



EP.M128 Two-Way Tables and Venn Diagram Reasoning

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A survey of 28 pupils asked which of two games they liked. The results were recorded in this table.

Football Cricket

Boys 11 4

Girls 9 4

How many pupils like cricket?

- ☐ A) 4
☐ B) 9
☐ C) 8
☐ D) 15
☐ E) 20

(Total for Question 1 is 1 mark)

- 2** In a survey of 40 pupils the table shows whether they own a bike.

Owns bike Yes Owns bike No

Cats 12 5

Dogs 6 17

How many pupils own a bike?

- ☐ A) 28
☐ B) 18
☐ C) 17
☐ D) 25
☐ E) 19

(Total for Question 2 is 1 mark)

- 3** In a class of 26 pupils, 15 play football, 11 play chess and 6 play both football and chess. How many pupils play neither football nor chess?

- ☐ A) 4
- ☐ B) 6
- ☐ C) 7
- ☐ D) 8
- ☐ E) 10

(Total for Question 3 is 1 mark)

- 4** A shop recorded purchases by 52 customers. 16 bought bananas. What is the probability that a randomly chosen customer bought bananas?

- ☐ A) $16/52$
- ☐ B) $4/13$
- ☐ C) $16/50$
- ☐ D) $1/4$
- ☐ E) $8/26$

(Total for Question 4 is 1 mark)

- 5** A factory has morning and evening shifts. The table shows how many workers of each sex work each shift.

	Morning	Evening
Male	13	11
Female	17	19

How many females work the morning shift?

- ☐ A) 13
- ☐ B) 11
- ☐ C) 17
- ☐ D) 30
- ☐ E) 6

(Total for Question 5 is 1 mark)

6 The table below shows a small cinema's customers.

Child Adult

Matinee 9 13

Evening 7 15

How many adults attended the cinema in total?

- ☐ A) 13
- ☐ B) 15
- ☐ C) 28
- ☐ D) 22
- ☐ E) 16

(Total for Question 6 is 1 mark)

7 A questionnaire of 36 pupils recorded whether they like science and whether they like art. The table shows:

Like science only: 15

Like art only: 3

Like both: x

Total who like at least one subject: 30

How many like both science and art?

- ☐ A) 3
- ☐ B) 6
- ☐ C) 7
- ☐ D) 9
- ☐ E) 12

(Total for Question 7 is 1 mark)

- 8** The two-way table shows students' choices of after-school clubs.

	Drama	Music	Total
Chosen Club	Yes	Yes	
Boys	7	5	12
Girls	9	7	16
Total	16	12	28

What fraction of the students chose Music?

- ☐ A) $\frac{12}{28}$
☐ B) $\frac{3}{7}$
☐ C) $\frac{6}{14}$
☐ D) $\frac{12}{26}$
☐ E) $\frac{7}{16}$

(Total for Question 8 is 1 mark)

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- 9** Fill in the missing cell in the table. The table shows pets owned by 30 pupils.

	Cats	Dogs	Total
Yes	10	8	18
No	5	7	12
Total	15	15	30

Is the table consistent? If not, give the correct value for the missing cell or explain.

(Total for Question 9 is 1 mark)

- 10** A class completes a survey about owning a tablet and owning a smartphone. The table shows some counts.

Smartphone	Yes	Smartphone	No	Total
Tablet	Yes	8	4	12
Tablet	No	6	6	12
Total	14	10	24	

How many pupils own both a tablet and a smartphone?

- ☐ A) 8
☐ B) 6
☐ C) 4
☐ D) 12
☐ E) 14

(Total for Question 10 is 1 mark)

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- 11** From this table we see pupils who bring packed lunch and those who bring lunch money.

Packed lunch	Yes	Packed lunch	No
Lunch money	Yes	10	4
Lunch money	No	6	10

How many pupils bring neither packed lunch nor lunch money?

- ☐ A) 6
☐ B) 10
☐ C) 4
☐ D) 16
☐ E) 30

(Total for Question 11 is 1 mark)

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- 12** A small snack stall recorded purchases by 40 customers. 18 bought cakes, 9 bought sandwiches and 6 bought both. How many bought only a cake?

- ☐ A) 12
☐ B) 9
☐ C) 6
☐ D) 18
☐ E) 24

(Total for Question 12 is 1 mark)

13 The table shows pupils taking French and German.

German	Not German	Total
Takes French	7 5	12
Does not take	6 12	18
Total	13 17	30

(a) How many pupils take German? (b) How many pupils take neither French nor German?

(a) How many pupils take German? (1)

(b) How many pupils take neither French nor German? (1)

(Total for Question 13 is 2 marks)

14 In a survey of 50 pupils, 28 like maths, 22 like history and 10 like both. Work out how many pupils like neither maths nor history.

(Total for Question 14 is 2 marks)

- 15** A class of 24 pupils were asked if they take piano lessons and if they take violin lessons. The results are:

Takes piano only: 7
Takes violin only: 4
Takes both: ?
Takes neither: 5

(a) How many pupils take both piano and violin? (b) How many pupils take at least one of the two instruments?

(a) How many pupils take both piano and violin? (1)

(b) How many pupils take at least one of the two instruments? (2)

(Total for Question 15 is 3 marks)

- 16** A table shows students who cycle to school and who use public transport.

	Public Yes	Public No	Total
Cycle Yes	9	7	16
Cycle No	5	13	18
Total	14	20	34

How many students do not cycle and do not use public transport?

(Total for Question 16 is 2 marks)

- 17** In a school of 60 pupils, 30 study French, 28 study Spanish and 12 study both. A pupil is chosen at random. Work out the probability that the pupil studies exactly one of the two languages. Give your answer as a fraction in simplest form.

(Total for Question 17 is 3 marks)

- 18** A Venn diagram shows pupils who like swimming (S) and pupils who like cycling (C). 20 pupils like swimming, 16 like cycling and 9 like both. How many pupils like either swimming or cycling or both?

(Total for Question 18 is 3 marks)

- 19** A school asked 100 pupils whether they prefer early lunch, late lunch, or no preference. The results were recorded as: early 42, late 38, no preference 20. The headteacher realises the counts must add to 100. Is the table complete and consistent? If not, suggest a possible reason why and correct the numbers so they sum to 100.

(Total for Question 19 is 3 marks)

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Question 1

- **B1** correct option C (8) cao
- **Answer: C) 8** (4 boys + 4 girls = 8 pupils like cricket.)

Question 2

- **B1** correct option B (18) cao
- **Answer: B) 18** ($12 + 6 = 18$ pupils own a bike)

Question 3

- **B1** correct option B (6) cao
- **Answer: B) 6**

Explanation: number playing at least one = $15 + 11 - 6 = 20$, so neither = $26 - 20 = 6$.

Question 4

- **B1** correct option B (4/13) cao
- **Answer: B) 4/13** ($16/52$ simplified = $4/13$)

Question 5

- **B1** correct option C (17) cao
- **Answer: C) 17**

Question 6

- **B1** correct option C (28) cao
- **Answer: C) 28** ($13 + 15 = 28$ adults)

Question 7

- **B1** correct option E (12) cao
- **Answer: E) 12**

Working: at least one = (science only) + (art only) + (both) = $15 + 3 + x = 18 + x = 30$, so $x = 12$.

Question 8

- **B1** correct option A (12/28) cao
- **Answer: A) 12/28** = $3/7$

Question 9

- **B1** 15 for total Cats cao or state table consistent
- **Answer: The table is consistent as written: Cats total 15, Dogs total 15, totals match 30. Missing cell not required.**

Question 10

- **B1** correct option A (8) cao
- **Answer: A) 8**

Question 11

- **B1** correct option B (10) cao
- **Answer: B) 10** (Lunch money No row, Packed lunch No column = 10)

Question 12

- **B1** correct option A (12) cao
- **Answer: A) 12** (only cake = $18 - 6 = 12$)

Question 13

- (a) **B1** 13 cao
- (a) **Answer: 13**
- (b) **B1** 12 cao
- (b) **Answer: 12**

Question 14

- **M1** $28 + 22 - 10 (= 40)$ seen for at least one
- **A1** 10 cao for neither ($50 - 40 = 10$)
- **Answer: 10 (At least one = $28 + 22 - 10 = 40$; neither = $50 - 40 = 10$)**

Question 15

- (a) **B1** 8 cao
- (a) **Answer: 8**
- (b) **M1** method for at least one using totals seen
- (b) **A1** 19 cao
- (b) **Answer: 19**

Question 16

- **M1** use of table to read Cycle No and Public No cell or equivalent
- **A1** 13 cao
- **Answer: 13 (Cycle No and Public No = 13)**

Question 17

- **M1** calculate at least one or exactly one expression: exactly one = $30 + 28 - 2 \times 12$
- **M1** substitution: exactly one = $30 + 28 - 24 = 34$
- **A1** $34/60 = 17/30$ cao
- **Answer: 17/30 (Exactly one = $30 + 28 - 2 \times 12 = 34$, probability = $34/60 = 17/30$)**

Question 18

- **M1** apply inclusion-exclusion: $20 + 16 - 9$ seen
- **A1** 27 cao
- **B1** explain that 27 is number who like at least one oe
- **Answer: 27 ($20 + 16 - 9 = 27$)**

Question 19

- **M1** state that $42 + 38 + 20 = 100$ seen or note if arithmetic error
- **A1** $42 + 38 + 20 = 100$ cao
- **B1** if inconsistent suggest a plausible correction (e.g. miscounted 20 should be 20 and explain) or state consistent as given
- **Answer: The counts add to 100 ($42 + 38 + 20 = 100$), so the table is complete and consistent.**