Name:

Section:

SETS WORKSHEET

1 **(a)** $\mathscr{E} = \{x : x \text{ is an integer } 10 \leqslant x \leqslant 40\}$
$P = \{x : x \text{ is a multiple of } 6\}$
$Q = \{x : x \text{ is a square number}\}$

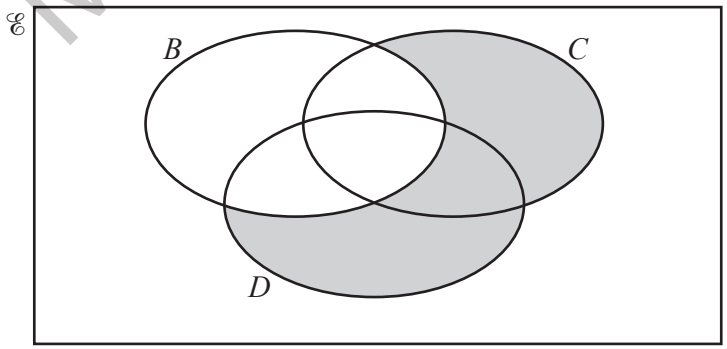
(i) Write down the elements of $P \cup Q$.

..... [1]

(ii) Find $\mathrm{n}(P' \cap Q)$.

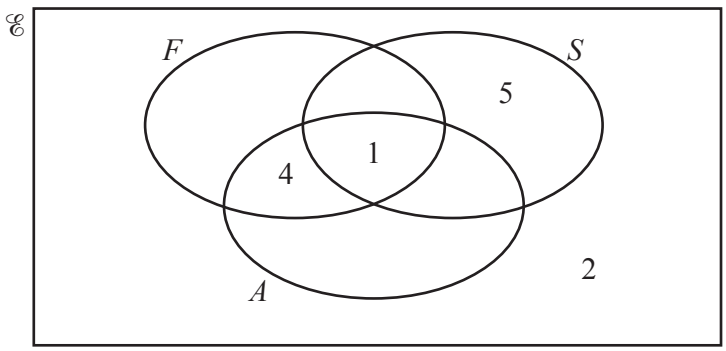
..... [1]

(b) Use set notation to describe the shaded region in the Venn diagram.



..... [1]

(c) In a college, students can study French (F), Spanish (S) and Arabic (A).
A group of 25 students are asked which languages they study.
Some of the results are shown in the Venn diagram.



(i) All students who study both Arabic and Spanish also study French.
7 students study French only.
8 students study Arabic.

Use this information to complete the Venn diagram.

[2]

2 **(a)** $\mathscr{E} = \{a, b, c, d, e, f, g, h, i, j\}$
$P = \{a, e, i\}$
$Q = \{f, g, h, i, j\}$
$R = \{c, d, e, f, g\}$

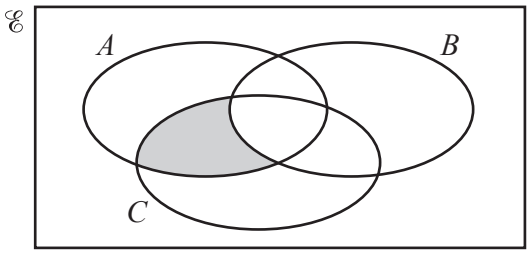
(i) Find $P \cup Q$.

..... [1]

(ii) Find $n(P' \cap (Q \cup R))$.

..... [1]

(b)



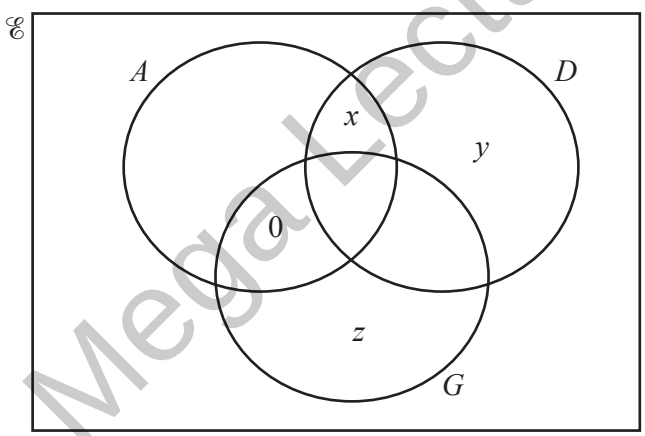
Use set notation to describe the shaded subset in the Venn diagram.

..... [1]

3 40 students can take part in three activities, Art (A), Dancing (D) and Gardening (G).

- 5 do not take part in any of the activities
- 12 do Art only
- 4 do Dancing and Gardening but not Art
- 1 student does all three activities

(a) Complete the Venn diagram.



[2]

(b) On the Venn diagram, the ratio $x : y : z = 1 : 2 : 3$.

Find the value of each of x, y and z.

$x =$ .....

$y =$ .....

$z =$ ..... [3]

(c) One subset in the Venn diagram in **part (a)** has no students.

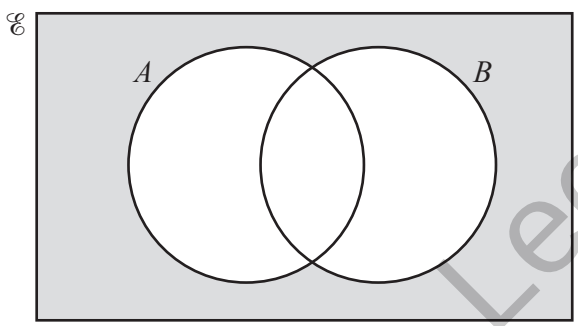
Use set notation to describe this subset.

..... [1]

(d) Find $\mathrm{n}((D \cup G) \cap A)$.

..... [1]

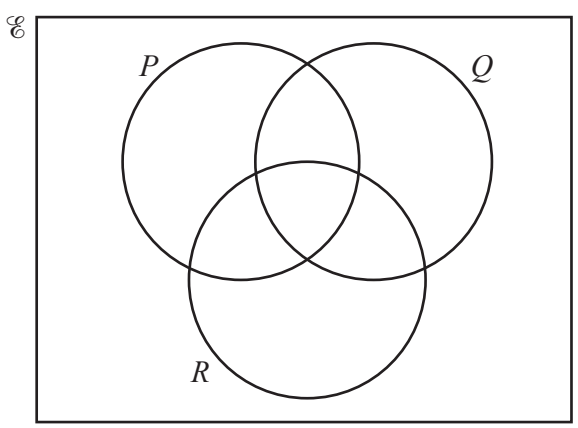
4 **(a)** Use set notation to describe the subset shaded in the Venn diagram.



..... [1]

(b) $\mathscr{E} = \{ 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \}$
$P = \{ x : x \text{ is a factor of } 36 \}$
$Q = \{ x : x \text{ is a multiple of } 4 \}$
$R = \{ x : 3 \leqslant x \leqslant 6 \}$

(i) Complete the Venn diagram.



[3]

(ii) List the elements of $P \cap (Q \cup R)'$.

..... [1]

(iii) Find $\mathrm{n}(P \cup Q)$.

..... [1]

(iv) Use set notation to complete the statement.

..... $= \varnothing$ [1]

5 **(a)** $P = \{ 1, 2, 3, 4, 5, 6, 7, 8 \}$

$Q = \{ 1, 3, 5, 7, 9, 11 \}$

Find $\mathrm{n}(P \cup Q)$.

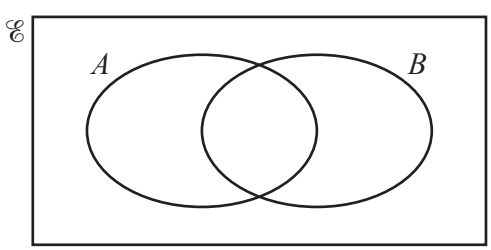
..... [1]

(b) $p \in A \cap B$

$q \in (A \cup B)'$

$r \in A \cap B'$

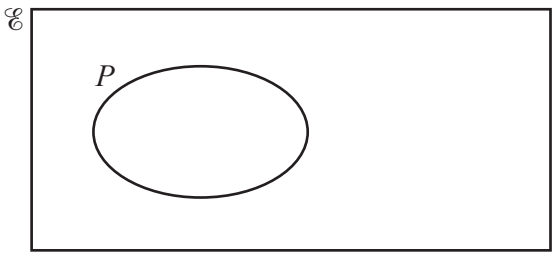
On the Venn diagram below, write each of the letters p, q and r in its appropriate subset.



[3]

6 $Q \subset P$
$P \cap R = \varnothing$

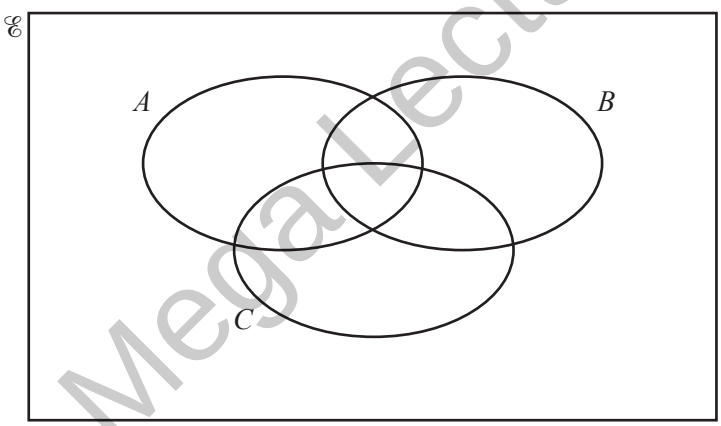
Complete the Venn diagram to show sets Q and R.



[2]

7 **(a)** $\mathscr{E} = \{x : x \text{ is an integer } 1 \leqslant x \leqslant 16\}$
$A = \{x : x \text{ is an even number}\}$
$B = \{x : x \text{ is a square number}\}$
$C = \{x : x \text{ is a factor of } 100\}$

(i) Complete the Venn diagram.



[3]

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

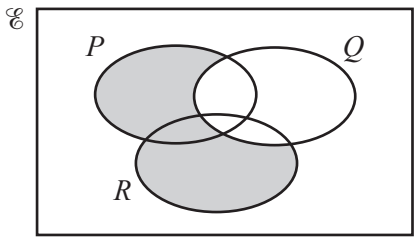
..... [1]

(iii) $p \in A \cap C$

Write down all the possible values of p.

..... [1]

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



..... [1]

(b) $\mathscr{E} = \{x : x \text{ is a positive number}\}$
$A = \{x : 9 < x < 10\}$
$B = \{x : x \text{ is an irrational number}\}$

Write down an element of $A \cap B$.

..... [2]

9 $\mathscr{E} = \{ 0, 1, 2, 3, 4, 5, 6 \}$
$P = \{ x : x = 0, 1, 2 \}$
$Q = \{ y : y = 0, 2 \}$

(a) List the members of $P \cap Q$.

Answer ..... [1]

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

Answer .....

(c) $R = \{ z : z = 2x + y,\ x \in P,\ y \in Q \}$

List the members of R.

Answer ..... [2]

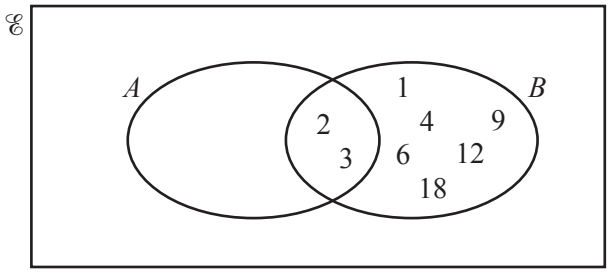
10 In a group of 35 people,

22 are wearing spectacles,
10 are wearing a hat,
6 are wearing spectacles and a hat.

By drawing a Venn diagram, or otherwise, find the number of people who are wearing neither spectacles nor a hat.

Answer ..... [2]

11 **(a)** $\mathscr{E} = \{x : x \text{ is an integer } 1 \leqslant x \leqslant 18\}$
$A = \{x : x \text{ is a prime number}\}$
$B = \{1, 2, 3, 4, 6, 9, 12, 18\}$



(i) Complete the Venn diagram to illustrate this information. [1]

(ii) Complete the description of the set B.

Answer $B = \{ x : x \text{ is a factor of } \ldots\ldots\ldots \}$ [1]

(iii) Find $\text{n}(A \cup B)$.

Answer ..... [1]

(iv) List the elements of $A' \cap B$.

Answer ..... [1]

12 **(a)** $\mathscr{E} = \{x : x \text{ is an integer and } 10 \leqslant x \leqslant 20\}$

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

$B = \{x : x \text{ is a multiple of } 5\}$

(i) Find $\text{n}(A \cap B)$.

Answer ..... [1]

(ii) Find $A' \cup B$.

Answer ..... [1]

(iii) A number, r, is chosen at random from $\mathscr{E}$.

Find the probability that $r \in A \cup B$.

Answer ..... [1]

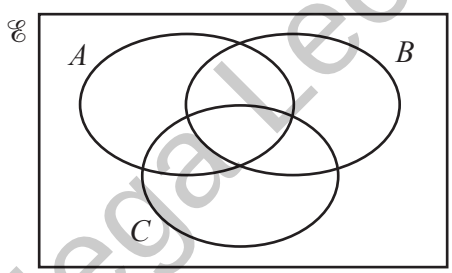
(b) In a survey, 40 people were asked what they had read that day.

- A total of 10 people had read a book
- A total of 24 people had read a newspaper
- 14 people had read neither a book nor a newspaper

(i) By drawing a Venn diagram, or otherwise, find the number of people who had read both a book and a newspaper.

Answer ..... [2]

13 **(a)** In the Venn diagram, shade the region which represents the subset $(A \cap B') \cup C$.



[1]

(b) In a group of 36 students,

23 study Spanish,
17 study French,
4 study neither Spanish nor French.

By drawing a Venn diagram, or otherwise, find the number of students who study both Spanish and French.

Answer ..... [2]

14 **(a)** $\mathscr{E} = \{ 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \}$
$A = \{ x : x \text{ is a prime number} \}$
$B = \{ x : x \text{ is an even number} \}$
$C = \{ x : x \text{ is a multiple of 5} \}$

(i) List the members of the subsets

(a) $B \cap C$,

Answer ..... [1]

(b) $(A \cup B \cup C)'$,

Answer ..... [1]

(c) $A \cap B'$.

Answer ..... [1]

(ii) A number q is chosen at random from $\mathscr{E}$.

Find the probability that $q \in A \cap B'$.

Answer ..... [1]

15 50 students are asked what type of movie they like to watch.
Of these students,

- 26 like comedy,
- 15 like both action and comedy and
- 8 like neither action nor comedy.

Using a Venn diagram, or otherwise, find the number of students who like action but not comedy.

Answer ..... [2]

16 **(a)** In a group of students

30 play cricket,
38 play football and
9 play neither cricket nor football.

Find the lowest possible number of students in the group.

Answer ..... [2]

(b) In a group of 25 people,
11 people own both a bicycle and a skateboard,
6 people own neither a bicycle nor a skateboard,
n people own a bicycle.

Find the smallest and the largest possible values of n.

Answer smallest ..... [1]

largest ..... [1]