PEARSON EDEXCEL INTERNATIONAL GCSE MATHEMATICS A (4MA1) · HIGHER TIER

Sets and Venn Diagrams: exam questions

10 questions · 26 marks · mark schemes at the end

Name _____ Date _____ Score / 26

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/sets-and-venn-diagrams

1. **3 marks**

$\mathscr{E} = \{1, 2, 3, \ldots, 12\}$, $A = \{\text{multiples of } 3\}$ and $B = \{\text{even numbers}\}$.

(a) List the members of $A \cap B$. **(1)**

(b) Find $n(A \cup B)$. **(1)**

(c) Find $n(A')$. **(1)**

2. **3 marks**

$n(\mathscr{E}) = 40$, $n(A) = 22$, $n(B) = 15$ and $n(A \cap B) = 6$.

Find $n\left((A \cup B)'\right)$.

3. **2 marks**

$n(\mathscr{E}) = 40$, $n(A) = 22$, $n(B) = 15$ and $n(A \cap B) = 6$. A member of $\mathscr{E}$ is chosen at random.

Find $P(A \cap B')$.

4. **3 marks**

There are 50 students in a club. 31 play football, 24 play tennis and 8 play neither.

How many students play both football and tennis?

5. **2 marks**

$n(\mathscr{E}) = 40$, $n(A) = 22$, $n(B) = 15$ and $n(A \cap B) = 6$. A member of A is chosen at random.

Find the probability that it is also a member of B.

6. **4 marks**

$n(\mathscr{E}) = 50$. $n(A) = 20$, $n(B) = 18$, $n(C) = 15$, $n(A \cap B) = 7$, $n(A \cap C) = 5$, $n(B \cap C) = 6$ and $n(A \cap B \cap C) = 3$.

Find $n\left((A \cup B \cup C)'\right)$.

7. 2 marks

$A = \{x : 2 < x \leqslant 7,\ x \text{ is an integer}\}$

(a) List the members of A. **(1)**

(b) Write down $n(A)$. **(1)**

8. 2 marks

Use set notation to describe

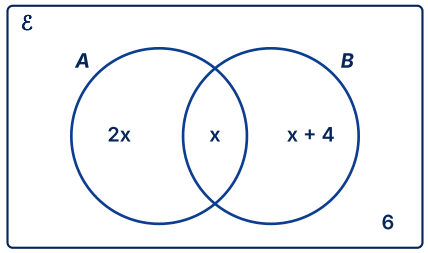
(a) the members of A that are not members of B **(1)**

(b) the members of $\mathscr{E}$ that are in neither A nor B. **(1)**

9. 3 marks

In a Venn diagram, the region for A only has $2x$ members, $A \cap B$ has x members, B only has $x + 4$ members and 6 members are in neither set. $n(\mathscr{E}) = 38$.

Find $n(B)$.



10. **2 marks**

$B \subset A$. $n(\mathscr{E}) = 20$, $n(A) = 12$ and $n(B) = 5$.

(a) Find $n(A \cap B')$. **(1)**

(b) Find $n(A')$. **(1)**

Answers and worked solutions

Question 1 — 3 marks

(a)

B1 $\{6, 12\}$

(b)

B1 8

(c)

B1 8

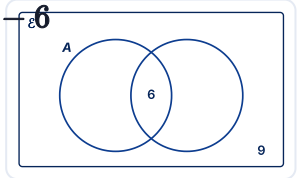
Answer: (a) $\{6, 12\}$; (b) 8; (c) 8

Question 2 — 3 marks

M1 $n(A \cup B) = 22 + 15 - 6$

M1 31

A1 9

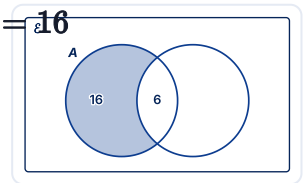


Answer: 9

Question 3 — 2 marks

M1 $n(A \cap B') = 22 - 6 = 16$

A1 $\frac{16}{40} = \frac{2}{5}$



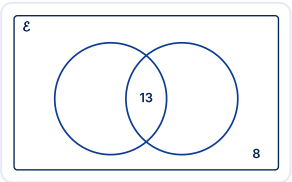
Answer: $\frac{2}{5}$

Question 4 — 3 marks

M1 $50 - 8 = 42$ play at least one

M1 $31 + 24 - 42$

A1 13



Answer: 13

Question 5 — 2 marks

M1 $\frac{6}{22}$

A1 $\frac{3}{11}$

Answer: $\frac{3}{11}$

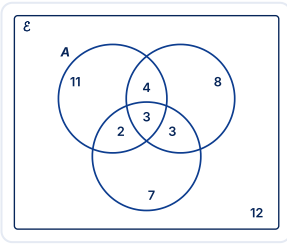
Question 6 — 4 marks

M1 the centre region 3 and the regions for exactly two sets: 4, 2, 3

M1 the regions for exactly one set: 11, 8, 7

M1 $n(A \cup B \cup C) = 38$

A1 12



Answer: 12

Question 7 — 2 marks

(a)

B1 $\{3, 4, 5, 6, 7\}$

(b)

B1 5

Answer: (a) $\{3, 4, 5, 6, 7\}$; (b) 5

Question 8 — 2 marks

(a)

B1 $A \cap B'$

(b)

B1 $(A \cup B)'$ or $A' \cap B'$

Answer: (a) $A \cap B'$; (b) $(A \cup B)'$

Question 9 — 3 marks

M1 $2x + x + x + 4 + 6 = 38$

A1 $x = 7$

A1 $n(B) = 7 + 11 = 18$

Answer: 18

Question 10 — 2 marks

(a)

B1 7

(b)

B1 8

Answer: (a) 7; (b) 8

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/sets-and-venn-diagrams
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