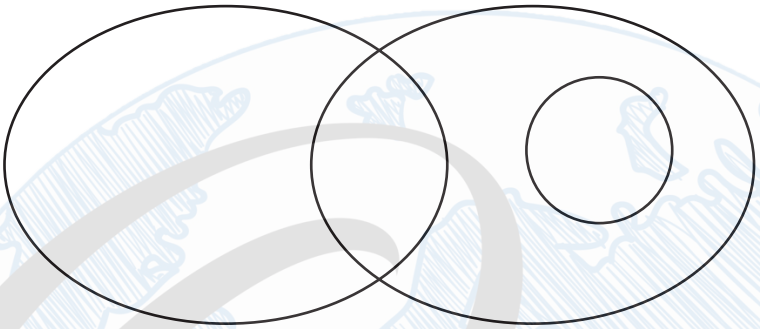
Sets

1) June 2010 V1

12 $Q = \{2, 4, 6, 8, 10\}$ and $R = \{5, 10, 15, 20\}$.
$15 \in P$, $n(P) = 1$ and $P \cap Q = \varnothing$.

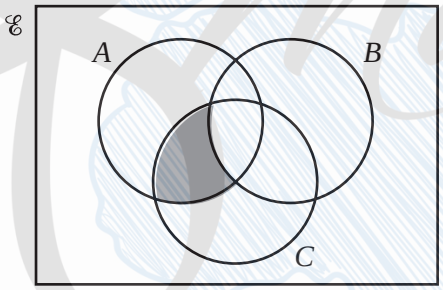
Label each set and complete the Venn diagram to show this information.



[3]

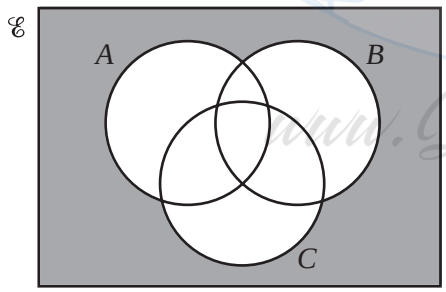
2) June 2010 V2

7

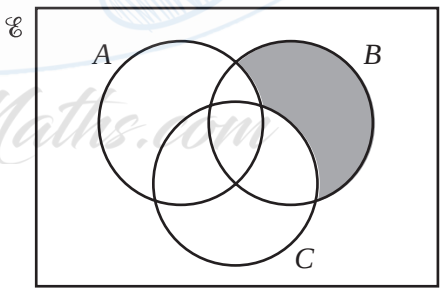


The shaded area in the diagram shows the set $(A \cap C) \cap B'$.

Write down the set shown by the shaded area in each diagram below.



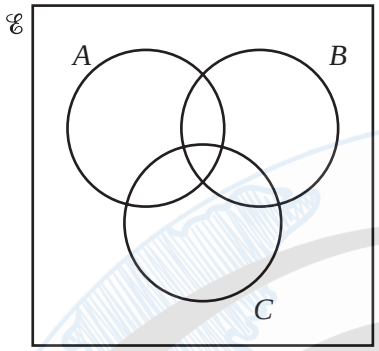
.....



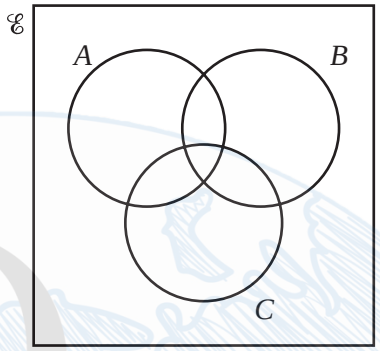
.....

[2]

7 Shade the required regions in the Venn diagrams below.



$(A \cup B)' \cap C$



$(A \cap B) \cup C$

[2]

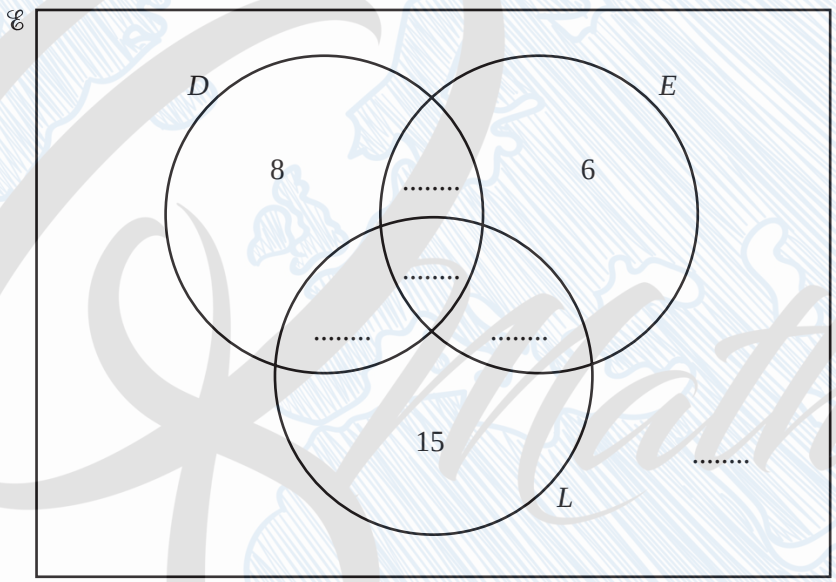
22 In a survey of 60 cars, 25 use diesel, 20 use liquid hydrogen and 22 use electricity.

No cars use all three fuels and 14 cars use both diesel and electricity.

There are 8 cars which use diesel only, 15 cars which use liquid hydrogen only and 6 cars which use electricity only.

In the Venn diagram below

$\mathscr{E}$ = {cars in the survey},
D = {cars which use diesel},
L = {cars which use liquid hydrogen},
E = {cars which use electricity}.



(a) Use the information above to fill in the five missing numbers in the Venn diagram. [4]

(b) Find the number of cars which use diesel but not electricity.

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

(c) Find n($D' \cap (E \cup L)$).

Answer(c) ..... [1]

5) November 2010 V2

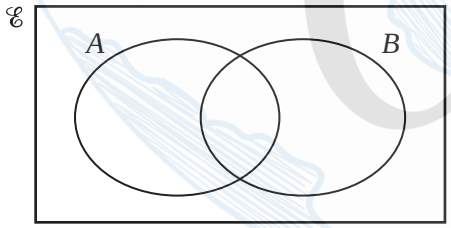
2 In a group of 30 students, 18 have visited Australia, 15 have visited Botswana and 5 have not visited either country.

Work out the number of students who have visited Australia but not Botswana.

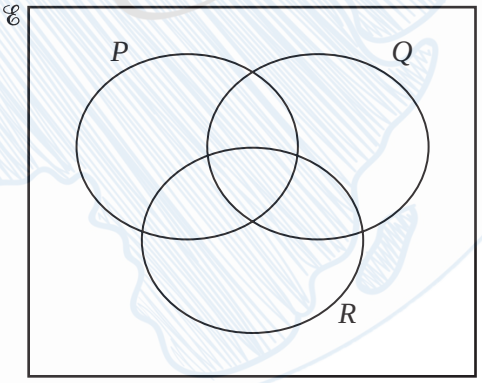
Answer ..... [2]

6) November 2010 V3

4 Shade the required region on each Venn diagram.



$A \cap B'$



$(P \cup Q) \cap R'$

[2]

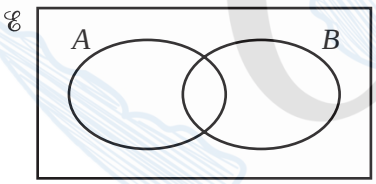
7) November 2010 V3

11 In a group of 24 students, 21 like football and 15 like swimming.
One student does **not** like football and does **not** like swimming.
Find the number of students who like **both** football and swimming.

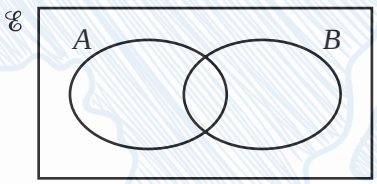
Answer ..... [2]

8) June 2011 V1

2 Shade the required region on each Venn diagram.



$A \cup B'$



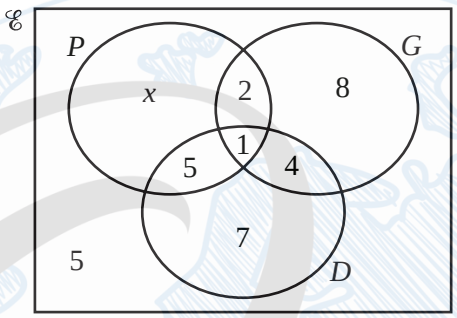
$(A \cap B)'$

[2]

15 A teacher asks 36 students which musical instruments they play.

P = {students who play the piano}
G = {students who play the guitar}
D = {students who play the drums}

The Venn diagram shows the results.



(a) Find the value of x.

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

(b) A student is chosen at random.

Find the probability that this student

(i) plays the drums but **not** the guitar,

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

(ii) plays only 2 different instruments.

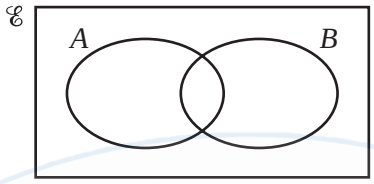
Answer(b)(ii) ..... [1]

(c) A student is chosen at random from those who play the guitar.

Find the probability that this student plays no other instrument.

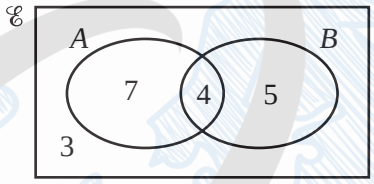
Answer(c) ..... [1]

3 **(a)**



Shade the region $A \cap B'$. [1]

(b)

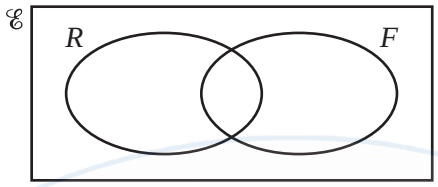


This Venn diagram shows the number of elements in each region.

Write down the value of $n(A \cup B')$.

Answer(b) $n(A \cup B') =$ ..... [1]

17



In the Venn diagram, $\mathscr{E}$ = {students in a survey}, R = {students who like rugby} and F = {students who like football}.

$n(\mathscr{E}) = 20$ $n(R \cup F) = 17$ $n(R) = 13$ $n(F) = 11$

(a) Find

(i) $n(R \cap F)$,

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

(ii) $n(R' \cap F)$.

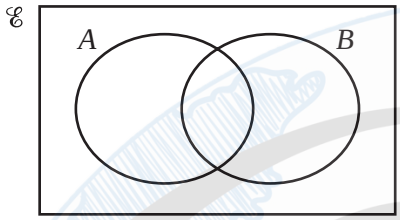
Answer(a)(ii) ..... [1]

(b) A student who likes rugby is chosen at random.

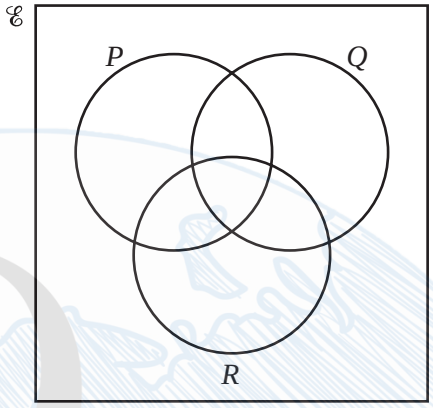
Find the probability that this student also likes football.

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

9 Shade the required region in each of the Venn diagrams.



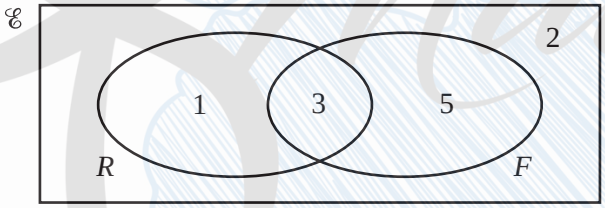
A'



$(P \cap R) \cup Q$

[2]

12



11 students are asked if they like rugby (R) and if they like football (F).
The Venn diagram shows the results.

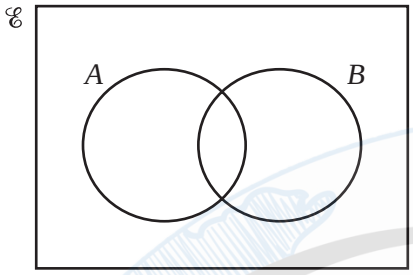
(a) A student is chosen at random.

What is the probability that the student likes rugby **and** football?

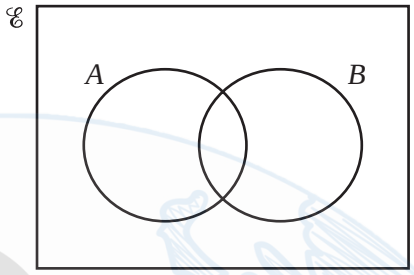
Answer(a) ..... [1]

(b) On the Venn diagram shade the region $R' \cap F'$. [1]

1 Shade the required region on each Venn diagram.



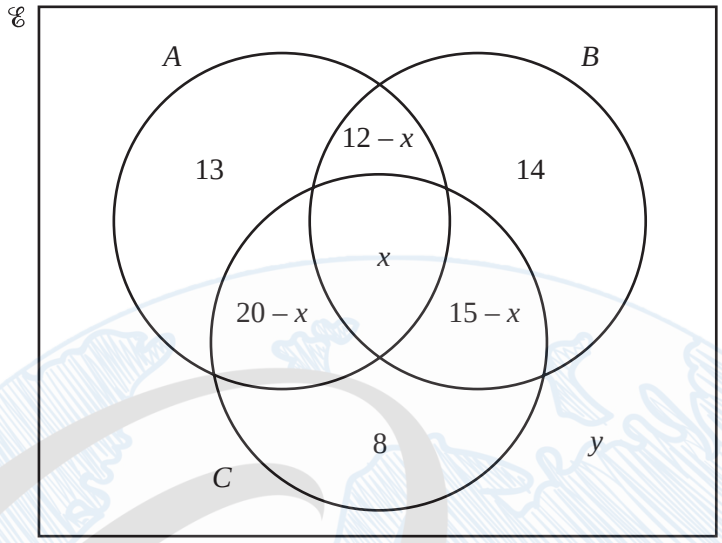
$A' \cup B$



$A' \cap B'$

[2]

15



The Venn diagram shows the number of elements in sets A, B and C.

(a) $n(A \cup B \cup C) = 74$

Find x.

Answer(a) $x =$ ..... [2]

(b) $n(\mathscr{E}) = 100$

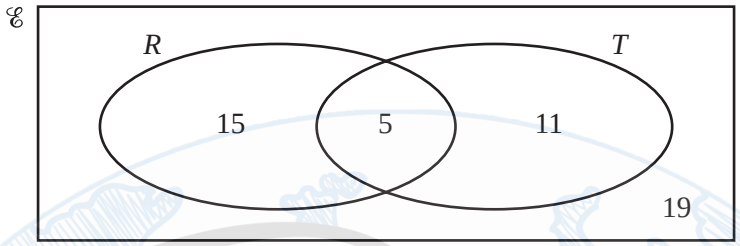
Find y.

Answer(b) $y =$ ..... [1]

(c) Find the value of $n((A \cup B)' \cap C)$.

Answer(c) ..... [1]

22



The Venn diagram shows the number of red cars and the number of two-door cars in a car park.
There is a total of 50 cars in the car park.
R = {red cars} and T = {two-door cars}.

(a) A car is chosen at random.

Write down the probability that

(i) it is red and it is a two-door car,

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

(ii) it is not red and it is a two-door car.

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

(b) A two-door car is chosen at random.

Write down the probability that it is not red.

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

(c) Two cars are chosen at random.

Find the probability that they are both red.

Answer(c) ..... [2]

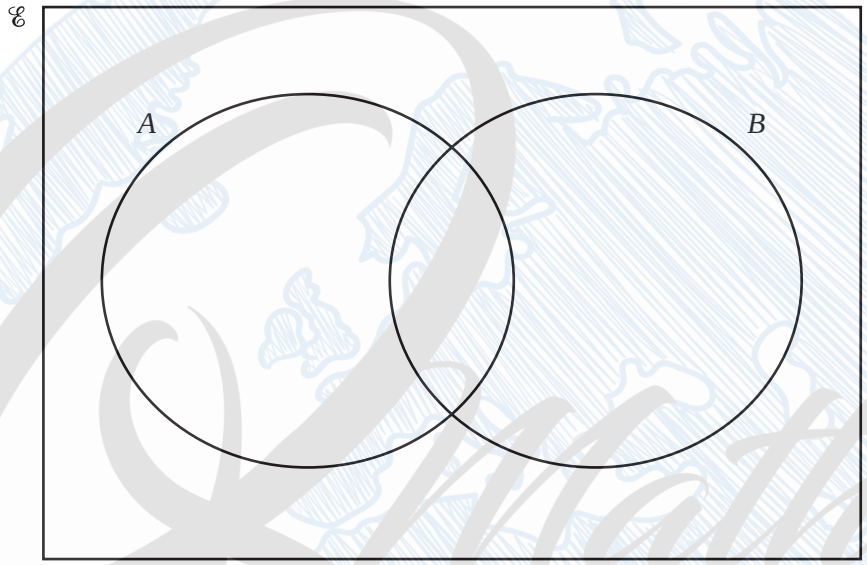
(d) On the Venn diagram, shade the region $R \cup T'$. [1]

17 $\mathscr{E} = \{x : 1 \leqslant x \leqslant 10$, where x is an integer$\}$

$A = \{$square numbers$\}$

$B = \{1, 2, 3, 4, 5, 6\}$

(a) Write all the elements of $\mathscr{E}$ in their correct place in the Venn diagram.



[2]

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

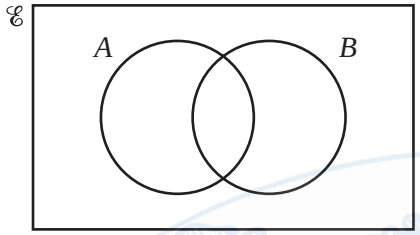
Answer(b) ..... [1]

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

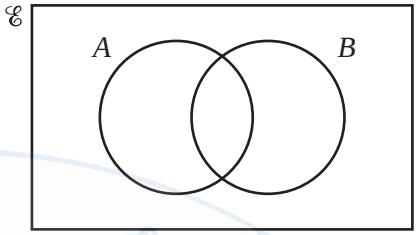
Answer(c) ..... [1]

18) November 2014 V2

4 Shade the region required in each Venn diagram.



$(A \cup B)'$



$A' \cap B$

[2]

19) November 2014 V3

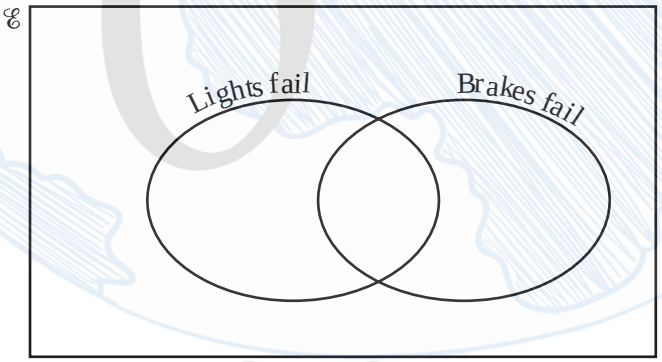
15 The lights and brakes of 30 bicycles are tested.
The table shows the results.

	Lights	Brakes
Fail test	3	9
Pass test	27	21

The lights and brakes both failed on one bicycle only.

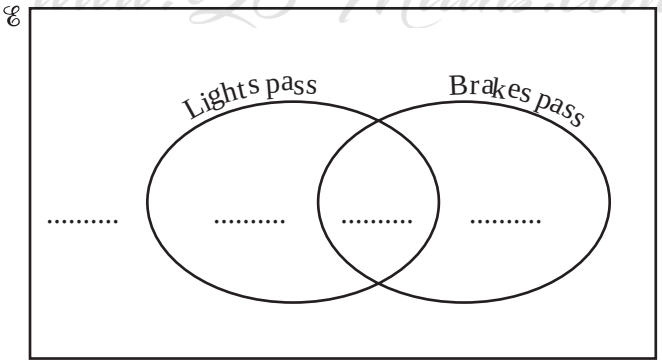
ℰ = {30 bicycles}
Complete the Venn diagrams.

(a)



[2]

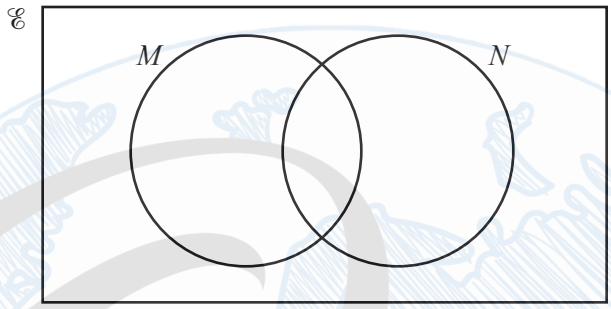
(b)



[2]

20 **(a)** You may use this Venn diagram to help you answer **part (a)**.

$\mathscr{E} = \{x : 1 \leqslant x \leqslant 12, x \text{ is an integer}\}$
$M = \{\text{odd numbers}\}$
$N = \{\text{multiples of 3}\}$



(i) Find n(N).

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

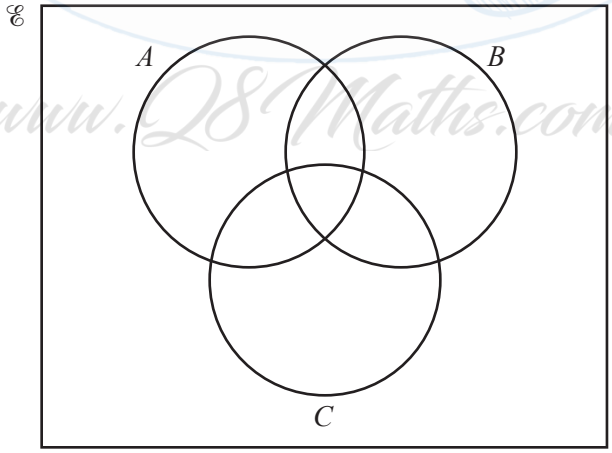
(ii) Write down the set $M \cap N$

Answer(a) (ii) $M \cap N = \{$ ..... $\}$ [1]

(iii) Write down a set P where $P \subset M$

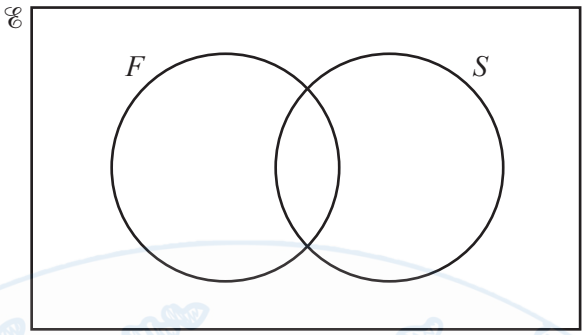
Answer(a)(iii) $P = \{$ ..... $\}$ [1]

(b) Shade $(A \cup C) \cap B'$ in the Venn diagram below.



[1]

16 **(a)** In this part, 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.

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

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

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

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

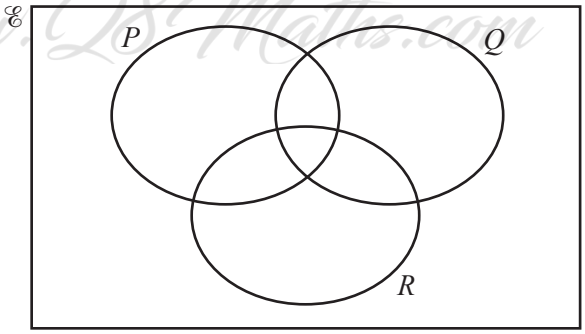
Answer(a)(ii) ..... [1]

(iii) A student who does not study Spanish is chosen at random.

Find the probability that this student studies French.

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

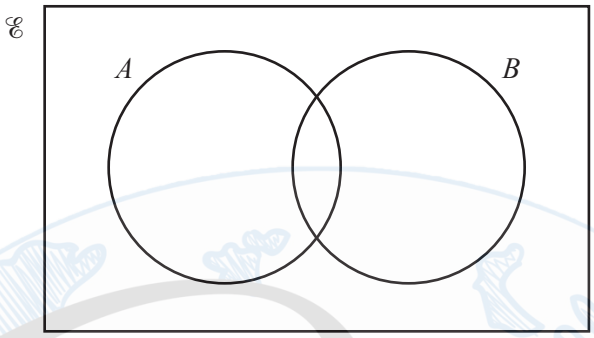
(b)



On this Venn diagram, shade the region $R \cap (P \cup Q)'$. [1]

22) November 2015 V1

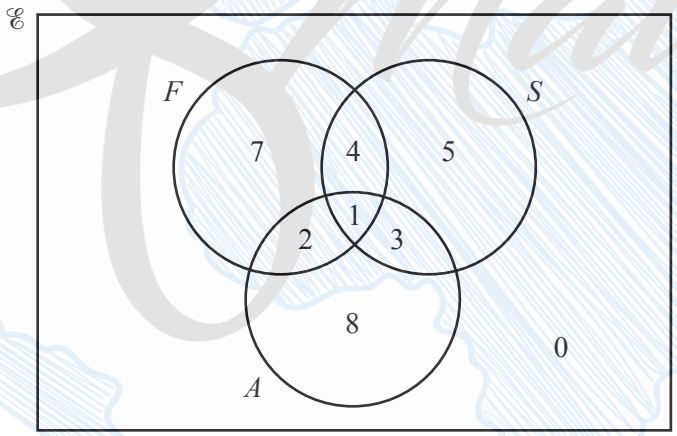
2



In the Venn diagram shade the region $A \cup B'$. [1]

23) November 2015 V2

6 The Venn diagram shows the number of students who study French (F), Spanish (S) and Arabic (A).



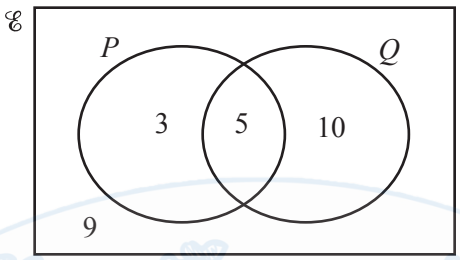
(a) Find $n(A \cup (F \cap S))$.

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

(b) On the Venn diagram, shade the region $F' \cap S$. [1]

24) November 2015 V3

12



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

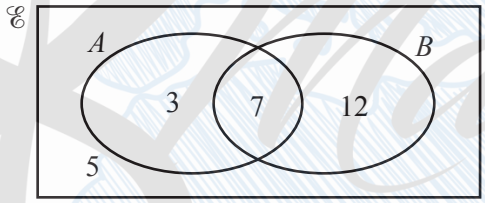
(a) Find $n(P' \cap Q)$.

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

(b) Complete the statement $n(\text{.....}) = 17$. [1]

25) June 2016 V1

22



The Venn diagram shows the numbers of elements in each region.

(a) Find $n(A \cap B')$

..... [1]

(b) An element is chosen at random.

Find the probability that this element is in set B

..... [1]

(c) An element is chosen at random from set A.

Find the probability that this element is also a member of set B

[1]

(d) On the Venn diagram, shade the region $(A \cup B)'$. [1]

14 **(a)** $\mathscr{E} = \{x: 2 \leqslant x \leqslant 16, x \text{ is an integer}\}$
$M = \{\text{even numbers}\}$
$P = \{\text{prime numbers}\}$

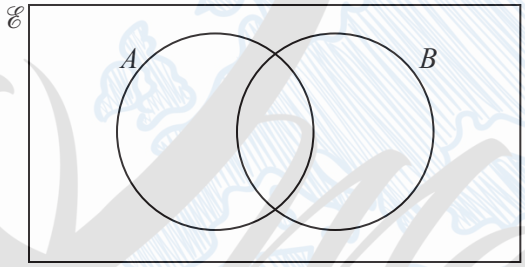
(i) Find n(M).

[1]

(ii) Write down the set $(P \cup M)'$.

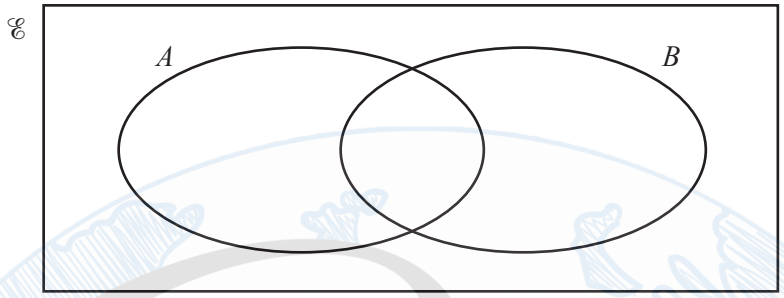
$(P \cup M)' = \{.....\}$ [1]

(b) On the Venn diagram, shade $A \cap B'$.



[1]

22 **(a)** $n(\mathscr{E}) = 10,\ n(A) = 7,\ n(B) = 6,\ n(A \cup B)' = 1.$



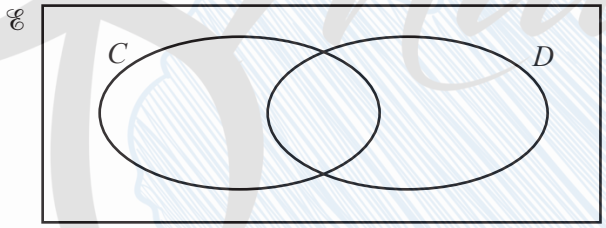
(i) Complete the Venn diagram by writing the number of elements in each subset. [2]

(ii) An element of $\mathscr{E}$ is chosen at random.

Find the probability that this element is an element of $A' \cap B$.

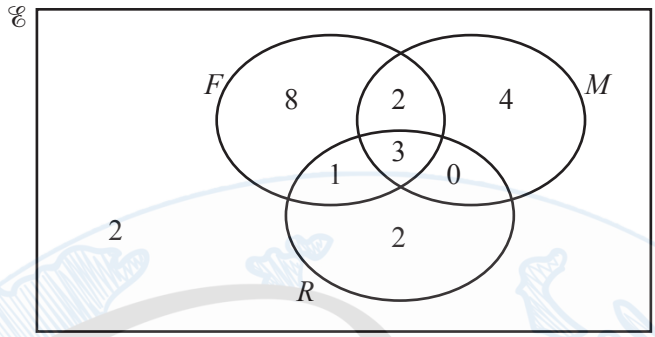
..... [1]

(b) On the Venn diagram below, shade the region $C' \cap D'$.



[1]

15



The Venn diagram shows the number of people who like films (F), music (M) and reading (R).

(a) Find

(i) $\mathrm{n}(M)$,

..... [1]

(ii) $\mathrm{n}(R \cup M)$.

..... [1]

(b) A person is chosen at random from the people who like films.

Write down the probability that this person also likes music.

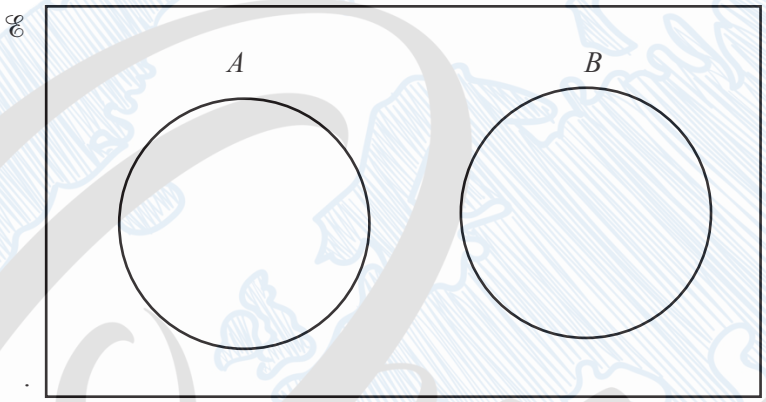
..... [1]

(c) On the Venn diagram, shade $M' \cap (F \cup R)$. [1]

20 **(a)** $\mathscr{E} = \left\{7,\ 9.3,\ \pi,\ \frac{5}{9},\ 2\sqrt{8}\right\}$

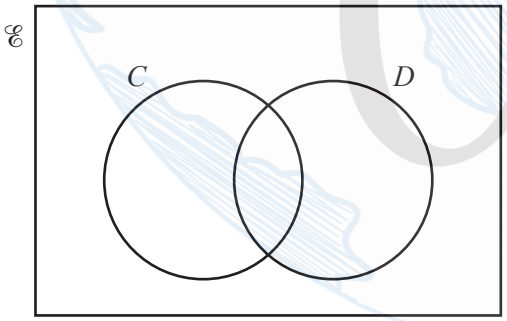
A = {integers}
B = {irrational numbers}

Write all the elements of $\mathscr{E}$ in their correct place on the Venn diagram.

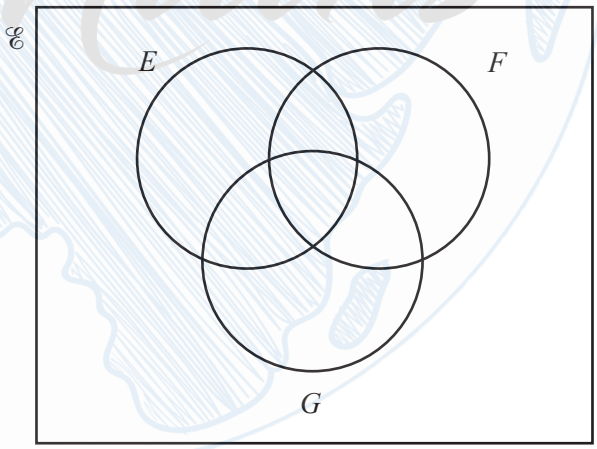


[2]

(b) Shade the region in each of the Venn diagrams below.



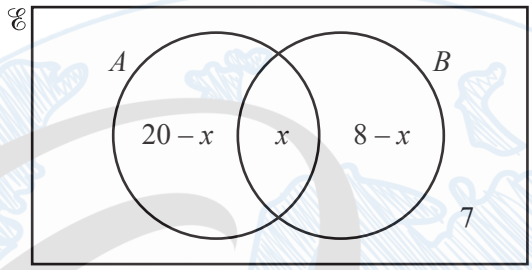
$C' \cup D$



$E \cap F' \cap G$

[2]

23 The Venn diagram shows information about the number of elements in sets A, B and $\mathscr{E}$.



(a) $n(A \cup B) = 23$

Find the value of x.

$x =$ ..... [3]

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

Find the probability that this element is in $(A \cup B)'$.

..... [2]