SET THEORY-1

1.

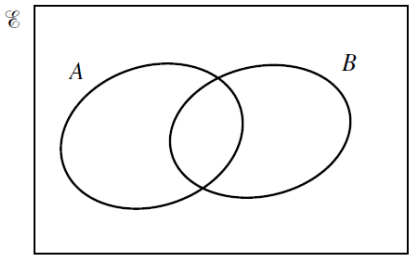


Diagram 1

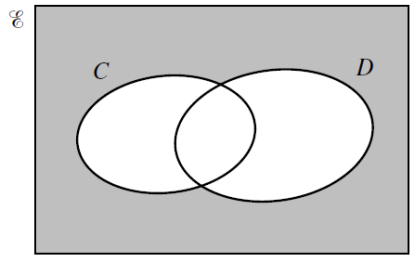


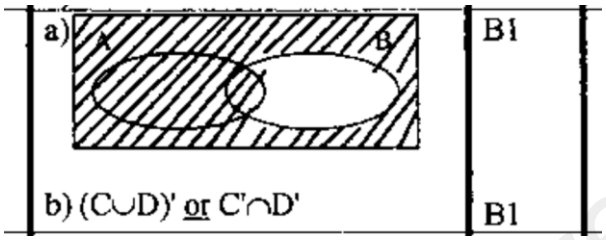
Diagram 2

(a) In Diagram 1, shade the area which represents $A \cup B'$. [1]

(b) Describe in set notation the shaded area in Diagram 2.

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

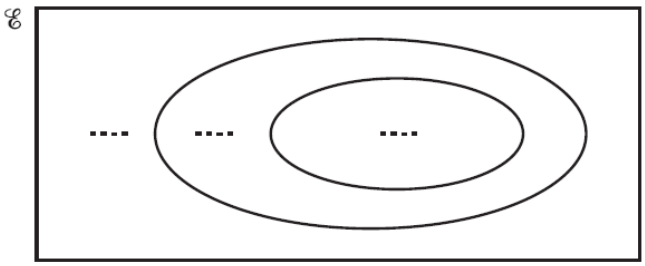
MS-1



2.

$n(A) = 18$, $n(B) = 11$ and $n(A \cup B)' = 0$.

(a) Label the Venn diagram to show the sets A and B where $n(A \cup B) = 18$.
Write down the number of elements in each region.

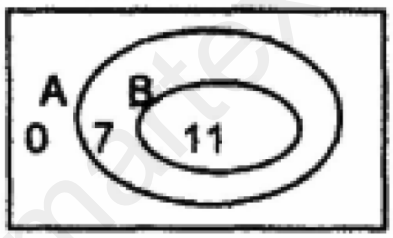
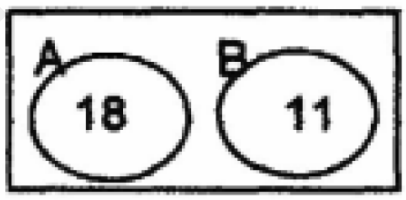


[2]

(b) Draw another Venn diagram to show the sets A and B where $n(A \cup B) = 29$.
Write down the number of elements in each region.

[2]

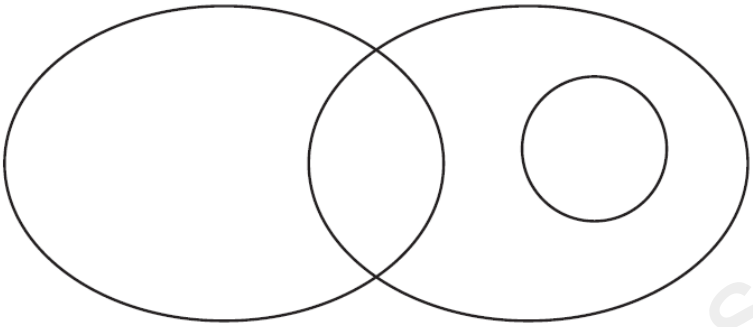
MS-2

(a)		**2**	**B1** numbers **B1** labels
(b)		**2**	**B1** numbers **B1** labels Allow 0 in an intersection of A and B

3.

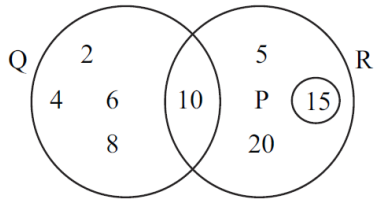
$Q = \{2, 4, 6, 8, 10\}$ and $R = \{5, 10, 15, 20\}$.
$15 \in P$, $n(P) = 1$ and $P \cap Q = \varnothing$.

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



[3]

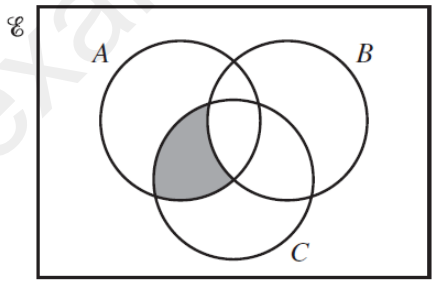
MS-3



3

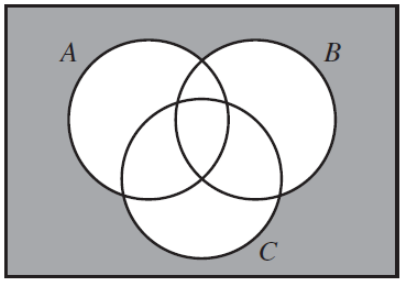
M1 15 only in small circle
M1 10 only in the intersection
A1 all correct including labels

4.

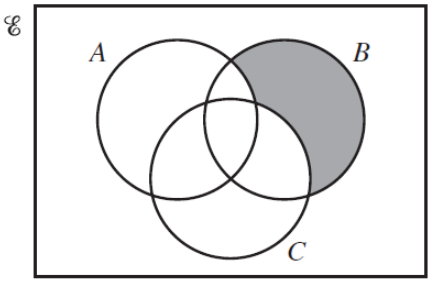


The shaded area in the diagram shows the set $(A \cap C) \cap B'$.

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



.....

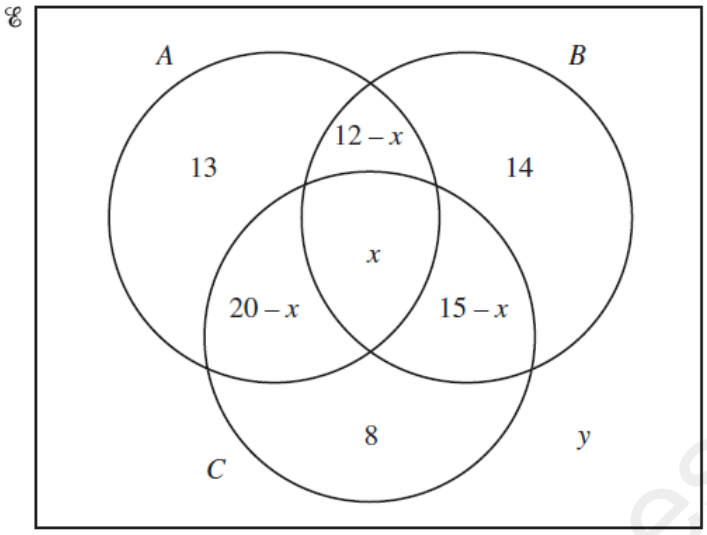


.....

[2]

MS-4	$(A \cup B \cup C)'$ $(A \cup C)' \cap B$	1 1	or $A' \cap B' \cap C'$ or $A' \cap (B \cup C)'$ or $A' \cap C' \cap B$

5.



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.

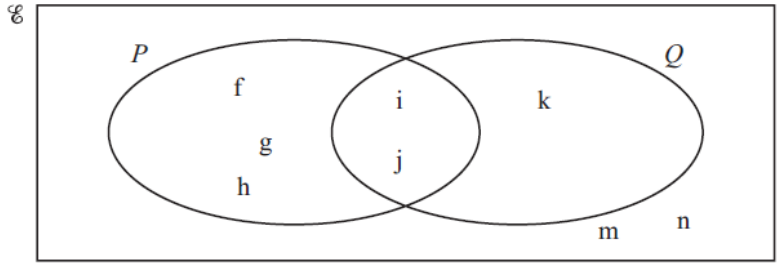
Answer(b) $y =$ ..... [1]

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

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

MS-5	**(a)**	4	**2**	**M1** for attempt at sum of all numeric and x terms equated to 74
	(b)	26	**1FT**	$=18 + 2 \times$ their (a)
	(c)	8	**1**	

6



(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]

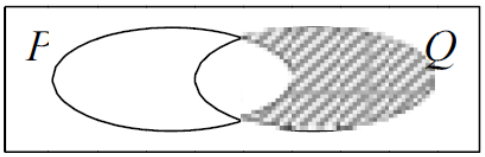
(c) On the Venn diagram shade the region $P' \cap Q$. [1]

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

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

[1]

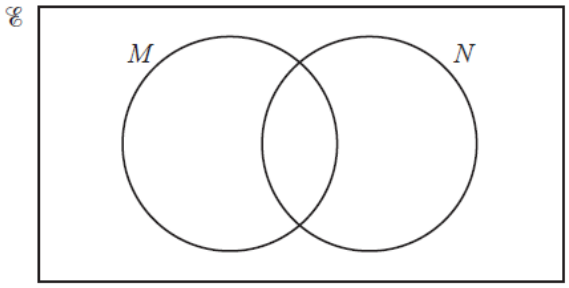
MS-6

(a)	i, j	**1**
	i, j, k, m, n	**1**
	2	**1**
(b)	$\frac{2}{3}$	**1**
(c)		**1**
(d)	$\subset$ or $\subseteq$	**1**

7

(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]

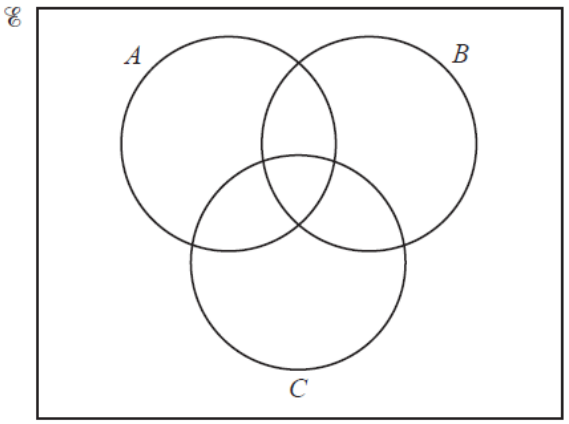
(ii) Write down the set $M \cap N$.

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

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

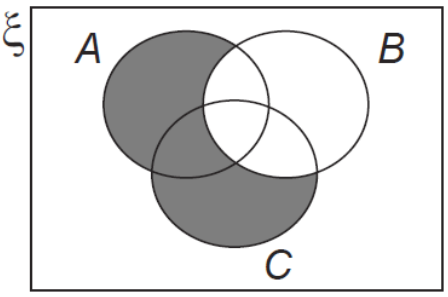
Answer(a)(iii) $P = \{$ ..... $\}$ [1]

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

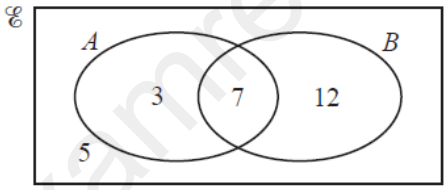


[1]

MS-7

(a) (i)	4	**1**
(ii)	{3, 9}	**1**
(iii)	fewer than 6 numbers from {1, 3, 5, 7, 9, 11} or ∅	**1**
(b)		**1**

8



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]

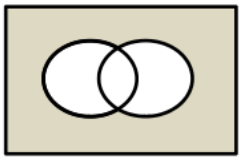
(c) An element is chosen at random from set A.

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]

MS-8

(a)	3	**1**	
(b)	$\frac{19}{27}$ oe	**1**	
(c)	$\frac{7}{10}$ oe	**1**	
(d)		**1**	

9

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

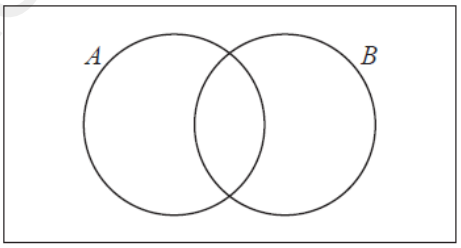
(i) Find n(M).

..... [1]

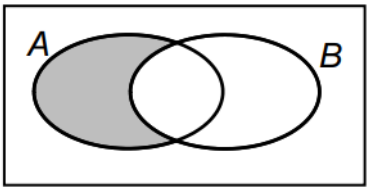
(ii) Write down the set $(P \cup M)'$.

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

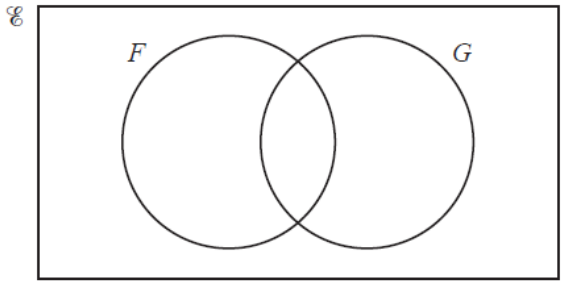
(b) On the Venn diagram, shade $A \cap B'$.



[1]

MS-9	**(a) (i)**	8	**1**
	(ii)	9, 15	**1**
	(b)		**1**

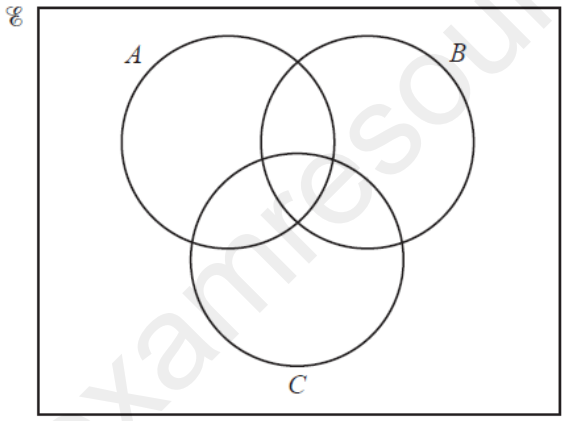
10 **(a)** In this Venn diagram, shade the region $F \cup G'$.



[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.

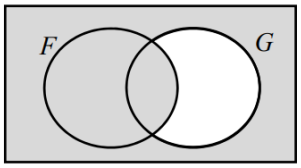
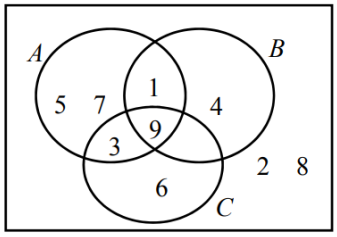


[2]

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

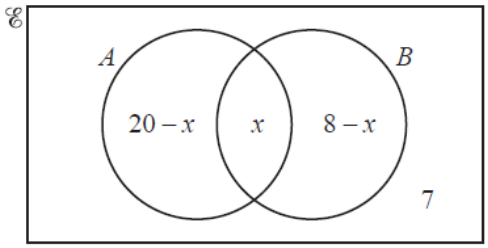
Write down a possible value for this number.

..... [1]

MS-10	(a)		**1**	
	(b)(i)		**2**	**B1** for four out of the eight regions correct
	(b)(ii)	Any even square number that is also a multiple of 3	**1**	

11

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]

MS-11

(a)	5	**3**	**M2** for $20 - x + x + 8 - x = 23$ or better or **B1** for identifying the correct region $A \cup B$
(b)	$\frac{7}{30}$ oe	**2**	**B1** for $\frac{7}{c}$ or $\frac{k}{30}$