



EP.M134 Multi-Step Mixed Reasoning Challenge Set 4

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 60 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Which of these is the largest number?

- ☐ A) $7/12$
- ☐ B) $3/5$
- ☐ C) $11/20$
- ☐ D) 0.55
- ☐ E) 57%

(Total for Question 1 is 1 mark)

2 What is the units digit of $3^4 + 7^3$?

- ☐ A) 1
- ☐ B) 3
- ☐ C) 4
- ☐ D) 7
- ☐ E) 9

(Total for Question 2 is 1 mark)

3 Three friends share £420 in the ratio 3: 5: 7. How much does the friend with the middle share receive?

- ☐ A) £84
- ☐ B) £105
- ☐ C) £140
- ☐ D) £175
- ☐ E) £210

(Total for Question 3 is 1 mark)

4 A car travels 150 km in 2 hours 30 minutes. What is its average speed in km/h?

- ☐ A) 50 km/h
- ☐ B) 55 km/h
- ☐ C) 60 km/h
- ☐ D) 65 km/h
- ☐ E) 75 km/h

(Total for Question 4 is 1 mark)

5 Priya buys 3 identical boxes of biscuits. Each box contains 450 g of biscuits and costs £2.40. She also buys a pack of ribbons costing £1.65. She divides all the biscuits into gift bags of 150 g and sells each bag for £0.95. Work out her profit or loss in pounds, to the nearest penny.

(Total for Question 5 is 3 marks)

6 A rectangle has width w cm and length $2w + 2$ cm. Its area is 180 cm^2 . Find the width and the length of the rectangle.

(Total for Question 6 is 3 marks)

7 A school has 240 pupils. Three eighths of the pupils play football and one sixth play cricket; the remaining pupils do other activities. Of the pupils who play football, 40% are girls. Work out

(a) the number of pupils who play football. (1)

(b) the number of girls who play football. (1)

(c) the number of girls who play football as a percentage of the whole school. (2)

(Total for Question 7 is 4 marks)

- 8** A cyclist rides 12 km in 45 minutes. He then increases his speed by 25% and rides for a further 30 minutes. Work out the total distance he travels, giving your answer in kilometres.

(Total for Question 8 is 4 marks)

- 9** In a class the ratio of boys to girls is 5: 4. Six more boys join the class and two girls leave. The new ratio of boys to girls becomes 3: 2. How many girls were in the class originally?

(Total for Question 9 is 3 marks)

- 10** A triangle is right-angled. One side is 5 cm and the hypotenuse is 13 cm. Find the area and the perimeter of the triangle.

(Total for Question 10 is 4 marks)

- 11** A jacket costs £120 before VAT. VAT at 20% is added, and then the shop applies a 15% discount to the new price. Work out the final price Priya pays, to the nearest penny.

(Total for Question 11 is 4 marks)

- 12** A 240 ml jug contains orange juice and apple juice. The jug is 40% orange juice and the rest is apple juice. 25% of the apple juice is poured away and replaced with orange juice. What percentage of the jug is now orange juice?

(Total for Question 12 is 4 marks)

- 13** A large cube is made from $5 \times 5 \times 5$ small unit cubes and then the outside faces of the large cube are painted. The large cube is then cut back into the small unit cubes. How many of the small cubes have exactly two faces painted?

(Total for Question 13 is 4 marks)

Mark scheme · EP.M134 Multi-Step Mixed Reasoning Challenge Set 4

Question 1

- **B1** correct option B ($3/5 = 0.6$) cao
- **Answer: B) 3/5 (0.6 is the largest)**

Question 2

- **B1** correct option C (units digit 4) cao
- **Answer: C) 4**

Question 3

- **B1** correct option C (£140) cao
- **Answer: C) £140**

Question 4

- **B1** correct option C ($150 / 2.5 = 60$ km/h) cao
- **Answer: C) 60 km/h**

Question 5

- **M1** method to find number of 150 g bags: total mass $3 \times 450 = 1350$ g, $1350 / 150 = 9$ seen
- **M1** method to find total cost and total revenue: cost = $3 \times 2.40 + 1.65$ seen, revenue = 9×0.95 seen
- **A1** final correct answer: loss of £0.30 (or -£0.30) cao
- **Answer: Loss of £0.30 (net -£0.30)**

Question 6

- **M1** method: set up $w(2w + 2) = 180$ or $2w^2 + 2w - 180 = 0$
- **M1** method: simplify to $w^2 + w - 90 = 0$ and factorise or apply quadratic
- **A1** correct dimensions: width 9 cm, length 20 cm cao
- **Answer: Width 9 cm, length 20 cm**

Question 7

- (a) **B1** 90 cao
- (a) **Answer: 90**
- (b) **B1** 36 cao
- (b) **Answer: 36**
- (c) **M1** method to compute $36 / 240$ seen
- (c) **A1** 15% cao
- (c) **Answer: 15%**

Question 8

- **M1** method to find initial speed: 12 km in 45 min = $12 / 0.75$ h = 16 km/h seen
- **M1** method to increase speed by 25%: $16 \times 1.25 = 20$ km/h seen
- **M1** method to find distance in next 30 min: $20 \times 0.5 = 10$ km seen
- **A1** total distance $12 + 10 = 22$ km cao
- **Answer: 22 km**

Question 9

- **M1** method: let multiplier k , boys = $5k$, girls = $4k$ and set $(5k + 6)/(4k - 2) = 3/2$
- **M1** method to solve: $2(5k + 6) = 3(4k - 2) \Rightarrow 10k + 12 = 12k - 6 \Rightarrow 2k = 18 \Rightarrow k = 9$
- **A1** original number of girls = $4k = 36$ cao
- **Answer: 36 girls**

Question 10

- **M1** method to find the other leg using Pythagoras: $\text{other}^2 = 13^2 - 5^2 = 169 - 25 = 144$ seen
- **M1** method: other side = 12 cm seen
- **M1** method to find area: $\frac{1}{2} \times 5 \times 12 = 30$ seen
- **A1** final values: area 30 cm^2 and perimeter $5 + 12 + 13 = 30 \text{ cm}$ cao
- **Answer: Area 30 cm^2 ; perimeter 30 cm**

Question 11

- **M1** method: find price after 20% VAT, $120 \times 1.20 = 144$ seen
- **M1** method: apply 15% discount to 144, i.e. 144×0.85 seen
- **M1** intermediate calculation leading to 122.4 seen
- **A1** final answer £122.40 cao
- **Answer: £122.40**

Question 12

- **M1** method to find initial amounts: orange = $0.40 \times 240 = 96 \text{ ml}$, apple = 144 ml seen
- **M1** method to find apple removed: 25% of 144 = 36 ml seen
- **M1** method to add 36 ml orange and compute new orange amount $96 + 36 = 132 \text{ ml}$ seen
- **A1** final percentage = $132/240 = 0.55 = 55\%$ cao
- **Answer: 55%**

Question 13

- **M1** method: identify that cubes with exactly two painted faces lie on edges but not corners; number per edge = $n - 2$ seen
- **M1** method: compute $n - 2 = 5 - 2 = 3$ seen
- **M1** method: number on all edges = $12 \times (n - 2) = 12 \times 3$ seen
- **A1** final answer 36 cao
- **Answer: 36**