ARIS ACADEMY · NSW SELECTIVE TEST PRACTICE

Mathematical Reasoning

Centre sample · 5 questions with worked answers

This sample contains 5 questions from the Mathematical Reasoning section of an Aris practice paper, with full worked answers at the back. In the NSW Selective Test, Mathematical Reasoning has 35 questions in 40 minutes. Allow about 6 minutes for this sample.

Instructions: Choose the best answer for each question and circle the letter. Calculators are not allowed. Working can be shown in the space around each question.

Question 1

Each symbol below represents a different number.

What is the value of △?

A. 5 B. 8 C. 9 D. 10 E. 15

Question 2

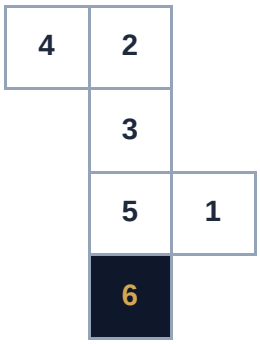
Emma had $20. Emma gave some money to Liam. Liam then gave half of what he was given to Oliver. Oliver gave two thirds of what he was given to Jason. Jason received $5.

How much did Emma give to Liam?

A. $2.50 B. $5 C. $7.50 D. $15 E. $15.50

Question 3

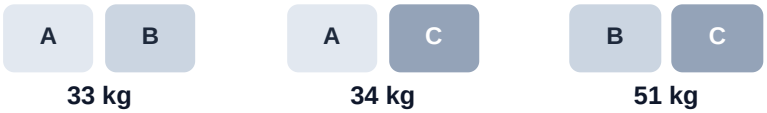
The net below folds into a cube. **Which number is on the face opposite 6?**



A. 1 B. 2 C. 3 D. 4 E. 5

Question 4

Three different boxes are weighed in pairs. The combined weights of the three pairs are **33 kg**, **34 kg** and **51 kg**, as shown.



When the three boxes are weighed together, what is their combined weight?

A. 59 kg B. 67 kg C. 84 kg D. 85 kg E. 118 kg

Question 5

In a magic square, each row, column and diagonal adds up to the same total. Some numbers are missing.

10	30	26
38		
	?	

What is the missing number at ?

A. 13 B. 14 C. 15 D. 17 E. 18

Worked answers (for tutors)

Question 1

4 × ☆ = 20, ○ = ☆ + 10, △ = ○ − 6. What is △?

```
☆ = 20 ÷ 4 = 5
○ = 5 + 10 = 15
△ = 15 − 6 = 9
```

Check: 4 × 5 = 20; 5 + 10 = 15; 15 − 6 = 9. All three equations hold.

Answer: C (9)

Question 2

Emma gave some money to Liam. Liam gave half to Oliver. Oliver gave two thirds of what he was given to Jason. Jason received $5. How much did Emma give to Liam?

```
Let x = the amount Emma gave Liam.
Liam gives Oliver: x ÷ 2 = x/2
Oliver gives Jason: (2/3) × (x/2) = x/3
Jason received $5, so x/3 = 5
x = 3 × 5 = 15
```

Check: $15 → half is $7.50 → two thirds of $7.50 is $5. The chain holds.

Answer: D ($15)

Question 3

The net folds into a cube. Which number is on the face opposite 6?

Keep face 5 flat on the table, facing up. Fold each joined face and note which way it ends up facing:

```
3 is above 5 → folds up to face north
6 is below 5 → folds down to face south
1 is right of 5 → folds to face east
2 is above 3 → folds over the top to face down (opposite 5)
4 is left of 2 → folds around to face west (opposite 1)
```

Opposite pairs: 5 and 2, 3 and 6, 4 and 1. So the face opposite 6 is 3.

Check the joined edges: 4-2, 2-3, 3-5, 5-1 and 5-6 all stay joined in the cube.

Answer: C (3)

Teaching tip: Guessing by picturing the cube often picks a face that only touches 5 at a corner, not an edge. Naming the direction each face points (north, south, east, west, up, down) turns the guess into a checkable method.

Question 4

A + B = 33 kg, A + C = 34 kg, B + C = 51 kg. What do all three boxes weigh together?

```
Add the three pairings:
(A + B) + (A + C) + (B + C) = 33 + 34 + 51
2A + 2B + 2C = 118
A + B + C = 118 ÷ 2 = 59 kg
```

Individual weights (not needed, but a good check):

```
A = 59 − 51 = 8 kg
B = 59 − 34 = 25 kg
C = 59 − 33 = 26 kg
```

Check: 8 + 25 = 33; 8 + 26 = 34; 25 + 26 = 51. All three pairings hold.

Answer: A (59 kg)

Teaching tip: Each box is weighed exactly twice across the three pairings, so the three pair totals add to double the combined weight. Students who see this skip solving for A, B and C entirely.

Question 5

Every row, column and diagonal adds to the same total. What is the missing number at ?

```
Row 1 is complete: 10 + 30 + 26 = 66 (the magic total)
Column 1: 10 + 38 + _ = 66 → 18
Diagonal: 26 + _ + 18 = 66 → centre = 22
Row 2: 38 + 22 + _ = 66 → 6
Column 2: 30 + 22 + ? = 66 → ? = 14
```

The completed square:

10	**30**	**26**
38	**22**	**6**
18	**14**	**34**

Check: every row, column and diagonal adds to 66.

Answer: B (14)

Answer key: Q1 C · Q2 D · Q3 C · Q4 A · Q5 B

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