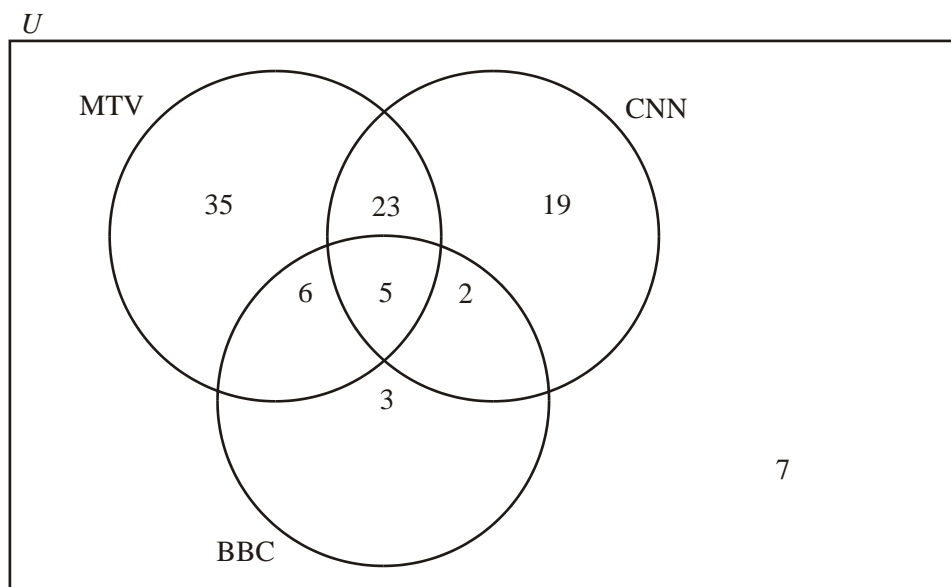


1. 100 students were asked which television channel (MTV, CNN or BBC) they had watched the previous evening. The results are shown in the Venn diagram below.



From the information in the Venn diagram, write down the number of students who watched

- both MTV and BBC;
- MTV or BBC;
- CNN and BBC but not MTV;
- MTV or CNN but not BBC.

**(Total 4 marks)**

2. A committee  $U$  has three sub-committees: research  $R$ , finance  $F$  and purchasing  $P$ . No member belongs to both finance and purchasing sub-committees. Some members belong to both research and purchasing committees. All members of the finance sub-committee also belong to the research sub-committee.

Draw a Venn diagram, showing the relationship between the sets  $U$ ,  $R$ ,  $F$  and  $P$ .

**(Total 4 marks)**

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

$$A = \{\text{integers that are multiples of 3}\}$$

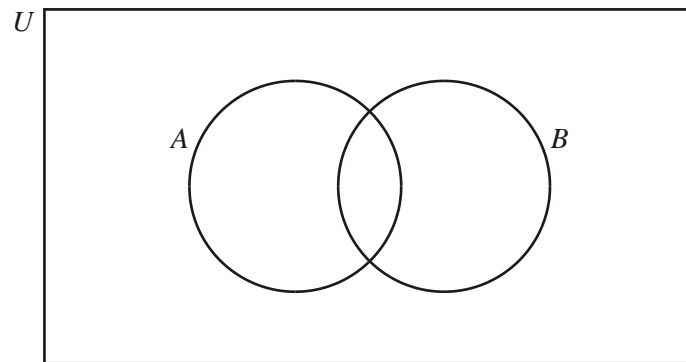
$$B = \{\text{integers that are factors of 30}\}$$

- (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)**

4. A school offers three activities, basketball ( $B$ ), choir ( $C$ ) and drama ( $D$ ). Every student must participate in at least one activity.

16 students play basketball only.

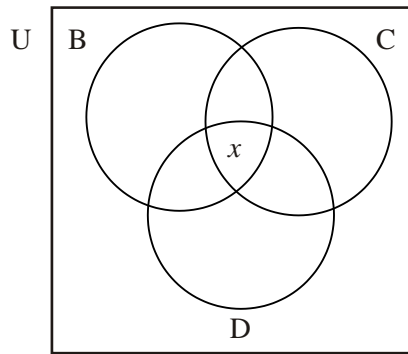
18 students play basketball and sing in the choir but do not do drama.

34 students play basketball and do drama but do not sing in the choir.

27 students are in the choir and do drama but do not play basketball.

- (a) Enter the above information on the Venn diagram below.

(2)



99 of the students play basketball, 88 sing in the choir and 110 do drama.

- (b) Calculate the number of students  $x$  participating in all three activities.

(1)

- (c) Calculate the total number of students in the school.

(3)

(Total 6 marks)

5. At a certain school there are 90 students studying for their IB diploma. They are required to study at **least one** of the subjects: Physics, Biology or Chemistry.

50 students are studying Physics,

60 students are studying Biology,

55 students are studying Chemistry,

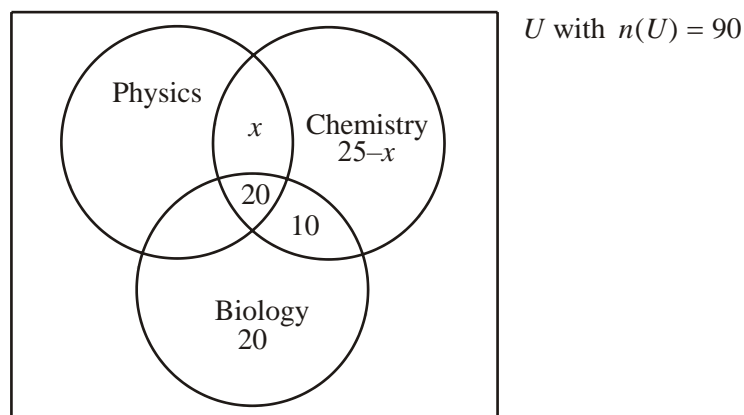
30 students are studying both Physics and Biology,

10 students are studying both Biology and Chemistry but not Physics,

20 students are studying all three subjects.

Let  $x$  represent the number of students who study both Physics and Chemistry but not Biology. Then  $25-x$  is the number who study Chemistry only.

The figure below shows some of this information and can be used for working.



- (a) Express the number of students who study Physics only, in terms of  $x$ .
- (b) Find  $x$ .
- (c) Determine the number of students studying **at least two** of the subjects.

**(Total 6 marks)**

6. 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)**

7. The following results were obtained from a survey concerning the reading habits of students.

60% read magazine P  
50% read magazine Q  
50% read magazine R  
30% read magazines P and Q  
20% read magazines Q and R  
30% read magazines P and R  
10% read all three magazines

(a) Represent all of this information on a Venn diagram. (4)

(b) What percentage of students read exactly two magazines? (1)

(c) What percentage of students read at least two magazines? (1)

(d) What percentage of students do not read any of the magazines? (1)

**(Total 7 marks)**

8. One day the number of customers at three cafés, “Alan’s Diner” ( $A$ ), “Sarah’s Snackbar” ( $S$ ) and “Pete’s Eats” ( $P$ ) was recorded and are given below.

17 were customers of Pete’s Eats only

27 were customers of Sarah’s Snackbar only

15 were customers of Alan’s Diner only

10 were customers of Pete’s Eats **and** Sarah’s Snackbar **but not** Alan’s Diner

8 were customers of Pete’s Eats **and** Alan’s Diner **but not** Sarah’s Snackbar

- (a) Draw a Venn Diagram, using sets labelled  $A$ ,  $S$  and  $P$ , that shows this information. (3)

There were 48 customers of Pete’s Eats that day.

- (b) Calculate the number of people who were customers of all three cafés. (2)

There were 50 customers of Sarah’s Snackbar that day.

- (c) Calculate the total number of people who were customers of Alan’s Diner. (3)

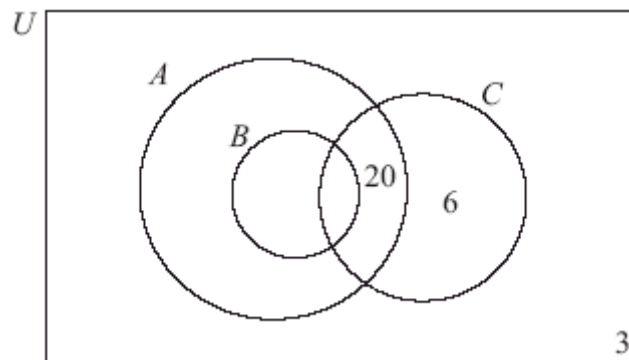
- (d) Write down the number of customers of Alan’s Diner that were also customers of Pete’s Eats. (1)

- (e) Find  $n[(S \cup P) \cap A']$ . (2)

**(Total 11 marks)**

9. The Venn diagram below represents the students studying Mathematics ( $A$ ), Further Mathematics ( $B$ ) and Physics ( $C$ ) in a school.

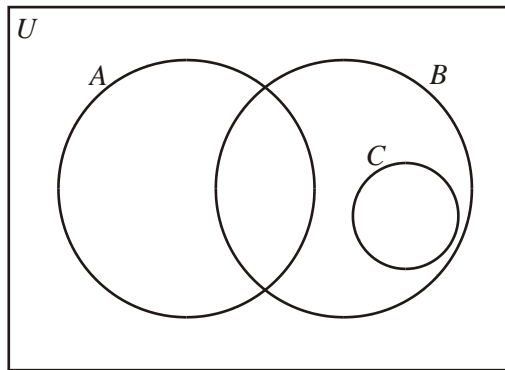
50 students study Mathematics  
 38 study Physics  
 20 study Mathematics and Physics but not Further Mathematics  
 10 study Further Mathematics but not Physics  
 12 study Further Mathematics and Physics  
 6 study Physics but not Mathematics  
 3 study none of these three subjects.



- (a) Copy and complete the Venn diagram **on your answer paper**. (3)
- (b) Write down the number of students who study Mathematics but not Further Mathematics. (1)
- (c) Write down the total number of students in the school. (1)
- (d) Write down  $n(B \cup C)$ . (2)

(Total 7 marks)

10. 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)  $A \cap C = \emptyset$
- (b)  $C \cup B = C$
- (c)  $C \subset (A \cup B)$
- (d)  $A \subset C'$

(Total 8 marks)