SETS

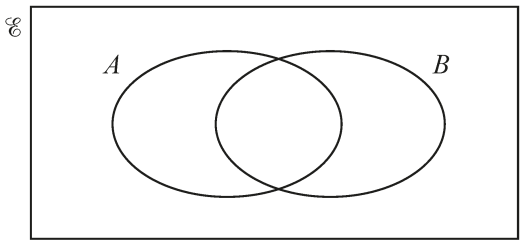
0580

10 IG MATH

Student Name: _____

Grade: 10

1 – (0580/22_Summer_2020_Q7) – *Sets*

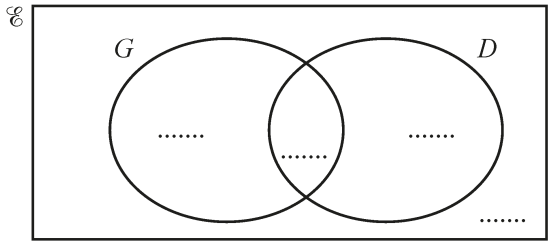


On the Venn diagram, shade the region $A \cap B$. [1]

2 – (0580/23_Summer_2020_Q19) – *Sets*

(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.

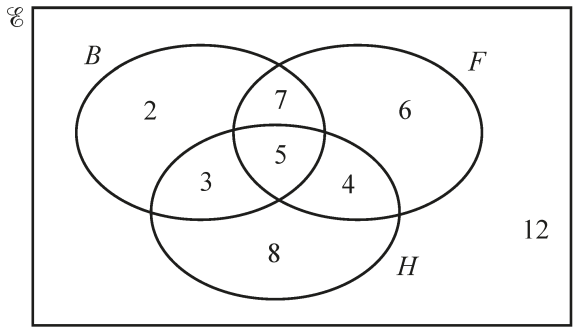


(i) Complete the Venn diagram. [2]

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

..... [1]

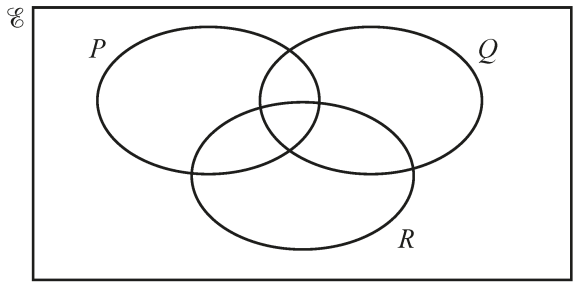
(b) This Venn diagram shows information about the number of students who play basketball (B), football (F) and hockey (H).



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

..... [1]

(c)

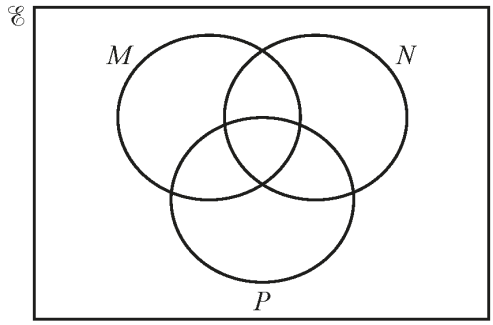


Shade the region $P \cup (Q \cap R)'$. [1]

3

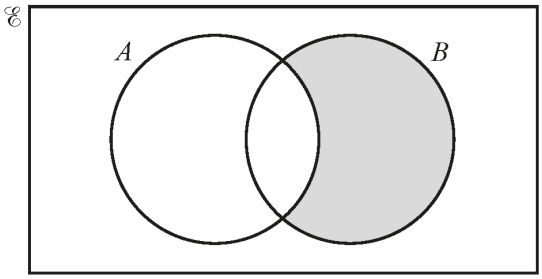
3 – (0580/21_Winter_2020_Q19) – *Sets*

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



[1]

4 – (0580/23_Winter_2020_Q13) – *Sets*



Use set notation to describe the shaded region.

..... [1]

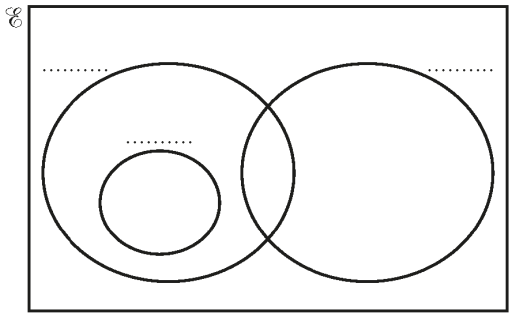
5 – (0580/22_Summer_2021_Q12) – *Sets*

(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 $B' \cap C$.

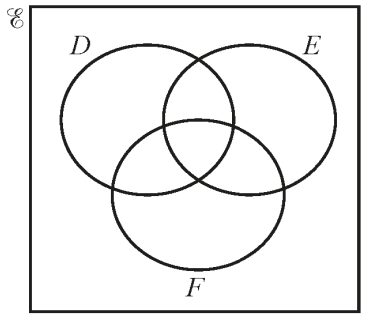
..... [1]

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



[1]

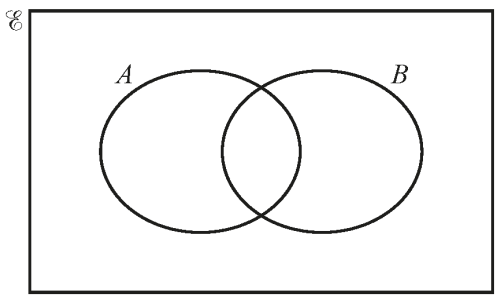
(b)



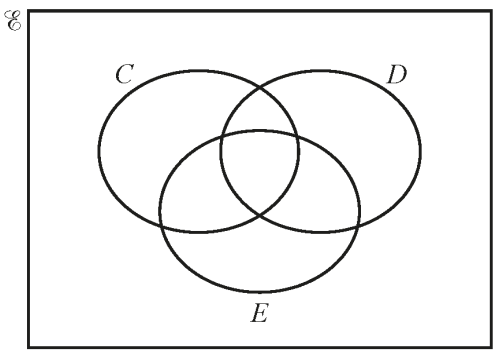
Shade the region $D' \cup (E \cap F)'$. [1]

6 – (0580/22_Winter_2021_Q19) – *Sets*

In these Venn diagrams, shade the given regions.



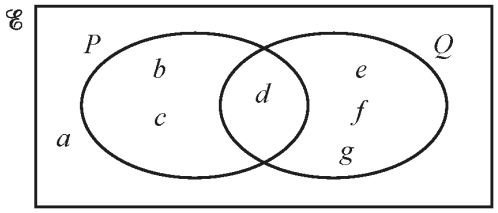
$A' \cup B'$



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

[2]

7 – (0580/23_Winter_2021_Q14) – *Sets*



(a) Complete the statement.

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

(b) Find $\text{n}(Q)$.

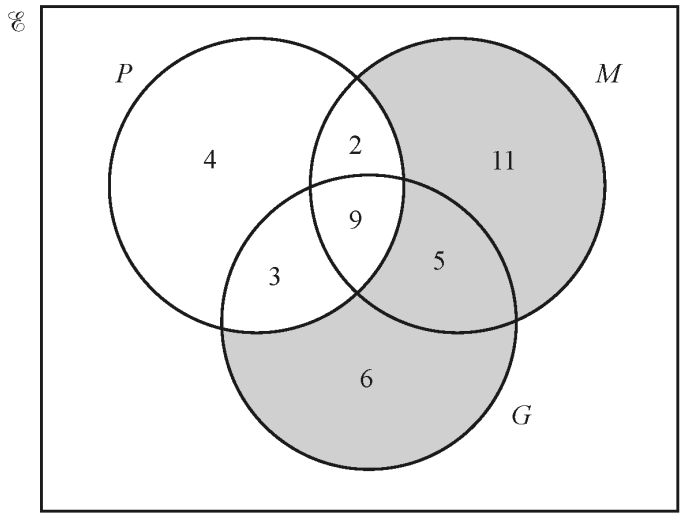
..... [1]

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

..... [1]

8 – (0580/22_Summer_2022_Q16) – *Sets, Probability*

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

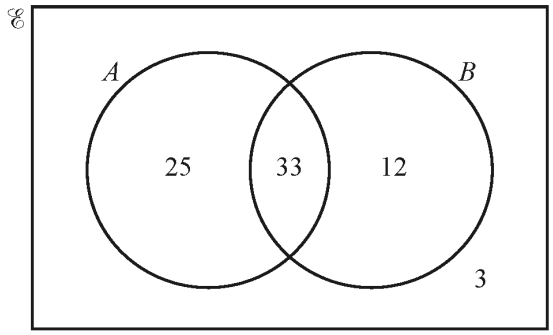
..... [1]

(c) A student is chosen at random from those studying geography.

Find the probability that this student also studies physics or mathematics but not both.

..... [2]

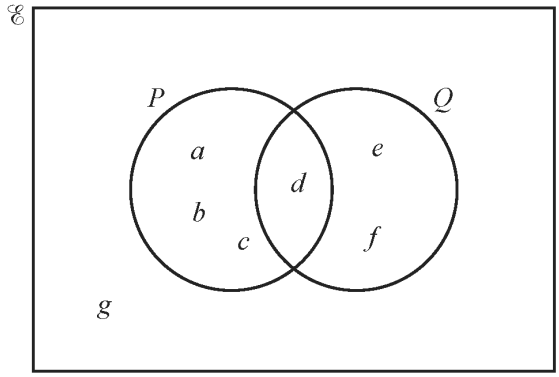
9 – (0580/23_Summer_2022_Q10) – *Sets*



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

..... [1]

10 – (0580/21_Winter_2022_Q7) – *Sets*



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

Complete the statements.

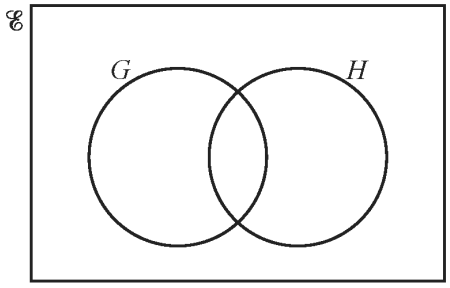
(a) $P = \{$ ..... $\}$ [1]

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

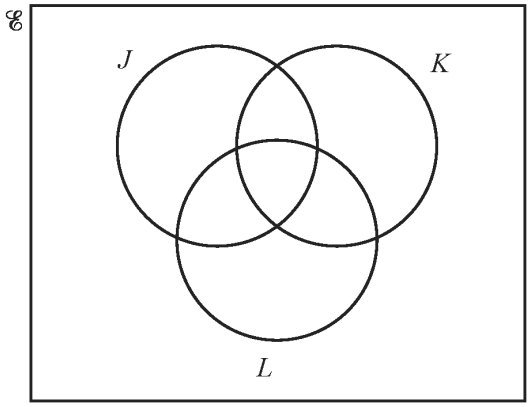
11 – (0580/22_Winter_2022_Q16) – *Sets*

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

$G \cap H'$

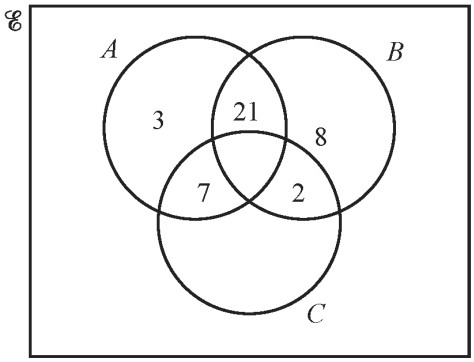


$(J \cup K') \cap L$



[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]

12 – (0580/22_Summer_2023_Q6) – *Sets*

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

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

..... [1]

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

..... [1]

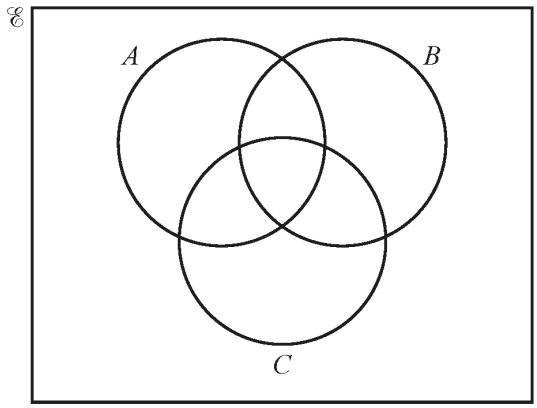
(c) $y \notin E$.

Write down a possible value of y.

..... [1]

13 – (0580/22_Summer_2023_Q20) – *Sets*

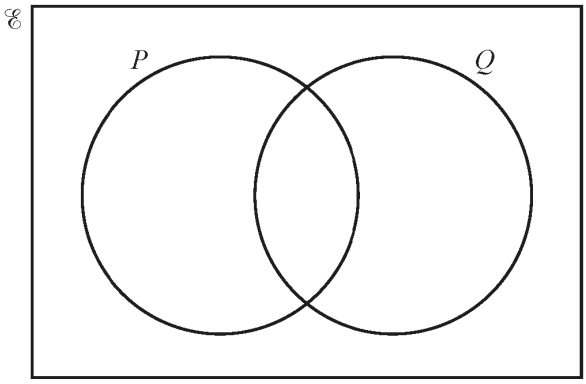
In the Venn diagram, shade the region $A \cap B' \cap C$.



[1]

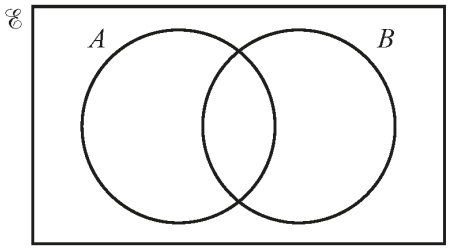
14 – (0580/23_Summer_2023_Q11) – *Sets*

(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]

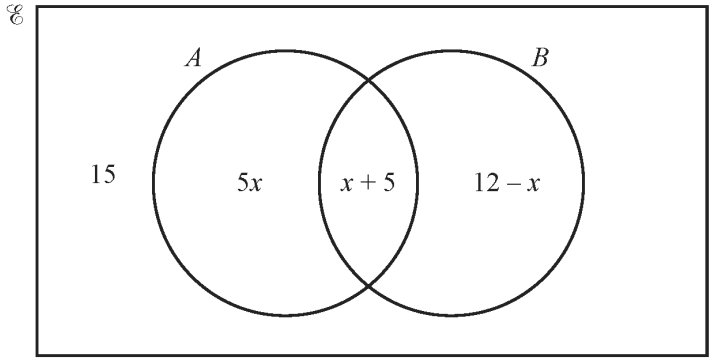
(b)



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

15 – (0580/21_Winter_2023_Q14) – *Sets*

(a)

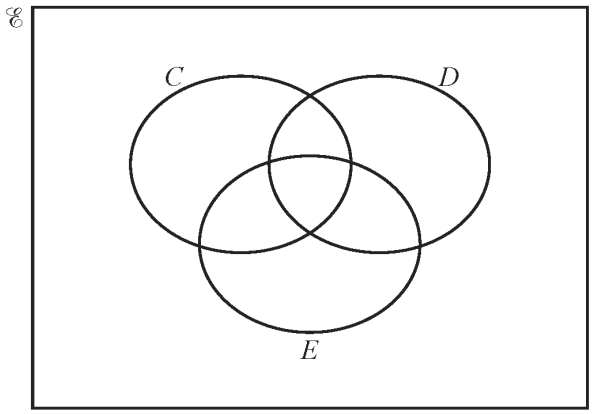


The Venn diagram shows information about the number of elements in sets A, B and $\mathscr{E}$.
$n(\mathscr{E}) = 52$.

Find $n(A \cap B)$.

..... [3]

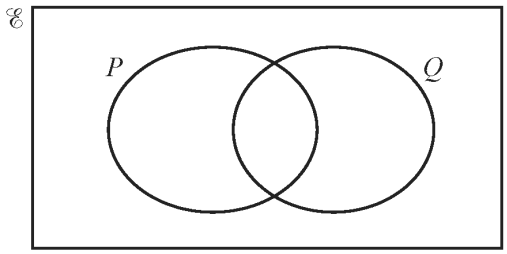
(b) In this Venn diagram, shade the region $C \cap D \cap E$.



[1]

16 – (0580/22_Winter_2023_Q15) – *Sets*

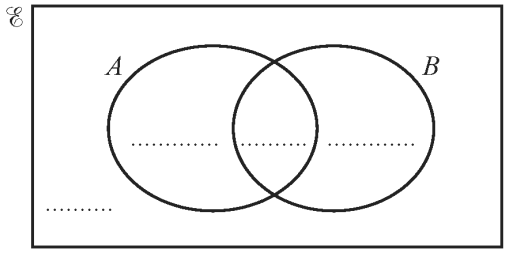
(a) On the Venn diagram, shade the region $P \cup Q'$.



[1]

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

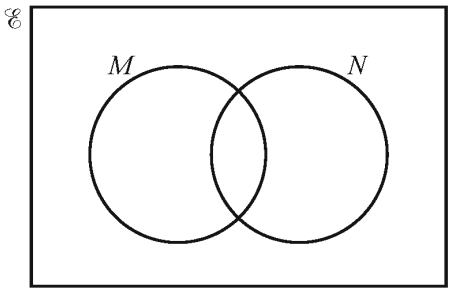
Complete the Venn diagram.



[2]

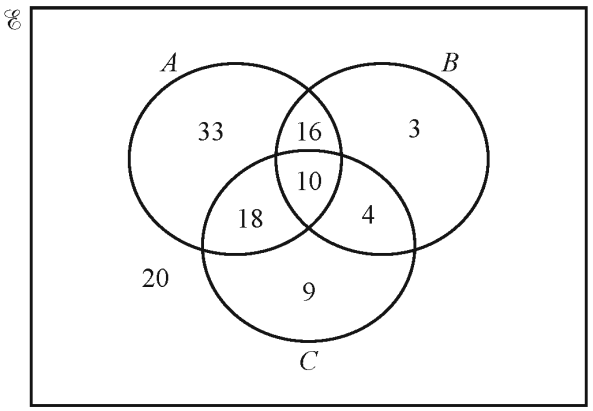
17 – (0580/21_Summer_2024_Q16) – *Sets*

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



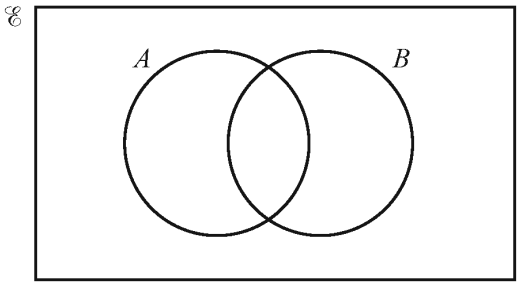
[1]

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



..... [1]

18 – (0580/22_Summer_2024_Q7) – *Sets*



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

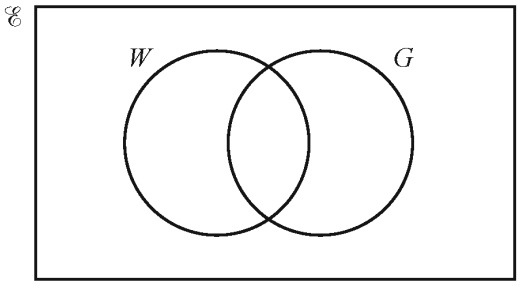
19 – (0580/22_Summer_2024_Q17) – *Sets*

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

There are 20 students in a class.

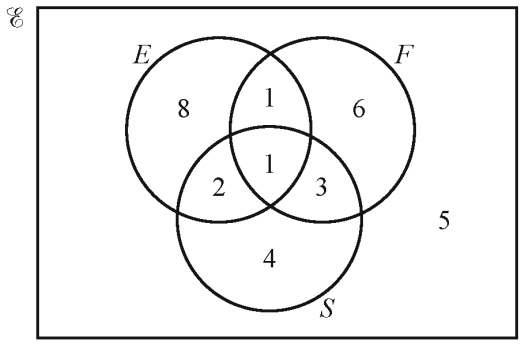
- 8 walk to school
- 3 wear glasses and walk to school
- 2 do not wear glasses and do not walk to school.

Complete the Venn diagram.



[2]

20 – (0580/22_Summer_2024_Q23) – *Sets*



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]

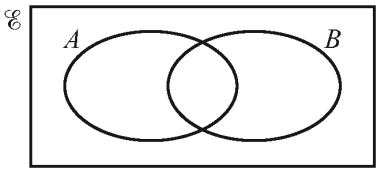
(b) One student is picked at random from those who study Spanish.

Find the probability that this student studies exactly two languages.

..... [2]

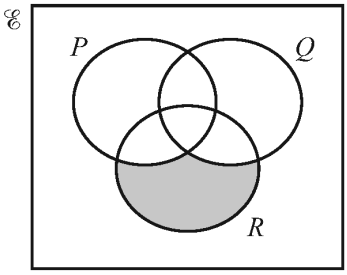
21 – (0580/23_Summer_2024_Q13) – *Sets*

(a)



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

(b)



Use set notation to describe the shaded region.

..... [1]

22 – (0580/21_Winter_2024_Q19) – *Sets*

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$P = \{\text{odd numbers}\}$
$Q = \{\text{multiples of 3}\}$
$R = \{\text{square numbers}\}$

(a) Find $P \cap Q \cap R$.

{ ..... } [1]

(b) **(i)** Find $Q \cup R$.

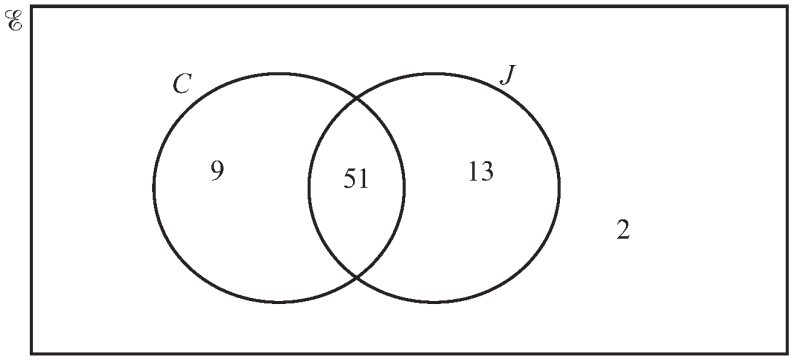
{ ..... } [1]

(ii) Find $\text{n}\left(P \cap (Q \cup R)'\right)$.

..... [1]

23 – (0580/22_Winter_2024_Q16) – *Sets*

75 people are asked if they have a car, C, and if they have a job, J.
The Venn diagram shows the results.



A person is chosen at random from those who have a car.

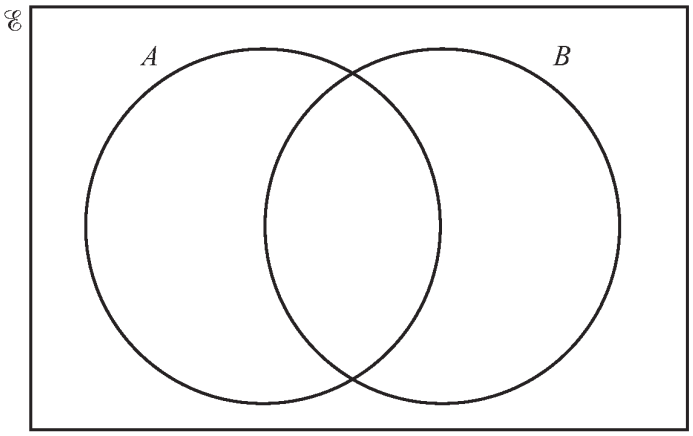
Find the probability that this person also has a job.

..... [1]

24 – (0580/22_Winter_2024_Q18) – *Sets*

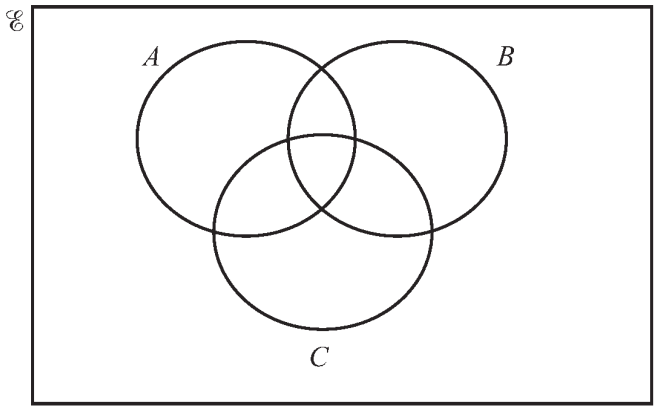
(a) $\mathscr{E} = \{8 \times 10^{-1}, \quad 0.\dot{8}, \quad 8\%, \quad \sqrt{0.08}\}$

$A = \{ a: 0.08 < a \leqslant 0.8\}$
$B = \{ b: b \geqslant 0.8\}$



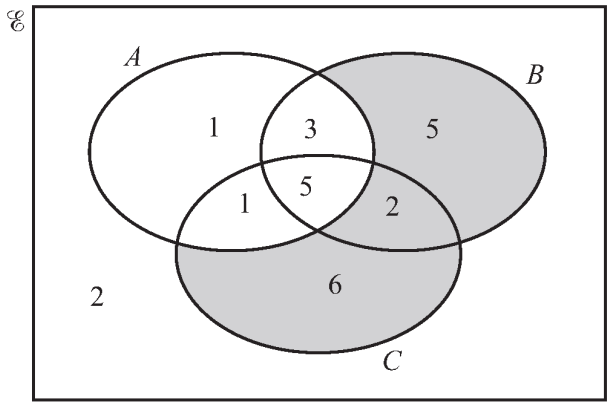
Complete the Venn diagram. [3]

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



[1]

25 – (0580/23_Winter_2024_Q21) – *Sets*



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

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

..... [1]

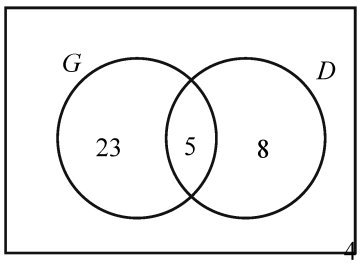
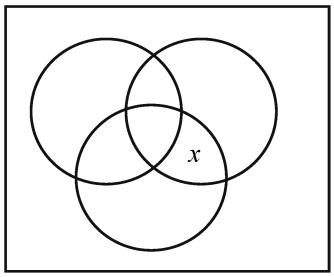
(b) Find $n(A \cap B \cap C)$.

..... [1]

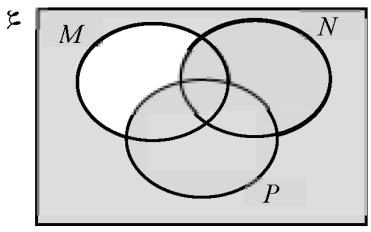
1 – (0580/22_Summer_2020_Q7) – *Sets*

	Intersection shaded	**1**	

2 – (0580/23_Summer_2020_Q19) – *Sets*

(a)(i)		**2**	**B1** for two correct
(a)(ii)	$G \cup D'$ oe	**1**	
(b)	15	**1**	
(c)		**1**	Shade whole rectangle except for region containing x

3 – (0580/21_Winter_2020_Q19) – *Sets*

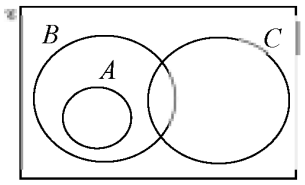
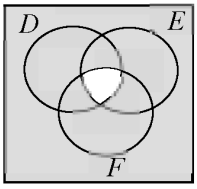
		**1**	

4 – (0580/23_Winter_2020_Q13) – *Sets*

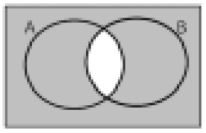
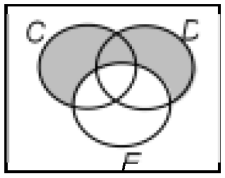
	$A' \cap B$	**1**	

5 – (0580/22_Summer_2021_Q12) – *Sets*

(a)(i)	Even square numbers oe	**1**	

(a)(ii)		1	
(b)		1	

6 – (0580/22_Winter_2021_Q19) – *Sets*

	 	2	**B1** for each

7 – (0580/23_Winter_2021_Q14) – *Sets*

(a)	b, c, d, e, f, g	1	
(b)	4	1	
(c)	3	1	

8 – (0580/22_Summer_2022_Q16) – *Sets, Probability*

(a)	$(M \cup G) \cap P'$	1	
(b)	22	1	
(c)	$\frac{8}{23}$ oe	2	**M1** for $\frac{k}{23}$ or $\frac{k}{3+9+5+6}$ or $\frac{8}{c}$ or $\frac{3+5}{c}$ $c \neq 1$ or for 8 and 23 identified

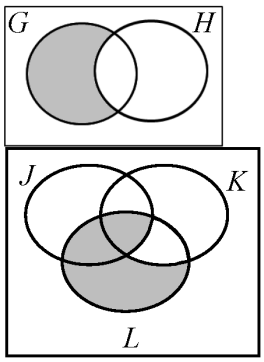
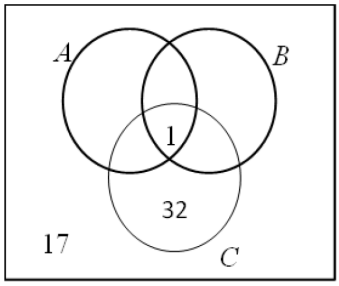
9 – (0580/23_Summer_2022_Q10) – *Sets*

	40	1	

10 – (0580/21_Winter_2022_Q7) – *Sets*

(a)	a, b, c, d	**1**	
(b)	6	**1**	

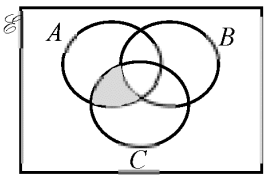
11 – (0580/22_Winter_2022_Q16) – *Sets*

(a)		**2**	**B1** for each
(b)		**2**	**B1** for 2 correct

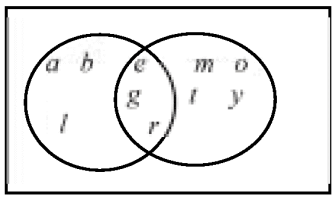
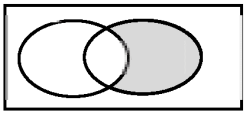
12 – (0580/22_Summer_2023_Q6) – *Sets*

(a)	4 cao	**1**	
(b)	10, 20	**1**	
(c)	An odd number or decimal in the range $1 \leqslant x \leqslant 20$	**1**	

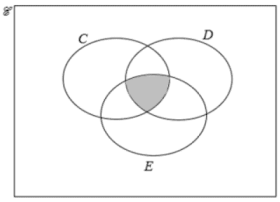
13 – (0580/22_Summer_2023_Q20) – *Sets*

	**1**	

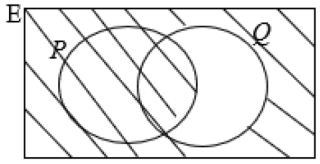
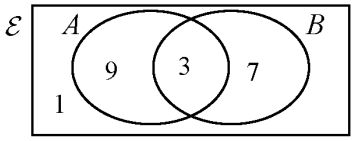
14 – (0580/23_Summer_2023_Q11) – *Sets*

(a)		**2**	**B1** for 1 region correct
(b)		**1**	

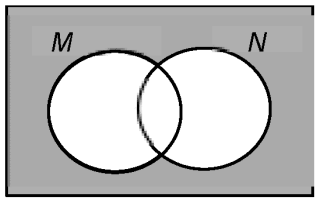
15 – (0580/21_Winter_2023_Q14) – *Sets*

(a)	9	**3**	**B2** for $x = 4$ or **B1** for answer 4 (without $x = 4$ in working) OR **M1** for $5x + x + 5 + 12 - x + 15 = 52$ oe or better **B1FT** for identifying the correct region $A \cap B$
(b)		**1**	

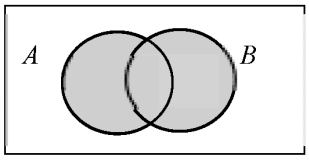
16 – (0580/22_Winter_2023_Q15) – *Sets*

(a)		**1**	
(b)		**2**	**B1** for two correct or for n(A) =12 **and** n(B) = 10 **and** n($A \cap B$) $\neq$ 0

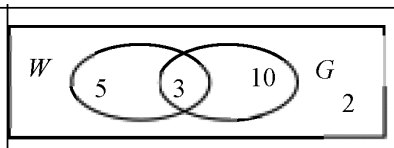
17 – (0580/21_Summer_2024_Q16) – *Sets*

(a)		**1**	
(b)	17	**1**	

18 – (0580/22_Summer_2024_Q7) – *Sets*

		**1**	

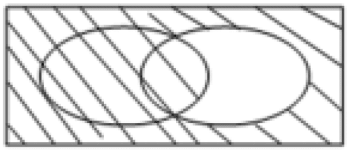
19 – (0580/22_Summer_2024_Q17) – *Sets*

		**2**	**B1** for 2 sections out of 4 correct

20 – (0580/22_Summer_2024_Q23) – *Sets*

(a)	15	**1**	
(b)	$\frac{1}{2}$ oe nfww	**2**	**M1** for $\frac{2+3}{2+1+3+4}$ oe or $1-\frac{4+1}{2+1+3+4}$ oe with either the numerator or denominator correct

21 – (0580/23_Summer_2024_Q13) – *Sets*

(a)		**1**	
(b)	$R \cap (P \cup Q)'$ or $R \cap P' \cap Q'$ oe	**1**	

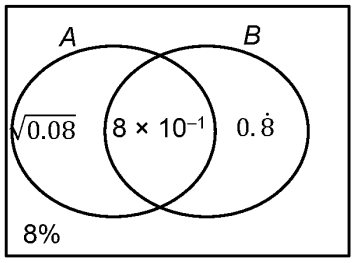
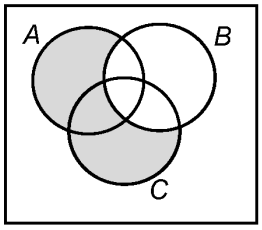
22 – (0580/21_Winter_2024_Q19) – *Sets*

(a)	9	**1**	
(b)(i)	1, 3, 4, 6, 9	**1**	
(b)(ii)	2	**1**	**FT** 5 – numbers of odds in **(b)(i)**

23 – (0580/22_Winter_2024_Q16) – *Sets*

	$\frac{17}{20}$ oe	**1**	

24 – (0580/22_Winter_2024_Q18) – *Sets*

(a)		**3**	**B2** for three correctly placed or **B1** for two correctly placed or correct conversion of 8×10^{-1}, 8% and $\sqrt{0.08}$ to 0.8, 0.08, 0.2[8…] or 0.3
(b)		**1**	

25 – (0580/23_Winter_2024_Q21) – *Sets*

(a)	$(B \cup C) \cap A'$ oe	**1**	
(b)	5	**1**	

1 – (0580/41_Summer_2020_Q5) – *Sets*

x is an integer.

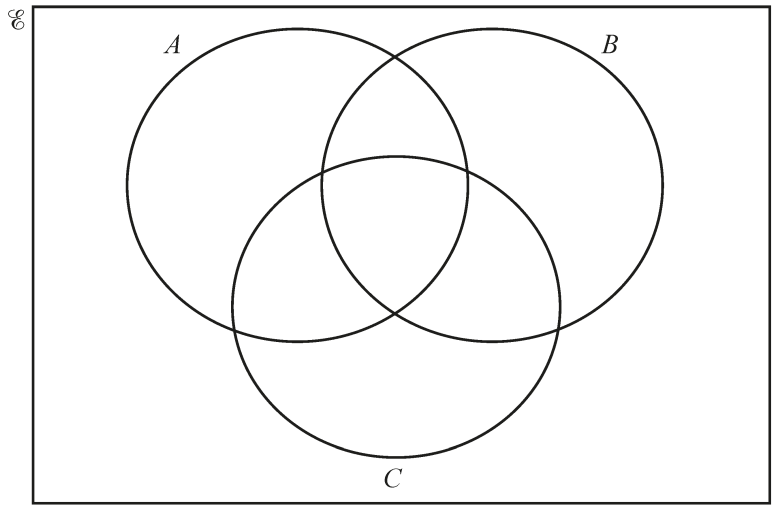
$\mathscr{E} = \{x : 41 \leqslant x \leqslant 50\}$

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

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

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

(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]

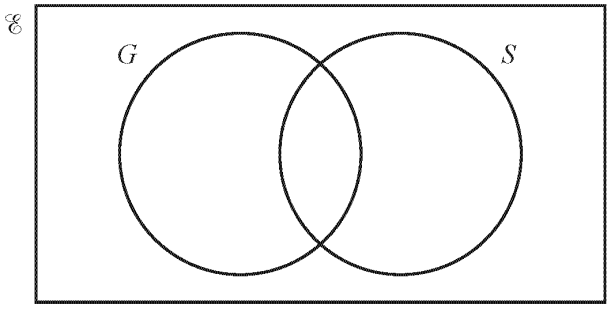
(c) Find $n(A \cap B \cap C)$.

..... [1]

2 – (0580/41_Winter_2020_Q9) – *Sets, Probability*

(a) There are 32 students in a class.

5 do not study any languages.
15 study German (G).
18 study Spanish (S).



(i) Complete the Venn diagram to show this information. [2]

(ii) A student is chosen at random.

Find the probability that the student studies Spanish but not German.

..... [1]

(iii) A student who studies German is chosen at random.

Find the probability that this student also studies Spanish.

..... [1]

(b) A bag contains 54 red marbles and some blue marbles.
36% of the marbles in the bag are red.

Find the number of blue marbles in the bag.

..... [2]

(c) Another bag contains 15 red beads and 10 yellow beads.
Ariana picks a bead at random, records its colour and replaces it in the bag.
She then picks another bead at random.

(i) Find the probability that she picks two red beads.

..... [2]

(ii) Find the probability that she does not pick two red beads.

..... [1]

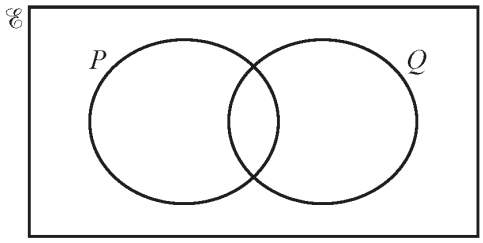
(d) A box contains 15 red pencils, 8 yellow pencils and 2 green pencils.
Two pencils are picked at random without replacement.

Find the probability that at least one pencil is red.

..... [3]

3 – (0580/41_Summer_2021_Q6) – *Sets, Probability*

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

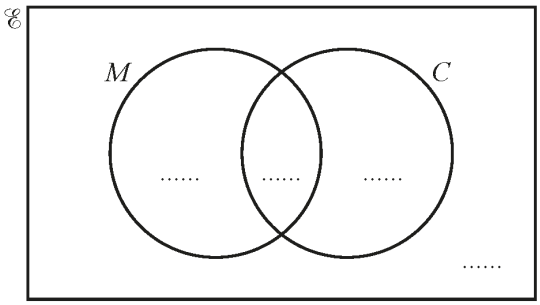


[1]

(b) There are 50 students in a group.

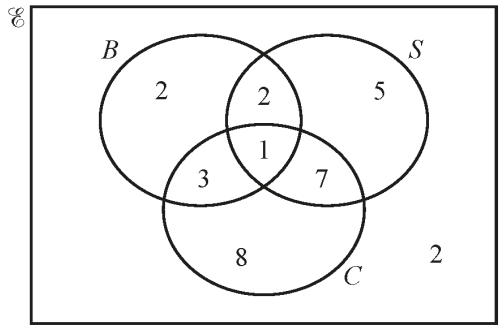
34 have a mobile phone (M).
39 have a computer (C).
5 have no mobile phone and no computer.

Complete the Venn diagram to show this information.



[2]

(c) The Venn diagram shows the number of students in a group of 30 who have brothers (B), sisters (S) or cousins (C).



(i) Write down the number of students who have brothers.

..... [1]

(ii) Write down the number of students who have cousins but do not have sisters.

..... [1]

(iii) Find $n(B \cup S \cup C)'$.

..... [1]

(iv) Use set notation to describe the set of students who have both cousins and sisters but do not have brothers.

..... [1]

(v) One student is picked at random from the 30 students.

Find the probability that this student has cousins.

..... [1]

(vi) Two students are picked at random from the students who have cousins.

Calculate the probability that both these students have brothers.

..... [3]

(vii) One student is picked at random from the 30 students.

Event A This student has sisters.
Event B This student has cousins but does not have brothers.

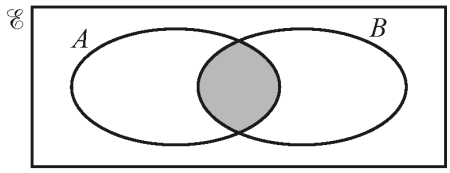
Explain why event A and event B are equally likely.

.....

..... [1]

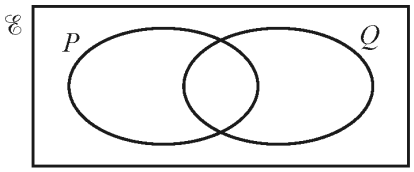
4 – (0580/41_Summer_2022_Q8) – *Sets, Probability*

(a) **(i)** Use set notation to describe the shaded region in the Venn diagram.

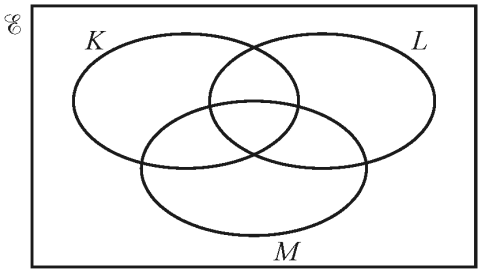


..... [1]

(ii) Shade the correct region in each Venn diagram.



$Q \cup P'$



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

[2]

(b)

V	E	N	N	D	I	A	G	R	A	M

The diagram shows 11 cards.

(i) One of these cards is chosen at random.

Write down the probability that the letter on the card is **not** A.

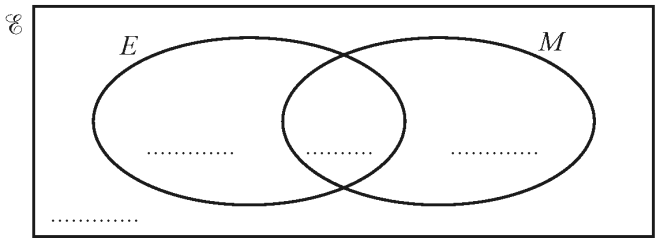
..... [1]

(ii) A card is chosen at random from these 11 cards and then replaced.
A second card is then chosen at random.

Find the probability that exactly one card has the letter N.

..... [3]

(c)



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.

(i) Complete the Venn diagram. [2]

(ii) A student is chosen at random.

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

..... [1]

(iii) Two students are chosen at random.

Find the probability that they both like mathematics.

..... [2]

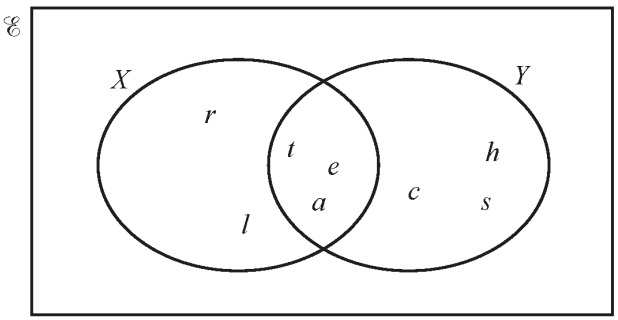
(iv) Two students who like English are chosen at random.

Find the probability that they both also like mathematics.

..... [2]

5 – (0580/41_Summer_2023_Q9) – *Sets*

(a) The Venn diagram shows set X and set Y.



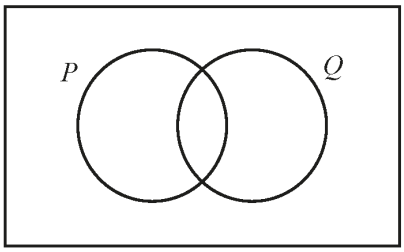
(i) List the elements of X.

..... [1]

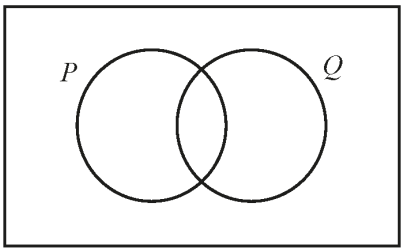
(ii) Find $n(Y')$.

..... [1]

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



$P \cup Q$



$P' \cap Q$

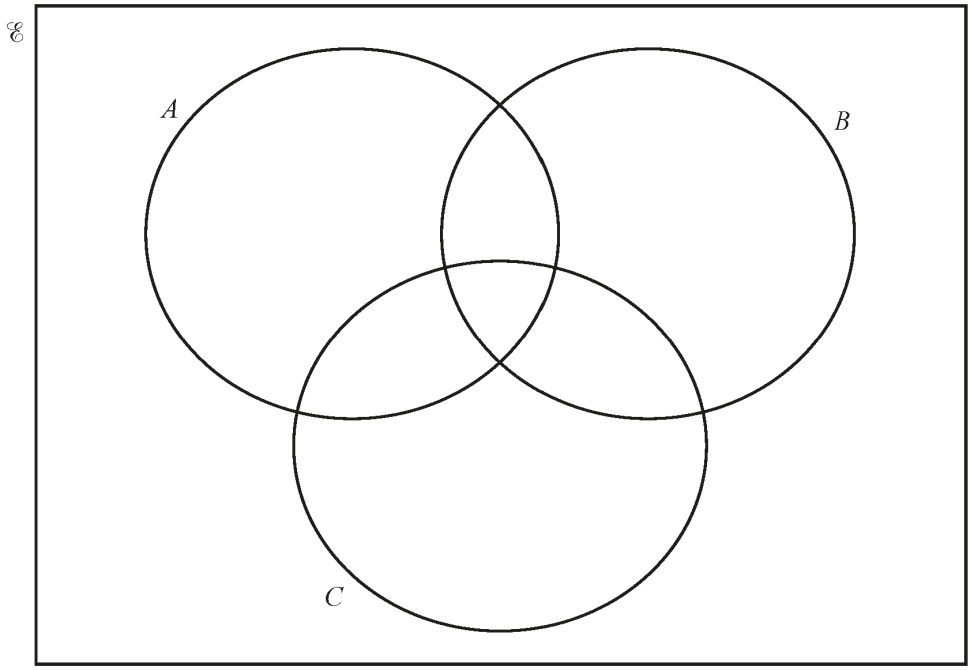
[2]

(c) $\mathscr{E} = \{\text{positive integers} < 13\}$

$A = \{x : x < 9\}$

$B = \{x : x \text{ is even}\}$

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

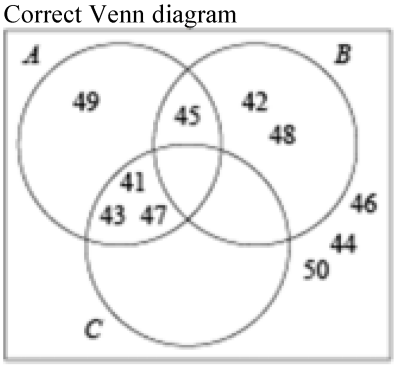


(i) Complete the Venn diagram. [3]

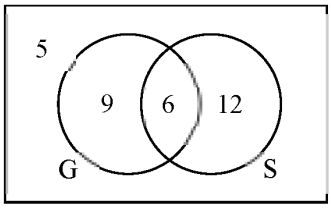
(ii) Find $\text{n}(A' \cup (B \cap C))$.

..... [1]

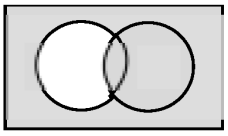
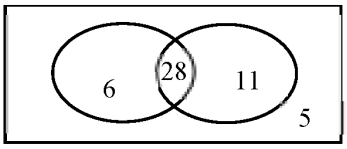
1 – (0580/41_Summer_2020_Q5) – *Sets*

(a)	Correct Venn diagram  	**3**	**B2** for 8 or 9 numbers correct or **B1** for 6 or 7 numbers correct
(b)(i)	41, 43, 47	**1**	**FT** *their* Venn diagram
(b)(ii)	44, 46, 49, 50	**1**	**FT** *their* Venn diagram
(c)	0	**1**	**FT** *their* Venn diagram

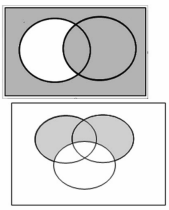
2 – (0580/41_Winter_2020_Q9) – *Sets, Probability*

(a)(i)		**2**	**B1** for two correct values Or **B1** 5 outside and total in G = 15 and total in S = 18
(a)(ii)	$\frac{3}{8}$ oe	**1**	**FT** $\frac{\textit{their } 12}{32}$
(a)(iii)	$\frac{2}{5}$ oe	**1**	**FT** $\frac{\textit{their } 6}{15}$
(b)	96	**2**	**M1** for $\frac{36}{64}=\frac{54}{x}$ oe or $36=\frac{54}{(54+b)}\times 100$ oe If 0 scored **SC**1 for answer 150
(c)(i)	$\frac{9}{25}$ oe	**2**	**M1** for $\frac{15}{25}\times\frac{15}{25}$ oe
(c)(ii)	$\frac{16}{25}$ oe	**1**	**FT** 1 – *their* **(c)(i)**
(d)	$\frac{17}{20}$ oe	**3**	**M2** for $1-\frac{10}{25}\times\frac{9}{24}$ oe or for $\frac{15}{25}\times\frac{14}{24}+\frac{15}{25}\times\frac{8}{24}+\frac{15}{25}\times\frac{2}{24}+\frac{8}{25}\times\frac{15}{24}+\frac{2}{25}\times\frac{15}{24}$ oe or **M1** for one correct relevant product

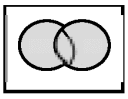
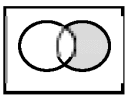
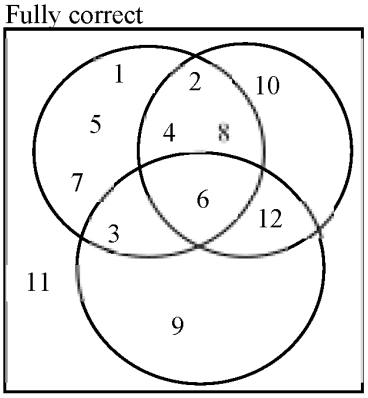
3 – (0580/41_Summer_2021_Q6) – *Sets, Probability*

(a)		**1**	
(b)		**2**	**B1** for 2 or 3 correct elements or **M1** for $34-x$, x and $39-x$ correctly placed on diagram and $x = 28$
(c)(i)	8	**1**	
(c)(ii)	11	**1**	
(c)(iii)	2	**1**	
(c)(iv)	$C \cap S \cap B'$ oe	**1**	
(c)(v)	$\frac{19}{30}$ oe	**1**	
(c)(vi)	$\frac{2}{57}$ oe	**3**	**M2** for $\frac{4}{19} \times \frac{3}{18}$ or **M1** for $\frac{4}{19}$ seen
(c)(vii)	Equal numbers 15 or equal probability $\frac{15}{30}$ oe	**1**	

4 – (0580/41_Summer_2022_Q8) – *Sets, Probability*

(a)(i)	$A \cap B$	**1**	
(a)(ii)		**2**	**B1** for each
(b)(i)	$\frac{9}{11}$	**1**	
(b)(ii)	$\frac{36}{121}$ oe	**3**	**M2** for $2 \times \frac{2}{11} \times \frac{9}{11}$ oe or **M1** for $\frac{2}{11} \times \frac{9}{11}$ oe If 0 scored **SC1** for $\frac{36}{110}$
(c)(i)	3, 5, 28, 14 correctly placed	**2**	**B1** for 28 in the intersection
(c)(ii)	$\frac{28}{50}$ oe	**1**	**FT** *their* 28 where *their* $28 < 50$
(c)(iii)	$\frac{123}{175}$ oe	**2**	**M1** for $\frac{42}{50} \times \frac{41}{49}$
(c)(iv)	$\frac{63}{88}$ oe	**2**	FT *their* 28 **M1** for $\frac{\textit{their}28}{33} \times \frac{\textit{their}28-1}{32}$

5 – (0580/41_Summer_2023_Q9) – *Sets*

(a)(i)	*r, l, t, e, a*	**1**	
(a)(ii)	2	**1**	
(b)		**1**	
		**1**	
(c)(i)	Fully correct 	**3**	**B2** for 7, 6, or 5 sections correct or **B1** for 4, 3 or 2 sections correct
(c)(ii)	5	**1FT**	strict FT from their diagram