Q1

1a

(i) List the letters that appear in set *A* 'and' set *B*.

p, r, a [1]

(ii) List the letters that appear in set *B* 'or' set *C*.

p, r, a, r, i, s, b, u, d, e, t [1]

1b

Identify which set has no letters in common with set *A*.

$$A \cap E = \emptyset$$

Prague and Lisbon have no letters in common [1]

Correct letter and explanation required for the mark

Q2-3

2a

Since both 4 and 8 are in the intersection of set *B* they must both be in set *B*.

Set *B* contains 3 elements and the universal set is even numbers, so any even number that is not in set *A* could be the third number in set *B*.

4, 8, 12 [1]

2b

The universal set contains even numbers.

There is no intersection between set *A* and set *C*, so any elements that are in set *A* cannot be in set *C*.

List and three even numbers that are not in set *A*.

14, 16, 18 [1]

3a

List the elements that are in set *S* 'and' in set *V*.

i, a [1]

3b

List the elements that are in set *S* 'or' set *V*.

c, h, i, n, a, t, l, y [1]

Q4

4a

Write down the elements that appear in set *A* 'or' set *B*.

1, 2, 3, 4, 5, 6, 7, 9

Write down the number of elements in the list.

8 [1]

4b

The elements in the universal set are integers between 1 and 10.

The elements in the intersection of set *A* and set *C* must be in set *C*.

There are 4 elements in set *C*, so list 4 and 5 from the intersection along with two other integers between 1 and 10 that do not appear in set *A*.

4, 5, 8, 10 [1]

5

Q5

5

The number of people who don't own a cat or a dog can be written outside the circles but inside the box.

Add up the the number of people who owned a cat, owned a dog and owned neither.
Subtract it from the total number of people who were surveyed to find the number of people who owned both a cat and a dog.

$$30 + 25 + 6 = 61$$

$$61 - 50 = 11$$

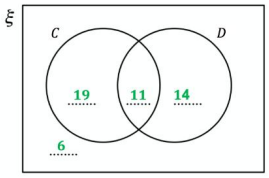
Find the number of people who owned a cat only by subtracting the number of people who owned a cat and a dog from the number of people who owned a cat.

$$30 - 11 = 19$$

Find the number of people who owned a dog only by subtracting the number of people who owned a cat and a dog from the number of people who owned a dog.

$$25 - 11 = 14$$

Write the values in the appropriate sections of the Venn diagram.



Correct value for the intersection [1]
Correct value in another section [1]
Fully correct Venn diagram [1]

Q6-7

6

i) List the members of the set that are in A "and" B; the odd multiples of 3.

21, 27 [1]

ii) List the members of the set that are in A "or" B; that are odd or are multiples of 3 (or both).

21, 23, 24, 25, 27, 29 [1]

7a

i) List the members of the set that are in A "and" B.

24, 30 [1]

It is helpful, though not essential, to realise that A is the set of even numbers and B is the set of multiples of 3.

ii) List the members of the set that are not in A.

21, 23, 25, 27, 29 [1]

It is helpful, though not essential, to realise that A is the set of even numbers so A' is the odd numbers.

7b

23, 25, 29 are not in A or B.

$(A \cup B)'$ or $A' \cap B'$ [1]

Writing $(A \cap B)'$ is a common mistake here which will receive no marks

Q8-9

8a

i) $B \cup I$ means the members of set B or set I. Write the letters that are in brazil or in ireland, without repeats.

b, r, a, z, i, l, e, n, d [1]

the letters can be given in any order but must not contain repeats

ii) $B \cap I'$ means the members of set B that are not in set I. Write the letters that are in brazil and not in ireland.

b, z [1]

the letters can be given in either order

8b

"$B \cap K = \varnothing$" means "$B \cap K$ is an empty set". In other words, there are no letters that appear in both brazil and in kenya.

"a" appears in both Brazil and Kenya so $B \cap K$ is not an empty set [1]

9a

i) $B \cup G$ means the members of set B or set G. Write the letters that are in blue or in grey, without repeats.

b, l, u, e, g, r, y [1]

the letters can be given in any order but must not contain repeats

ii) $W \cap G'$ means the members of set B that are not in set G. Write the letters that are in white and not in grey.

w, h, i, t [1]

the letters can be given in any order

9b

"$B \cap G \cap W = \varnothing$" means "$B \cap G \cap W$ is an empty set". In other words, there are no letters that appear in blue and in grey and in white.

No, because "e" appears in all three words ($B \cap G \cap W$ is not an empty set)

"Serena's statement is not correct" plus a valid reason [1]

Q10

10

i) $A \cap B$ means the elements that are in both set A and set B.

2, 4, 6, 12 [1]

ii) B' means the elements that are not in set B.

5, 7, 8, 9, 10, 11, 13, 14 [1]

These elements can be written in any order

Q11

11a

$A \cap B = \varnothing$ means $A \cap B$ is an empty set, in other words there are no elements that appear in both A and B.

Because there are no numbers which appear in both *A* and *B* [1]

11b

"$x \in \mathscr{E}$" means that x is a member of the universal set and "$x \notin A \cup B$" means that x is not a member of set A or set B.

1 and 9 [1]

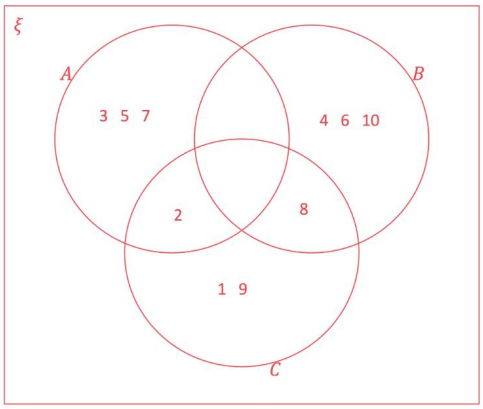
11c

You might find it useful to draw a Venn diagram to represent the information given.

$A \cup B \cup C = \mathscr{E}$ tells you there are no numbers outside $A \cup B \cup C$

$A \cap C = \{2\}$ tells you that 2 appears in both A and C.

$B \cap C' = \{4, 6, 10\}$ tells you that neither 4, 6 nor 10 appear in C (but 8 does as 8 is in B).



correct Venn diagram, or 3 correct values in final answer [1]

Write down all the values in C as the final answer.

1, 2, 8, 9 [1]

The values may be written in any order