VENN DIAGRAMS

[ESTIMATED TIME: 60 minutes]

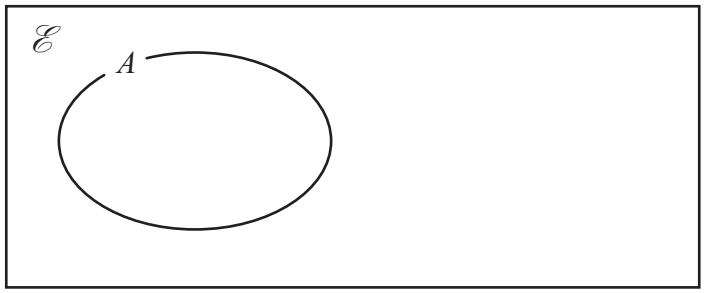
GCSE

(+ IGCSE) EXAM QUESTION PRACTICE

1. **[3 marks]**

A, B and C are three sets.

$A \cap B = \varnothing$ and $C \subset A$



(a) Complete the Venn diagram to show the sets B and C

(2)

(b) On the Venn diagram, shade the region that represents $A \cap C'$

(1)

2. **[4 marks]**

There are 35 students in a group.
18 students play hockey.
12 students play both hockey and tennis.
15 students play neither hockey nor tennis.

Find the number of students who play tennis.

.....

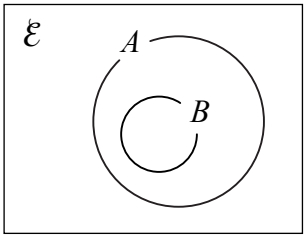
Q15

3. **[2 marks]**

Statements				
$A \subset B$	$B \subset A$	$A \cup B = \mathcal{E}$	$A \cap B = \emptyset$	$A \cap B = A$

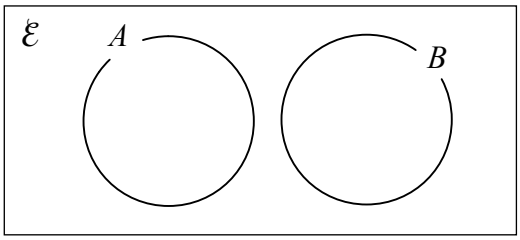
Choose a statement from the box that describes the relationship between sets A and B.

(i)



.....

(ii)



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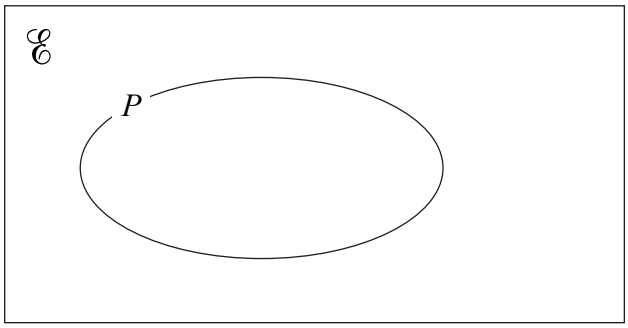
4. **[3 marks]**



Set P is shown on the Venn Diagram.
Two sets, Q and R, are such that

$$R \subset P$$

$$Q \cap R = \varnothing$$

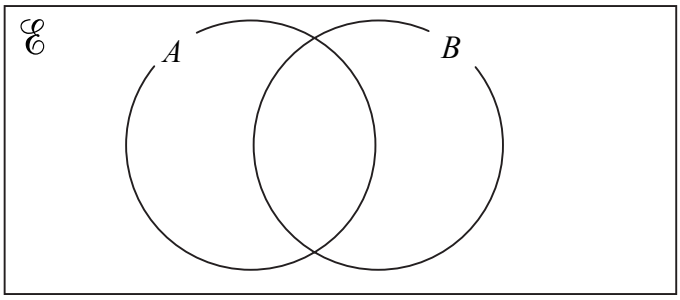
$$P \cup Q = P$$

Complete the Venn Diagram to show set Q and set R.

5. **[4 marks]**

The universal set, $\mathscr{E}$ = {Whole numbers}
A = {Multiples of 5}
B = {Multiples of 3}

Sets A and B are represented by the circles in the Venn diagram.



(a) (i) On the diagram, shade the region that represents the set $A \cap B'$.

(ii) Write down **three** members of the set $A \cap B'$.

....., ..., ...
(2)

C = {Multiples of 10}.

(b) (i) On the diagram draw a circle to represent the set C.

(ii) Write down **three** members of the set $A \cap B \cap C'$

....., ..., ...
(2)

6. **[4 marks]**

A and B are two sets.

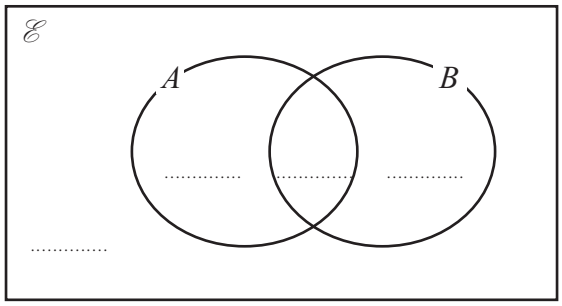
$n(\mathscr{E}) = 37$

$n(A) = 22$

$n(A \cap B) = 12$

$n(A \cup B) = 30$

(a) Complete the Venn Diagram to show the **numbers** of elements.



(2)

(b) Find (i) $n(A \cap B')$

.....

(ii) $n(A' \cup B')$

.....

(2)

7. **[5 marks]**

P and Q are two sets.
$n(P) = 9$ and $n(Q) = 5$

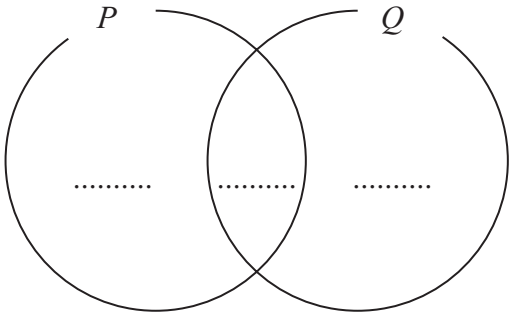
(a) Find the value of $n(P \cup Q)$ when $P \cap Q = \emptyset$

$n(P \cup Q) =$ .....
(1)

(b) Find the value of $n(P \cup Q)$ when $Q \subset P$

$n(P \cup Q) =$ .....
(1)

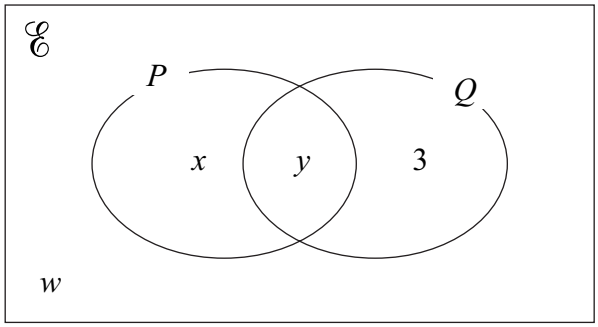
(c) (i) Complete the Venn Diagram to show **numbers** of elements when $n(P \cap Q) = 3$



(ii) Find the value of $n(P \cup Q)$ when $n(P \cap Q) = 3$

$n(P \cup Q) =$ .....
(3)

8. **[6 marks]**



In the Venn diagram, 3, w, x and y represent the **numbers** of elements.
$n(\mathscr{E}) = 24$ $n(P') = 8$ $n((P \cap Q)') = 15$

(a) Find the value of (i) w (ii) x (iii) y

(i) $w =$ .....

(ii) $x =$ .....

(iii) $y =$ .....

(3)

(b) (i) Find $n(P' \cap Q)$.

.....

(ii) Find $n(P' \cup Q')$.

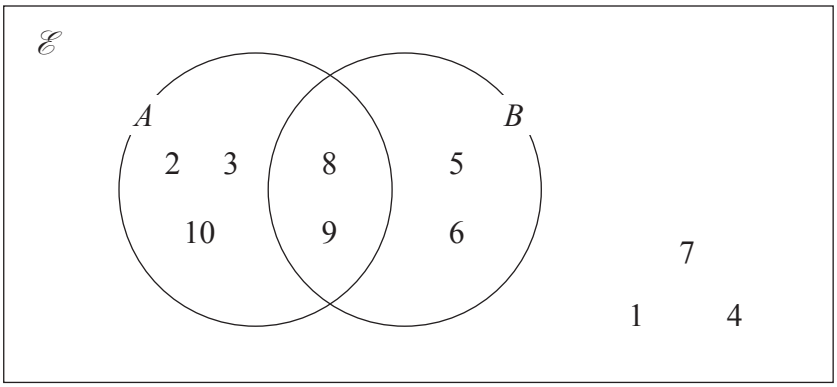
.....

(iii) Find $n(P \cap Q \cap P')$.

.....

(3)

9. **[4 marks]**



The Venn diagram shows all of the elements in sets A, B and $\mathscr{E}$.

(a) Write down the elements in A'

.....

(1)

(b) Find $n(A \cap B)'$

.....

(1)

(c) Find the elements in $(A \cap B) \cup (A \cup B)'$

.....

(1)

$A \cap C = \varnothing$
$B \cup C = \{5, 6, 7, 8, 9\}$
$n(C) = 3$

(d) Write down the elements in C.

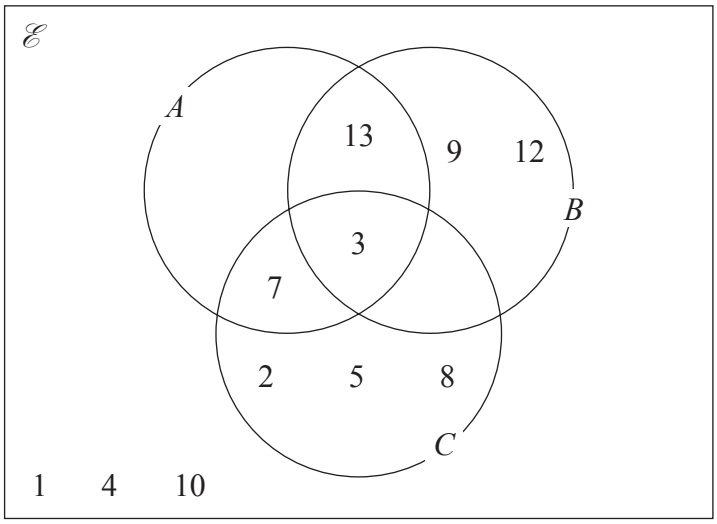
.....

(1)

10. **[4 marks]**

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
$A = \{3, 7, 11, 13\}$
$B = \{3, 6, 9, 12, 13\}$
$C = \{2, 3, 5, 6, 7, 8\}$

(a) Complete the Venn diagram.



(1)

(b) List the members of the set $B' \cap C$

.....

(1)

(c) List the members of the set $(A \cup C)' \cap B$

.....

(1)

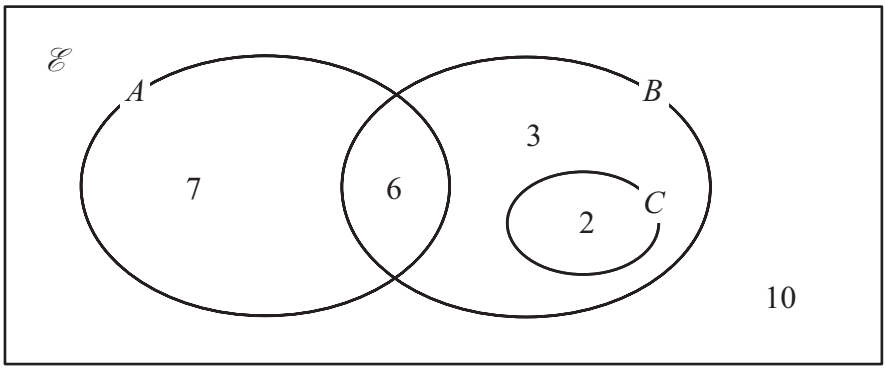
(d) Find $n(A' \cap B')$

.....

(1)

11. **[4 marks]**

The Venn diagram shows a universal set $\mathscr{E}$ and three sets A, B and C.



7, 6, 3, 2 and 10 represent the **numbers** of elements.

Find

(i) $\mathrm{n}(A \cup B)$

.....

(ii) $\mathrm{n}(A')$

.....

(iii) $\mathrm{n}(B \cap C')$

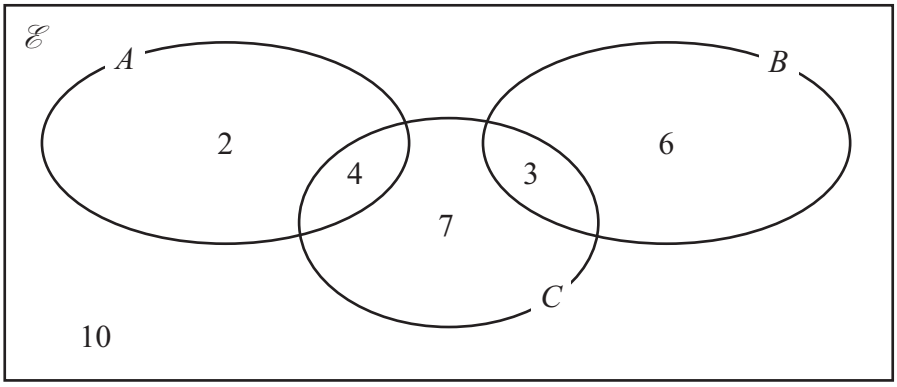
.....

(iv) $\mathrm{n}(A' \cup B')$

.....

12. **[4 marks]**

The Venn diagram shows a universal set $\mathscr{E}$ and 3 sets A, B and C.



2, 4, 7, 3, 6 and 10 represent **numbers** of elements.

Find

(i) n $(A \cup B)$

.....

(ii) n (B')

.....

(iii) n $(A \cap C')$

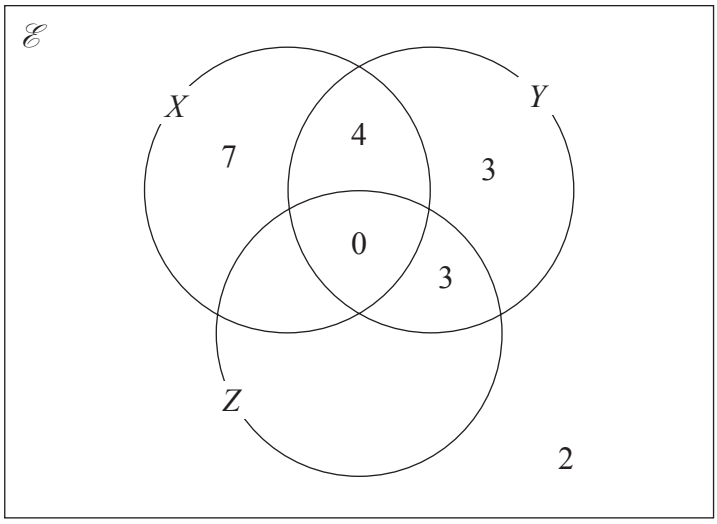
.....

(iv) n $(B' \cap C')$

.....

13. **[4 marks]**

The Venn diagram shows a universal set $\mathscr{E}$ and three sets X, Y and Z.



The numbers shown represent **numbers** of elements.

$n(X') = 14$
$n(Z) = 14$

(a) Complete the Venn diagram.

(2)

(b) Find the value of

(i) $n(X \cup !Z)$

.....

(ii) $n(X \cap Y')$

.....

(2)

14. **[3 marks]**

A garage tests cars for faults.
There are three types of fault – braking, steering and lighting.
A car fails the test if it has one or more of these three types of fault.

Last week, 11 cars had braking faults
9 cars had steering faults
7 cars had lighting faults
no car had both steering faults and lighting faults
2 cars had both braking faults and steering faults
3 cars had both braking faults and lighting faults.

By drawing a Venn Diagram, or otherwise, find the number of cars which failed the test last week.

15. **[4 marks]**

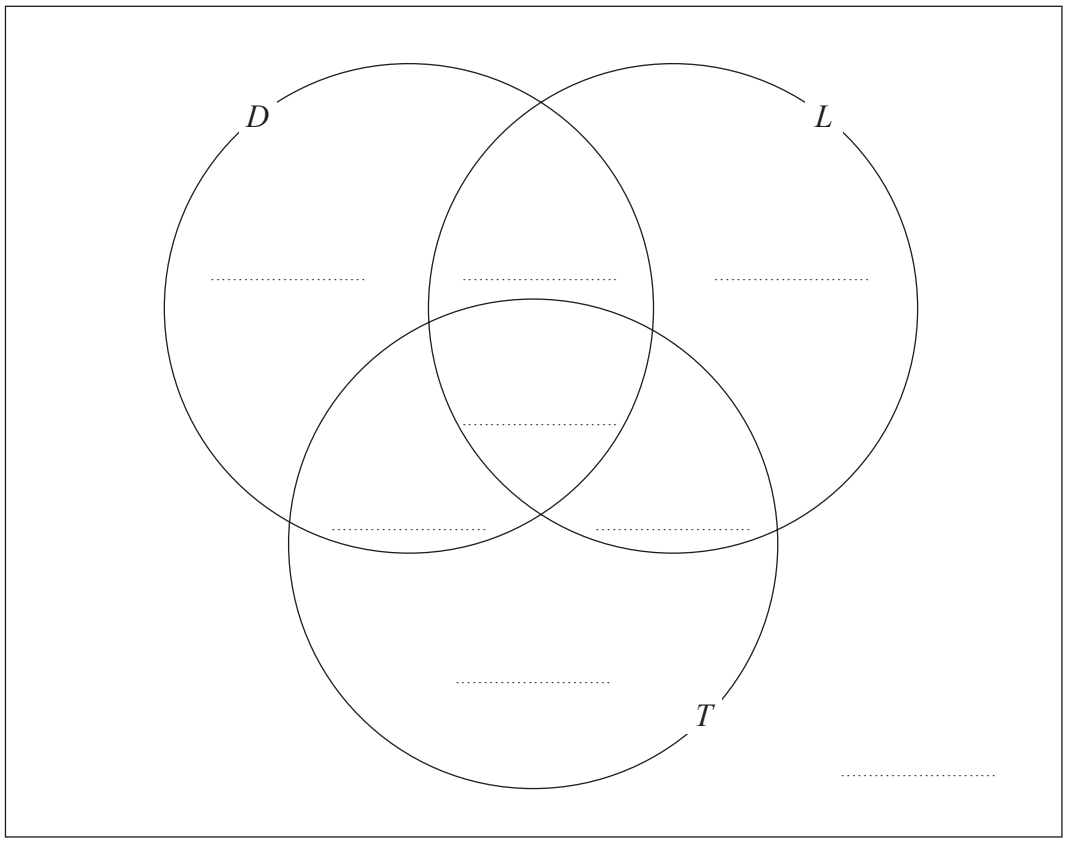
Each student in a group of 32 students was asked the following question.

"Do you have a desktop computer (D), a laptop (L) or a tablet (T)?"

Their answers showed that

19 students have a desktop computer
17 students have a laptop
16 students have a tablet
9 students have both a desktop computer and a laptop
11 students have both a desktop computer and a tablet
7 students have both a laptop and a tablet
5 students have all three.

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.



(3)

One of the students with both a desktop computer and a laptop is chosen at random.

(b) Find the probability that this student also has a tablet.

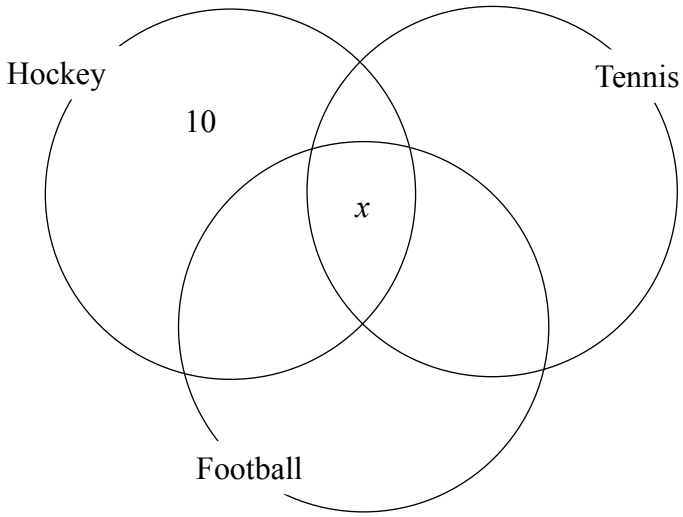
.....

(1)

16. **[4 marks]**

Each student in a group plays at least one of hockey, tennis and football.

10 students play hockey only
9 play football only.
13 play tennis only.
6 play hockey and football but not tennis.
7 play hockey and tennis.
8 play football and tennis.
x play all three sports.



(a) Write down an expression, in terms of x, for the number of students who play hockey and tennis, but not football.

.....

(1)

There are 50 students in the group.

(b) Find the value of x.

$x =$ .....

(3)