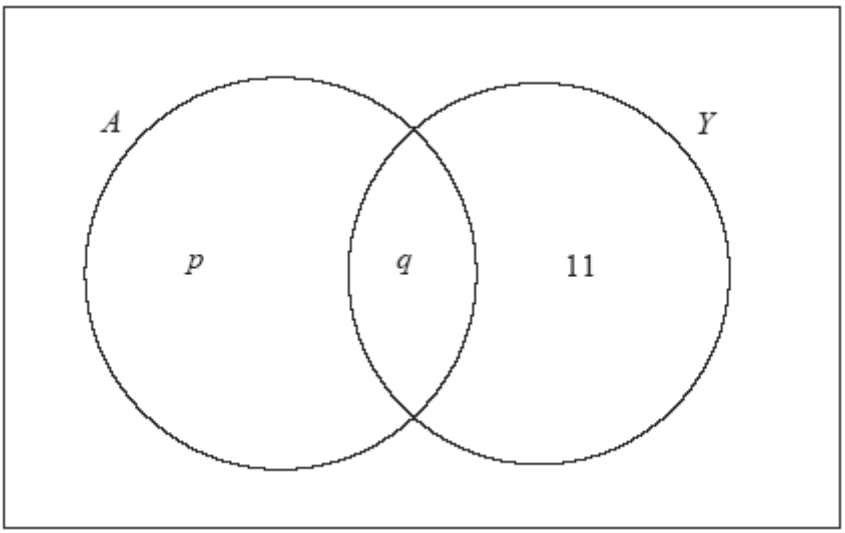
1. A fitness club has 60 members. 35 of the members attend the club's aerobics course (A) and 28 members attend the club's yoga course (Y). 17 members attend both courses.
A Venn diagram is used to illustrate this situation.



(a) Write down the value of q.

(1)

(b) Find the value of p.

(2)

(c) Calculate the number of members of the fitness club who attend neither the aerobics course (A) nor the yoga course (Y).

(2)

(d) Shade, on your Venn diagram, $A' \cap Y$.

(1)
(Total 6 marks)

2. Consider the universal set $U = \{x \in \mathbb{N} \mid 3 < x < 13\}$, and the subsets $A = \{\text{multiples of } 3\}$ and $B = \{4, 6, 12\}$.

(a) List the elements of the following sets.

(i) A

(ii) $A \cap B'$

(2)

(b) Write down one element of $(A \cup B)'$.

(2)

(c) One of the statements in the table below is false. Indicate with an **X** which statement is false. Give a reason for your answer.

$n(A \cup B) = 4$	
$15 \in A'$	
$A \subset A \cup B$	

(2)
(Total 6 marks)

3. The universal set U is the set of integers from 1 to 20 inclusive.

A and B are subsets of U where:
A is the set of even numbers between 7 and 17.
B is the set of multiples of 3.

List the elements of the following sets:

(a) A;

(1)

(b) B;

(1)

(c) $A \cup B$;

(2)

(d) $A \cap B'$.

(2)
(Total 6 marks)

4. Let $U = \{-4, -\frac{2}{3}, 1, \pi, 13, 26.7, 69, 10^{33}\}$.

A is the set of all the integers in U.

B is the set of all the rational numbers in U.

(a) List all the prime numbers contained in U.

(b) List all the members of A.

(c) List all the members of B.

(d) List all the members of the set $A \cap B$.

(Total 8 marks)

5. The sets U, P, R and S are defined as follows:

U = {all quadrilaterals}
P = {all parallelograms}
R = {all rectangles}
S = {all squares}

(a) Draw a Venn Diagram illustrating the relationships of the above sets.

(4)

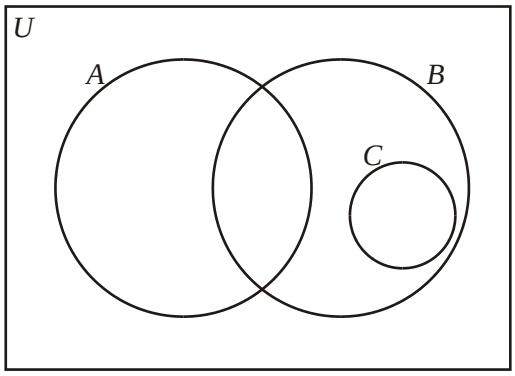
(b) Draw a separate Venn Diagram for each of the examples below.
Indicate by shading each of the following:

(i) $(P \cup S)'$

(ii) $(R \cup S) \cap P$

(4)
(Total 8 marks)

6. The following Venn Diagram shows the sets U, A, B and C.



State whether the following statements are true or false for the information illustrated in the Venn Diagram.

(a) $A \cap C = \varnothing$

(b) $C \cup B = C$

(c) $C \subset (A \cup B)$

(d) $A \subset C'$

(Total 8 marks)

7. The universal set U is defined as the set of positive integers less than 10. The subsets A and B are defined as:

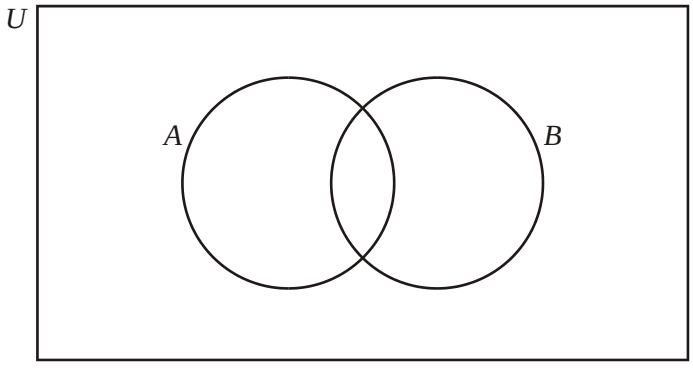
A = {integers that are multiples of 3}
B = {integers that are factors of 30}

(a) List the elements of

(i) A;

(ii) B.

(b) Place the elements of A and B in the appropriate region in the Venn diagram below.



(Total 4 marks)

8. The sets A, B and C are subsets of U. They are defined as follows:

U = {positive integers less than 16}

A = {prime numbers}

B = {factors of 36}

C = {multiples of 4}

(a) List the elements (if any) of the following:

(i) A;

(ii) B;

(iii) C;

(iv) $A \cap B \cap C$.

(4)

(b) (i) Draw a Venn diagram showing the relationship between the sets U, A, B and C.

(ii) Write the elements of sets U, A, B and C in the appropriate places on the Venn diagram.

(4)

(c) From the Venn diagram, list the elements of each of the following

(i) $A \cap (B \cup C)$;

(ii) $(A \cap B)'$;

(iii) $(A \cap B)' \cap C$.

(3)

(d) Find the probability that a number chosen at random from the universal set U will be

(i) a prime number;

(ii) a prime number, but **not** a factor of 36;

(iii) a factor of 36 or a multiple of 4, but **not** a prime number;

(iv) a prime number, given that it is a factor of 36.

(6)
(Total 17 marks)