Question 1
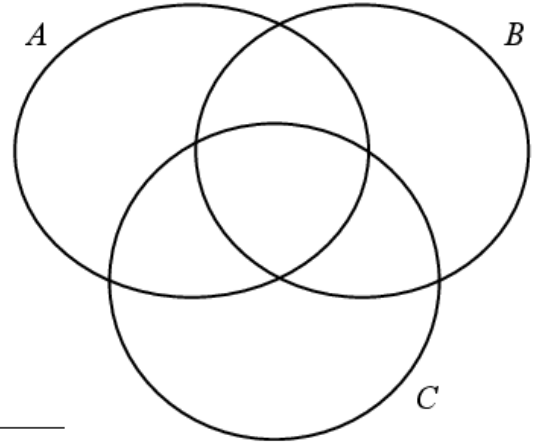
(a) The sets A, B, and C are as follows:

$A = \{2, 3, 4, 5, 6\}$, $B = \{2, 4, 6, 8, 10\}$, and $C = \{1, 4, 8, 12, 14\}$.

(i) Complete the Venn diagram.

(ii) List the elements of each of the following sets:

$A \cap B =$ _____

$B \setminus (A \cap C) =$ _____

$(B \setminus A) \cup (B \setminus C) =$ _____

(iii) Write down a null set, in terms of A, B, and C. _____

Question 2

(b) In a table quiz, 100 questions were asked. Team M answered 72 questions correctly. Team N answered 38 questions correctly.

(i) Find, with the aid of the Venn diagram, the minimum number of questions answered correctly by both teams.

Minimum =

U

M   N

(ii) Find, with the aid of the Venn diagram, the maximum number of questions answered correctly by both teams.
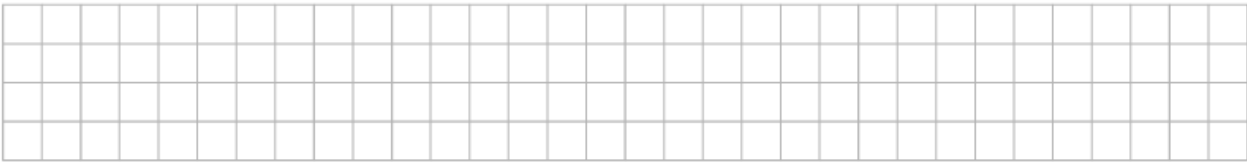
Maximum =

U

M   N

Question 3

$U = \{1, 2, 3, ..., 12\}$. P is the set of prime numbers less than 12. E is the set of even numbers less than 12. O is the set of odd numbers less than 12.
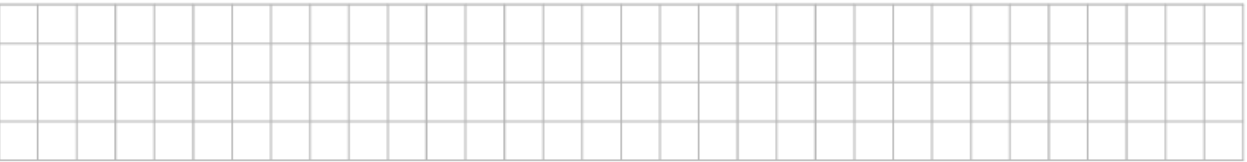
(a) Represent these sets on the Venn diagram.

U
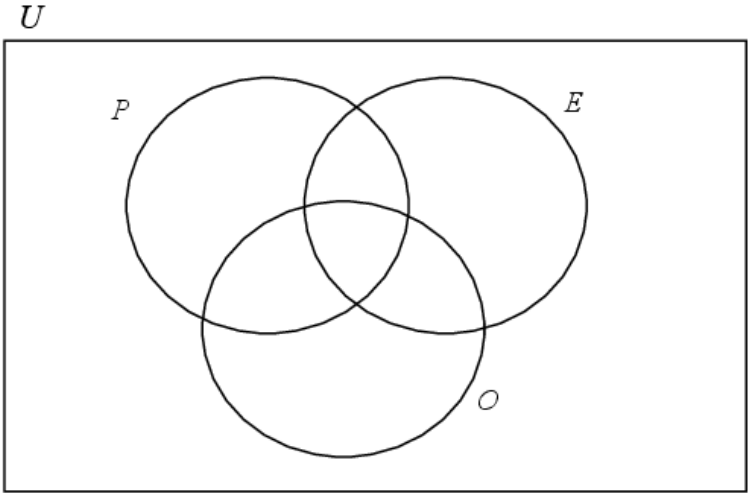
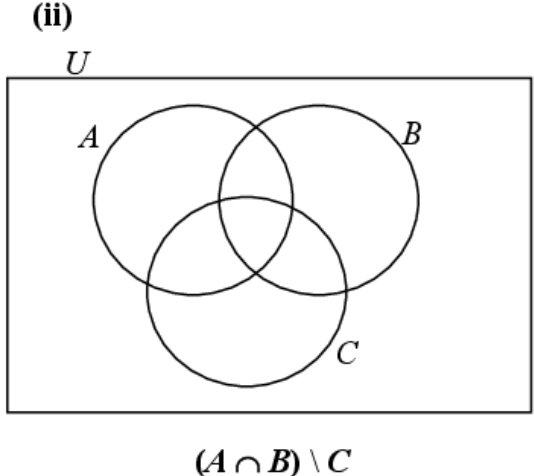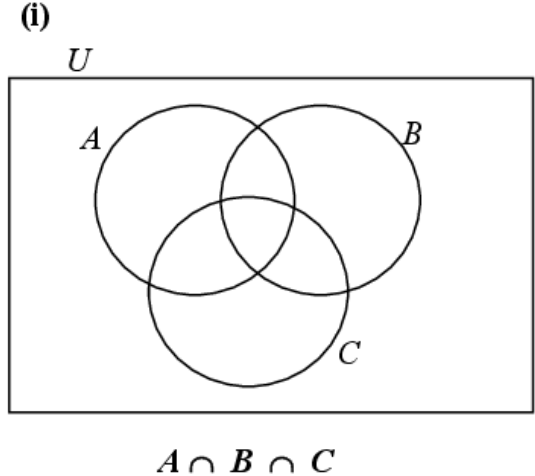**(b)** Name any set on this diagram (after part **(a)** has been completed) that is a null set.

(c) If a number is drawn at random from **set P**, what is the probability that it is even?

Question 4

(a) For diagrams **(i)** and **(ii)** below, shade in the named region.

(i)

U

A B

C

$A \cap B \cap C$

(ii)

U

A B

C

$(A \cap B) \setminus C$

(b) The box on the right contains six statements,
(**note**: P', is the complement of a set P).

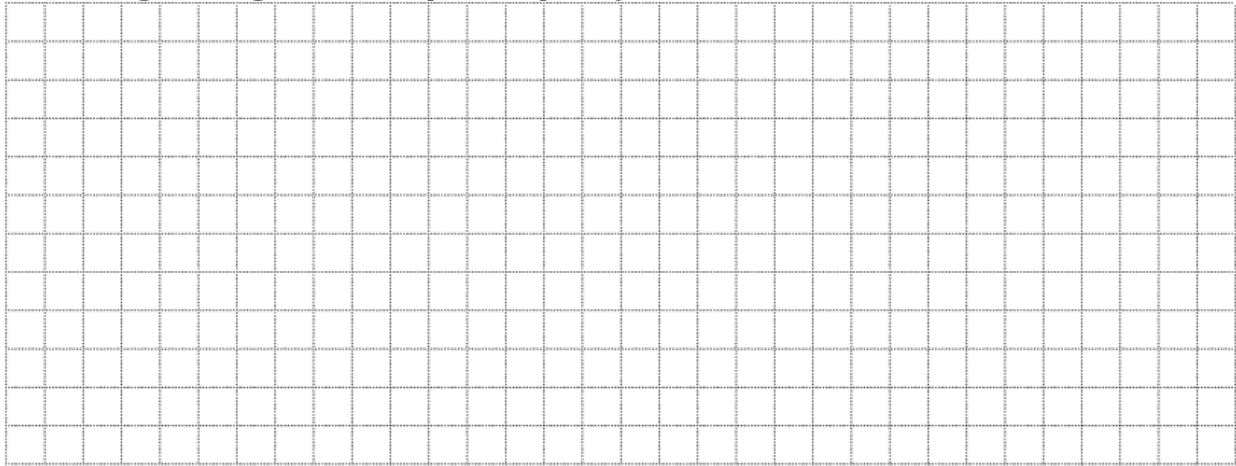A number of the statements are incorrect.

Write down one <u>incorrect</u> statement.

_____

<table>
<tr><td colspan="2" align="center">Statements</td></tr>
<tr><td>(i)</td><td>$A \cup B = B \cup A$</td></tr>
<tr><td>(ii)</td><td>$(A \cup B) \cup C = A \cup (B \cup C)$</td></tr>
<tr><td>(iii)</td><td>$(A \setminus B) \setminus C = A \setminus (B \setminus C)$</td></tr>
<tr><td>(iv)</td><td>$(A \cap B)' = U \setminus (A \cap B)$</td></tr>
<tr><td>(v)</td><td>$A \setminus B = B \setminus A$</td></tr>
<tr><td>(vi)</td><td>$B \setminus (A \cup C) = (B \cup C) \setminus A \setminus C$</td></tr>
</table>

Draw a diagram **or** give an example to explain your choice.

(c) A group of 38 students were asked if they had ever been to France or Spain.
The number who had been to Spain only was 3 more than the number who had been to both countries.
Twice as many had been to France as Spain.
4 students had not been to either country.

Find how many had been to both countries.
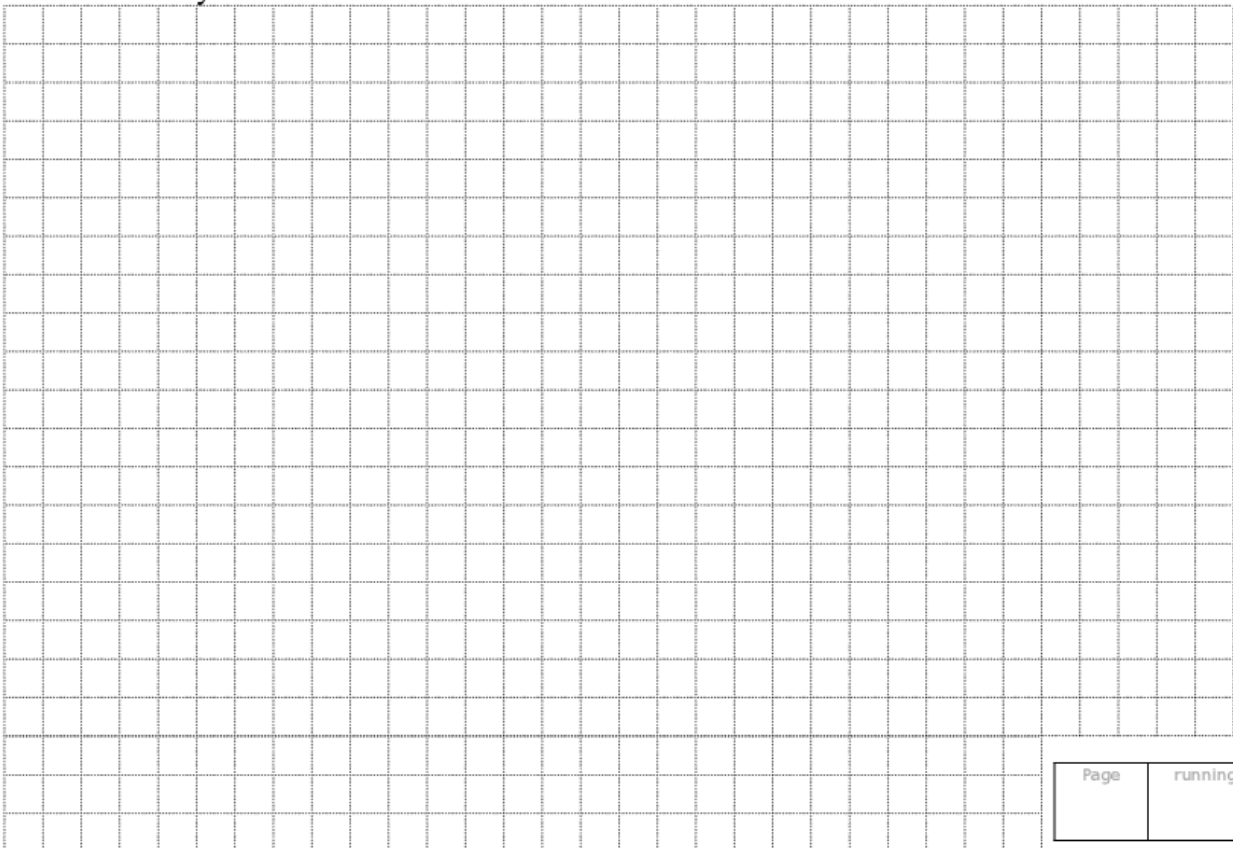
Question 5

In a survey, 54 people were asked which political party they had voted for in the last three elections. The results are as follows:

30 had voted for the Conservatives
22 had voted for the Liberals
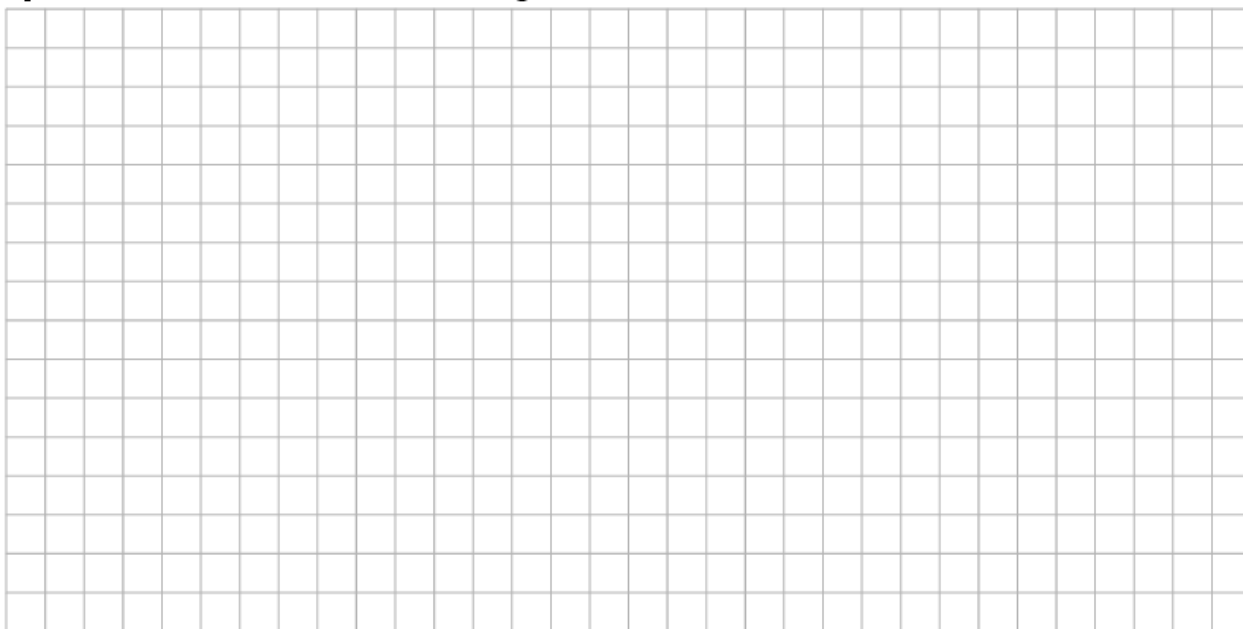22 had voted for the Republicans

12 had voted for the Conservatives and for the Liberals
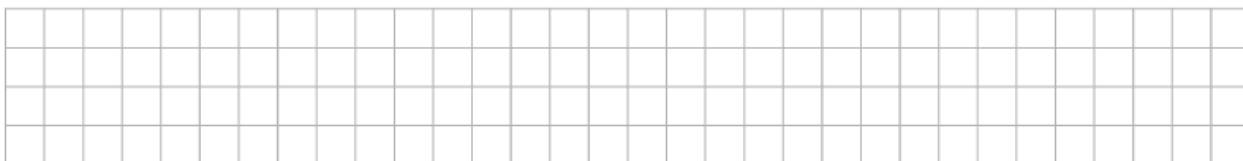9 had voted for the Liberals and for the Republicans
8 had voted for the Conservatives and for the Republicans
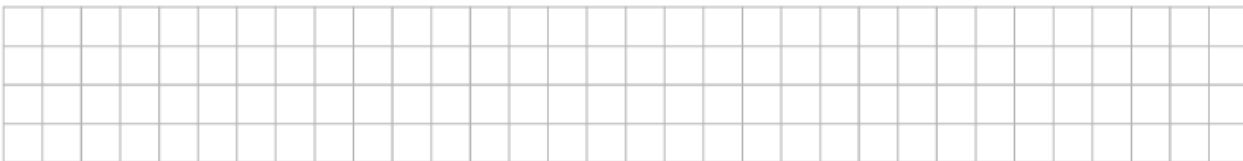
5 had voted for all three parties.

(a) Represent the information in a Venn diagram.

(b) If one person is chosen at random, what is the probability that the person chosen did not vote in any of the three elections?

(c) If one person is chosen at random, what is the probability that the person chosen voted for at least two different parties?

(d) If one person is chosen at random, what is the probability that the person chosen voted for the same party in all three elections?