..... [1]

(iii) Find n $(M \cap F)$.

..... [1]

(iv) A number is chosen at random from the universal set, $\mathscr{E}$.

Find the probability that this number is in set F.

..... [1]

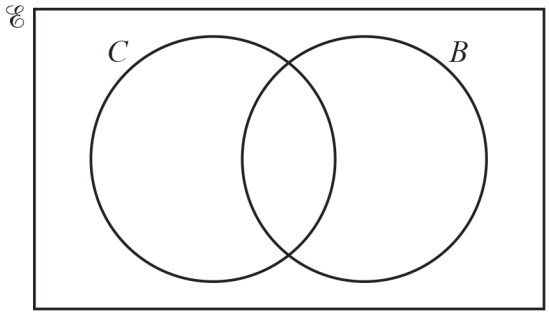
[Total: 9]

15 There are 50 families in a village.

C = {families who own a car}
B = {families who own a bicycle}

23 families own a car.
10 families own a car and a bicycle.
6 families own no cars and no bicycles.

(a) Complete the Venn diagram.



[2]

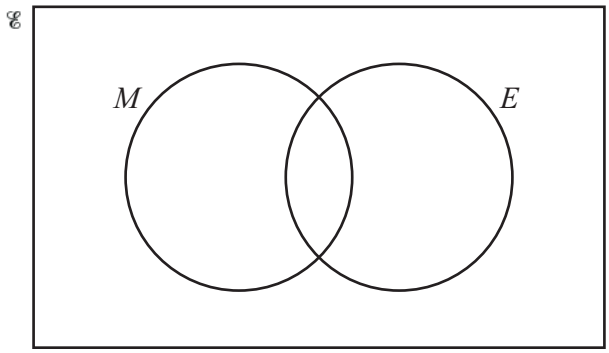
(b) Find n $(C \cup B)$.

..... [1]

[Total: 3]

16 A group of 120 students take two tests, mathematics and English.
Here is some information about the number of students who pass mathematics (M) and who pass English (E).

- 61 students pass mathematics.
- 27 students pass both mathematics and English.
- 19 students do not pass mathematics and do not pass English.



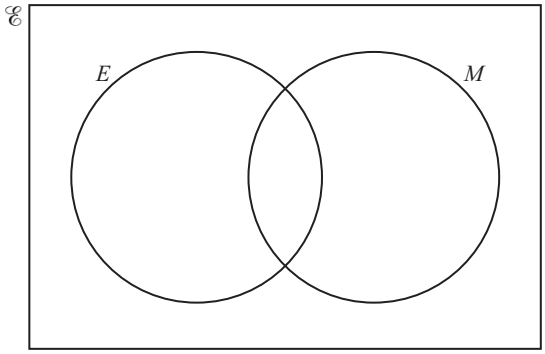
(a) Complete the Venn diagram. [3]

(b) Use the Venn diagram to find n(E).

..... [1]

[Total: 4]

17 $\mathscr{E}$ = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
E = {x: x is an even number}
M = {x: x is a multiple of 3}



(a) Complete the Venn diagram. [2]

(b) Write down n ($E \cup M$).

..... [1]

(c) A number is chosen at random from the universal set $\mathscr{E}$.

Write down the probability that the number is in the set $E \cap M$.

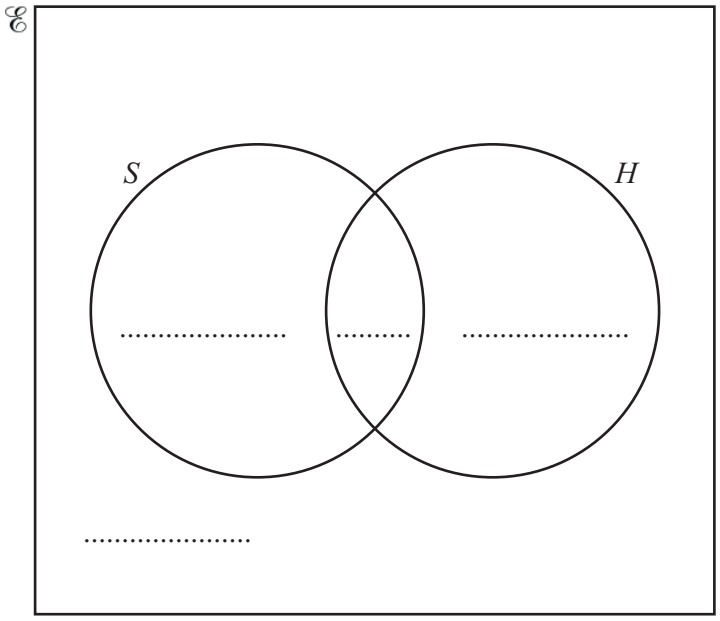
..... [2]

[Total: 5]

18 135 girls are asked if they like soccer (S) and if they like hockey (H).

$n(S) = 53$, $n(H) = 68$ and $n(S \cup H) = 110$.

(a) Complete the Venn diagram.



[3]

(b) Write down $n(S \cap H)$.

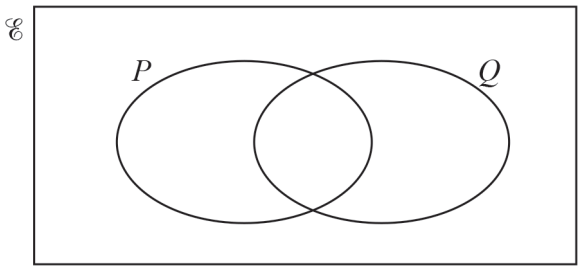
..... [1]

[Total: 4]

19 $\mathscr{E} = \{1, 2, 3, 4, 5, 6\}$

$P = \{x : x \text{ is an even number}\}$

$Q = \{x : x \text{ is a prime number}\}$

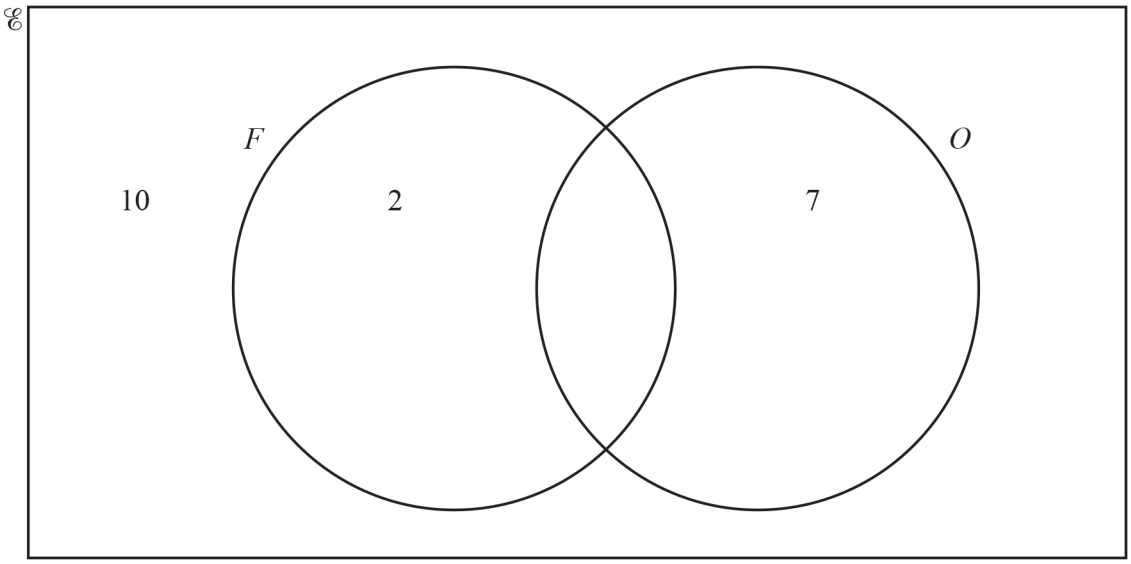


Complete the Venn diagram. [2]

[Total: 2]

20 $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

(a) Complete the Venn diagram to show the elements of these sets.



[2]

(b) Write down one number that is in set O, but not in set F.

..... [1]

(c) Find $n(F \cup O)$.

..... [1]

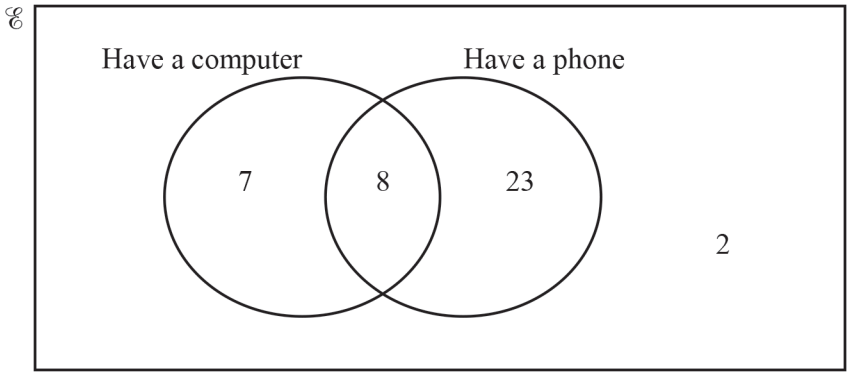
(d) A number is chosen at random from $\mathscr{E}$.

Work out the probability that this number is in set O.

..... [1]

[Total: 5]

21 40 children were asked if they have a computer or a phone or both.
The Venn diagram shows the results.

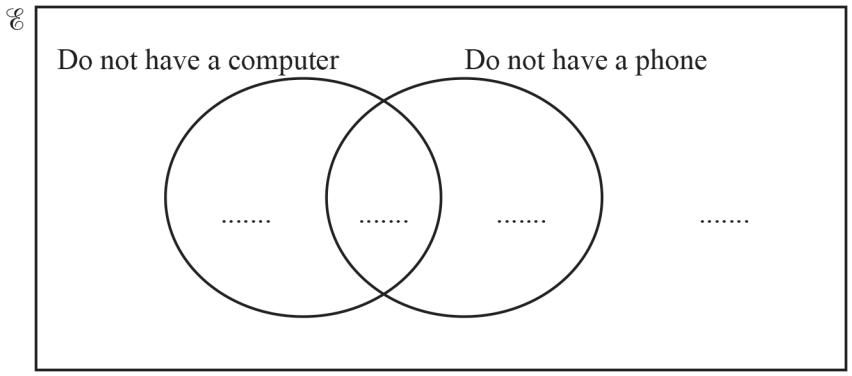


(a) A child is chosen at random from the children who have a computer.

Write down the probability that this child also has a phone.

..... [1]

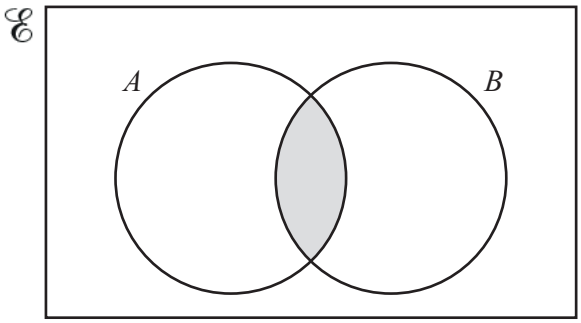
(b) Complete the Venn diagram.



[2]

[Total: 3]

22



Use set notation to describe the shaded region.

..... [1]

[Total: 1]