



5.23F Venn Diagrams: Foundation Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 45 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Here is a Venn diagram with two sets. 7 students like apples only, 5 students like bananas only and 3 students like both apples and bananas. How many students were asked in total?

(Total for Question 1 is 1 mark)

- 2** In a survey 12 people like tea, 9 people like coffee and 4 like both tea and coffee. How many people like tea or coffee (or both)?

(Total for Question 2 is 1 mark)

- 3** A class of pupils is asked about clubs. 8 pupils are in the drama club only, 6 are in the music club only and 5 are in both clubs. Draw a simple two-circle Venn diagram and write the numbers in each region. How many pupils are in at least one club?

(Total for Question 3 is 2 marks)

- 4** In a group of 30 children, 10 eat cereal, 8 eat toast and 4 eat both cereal and toast. How many children eat neither cereal nor toast?

(Total for Question 4 is 2 marks)

- 5 A two-circle Venn diagram shows pupils who play football (F) and pupils who play netball (N). The numbers are: F only 11, N only 7, both 4. A pupil is chosen at random. Give the probability that the pupil plays netball. Give your answer as a fraction in lowest terms.

(Total for Question 5 is 3 marks)

- 6 In a survey of 25 people, 15 like cats, 9 like dogs and 5 like both cats and dogs. Complete a two-set Venn diagram with the numbers and work out how many like neither cats nor dogs.

(Total for Question 6 is 3 marks)

- 7 A Venn diagram has two sets A and B. In set A only there are 9, in set B only there are 6 and in the overlap there are 3. Outside both sets there are 7. What is the total number of people shown in the diagram?

(Total for Question 7 is 3 marks)

- 8 At a book club, 14 members like fiction, 10 like non-fiction and 6 like both. How many members like fiction but not non-fiction? Also state the number who like at least one type of book.

(a) How many members like fiction but not non-fiction? (2)

(b) How many members like at least one type of book? (2)

(Total for Question 8 is 4 marks)

- 9** A school club recorded 28 pupils. 12 play chess, 10 play draughts and 6 play both chess and draughts. A pupil is picked at random. Work out the probability that the pupil plays neither chess nor draughts. Give your answer as a fraction in lowest terms.

(Total for Question 9 is 4 marks)

- 10** There are three sets in a simple situation. 5 pupils are in the overlap of sets A and B only, 4 pupils are in the overlap of B and C only, 3 pupils are in the overlap of A and C only, 2 pupils are in the overlap of all three A, B and C. The numbers in the single-only regions are: A only 6, B only 5, C only 4. How many pupils are there in total?

(Total for Question 10 is 4 marks)

- 11** In a class of 32, pupils chose morning activities. 18 chose reading, 14 chose drawing and 6 chose both reading and drawing. Work out how many pupils chose neither activity. Then explain briefly how you obtained your answer.

(a) How many pupils chose neither activity? (3)

.....
(b) Explain briefly how you obtained your answer to part (a). (2)

(Total for Question 11 is 5 marks)

- 12** A Venn diagram for three hobbies shows the following numbers: only A = 7, only B = 5, only C = 6, A and B only = 3, B and C only = 2, A and C only = 4, all three = 1. A teacher wants to divide pupils into teams of 6 so that each team has exactly one pupil who is in all three hobbies if possible. What is the maximum number of such teams the teacher can form? Show your working.

(Total for Question 12 is 6 marks)

Mark scheme · 5.23F Venn Diagrams: Foundation Tier Practice

Question 1

- **B1** 15 cao
- **Answer: 15 students** ($7 + 5 + 3 = 15$).

Question 2

- **B1** 17 cao
- **Answer: 17** ($12 + 9 - 4 = 17$).

Question 3

- **M1** correct placement of 8, 6 and 5 in the three regions of a two-set Venn diagram
- **A1** 19 cao ($8 + 6 + 5$)
- **Answer: 19 pupils; diagram regions: drama only 8, music only 6, both 5.**

Question 4

- **M1** correctly compute number who eat cereal or toast: $10 + 8 - 4 = 14$
- **A1** 16 cao ($30 - 14 = 16$)
- **Answer: 16 children** ($30 - (10 + 8 - 4) = 16$).

Question 5

- **M1** identify total who play netball = $7 + 4 = 11$
- **M1** identify total pupils = $11 + 7 + 4 = 22$
- **A1** $11/22 = 1/2$ cao (give final fraction in lowest terms)
- **Answer: 1/2** ($11/22 = 1/2$).

Question 6

- **M1** place 5 in intersection, then $15 - 5 = 10$ in cats only and $9 - 5 = 4$ in dogs only
- **M1** compute total in at least one = $10 + 4 + 5 = 19$
- **A1** 6 cao ($25 - 19 = 6$)
- **Answer: 6 people like neither.**

Question 7

- **M1** add regions: $9 + 6 + 3 + 7 = 25$ or show correct addition
- **A1** 25 cao
- **C1** clear final statement of total (communication)
- **Answer: 25 people in total.**

Question 8

- (a) **M1** compute fiction only = $14 - 6$
- (a) **A1** 8 cao
- (a) **Answer: 8 members**
- (b) **M1** compute total = $14 + 10 - 6$
- (b) **A1** 18 cao
- (b) **Answer: 18 members**

Question 9

- **M1** compute number who play at least one: $12 + 10 - 6 = 16$
- **M1** compute number who play neither: $28 - 16 = 12$
- **A1** $12/28 = 3/7$ cao
- **C1** final probability stated in lowest terms
- **Answer: 3/7** ($12/28 = 3/7$).

Question 10

- **M1** add all seven regions: $6 + 5 + 4 + 5 + 4 + 3 + 2$
- **A1** 29 cao
- **C1** final total stated clearly
- **B1** correct arithmetic shown or final answer correct
- **Answer: 29 pupils** ($6 + 5 + 4 + 5 + 4 + 3 + 2 = 29$).

Question 11

- (a) **M1** compute reading or drawing = $18 + 14 - 6 = 26$
- (a) **M1** compute neither = $32 - 26$
- (a) **A1** 6 cao
- (a) **Answer: 6 pupils**
- (b) **B1** state formula or method: used union formula or added and subtracted overlap
- (b) **B1** clear explanation: subtract number who do at least one from total
- (b) **Answer: Used $18 + 14 - 6$ to find pupils doing at least one activity (26) then $32 - 26 = 6$. Explanation: avoid double counting by subtracting the overlap.**

Question 12

- **M1** identify total pupils = $7 + 5 + 6 + 3 + 2 + 4 + 1 = 28$
- **M1** recognise each team requires exactly one pupil from the all three region, so limited by number in that region = 1
- **A1** 1 team cao
- **M1** alternative reasoning: cannot form more than 1 because only one pupil is in all three
- **C1** clear final statement of maximum number of teams and supporting working
- **B1** correct arithmetic or demonstration of total and team size
- **Answer: 1 team (only 1 pupil is in all three, so at most one team can have exactly one such pupil).**