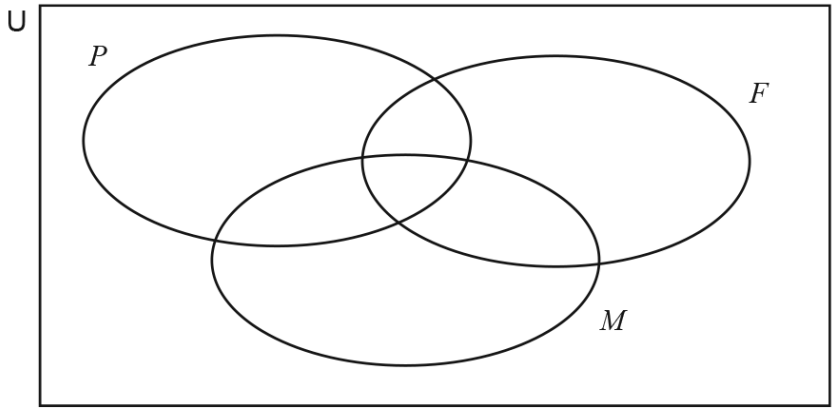
Chapter 9

Sets

01. 0607_w21_qp_43 Q: 6

The Venn diagram shows the sets P, F and M.



U = {integer values of x | $2 \leqslant x \leqslant 12$}
P = {prime numbers}
F = {factors of 12}
M = {multiples of 3}

(a) List the elements of set P and the elements of set F.

$P =$ .....

$F =$ ..... [2]

(b) Write each element of U in the correct region of the Venn diagram.

[2]

(c) List the elements of

(i) $F \cup M$,

..... [1]

(ii) $P' \cap M$,

..... [1]

(iii) $(P \cup F \cup M)'$.

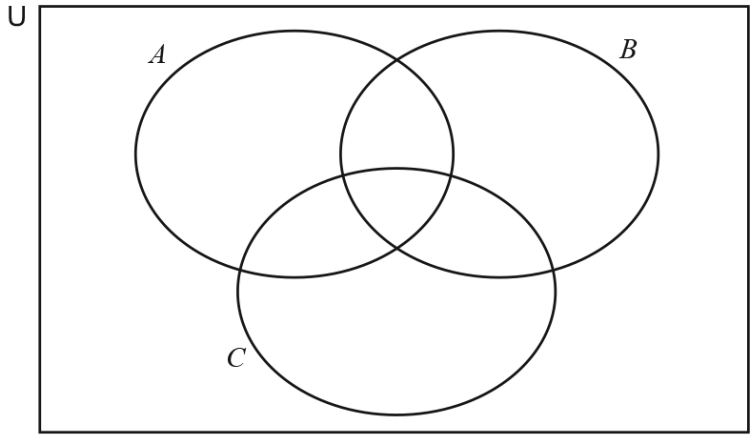
..... [1]

(d) Find $\mathrm{n}((P \cap F)' \cap M)$.

..... [1]

02. 0607_s19_qp_43 Q: 5

The Venn diagram shows the sets A, B and C.



$U = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
$A = \{\text{prime numbers}\}$
$B = \{\text{factors of } 12\}$
$C = \{\text{multiples of } 3\}$

(a) List the elements of set A.

..... [1]

(b) Write all the elements of U in the correct parts of the Venn diagram above. [3]

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

..... [1]

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

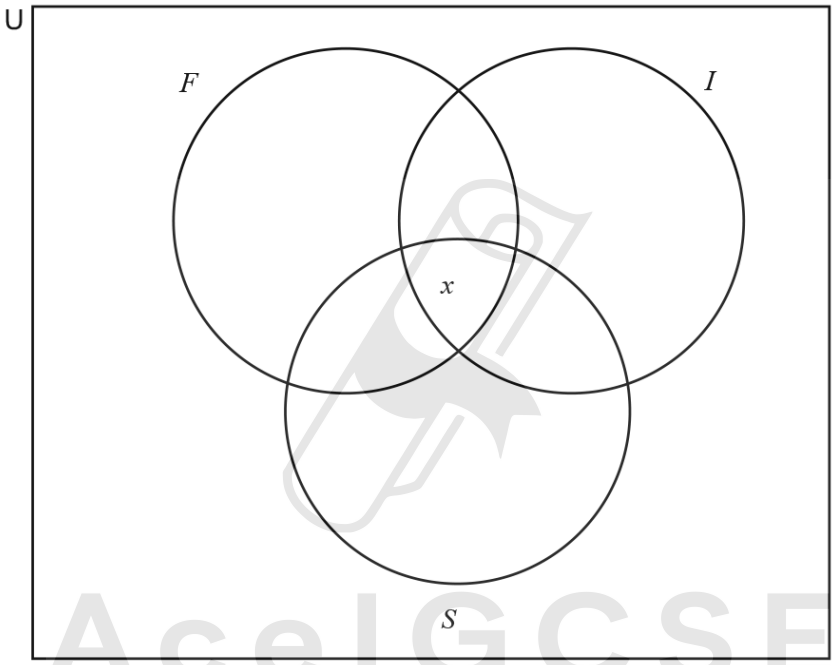
..... [1]

03. 0607_w19_qp_42 Q: 8

There are 100 students in a year group.
Each student studies at least one of the languages, French (F), Italian (I) and Spanish (S).

x students study all 3 languages.
y students study French only.
18 students study Italian only.
4 students study French and Italian but not Spanish.
12 students study French and Spanish but not Italian.
2 students study Italian and Spanish but not French.
74 students study only one language.

(a) Show this information on the Venn diagram.



[2]

(b) Twice as many students study French as Italian.

Find the number of students who study

(i) all 3 subjects,

$x =$ ..... [2]

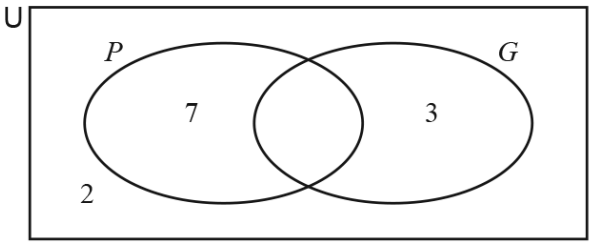
(ii) French only,

$y =$ ..... [2]

(iii) Spanish only.

..... [1]

04. 0607_s16_qp_42 Q: 9



The Venn diagram shows the following information.

U = {students in a music group} P = {students who play the piano} G = {students who play the guitar}

$$\mathrm{n}(P \cup G)' = 2 \qquad \mathrm{n}(P \cap G') = 7 \qquad \mathrm{n}(G \cap P') = 3.$$

(a) $\mathrm{n}(\mathsf{U}) = 23$

Find $\mathrm{n}(P \cap G)$.

..... [1]

(b) A student is chosen at random from the music group.

Find the probability that this student plays the piano but does not play the guitar.

..... [1]

(c) Two students who play the guitar are chosen at random.

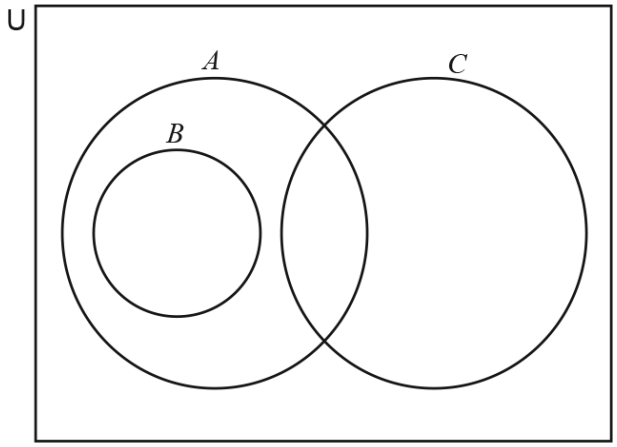
Find the probability that they both also play the piano.

..... [3]

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

05. 0607_s15_qp_41 Q: 6

The Venn diagram shows the sets A, B and C.



$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$
$A = \{\text{factors of } 12\}$
$B = \{\text{factors of } 6\}$
$C = \{11, 12, 13, 14\}$

(a) List the elements of sets A and B.

Answer(a) $A = \{$ ..... $\}$

$B = \{$ ..... $\}$ [2]

(b) Write all the elements of U in the correct regions of the Venn diagram above. [3]

(c) List the elements of

(i) $A \cap B$,

Answer(c)(i) $\{$ ..... $\}$ [1]

(ii) $A' \cap C$,

Answer(c)(ii) $\{$ ..... $\}$ [1]

(iii) $B \cup C'$.

Answer(c)(iii) $\{$ ..... $\}$ [1]

(d) Find

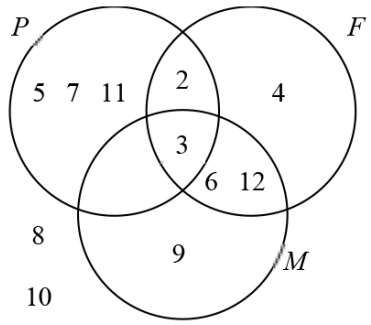
(i) $n(A \cup B \cup C)'$,

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

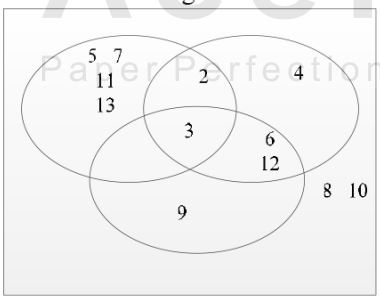
(ii) $n(A \cap B \cap C)'$.

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

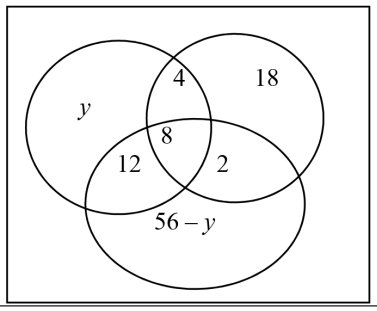
01. 0607_w21_ms_43 Q: 6

Question	Answer	Marks	Partial Marks
(a)	[P =] 2, 3, 5, 7, 11 [F =] 2, 3, 4, 6, 12	**2**	**B1** for each
(b)		**2**	**FT** *their* **(a)** **B1** for at least 8 values correct
(c)(i)	2, 3, 4, 6, 9, 12	**1**	**FT** *their* Venn diagram
(c)(ii)	6, 9, 12	**1**	**FT** *their* Venn diagram
(c)(iii)	8, 10	**1**	**FT** *their* Venn diagram
(d)	3	**1**	**FT** *their* Venn diagram

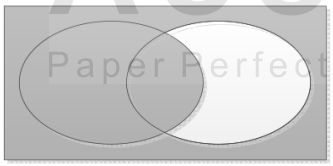
02. 0607_s19_ms_43 Q: 5

Question	Answer	Marks	Partial Marks
(a)	2, 3, 5, 7, 11, 13	**1**	
(b)	Correct Venn diagram 	**3**	**B2** for 1 or 2 errors/omissions or **B1** for 3 or 4 errors/omissions
(c)	8, 9, 10	**1**	**FT** *their* Venn diagram
(d)	4	**1**	**FT** *their* Venn diagram

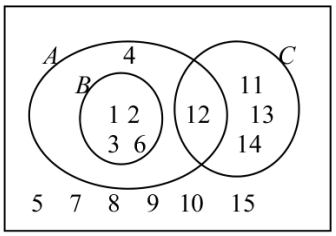
03. 0607_w19_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct Venn diagram 	2	**B1** for 2, 4, 12, 18 correct **B1** for y and $56-y$ correct oe
(b)(i)	8	2	**M1** for $100 = 74 + 18 + x$ oe
(b)(ii)	40	2	**M1** for $16 + \textit{their}(x) + y = 2(24 + \textit{their}(x))$ oe
(b)(iii)	16	1	**FT** $56 - \textit{their}$ **(b)(ii)** ($\textit{their}$ **(b)(ii)** $\leqslant 56$)

04. 0607_s16_ms_42 Q: 9

Question	Answer	Mark	Part Marks
(a)	11	1	
(b)	$\frac{7}{23}$ oe	1	
(c)	$\frac{110}{182}$ oe	3	**M2** for $\frac{\textit{their}(a)}{\textit{their}(a)+3} \times \frac{\textit{their}(a)-1}{\textit{their}(a)+2}$ or **M1** for a single product of two fractions with first fraction $\frac{\textit{their}(a)}{\textit{their}(a)+3}$
(d)		1	

05. 0607_s15_ms_41 Q: 6

Qu.	Answer	Mark	Part Marks
(a)	$A = \{1, 2, 3, 4, 6, 12\}$ $B = \{1, 2, 3, 6\}$	**1** **1**	
(b)		**3**	**B1** for 4 in correct position **B1** for 12 in correct position

Qu.	Answer	Mark	Part Marks
(c) (i)	{1, 2, 3, 6}	**1FT**	**FT** from *their* diagram
(ii)	{11, 13, 14}	**1FT**	**FT** from *their* diagram
(iii)	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15}	**1FT**	**FT** from *their* diagram
(d) (i)	6	**1FT**	**FT** from *their* diagram
(ii)	15	**1FT**	**FT** from *their* diagram