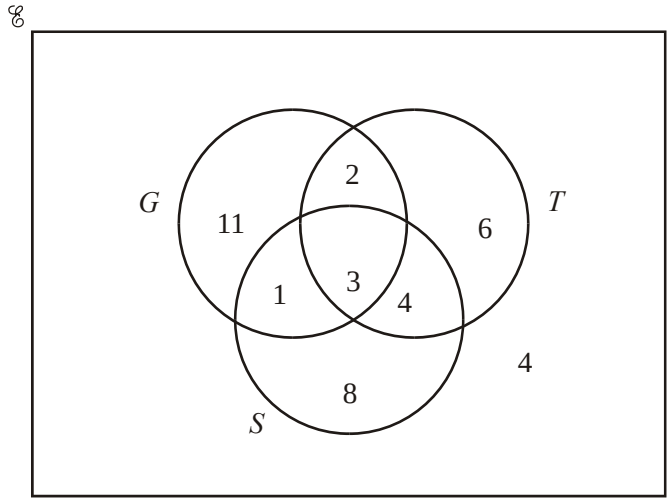
1. The sports offered at a retirement village are Golf (*G*), Tennis (*T*) and Swimming (*S*). The Venn diagram shows the numbers of people involved in each activity.



(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 $(G \cap S)'$.

Working:

Answers:

(a) (i) ……..

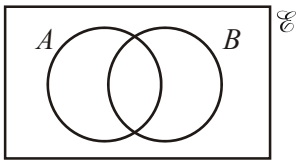
(ii) …….

(iii) …….

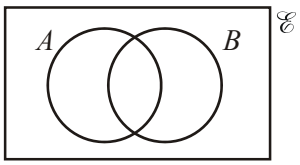
(Total 4 marks)

2. In each of the Venn diagrams, shade the region indicated.

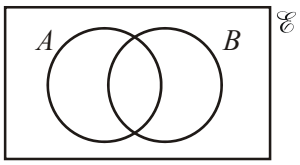
(a) $A \cap B$



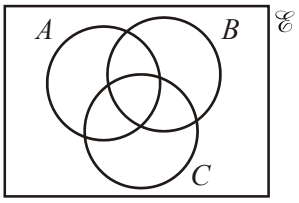
(b) The complement of $(A \cap B)$



(c) The complement of $(A \cup B)$



(d) $A \cup (B \cap C)$



Working:

(Total 4 marks)

3. A group of 30 children are surveyed to find out which of the three sports cricket (C), basketball (B) or volleyball (V) they play. The results are as follows:

3 children do not play any of these sports
2 children play all three sports
6 play volleyball and basketball
3 play cricket and basketball
6 play cricket and volleyball
16 play basketball
12 play volleyball.

(a) Draw a Venn diagram to illustrate the relationship between the three sports played.

(1)

(b) On your Venn diagram indicate the number of children that belong to each region.

(3)

(c) How many children play only cricket?

(2)

(Total 6 marks)

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

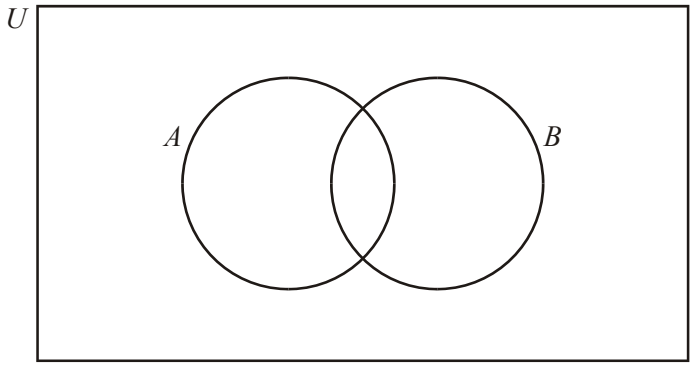
A = {integers that are multiples of 3}
B = {integers that are factors of 30}

(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.



Working:

Answers:

(a) (i) ……

(ii) .....

(Total 4 marks)

5. 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.

Answer:

(Total 4 marks)

6. 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.

Diagram:

Working:

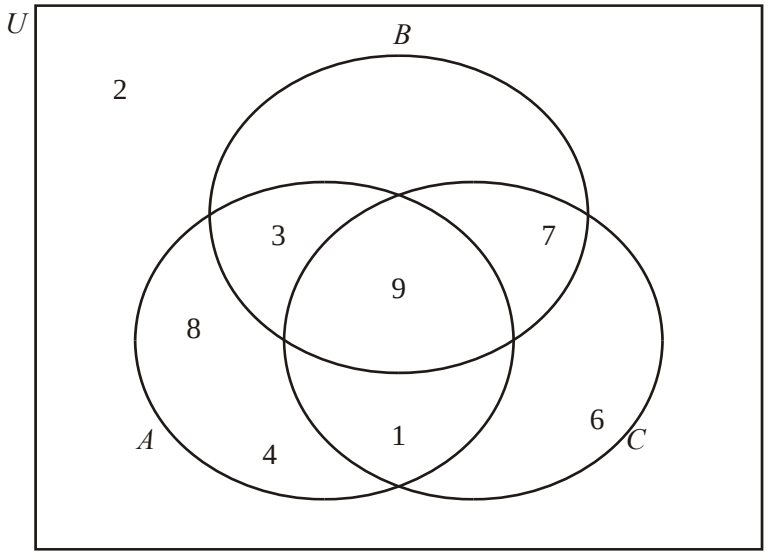
Answers:

(b) (i) ……..

(ii) ……..

(Total 8 marks)

7. 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) $(A' \cap C) \cup B$

Working:

Answers:

(a) .....

(b) .....

(c) .....

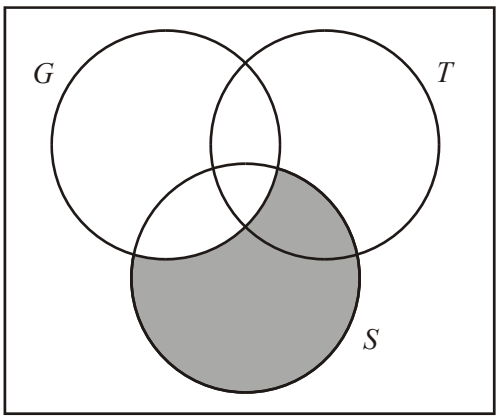
(Total 8 marks)

1. (a) (i) 11 (A1) (C1)

(ii) 2 + 3 = 5 (A1) (C1)

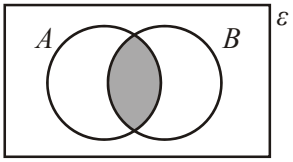
(iii) $8 + 4 + 6 + 4 = 22$ (A1) (C1)

(b)

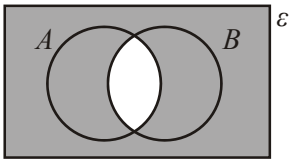


(A1) (C1)
[4]

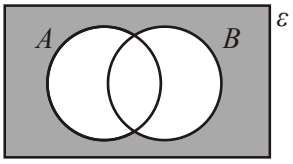
2. (a) $A \cap B$ (A1)



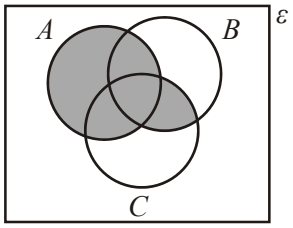
(b) The complement of $(A \cap B)$ (A1)



(c) The complement of $(A \cup B)$ (A1)



(d) $A \cup (B \cap C)$ (A1)

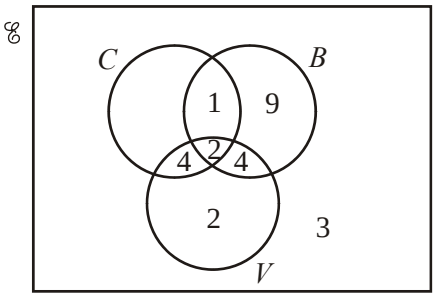


[4]

3. (a) (A1)

Award (A1) for a rectangle containing 3 intersecting circles.

(b) (A3) 4



Notes:

(b) Award (A3) for 6 or 7 correct numbers in the regions.
(A2) for 4 or 5 correct, (A1) for 2 or 3 correct.

(c) $1 + 9 + 4 + 2 + 4 + 2 + 3 = 25$ (M1)
$n(C) = 30 - 25$
$= 5$ (A1)

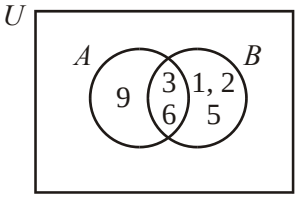
OR
$n(C) = 5$ (C2) 2
[6]

4. (a) (i) $A = \{3, 6, 9\}$ (A1) (C1)

(ii) $B = \{1, 2, 3, 5, 6\}$ (A1) (C1)

Note: *Candidates must list all the elements and no extra elements for each (A1)*

(b)

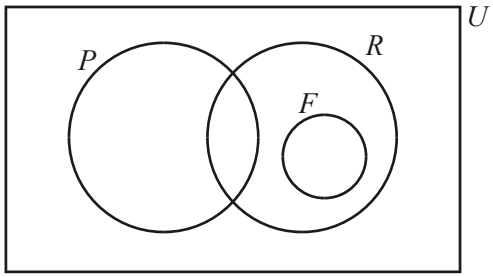


(A2) (C2)

Notes: *Follow through from (a).*
Award (A1) for 3 and 6 in the intersection.
Award (A1) for other values correctly positioned

[4]

5.

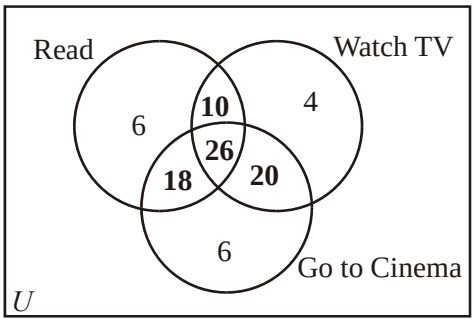


(A4)

Note: *Award (A1) for rectangle, (A1) for F entirely within R, (A1) for F disjoint from P, (A1) for $P \cap R$ non-empty.*

[4]

6. (a)



(A4)(C4)

Notes*: Award (A1) for Venn Diagram drawn correctly (circles and rectangle).*
Award (A3) for all four correct (A2) for three correct (A1) for two correct and (A0) for one correct.

(b) (i) $60 - (10 + 26 + 20)$ (M1)
$= 4$ (A1)

(ii) $70 - (18 + 26 + 20)$ (M1)
$= 6$ (A1)(C4)
[8]

7. ***Note:*** *Award (A1) for each pair of correct entries in parts (a) and (c).*
A list of numbers with no set brackets is acceptable.

(a) $A \cup B = \{1, 3, 4, 7, 8, 9\}$ (A1)(A1)(A1)

(b) $A \cap B \cap C = \{9\}$ (A1) (C1)

(c) $A' = \{1, 3, 4, 7, 8, 9\}$ (A1)
$A' \cap C = \{6, 7\}$ (A1)
$(A' \cap C) \cup B = \{3, 6, 7, 9\}$ (A1)(A1)
[8]