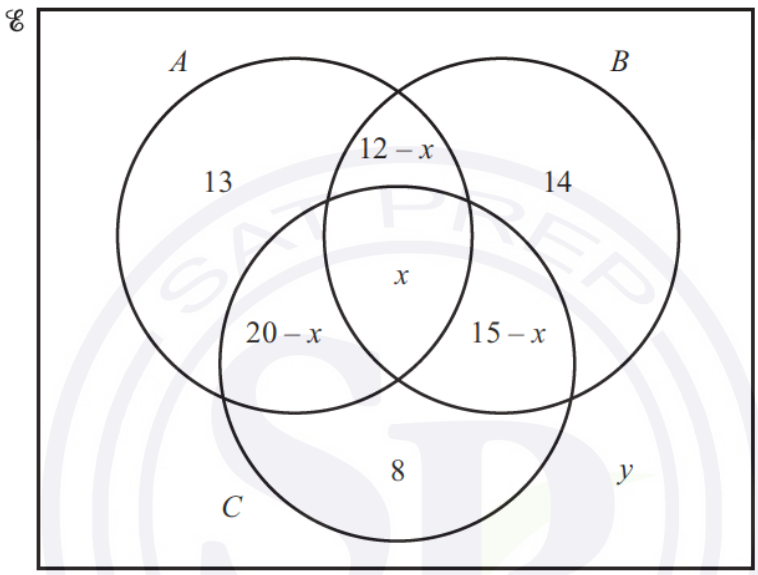
Extended Mathematics
Topic : Set
Year :May 2013 -May 2024
Paper -2
Questions Booklet

Question 1



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.

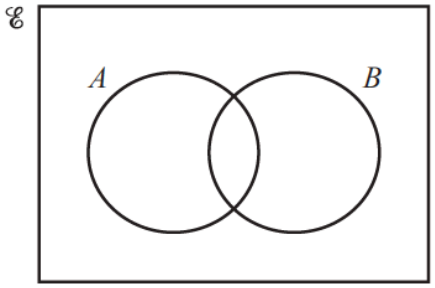
Answer(b) $y =$ ..... [1]

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

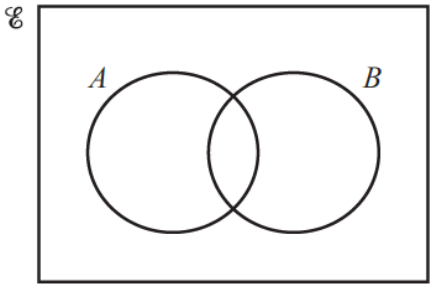
Answer(c) ..... [1]

Question 2

Shade the required region on each Venn diagram.



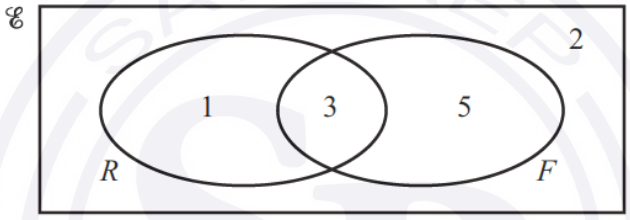
$A' \cup B$



$A' \cap B'$

[2]

Question 3



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]

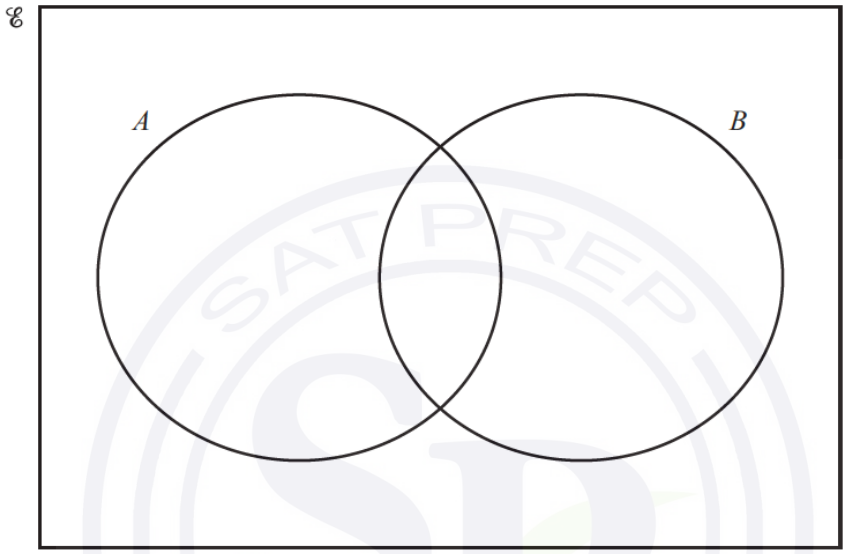
Question 4

$\mathscr{E} = \{x : 1 \leqslant x \leqslant 10$, 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]

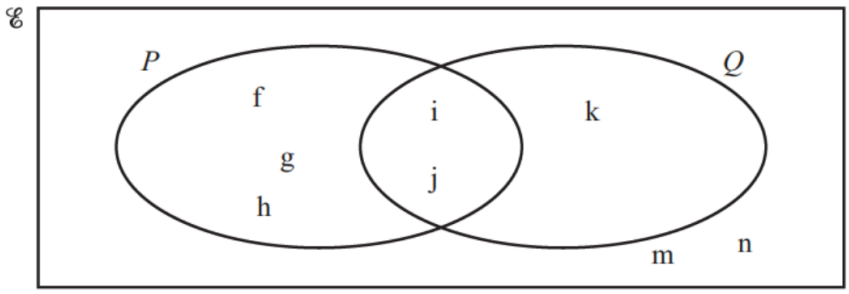
(b) List the elements of $(A \cup B)'$.

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

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

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

Question 5



(a) Use the information in the Venn diagram to complete the following.

(i) $P \cap Q = \{.....\}$ [1]

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

(iii) $n(P \cup Q)' =$ ..... [1]

(b) A letter is chosen at random from the set Q.

Find the probability that it is also in the set P.

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

(c) On the Venn diagram shade the region $P' \cap Q$. [1]

(d) Use a set notation symbol to complete the statement.

{f, g, h} ..... P

[1]

Question 6

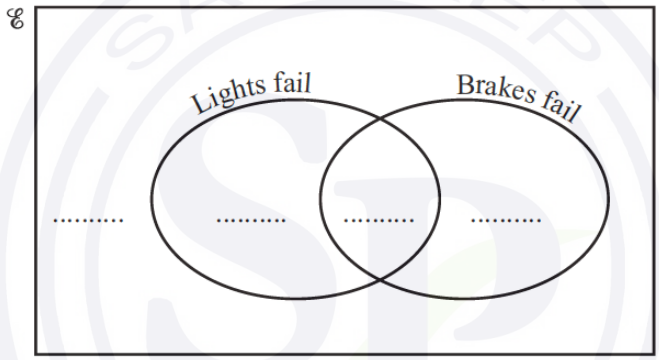
The lights and brakes of 30 bicycles are tested.
The table shows the results.

	Lights	Brakes
Fail test	3	9
Pass test	27	21

The lights and brakes both failed on one bicycle only.

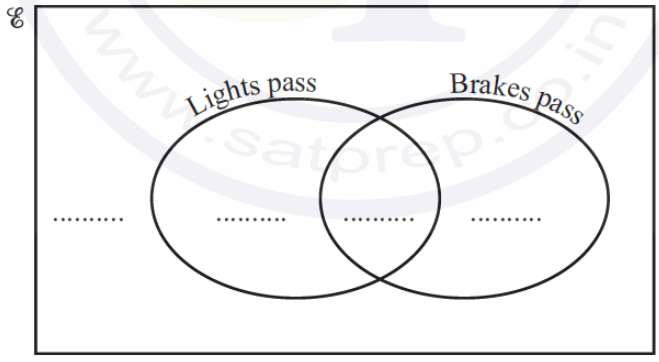
$\mathscr{E}$ = {30 bicycles}
Complete the Venn diagrams.

(a)



[2]

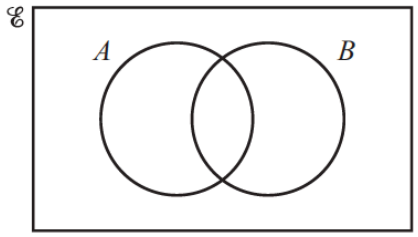
(b)



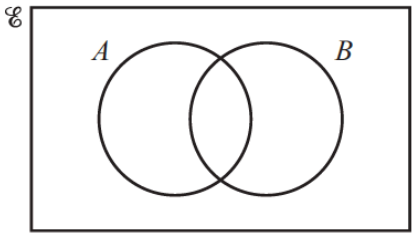
[2]

Question 7

Shade the region required in each Venn diagram.



$(A \cup B)'$

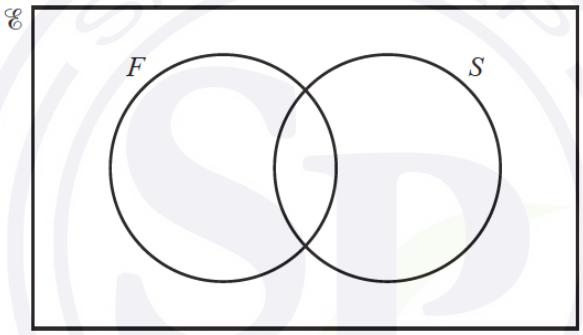


$A' \cap B$

[2]

Question 8

(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]

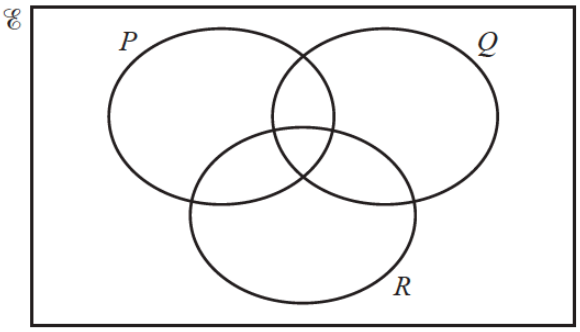
(iii) A student who does not study Spanish is chosen at random.

Find the probability that this student studies French.

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

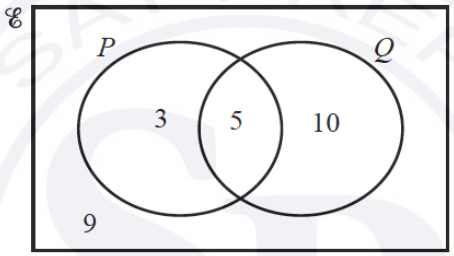
Continue on the next page…

(b)



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

Question 9



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

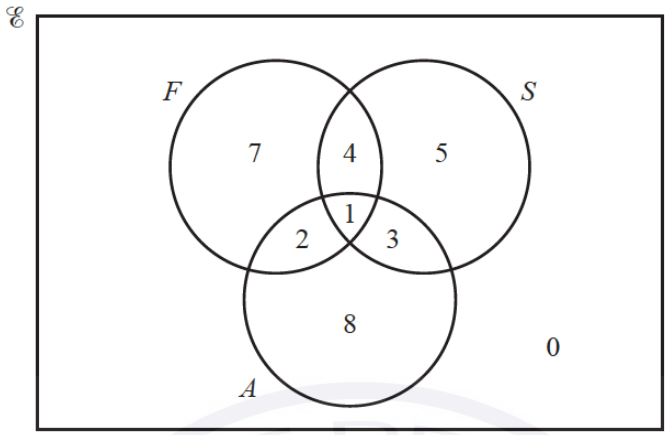
(a) Find $n(P' \cap Q)$.

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

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

Question 10

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

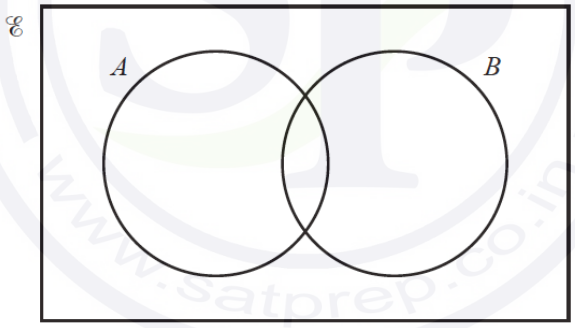


(a) Find $n(A \cup (F \cap S))$.

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

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

Question 11



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

Question 12

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

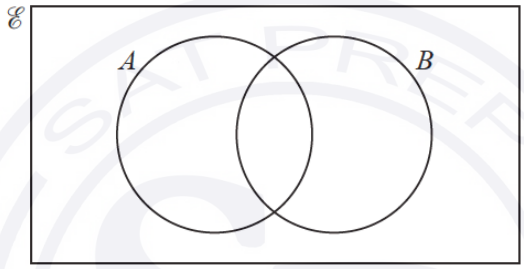
(i) Find n(M).

..... [1]

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

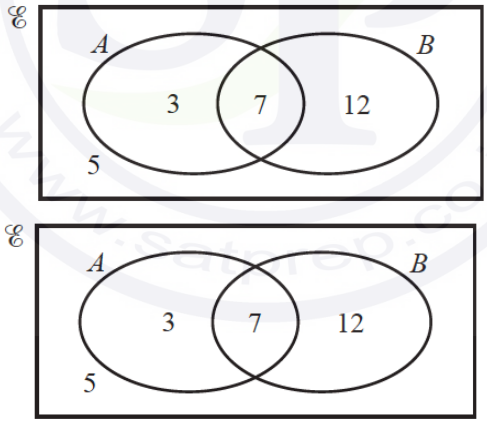
$(P \cup M)' = \{$..... $\}$ [1]

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



[1]

Question 13



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]

Continue on the next page…

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

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

..... [1]

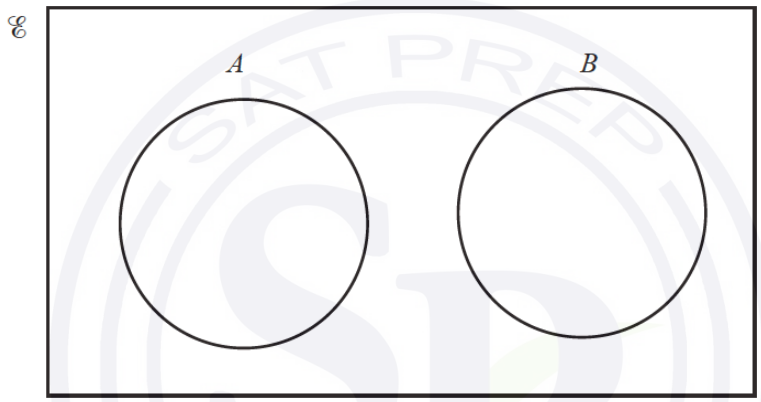
(d) On the Venn diagram, shade the region $(A \cup B)'$. [1]

Question 14

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

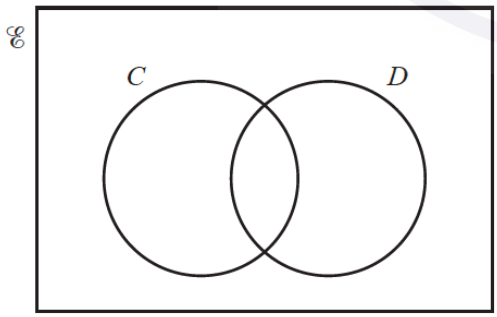
A = {integers}
B = {irrational numbers}

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

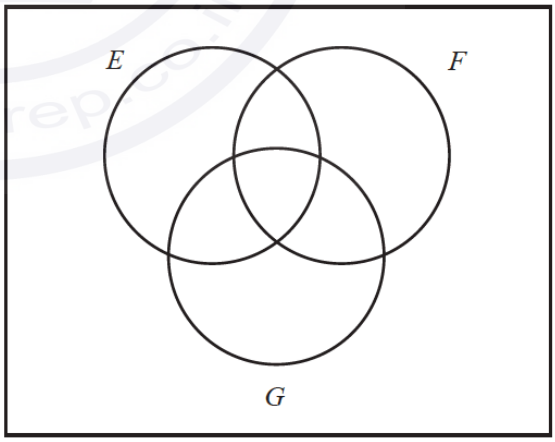


[2]

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



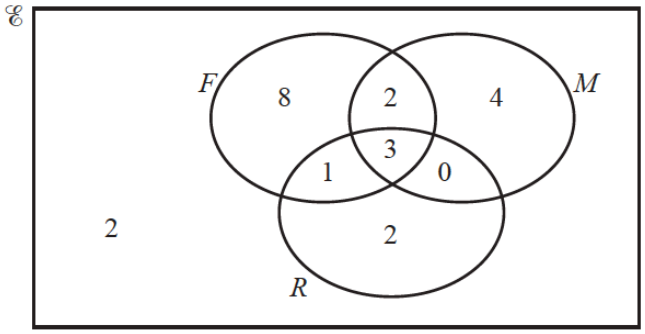
$C' \cup D$



$E \cap F' \cap G$

[2]

Question 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.

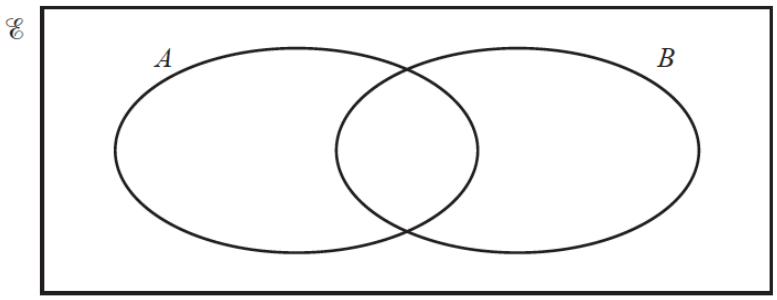
Write down the probability that this person also likes music.

..... [1]

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

Question 16

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



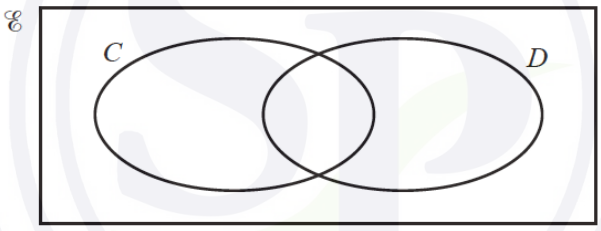
(i) Complete the Venn diagram by writing the number of elements in each subset. [2]

(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 $C' \cap D'$.

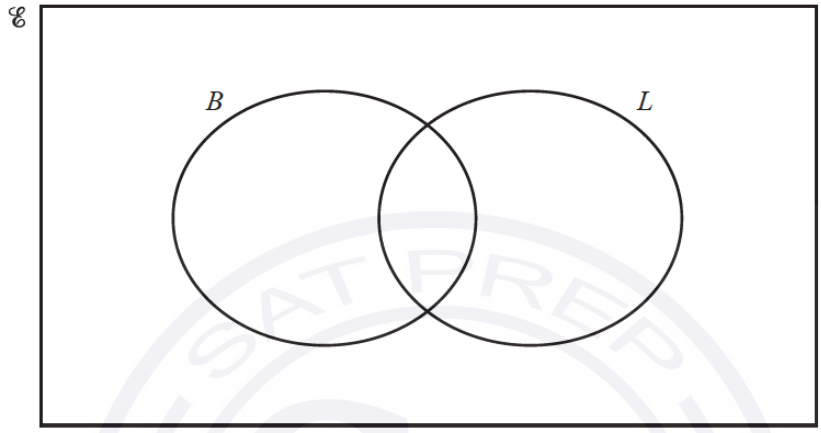


[1]

Question 17

(a) A total of 20 trucks were tested at a checkpoint.

- 6 trucks failed the test for brakes (B)
- 7 trucks failed the test for lights (L)
- 9 trucks passed the tests for both brakes and lights.

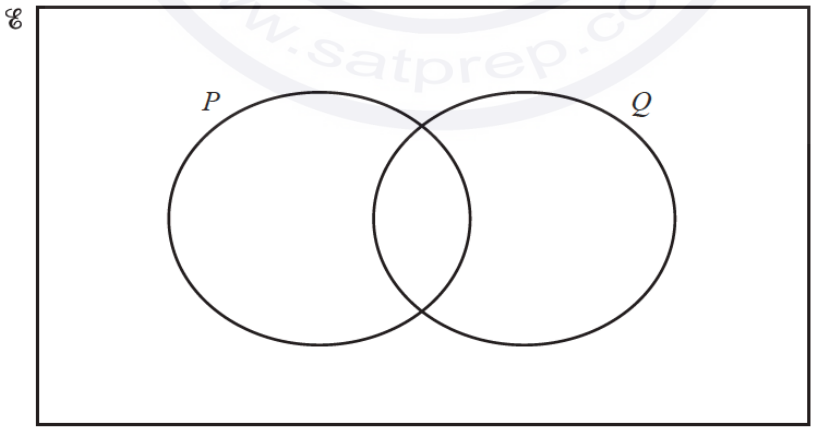


(i) Complete the Venn diagram. [2]

(ii) Find $n(B' \cap L')$.

..... [1]

(b) In the Venn diagram below, shade the region $(P \cup Q) \cap Q'$.

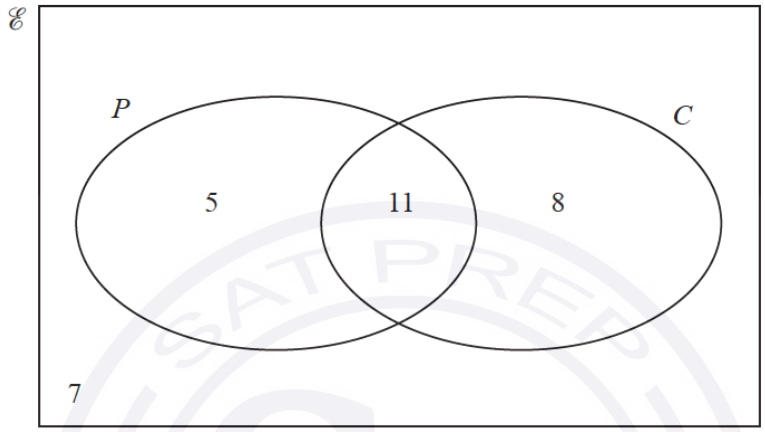


[1]

Question 18

(a) $\mathscr{E}$ = {students in a class}
P = {students who study physics}
C = {students who study chemistry}

The Venn diagram shows numbers of students.



(i) Find the number of students who study physics or chemistry.

..... [1]

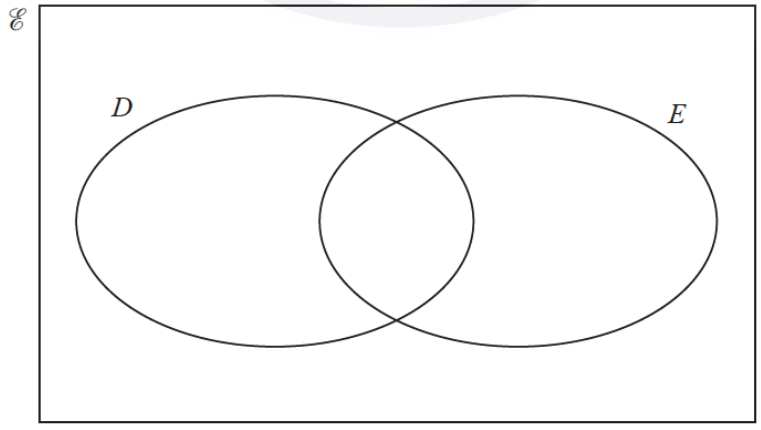
(ii) Find $n(P \cap C')$.

..... [1]

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

Find the probability that this student does not study physics.

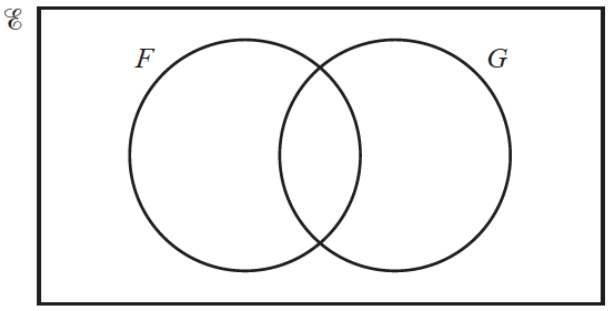
(b) On the Venn diagram below, shade the region $D \cup E'$.



[1]

Question 19

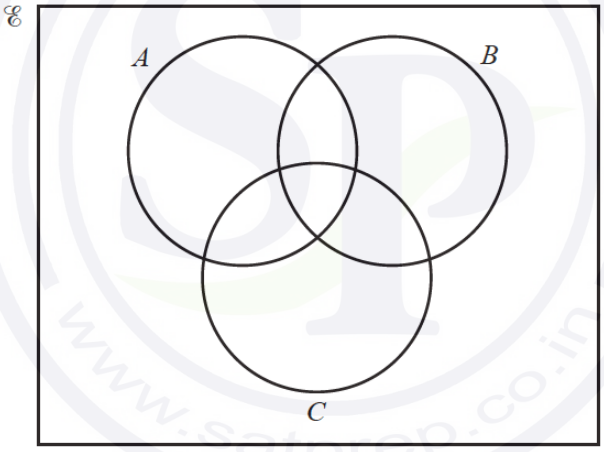
(a) In this Venn diagram, shade the region $F \cup G'$.



[1]

(b) $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$A = \{x: x \text{ is an odd number}\}$
$B = \{x: x \text{ is a square number}\}$
$C = \{x: x \text{ is a multiple of 3}\}$

(i) Write all the elements of $\mathscr{E}$ in the Venn diagram below.



[2]

(ii) Another number is included in the set $\mathscr{E}$.
This number is in the region $A' \cap B \cap C$.

Write down a possible value for this number.

..... [1]

Question 20

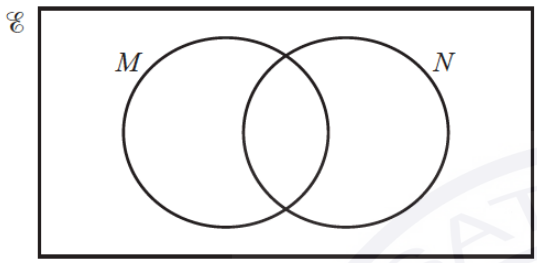
(a) $Q = \{1, 2, 3, 4, 5, 6\}$

Write down a set P where $P \subset Q$.

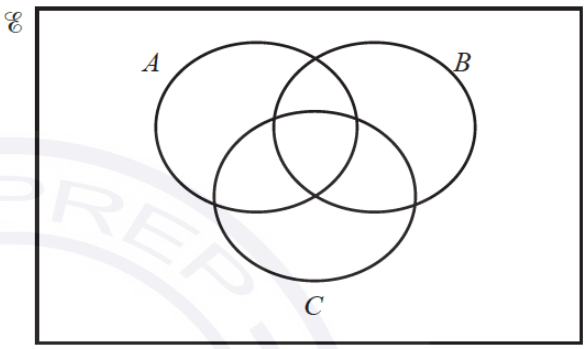
$P =$ ..... [1]

(b) Shade these regions in the Venn diagrams.

$M \cup N'$

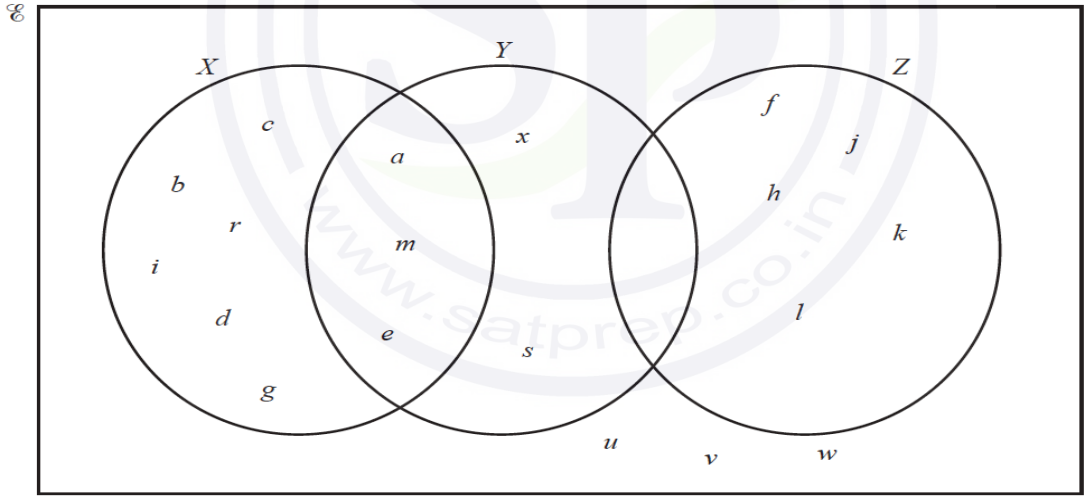


$(A \cup B) \cap C'$



[2]

Question 21



Continue on the next page…

(a) Use set notation to complete the statements for the Venn diagram above.

(i) c ..... X [1]

(ii) ..... $= \{ a, m, e \}$ [1]

(iii) $Y \cap Z =$ ..... [1]

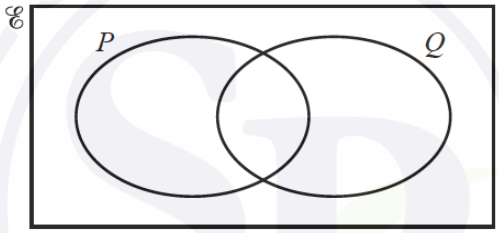
(b) List the elements of $(X \cup Y \cup Z)'$.

..... [1]

(c) Find $\mathrm{n}(X' \cap Z)$.

..... [1]

Question 22



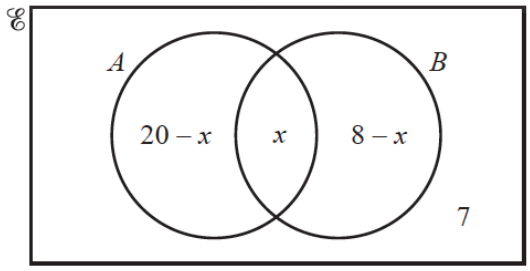
$\mathrm{n}(\mathscr{E}) = 20$, $\mathrm{n}(P) = 10$, $\mathrm{n}(Q) = 13$ and $\mathrm{n}(P \cup Q)' = 5$.

Work out $\mathrm{n}(P \cap Q)$.
You may use the Venn diagram to help you.

$\mathrm{n}(P \cap Q) =$ ..... [2]

Question 23

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



Continue on the next page…

(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]

Question 24

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

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

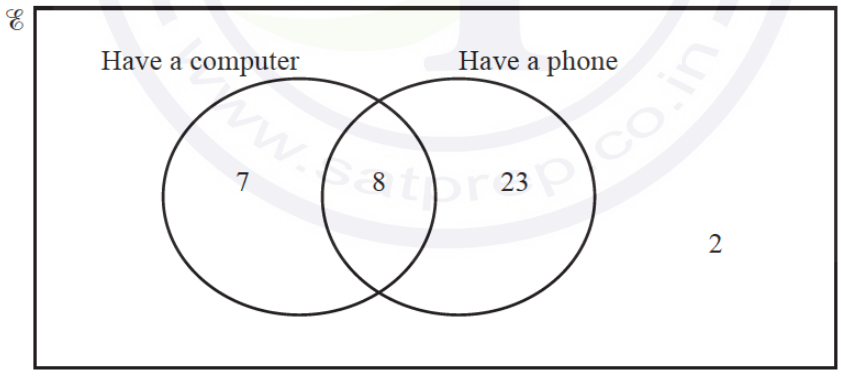
$D = \varnothing$ $C \cap D = \{10\}$ $6 \in D$ $D \subset C$ [1]

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

..... [1]

Question 25

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



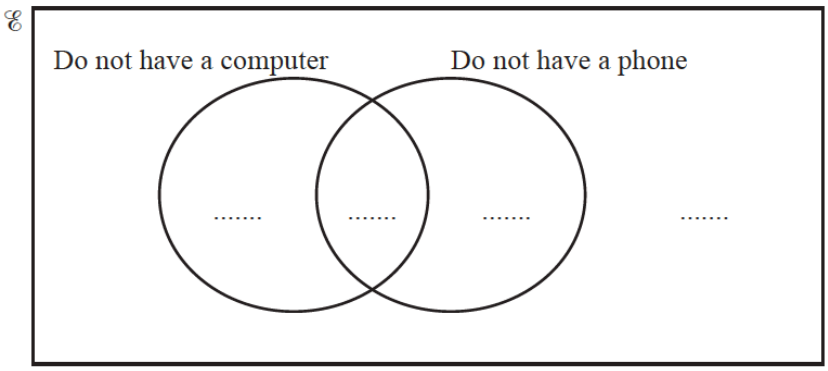
(i) A child is chosen at random from the children who have a computer.

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

..... [1]

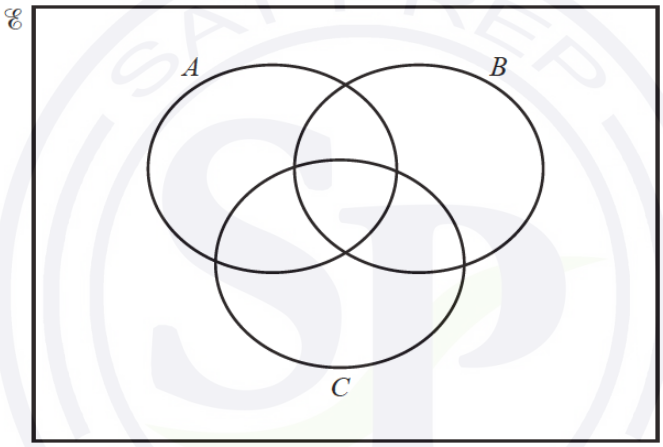
Continue on the next page…

(ii) Complete the Venn diagram.



[2]

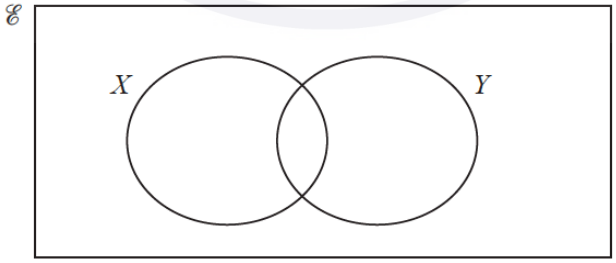
(b) In this Venn diagram, shade the region $(A \cup B') \cap C$.



[1]

Question 26

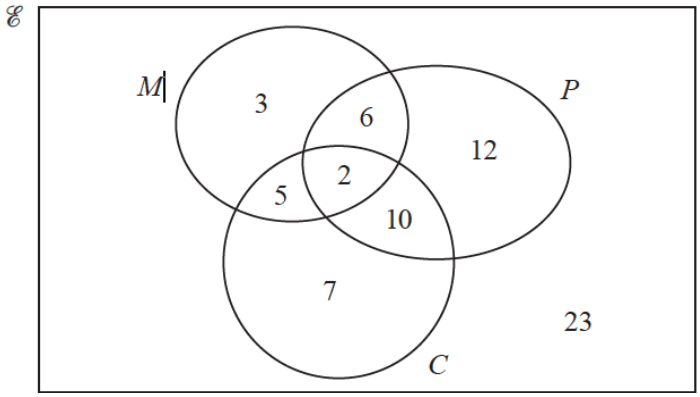
(a) In the Venn diagram, shade $X' \cap Y$.



[1]

(b) The Venn diagram below shows information about the number of gardeners who grow melons (M), potatoes (P) and carrots (C).

Continue on the next page…



(i) A gardener is chosen at random from the gardeners who grow melons.

Find the probability that this gardener does not grow carrots.

..... [2]

(ii) Find $n((M \cap P) \cup C')$.

..... [1]

Question 27

(a) $M = \{x : x \text{ is an integer and } 2 \leqslant x < 6\}$

(i) Find $n(M)$.

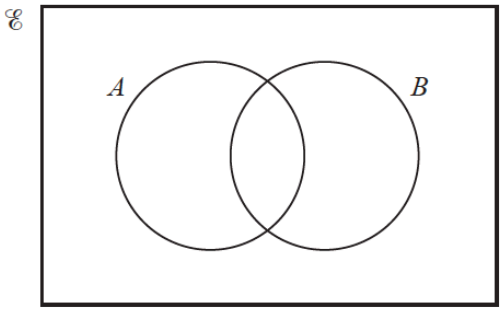
..... [1]

(ii) Write down a set N where $N \subset M$ and $N \neq \varnothing$.

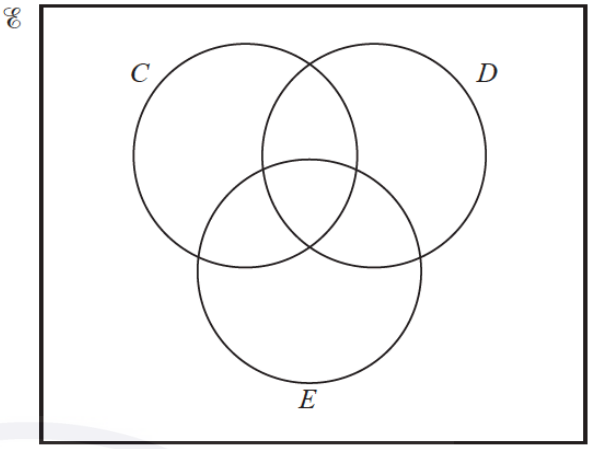
{.....} [1]

Continue on the next page…

(b) In each Venn diagram, shade the required region.



$(A \cup B)'$

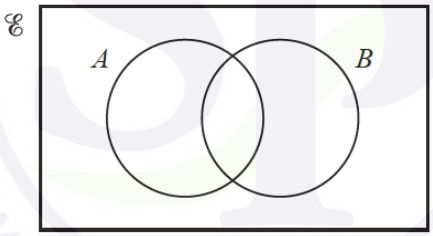


$(C \cap D') \cup E$

[2]

Question 28

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



[1]

Question 29

$\mathscr{E} = \{0, 1, 2, 3, 4, 5, 6\}$ $A = \{0, 2, 4, 5, 6\}$ $B = \{1, 2, 5\}$

Complete each of the following statements.

$A \cap B = \{.....\}$

$n(B) = ...$

$\{0, 4, 6\} = ... \cap .....$

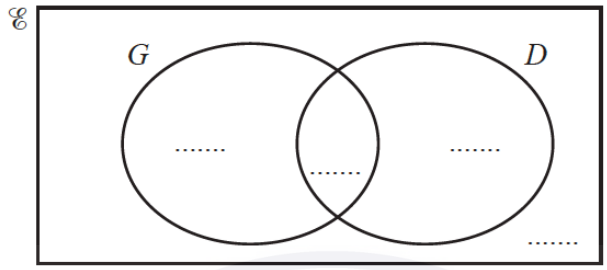
$\{2, 4\}$ ..... A

[4]

Question 30

(a) 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.

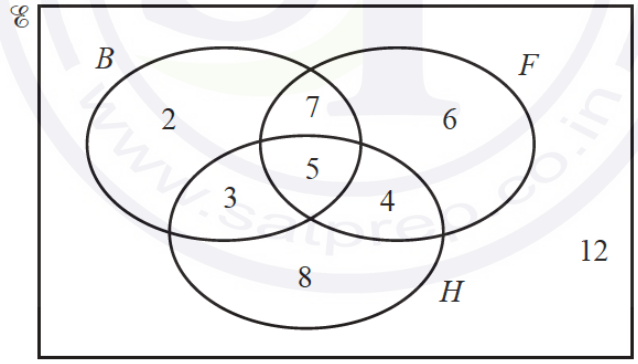


(i) Complete the Venn diagram. [2]

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

..... [1]

(b) This Venn diagram shows information about the number of students who play basketball (B), football (F) and hockey (H).

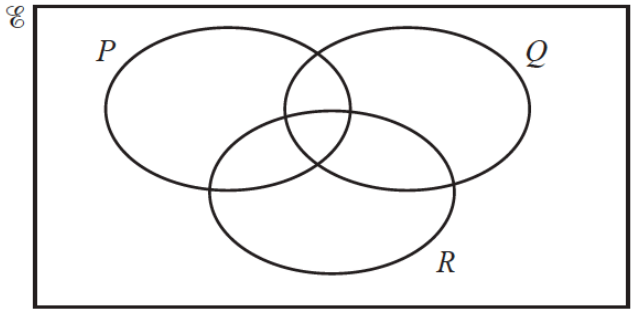


Find $n((B \cup F) \cap H')$.

.....[1]

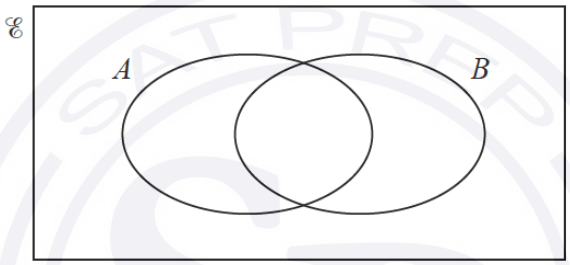
Continue on the next page…

(c)



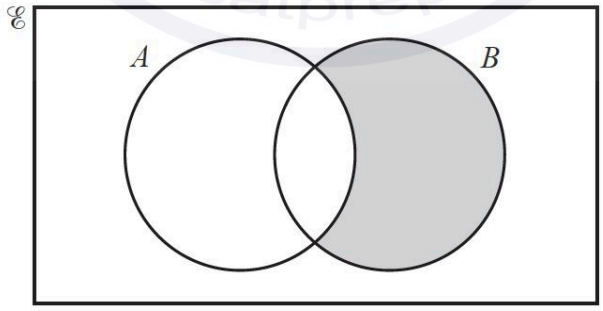
Shade the region $P \cup (Q \cap R)'$. [1]

Question 31



On the Venn diagram, shade the region $A \cap B$. [1]

Question 32

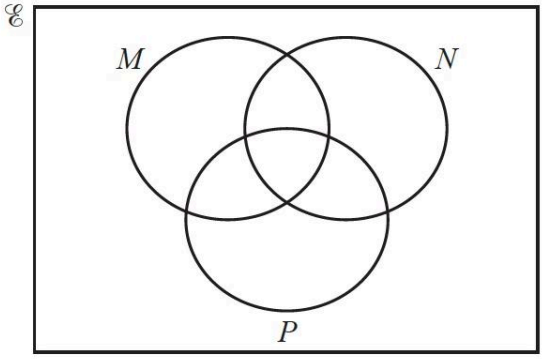


Use set notation to describe the shaded region.

..... [1]

Question 33

In this Venn diagram, shade the region $M' \cup N \cup P$.



[1]

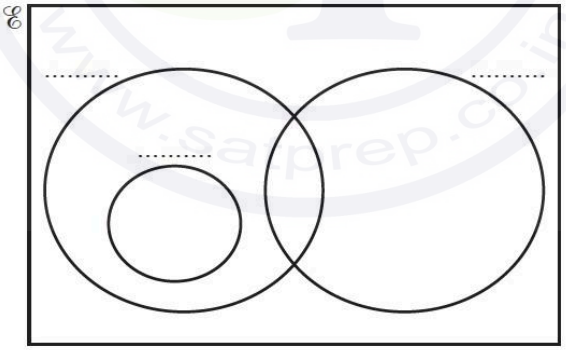
Question 34

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

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

..... [1]

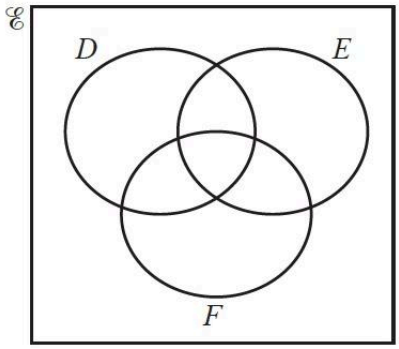
(ii) Complete the set labels on the Venn diagram.



[1]

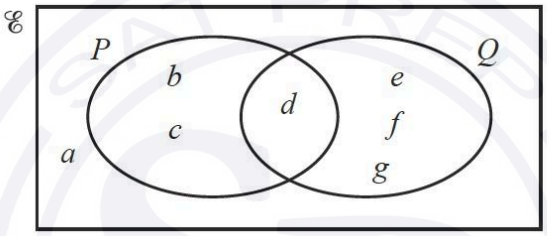
Continue on the next page…

(b)



Shade the region $D' \cup (E \cap F)'$. [1]

Question 35



(a) Complete the statement.

$P \cup Q = \{$ ..... $\}$ [1]

(b) Find $n(Q)$.

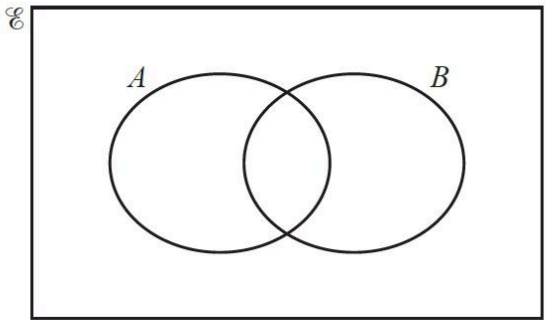
..... [1]

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

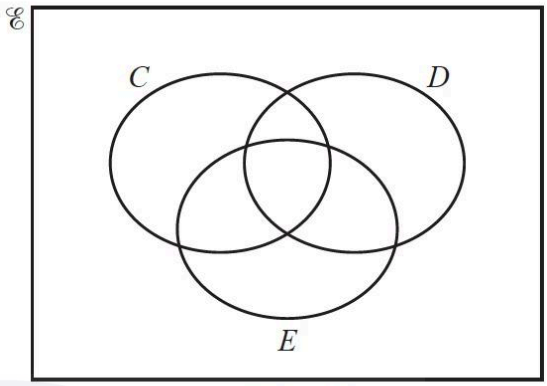
..... [1]

Question 36

In these Venn diagrams, shade the given regions.



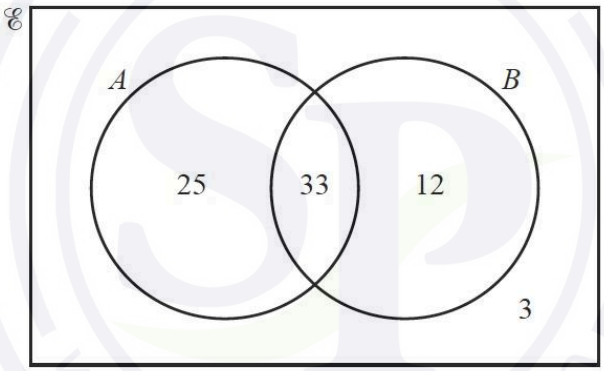
$A' \cup B'$



$(C \cup D) \cap E'$

[2]

Question 37

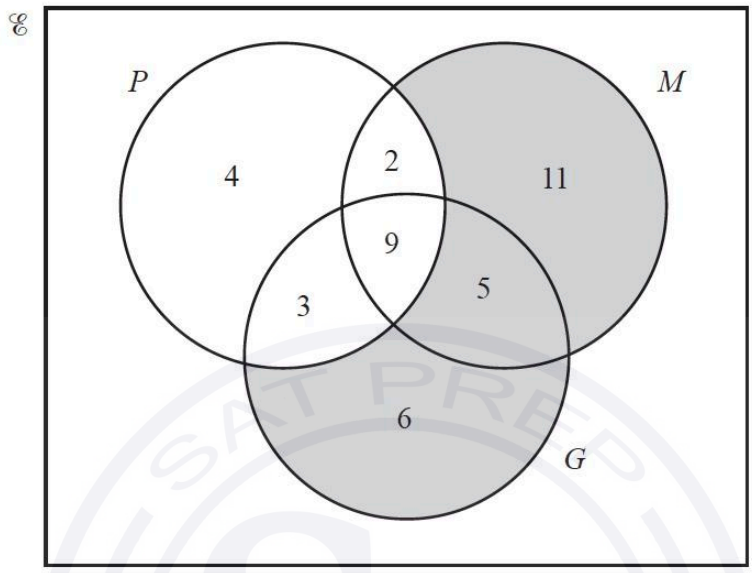


Find $\mathrm{n}(A \cap B)'$.

..... [1]

Question 38

The Venn diagram shows the number of students in a class of 40 who study physics (P), mathematics (M) and geography (G).



(a) Use set notation to describe the shaded region.

..... [1]

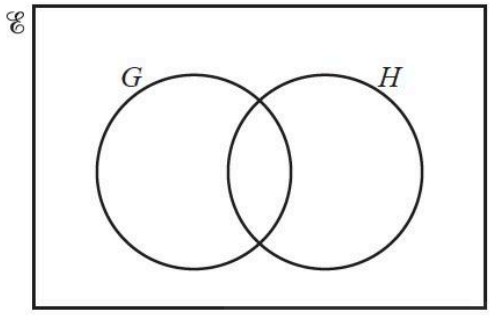
(b) Find $n((P \cap G) \cup M')$.

..... [1]

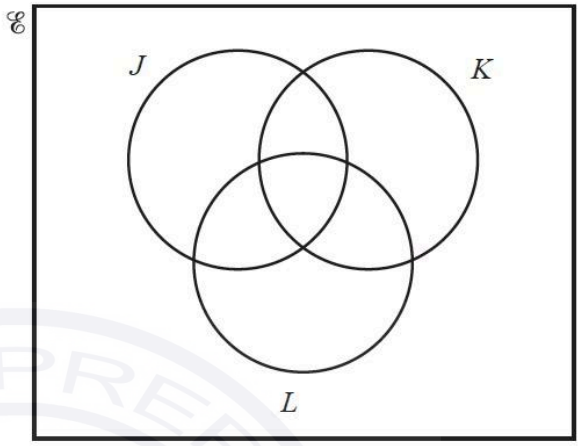
Question 39

(a) Shade the region indicated in each Venn diagram.

$G \cap H'$

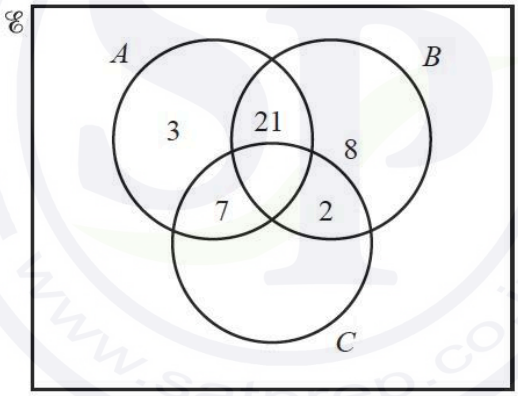


$(J \cup K') \cap L$



[2]

(b) The Venn diagram shows some information about the number of elements in sets A, B, C and $\mathscr{E}$.

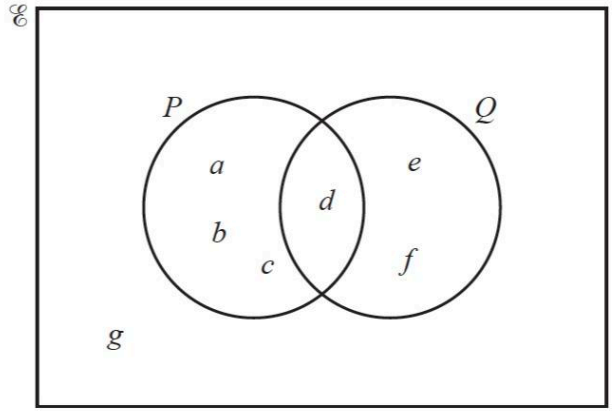


Given the following information, complete the Venn diagram.

$n(A \cap B \cap C) = 1$
$n(A \cup B \cup C)' = 17$
$n(C) = 42$

[2]

Question 40



The Venn diagram shows the elements of the sets $\mathscr{E}$, P and Q.

Complete the statements.

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

(b) $n(P \cup Q) =$ ..... [1]

Question 41

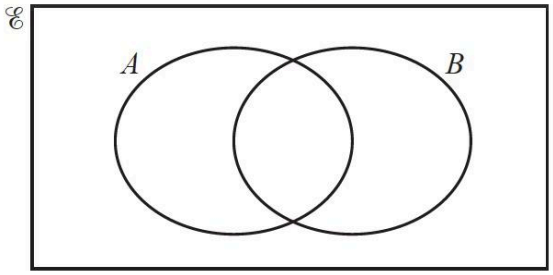
The probability of Jamie hitting a target is $\frac{1}{3}$.

The probability that he hits the target for the first time on his nth attempt is $\frac{64}{2187}$.

Find the value of n.

$n =$ ..... [2]

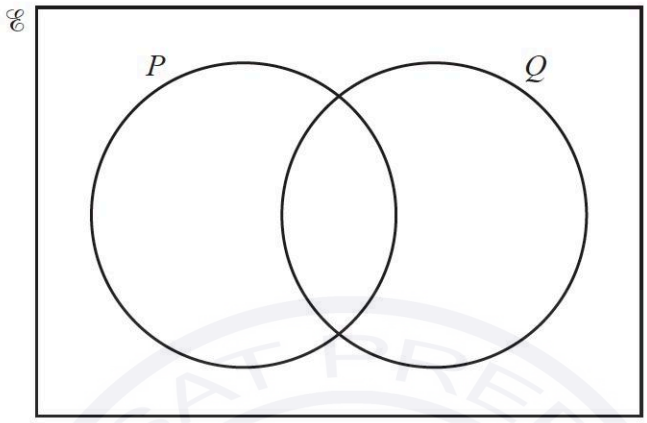
Question 42



On the Venn diagram, shade the region $A \cap B$. [1]

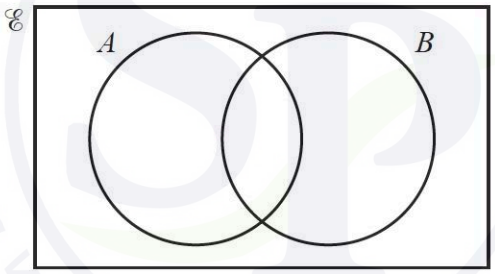
Question 43

(a) $\mathscr{E} = \{ a, b, e, g, l, m, o, r, t, y \}$
$P = \{ a, b, e, g, l, r \}$
$Q = \{ e, g, m, o, r, t, y \}$



Complete the Venn diagram. [2]

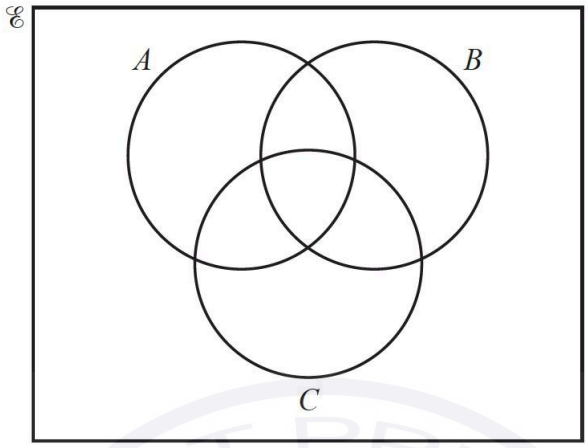
(b)



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

Question 44

In the Venn diagram, shade the region $A \cap B' \cap C$.



[1]

Question 45

$\mathscr{E} = \{x: 1 \leqslant x \leqslant 20\}$
$E = \{\text{even numbers}\}$
$M = \{\text{multiples of } 5\}$

(a) Find $\text{n}(M)$.

..... [1]

(b) Find the elements in the set $E \cap M$.

..... [1]

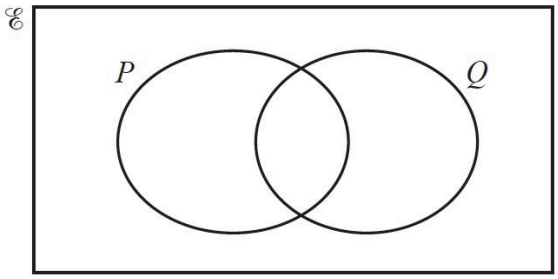
(c) $y \notin E$.

Write down a possible value of y.

..... [1]

Question 46

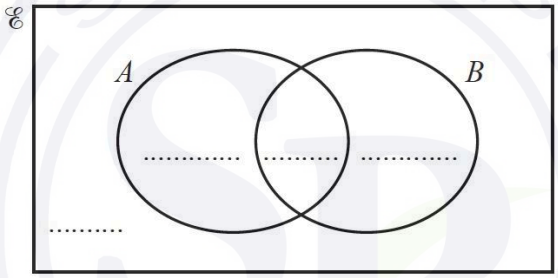
(a) On the Venn diagram, shade the region $P \cup Q'$.



[1]

(b) $n(\mathscr{E}) = 20$ $n(A \cup B)' = 1$ $n(A) = 12$ $n(B) = 10$

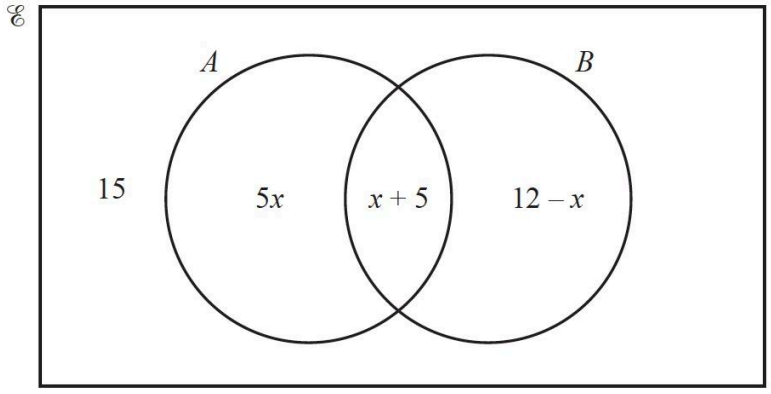
Complete the Venn diagram.



[2]

Question 47

(a)

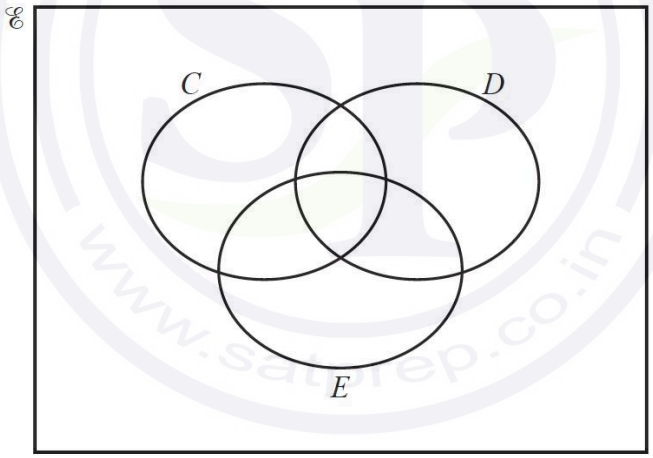


The Venn diagram shows information about the number of elements in sets A, B and $\mathscr{E}$.
$n(\mathscr{E}) = 52$.

Find $n(A \cap B)$.

..... [3]

(b) In this Venn diagram, shade the region $C \cap D \cap E$.

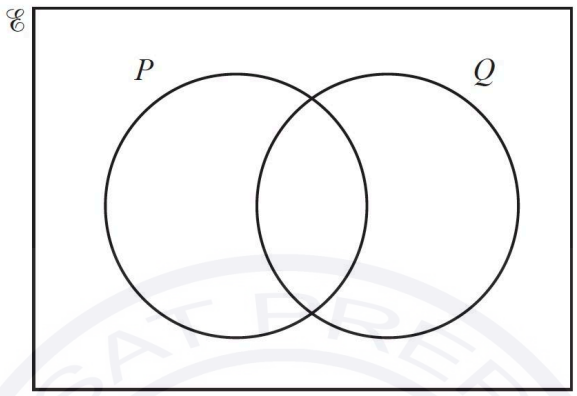


[1]

Question 48

x is an integer.

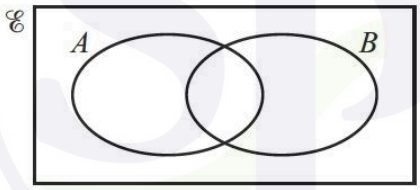
$\mathscr{E} = \{x : 1 \leqslant x \leqslant 10\}$
$P = \{x : x \text{ is an even number}\}$
$Q = \{x : x \text{ is a multiple of } 5\}$



Complete the Venn diagram. [2]

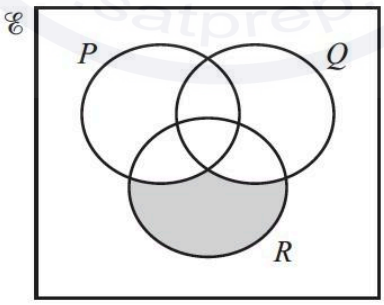
Question 49

(a)



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

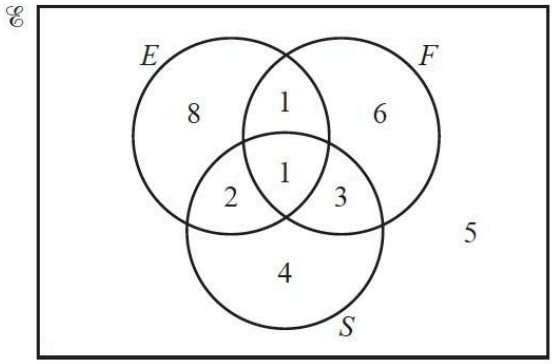
(b)



Use set notation to describe the shaded region.

..... [1]

Question 50



The Venn diagram shows information about the number of students in a class.
Some study English (E), some study French (F), some study Spanish (S) and some do not study any of these languages.

(a) Find $\mathrm{n}\left((E \cup F)' \cup S\right)$.

..... [1]

(b) One student is picked at random from those who study Spanish.

Find the probability that this student studies exactly two languages.

..... [2]

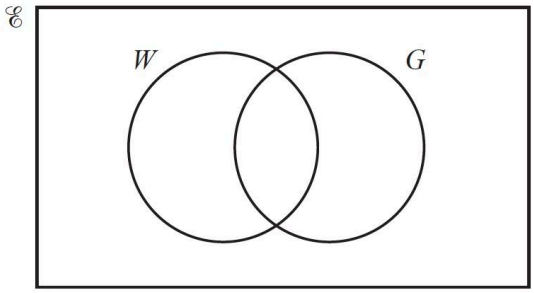
Question 51

W = {students who walk to school}
G = {students who wear glasses}

There are 20 students in a class.

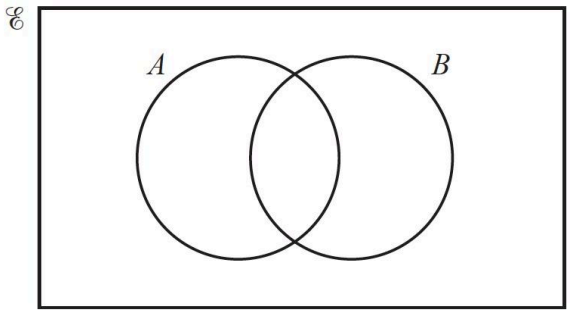
- 8 walk to school
- 3 wear glasses and walk to school
- 2 do not wear glasses and do not walk to school.

Complete the Venn diagram.



[2]

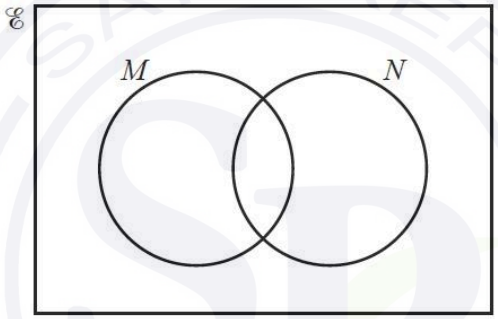
Question 52



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

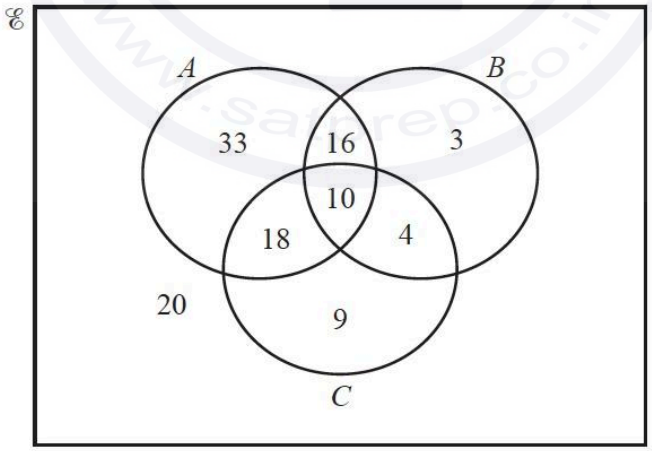
Question 53

(a) In the Venn diagram, shade the region $M' \cap N'$.



[1]

(b) Find $n(B \cap (A' \cup C))$.



..... [1]

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