



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Venn Diagrams & Set Notation · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☐ Secure

☒ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Venn Diagrams & Set Notation

Total marks available: 86

● Venn Diagrams & Set Notation

✓ {1, 3, 5, 6, 7, 9, 11, 12}

Q1 · ● Developing · 2 marks

METHOD

$$A \cup B' = \{1, 3, 5, 6, 7, 9, 11, 12\}$$

✓ 12

Q2 · ● Developing · 1 mark

METHOD

$$A' \cap B: 12$$

✓ $(A \cap B)'$

Q3 · ● Developing · 1 mark

METHOD

The shaded region is $(A \cap B)'$

✓ 23

Q4 · ● Developing · 2 marks

METHOD

$$B': 7 + 16 = 23$$

✓ $A' \cup B$

Q5 · ● Developing · 1 mark

METHOD

The shaded region is $A' \cup B$

✓ {1, 5, 7, 11, 13}

Q6 · ● Developing · 2 marks

METHOD

$$A' \cap B = \{1, 5, 7, 11, 13\}$$

✓12

Q7 · ● Developing · 1 mark

METHOD

$$A \cap B: 12$$

✓ $A' \cup B$

Q8 · ● Developing · 1 mark

METHOD

The shaded region is $A' \cup B$ ✓ $\{5, 7, 8, 10, 11\}$

Q9 · ● Developing · 2 marks

METHOD

$$(A \cup B)' = \{5, 7, 8, 10, 11\}$$

✓13

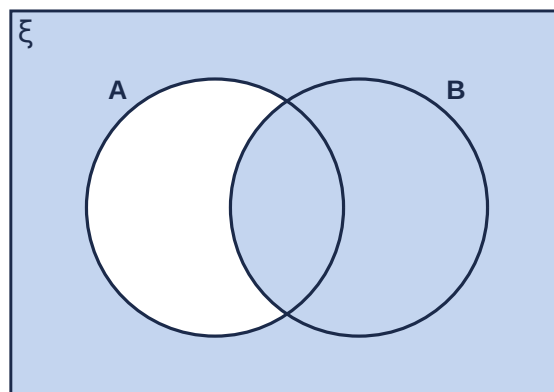
Q10 · ● Developing · 1 mark

METHOD

$$A' \cap B: 13$$

✓ Shaded: A and B, B only, outside both circles Q11 · ● Secure · 2 marks

METHOD

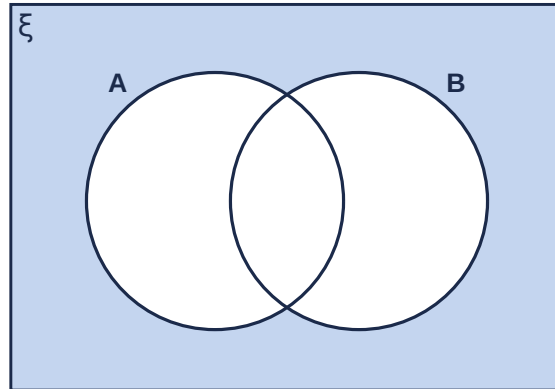
 $A' \cup B$: A and B, B only, outside both circles

✓ Shaded: outside both circles

Q12 · ● Secure · 2 marks

METHOD

$(A \cup B)'$: outside both circles



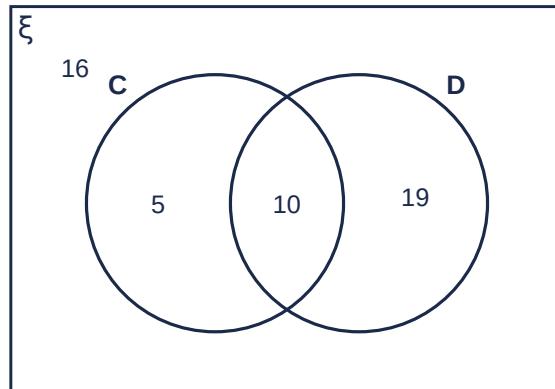
✓ (a) see diagram; (b) 10/29

Q13 · ● Secure · 4 marks

METHOD

Both: 10; C only: $15 - 10 = 5$; D only: $29 - 10 = 19$; neither: 16

(b) Restrict to the 29 who satisfy the condition: $P = 10/29$



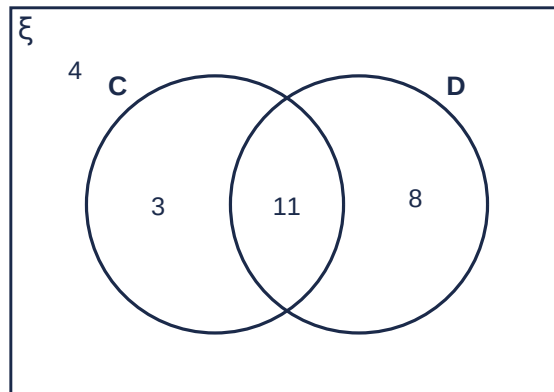
✓ (a) see diagram; (b) $2/3$

Q14 · ● Secure · 4 marks

METHOD

Both: 11; C only: $14 - 11 = 3$; D only: $19 - 11 = 8$; neither: 4

(b) Restrict to the 12 who satisfy the condition: $P = 8/12 = 2/3$

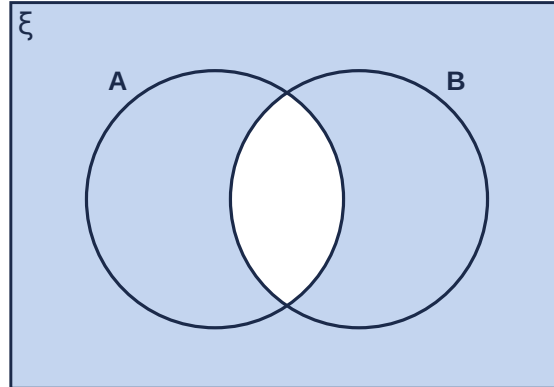


✓ Shaded: A only, B only, outside both circles

Q15 · ● Secure · 2 marks

METHOD

$(A \cap B)'$: A only, B only, outside both circles



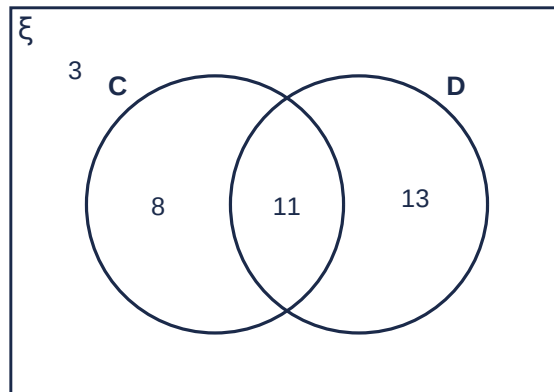
✓ (a) see diagram; (b) 13/16

Q16 · ● Secure · 4 marks

METHOD

Both: 11; C only: $19 - 11 = 8$; D only: $24 - 11 = 13$; neither: 3

(b) Restrict to the 16 who satisfy the condition: $P = 13/16$



✓ 21/47

Q17 · ● Secure · 2 marks

METHOD

$9 + 11 + 1 = 21$

$P = 21/47$

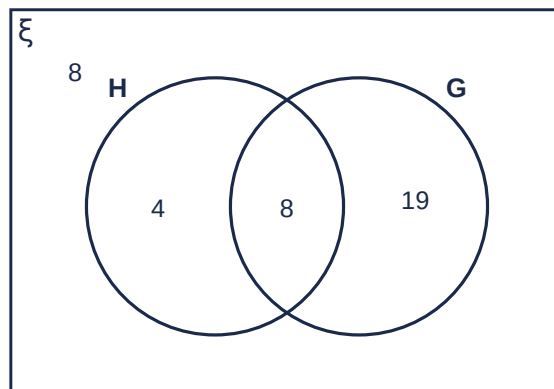
✓ (a) see diagram; (b) 19/27

Q18 · ● Secure · 4 marks

METHOD

Both: 8; H only: $12 - 8 = 4$; G only: $27 - 8 = 19$; neither: 8

(b) Restrict to the 27 who satisfy the condition: $P = 19/27$



✓7/68

Q19 · ● Secure · 2 marks

METHOD

$$P = 7/68$$

✓18/53

Q20 · ● Secure · 2 marks

METHOD

$$10 + 7 + 1 = 18$$

$$P = 18/53$$

✓(a) $x = 3$; (b) $1/7$

Q21 · ● Greater Depth · 5 marks

METHOD

$$(2x + 1) + (x - 1) + 4x + 8 = 29$$

$$7x + 8 = 29$$

$$7x = 21$$

$$x = 3$$

$$n(A) = 12 + 2 = 14$$

$$P = 2/14 = 1/7$$

✓11/47

Q22 · ● Greater Depth · 3 marks

METHOD

$$n(H \cup G) = 20 + 11 + 16 = 47$$

$$P = 11/47$$

✓ (a) $x = 4$; (b) $3/11$

Q23 · ● Greater Depth · 5 marks

METHOD

$$(3x + 2) + (x - 1) + 2x + 15 = 40$$

$$6x + 16 = 40$$

$$6x = 24$$

$$x = 4$$

$$n(G) = 8 + 3 = 11$$

$$P = 3/11$$

✓ 14/25

Q24 · ● Greater Depth · 3 marks

METHOD

$$n(C') = 14 + 11 = 25$$

$$P = 14/25$$

✓ (a) see diagram; (b) $18/41$

Q25 · ● Greater Depth · 5 marks

METHOD

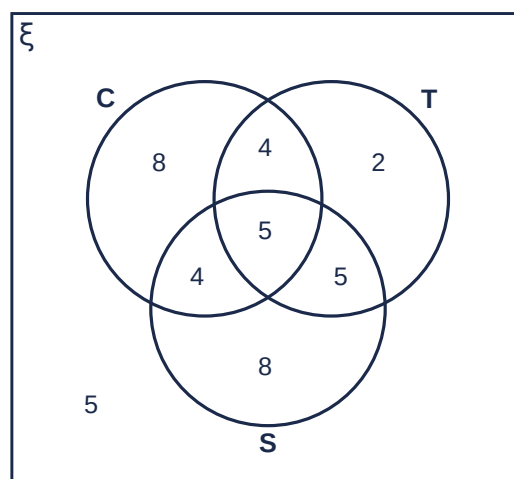
Centre: 5

CT only: $9 - 5 = 4$; CS only: $9 - 5 = 4$; TS only: $10 - 5 = 5$

C only: $21 - 4 - 4 - 5 = 8$; T only: $16 - 4 - 5 - 5 = 2$; S only: $22 - 4 - 5 - 5 = 8$

In none of the sets: $41 - 36 = 5$

(b) $P = 18/41$



✓ (a) see diagram; (b) $4/41$

Q26 · ● Greater Depth · 5 marks

METHOD

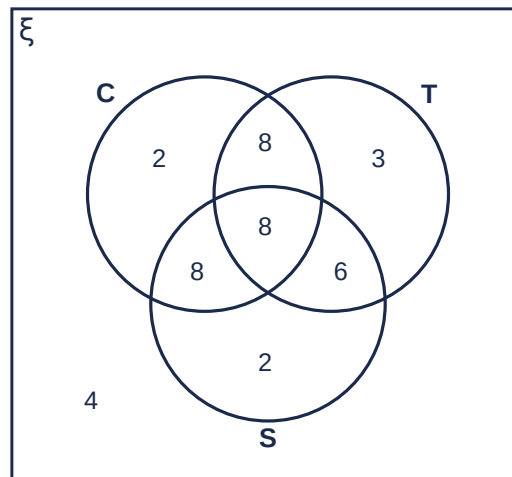
Centre: 8

CT only: $16 - 8 = 8$; CS only: $16 - 8 = 8$; TS only: $14 - 8 = 6$

C only: $26 - 8 - 8 - 8 = 2$; T only: $25 - 8 - 6 - 8 = 3$; S only: $24 - 8 - 6 - 8 = 2$

In none of the sets: $41 - 37 = 4$

(b) $P = 4/41$



✓ (a) $x = 8$; (b) $7/22$

Q27 · ● Greater Depth · 5 marks

METHOD

$$(2x + 1) + (x - 1) + (x + 7) + 8 = 47$$

$$4x + 15 = 47$$

$$4x = 32$$

$$x = 8$$

$$n(C) = 15 + 7 = 22$$

$$P = 7/22$$

✓ (a) see diagram; (b) 12/47

Q28 · ● Greater Depth · 5 marks

METHOD

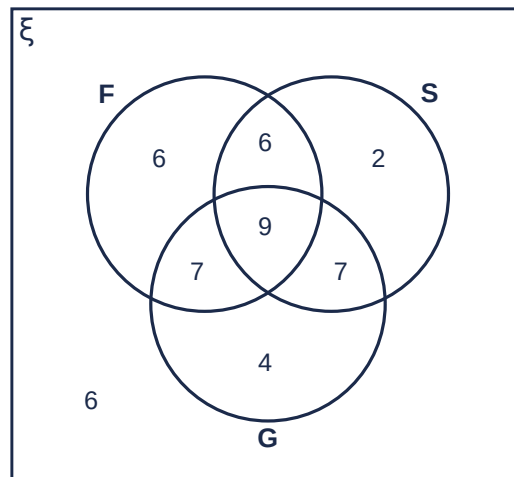
Centre: 9

FS only: $15 - 9 = 6$; FG only: $16 - 9 = 7$; SG only: $16 - 9 = 7$

F only: $28 - 6 - 7 - 9 = 6$; S only: $24 - 6 - 7 - 9 = 2$; G only: $27 - 7 - 7 - 9 = 4$

In none of the sets: $47 - 41 = 6$

(b) $P = 12/47$



✓ (a) $x = 9$; (b) 11/27

Q29 · ● Greater Depth · 5 marks

METHOD

$$3x + (x + 2) + (x + 7) + 15 = 69$$

$$5x + 24 = 69$$

$$5x = 45$$

$$x = 9$$

$$n(D) = 16 + 11 = 27$$

$$P = 11/27$$

✓ 5/13

Q30 · ● Greater Depth · 3 marks

METHOD

$$n(C \cup D) = 4 + 5 + 4 = 13$$

$$P = 5/13$$