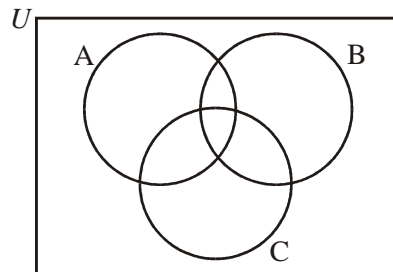# Venn Dia 3 sets and problems
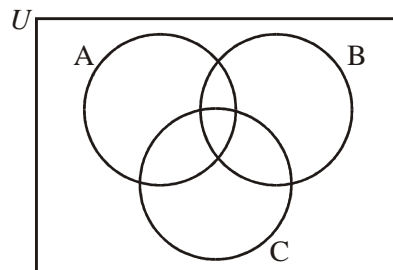
56 min

68 marks

1. Shade the given region on the corresponding Venn Diagram.
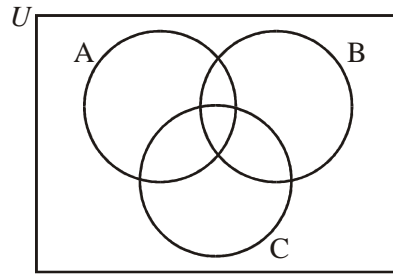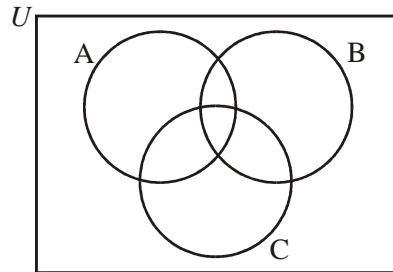
(a) $A \cap B$

(b) $C \cup B$

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

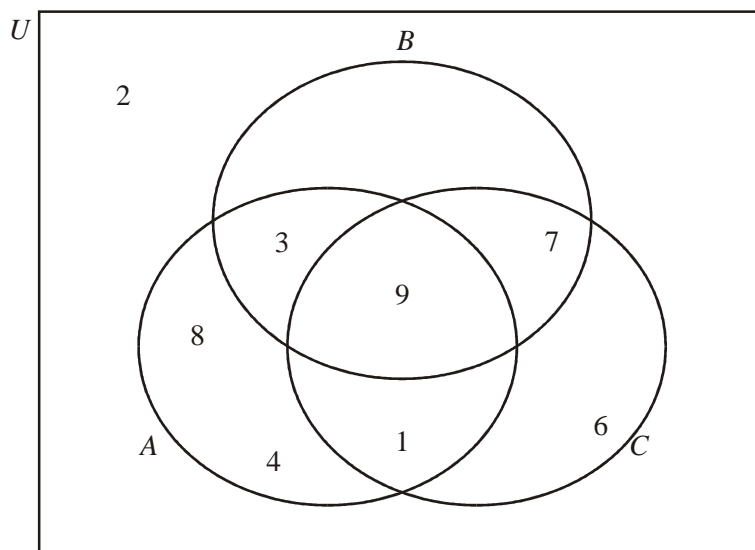

(d) $A \cap C'$

2.   In the Venn diagram below, *A*, *B* and *C* are subsets of a universal set $U = \{1,2,3,4,6,7,8,9\}$.

List the elements in each of the following sets.

(a) $A \cup B$

(b) $A \cap B \cap C$

(c) $(A' \cap C) \cup B$

(Total 8 marks)

3.   *U* is the set of all the **positive** integers less than or equal to 12.
A, B and *C* are subsets of *U*.

$$A = \{1, 2, 3, 4, 6, 12\}$$
$$B = \{\text{odd integers}\}$$
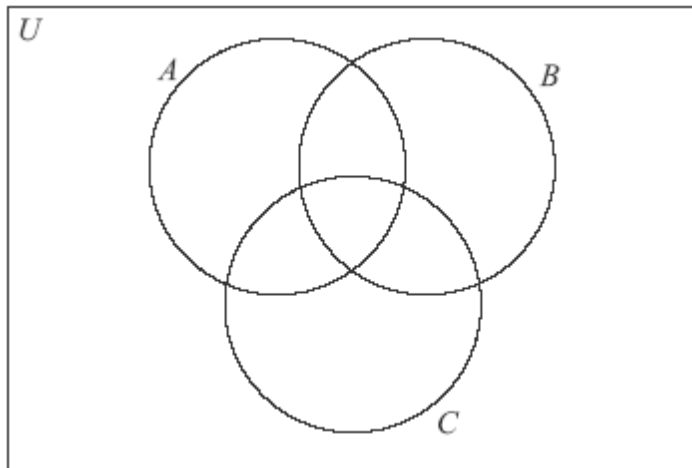$$C = \{5, 6, 8\}$$

(a)   Write down the number of elements in $A \cap C$.

(1)

(b)   List the elements of *B*.

(1)

(c)   Complete the following Venn diagram with **all** the elements of *U*.

(4)
(Total 6 marks)

4. The sports offered at a retirement village are Golf (*G*), Tennis (*T*) and Swimming (*S*). The Venn diagram shows the numbers of people involved in each activity.
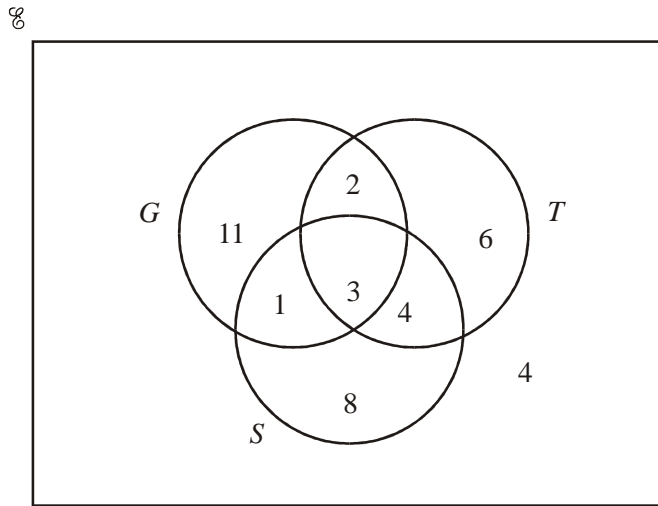
(a) How many people

    (i)   only play golf?

    (ii)   play both tennis and golf?

    (iii) do not play golf?

(b) Shade the part of the Venn diagram that represents the set $\complement G \cap S$.

(Total 4 marks)

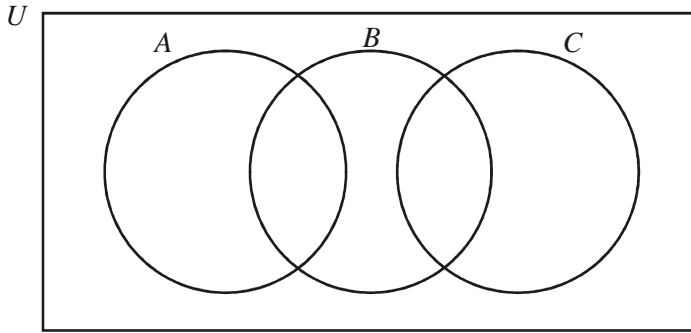**5.** (a) Shade $(A \cup B) \cap C'$ on the diagram below.

(2)

(b) In the Venn diagram below, the number of elements in each region is given.
Find $n\,((P \cap Q) \cup R)$.
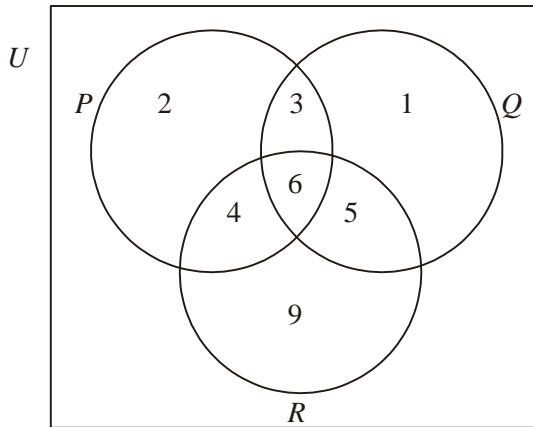
(2)

(c) U is the set of positive integers, $\mathbb{Z}^+$.
E is the set of even numbers.
M is the set of multiples of 3.

    (i) List the first six elements of the set M.

    (ii) List the first six elements of the set $E' \cap M$.

(2)
(Total 6 marks)

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

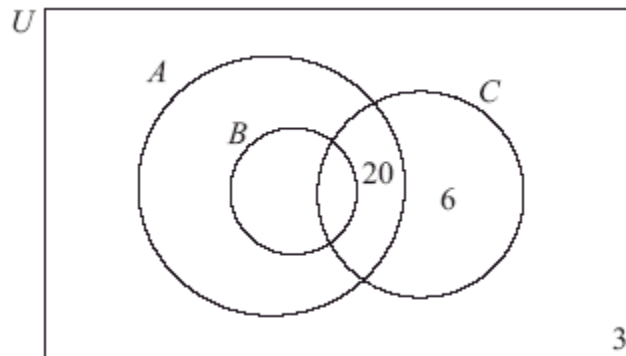50 students study Mathematics
38 study Physics
20 study Mathematics and Physics but not Further Mathematics
10 study Further Mathematics but not Physics
12 study Further Mathematics and Physics
6 study Physics but not Mathematics
3 study none of these three subjects.

(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)

7. A poll was taken of the leisure time activities of 90 students.

60 students watch TV (T), 60 students read (R), 70 students go to the cinema (C).
26 students watch TV, read **and** go to the cinema.
20 students watch TV and go to the cinema only.
18 students read and go to the cinema only.
10 students read and watch TV only.

(a)   Draw a Venn diagram to illustrate the above information.

(b)   Calculate how many students

(i)   only watch TV;

(ii)   only go to the cinema.

(Total 8 marks)

8. A school offers three activities, basketball (*B*), choir (*C*) and drama (*D*). Every student must participate in at least one activity.
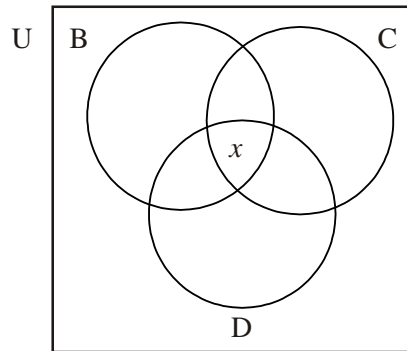
16 students play basketball only.
18 students play basketball and sing in the choir but do not do drama.
34 students play basketball and do drama but do not sing in the choir.
27 students are in the choir and do drama but do not play basketball.

(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)

9. 100 students are asked what they had for breakfast on a particular morning. There were three choices: cereal (*X*), bread (*Y*) and fruit (*Z*). It is found that

> 10 students had all three
> 17 students had bread and fruit only
> 15 students had cereal and fruit only
> 12 students had cereal and bread only
> 13 students had only bread
> 8 students had only cereal
> 9 students had only fruit

(a) Represent this information on a Venn diagram.

(4)

(b) Find the number of students who had none of the three choices for breakfast.

(2)

(c) Write down the percentage of students who had fruit for breakfast.

(2)

(d) Describe in words what the students in the set $X \cap Y'$ had for breakfast.

(2)

(e) Find the probability that a student had **at least** two of the three choices for breakfast.

(2)

(f) Two students are chosen at random. Find the probability that both students had all three choices for breakfast.

(3)
(Total 15 marks)