Sets & Venn Diagrams

Question Paper 3

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Number
Sub-Topic	Sets & Venn Diagrams
Booklet	Question Paper 3

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

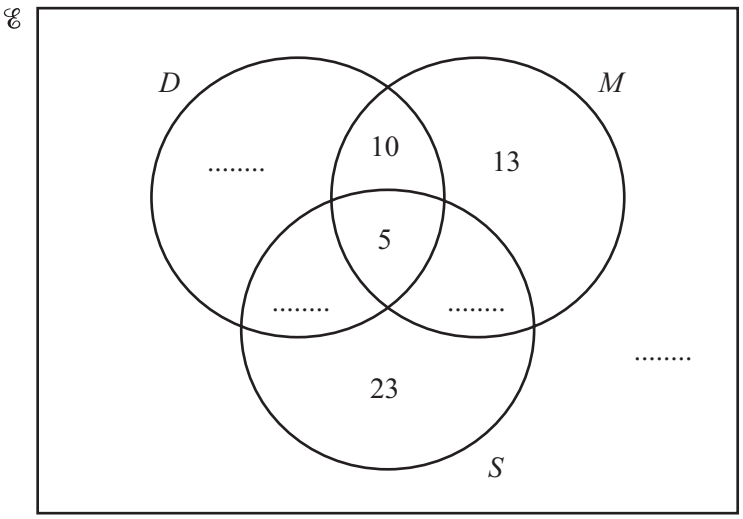
Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 90 students are asked which school clubs they attend.

D = {students who attend drama club}
M = {students who attend music club}
S = { students who attend sports club}

39 students attend music club.
26 students attend **exactly two** clubs.
35 students attend drama club.



(a) Write the four missing values in the Venn diagram. [4]

(b) How many students attend

(i) all three clubs,

Answer(b)(i) ..... [1]

(ii) one club only?

Answer(b)(ii) ..... [1]

(c) Find

(i) n($D \cap M$),

Answer(c)(i) ..... [1]

(ii) n$\left((D \cap M) \cap S'\right)$.

..... [1]

(d) One of the 90 students is chosen at random.

Find the probability that the student

(i) **only** attends music club,

Answer(d)(i) ..... [1]

(ii) attends **both** music and drama clubs.

Answer(d)(ii) ..... [1]

(e) Two of the 90 students are chosen at random without replacement.

Find the probability that

(i) they **both** attend all three clubs,

Answer(e)(i) ..... [2]

(ii) one of them attends sports club only and the other attends music club only.

Answer(e)(ii) ..... [3]

2 **(a)** $\mathscr{E}$ = {25 students in a class}

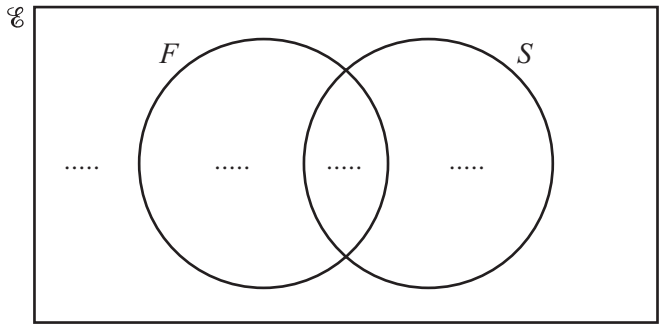
F = {students who study French}

S = {students who study Spanish}

16 students study French and 18 students study Spanish.

2 students study neither of these.

(i) Complete the Venn diagram to show this information.



[2]

(ii) Find n(F').

Answer(a)(ii) ..... [1]

(iii) Find n($F \cap S$)$'$.

Answer(a)(iii) ..... [1]

(iv) One student is chosen at random.

Find the probability that this student studies both French and Spanish.

Answer(a)(iv) ..... [1]

(v) Two students are chosen at random without replacement.

Find the probability that they both study only Spanish.

Answer(a)(v) ..... [2]

(b) In another class the students all study at least one language from French, German and Spanish.

No student studies all three languages.

The set of students who study German is a proper subset of the set of students who study French.

4 students study both French and German.

12 students study Spanish but not French.

9 students study French but not Spanish.

A total of 16 students study French.

(i) Draw a Venn diagram to represent this information.

[4]

(ii) Find the total number of students in this class.

Answer(b)(ii) ..... [1]

3 **(a)**

Two discs are chosen at random **without** replacement from the five discs shown in the diagram.

(i) Find the probability that both discs are numbered 2 .

Answer(a)(i) ..... [2]

(ii) Find the probability that the numbers on the **two** discs have a total of 5 .

Answer(a)(ii) ..... [3]

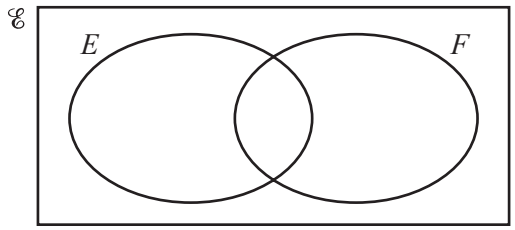
(iii) Find the probability that the numbers on the two discs do **not** have a total of 5.

Answer(a)(iii) ..... [1]

(b) A group of international students take part in a survey on the nationality of their parents.

E = {students with an English parent}
F = {students with a French parent}

$\mathrm{n}(\mathscr{E}) = 50$, $\mathrm{n}(E) = 15$, $\mathrm{n}(F) = 9$ and $\mathrm{n}(E \cup F)' = 33$.



(i) Find $\mathrm{n}(E \cap F)$.

Answer(b)(i) ..... [1]

(ii) Find $\mathrm{n}(E' \cup F)$.

Answer(b)(ii) ..... [1]

(iii) A student is chosen at random.
Find the probability that this student has an English parent and a French parent.

Answer(b)(iii) ..... [1]

(iv) A student who has a French parent is chosen at random.
Find the probability that this student also has an English parent.

Answer(b)(iv) ..... [1]

4 $\mathscr{E} = \{1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9\}$

$E = \{x : x \text{ is an even number}\}$

$F = \{2,\ 5,\ 7\}$

$G = \{x : x^2 - 13x + 36 = 0\}$

(a) List the elements of set E.

Answer(a) $E = \{$ $\}$ [1]

(b) Write down $\text{n}(F)$.

Answer(b) $\text{n}(F) =$ ..... [1]

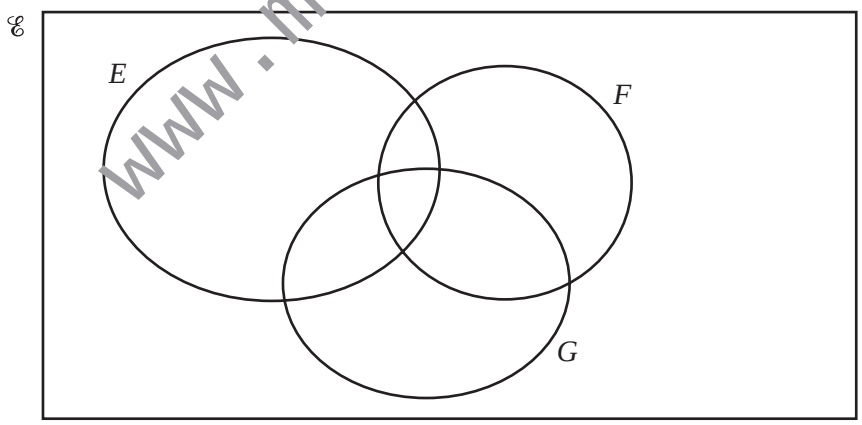
(c) **(i)** Factorise $x^2 - 13x + 36$.

Answer(c)(i) ..... [2]

(ii) Using your answer to **part (c)(i)**, solve $x^2 - 13x + 36 = 0$ to find the two elements of G.

Answer(c)(ii) $x =$ ..... or $x =$ ..... [1]

(d) Write all the elements of $\mathscr{E}$ in their correct place in the Venn diagram.



[2]

(e) Use set notation to complete the following statements.

(i) $F \cap G =$ ..... [1]

(ii) 7 .... E [1]

(iii) $\text{n}(E$ ..... $F) = 6$ [1]