



MINERVA EDUCATION

NSW SELECTIVE HIGH SCHOOL PREPARATION

Mathematical Reasoning & Thinking Skills

Week 1 Student Booklet

MATHEMATICS Multi-step worded problems (number & operations)

THINKING SKILLS Verbal reasoning & logical deduction

Student name

Class / group

Date

Contents

Full term map

The complete 11-week program. Odd weeks cover Mathematics and Thinking Skills; even weeks cover Reading and Writing. Week 11 is a joint mock test.

| WK | COMPONENT | FOCUS FOR THE WEEK |
|----|---|---|
| 1 | Math & Thinking Skills YOU ARE HERE | Multi-step worded problems (number & operations); verbal reasoning & logical deduction |
| 2 | Reading & Writing | Literal & inferential comprehension; narrative structure & planning |
| 3 | Math & Thinking Skills | Ratio, proportion & fraction reasoning; critical thinking (assumptions, flaws, arguments) |
| 4 | Reading & Writing | Evaluative comprehension (tone, purpose, viewpoint); persuasive structure |
| 5 | Math & Thinking Skills | Geometry & measurement reasoning; abstract reasoning (matrices, odd-one-out) |
| 6 | Reading & Writing | Vocabulary-in-context & cloze; discursive / reflective writing |
| 7 | Math & Thinking Skills | Algebraic / pattern reasoning & working backwards; figure series & spatial transformations |
| 8 | Reading & Writing | Text structure & synthesis across texts; sophisticated language under timed conditions |
| 9 | Math & Thinking Skills | Consolidation: targeted review of weakest types from Weeks 1, 3, 5, 7 plus mixed timed practice |
| 10 | Reading & Writing | Consolidation: targeted review of weakest types from Weeks 2, 4, 6, 8 plus mixed timed practice |
| 11 | Joint mock test | Full computer-based mock under timed conditions; review of common errors |

In this booklet

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Diagnostic assessment

About 15 minutes. Attempt every question on your own. This is not marked for a grade; it shows your tutor which skills to focus on. Choose one answer for each question. Some questions include extra information you do not need.

Mathematical Reasoning five options (A–E)

1

A bakery opens at 7 am and closes at 4 pm. One Saturday it began with a full tray of muffins. It sold three-fifths of the tray before lunch and another 18 muffins during the afternoon, leaving 6 muffins unsold at closing time. How many muffins were on the tray to begin with?

- A 40
- B 45
- C 50
- D 60
- E 72

2

A class of 28 students is going on an excursion. The bus costs \$180 and museum entry is \$7 for each student. One teacher and two parent helpers travel free. The class has already raised \$120 from a cake stall. How much more money does the class still need to cover the bus and entry?

- A \$196
- B \$232
- C \$256
- D \$277
- E \$300

3

A farmer collects 158 eggs on Monday and 173 eggs on Tuesday. She packs them into boxes that hold 12 eggs each and sells each full box for \$5. How many full boxes can she pack from the two days?

- A 25
- B 26
- C 27
- D 28
- E 29

4

Two trains run between the same two cities. The Coastal train covers 240 km in 3 hours. The Valley train covers 350 km in 5 hours. Both trains carry 8 carriages. Which train has the greater average speed, and by how much?

- A The Valley train, by 10 km/h
- B The Coastal train, by 10 km/h
- C The Coastal train, by 20 km/h
- D The Valley train, by 20 km/h
- E They have the same average speed

Thinking Skills four options (A–D)

5

If Daniel does not revise, he is likely to be unprepared. If he is unprepared, then he will not finish the test in time. If he finishes the test in time, he may earn a merit; if he does not finish in time, he cannot earn one. Which one of the following is **not** possible?

- A Daniel did not revise but earned a merit.
- B Daniel revised but did not earn a merit.
- C Daniel finished the test in time but did not earn a merit.
- D Daniel was unprepared but still earned a merit.

6

Every student in the orchestra at Greenfield School has passed a music exam. Aisha says: “Ben plays in the orchestra, so Ben has passed a music exam.” Carl says: “Dina has passed a music exam, so Dina plays in the orchestra.” Whose reasoning is correct?

- A Carl only
- B Aisha only
- C Both Aisha and Carl
- D Neither Aisha nor Carl

7

At a market, every stall that sells honey also sells jam, and no stall that sells jam sells chillies. Which one of the following **must** be true?

- A A stall that sells chillies does not sell honey.
- B A stall that sells jam also sells honey.
- C A stall that sells chillies also sells jam.
- D Every stall sells either honey or jam.

8

Four friends finished a fun run: Bo, Cy, Di and Ed. Di finished ahead of Bo. Ed finished immediately after Bo. Cy did not finish last. Who finished last?

- A Bo
- B Cy
- C Ed
- D Di

Part A Mathematical Reasoning

Multi-step worded problems (number & operations)

In the real test, number questions are rarely a plain calculation. The work is in deciding *what* to do. A single problem often chains two or three steps, and the wording usually hides a useful number among details you do not need.

Three habits help on this question type:

- **Read to the end first.** Decide what the question is actually asking before you touch any numbers.
- **Sort the information.** Mark the numbers you need and cross out the ones that are only there to distract you.
- **Work backwards when the end is given.** If a problem tells you the final amount and the steps that led there, undo each step in reverse: addition becomes subtraction, and multiplication becomes division.

WORKED EXAMPLE 1

A theatre sold tickets for one show. It sold half of all its seats in the first week and another 40 seats in the second week. The theatre has two exits and its seats are set out in 12 rows. After the second week, 30 seats were still unsold. How many seats does the theatre have?

WORKING

Read to the end before calculating, and notice what is *not* needed: the two exits and the 12 rows are there to distract you.

Work backwards from the end. After the second week, 30 seats were unsold. Just before those 40 seats sold, there were $30 + 40 = 70$ unsold seats. Those 70 seats are the half that was still unsold after the first week, so the theatre has $70 \times 2 = \mathbf{140 \text{ seats}}$.

Check: half of 140 is 70 sold in week one, 40 more leaves $70 - 40 = 30$ unsold. Correct.

WORKED EXAMPLE 2

A whole number is multiplied by 4, and the answer is less than 30. The same whole number multiplied by 7 gives an answer greater than 40. What is the sum of all the whole numbers this could be?

WORKING

This question hides two conditions inside ordinary sentences. Turn each into a limit.

“Multiplied by 4, less than 30” means the number is at most 7, because $4 \times 7 = 28$ but $4 \times 8 = 32$. “Multiplied by 7, greater than 40” means the number is at least 6, because $7 \times 6 = 42$ but $7 \times 5 = 35$.

So the number is 6 or 7. The question asks for the *sum*, not the count, so the answer is $6 + 7 = \mathbf{13}$. A common slip is to stop at one value, or to give the count (2) instead of the sum.

Practice

Core questions match the harder items in the middle of the real paper. Challenge questions are stretch problems at the level of the toughest items. Work without a calculator.

Core

1

Olivia had a bag of marbles. She gave one-third of them to her brother, then gave 8 marbles to a friend. She kept the remaining 16 marbles. Her brother already owned 25 marbles before this. How many marbles did Olivia start with?

- A 24
- B 36
- C 48
- D 60
- E 72

2

Sam set out for school with some pocket money. He spent one-quarter of it on lunch, then \$6 on the bus, and arrived home with \$15 left. His brother had given him \$5 the day before. How much did Sam set out with?

- A \$21
- B \$24
- C \$26
- D \$28
- E \$40

3

A printer prints 24 pages every minute. It first prints a 180-page report, then keeps running for another 5 minutes at the same rate before it is switched off. The printer holds 500 sheets of paper. How many pages does it print in total?

- A 205
- B 276
- C 300
- D 360
- E 420

4

A class of 30 students visits the library. Each student borrows 3 fiction books. On the same visit, 12 of those students also borrow 2 non-fiction books each. The library closes at 5 pm. How many books are borrowed altogether?

- A 114
- B 126
- C 138
- D 150
- E 162

5

A school is taking 295 students on a trip. Each bus seats 40 students, and each bus needs one teacher on board. How many buses are needed so that every student has a seat?

- A 6
- B 7
- C 8
- D 9
- E 10

6

In a shop, a pen costs \$3 and a notebook costs \$7. Ravi buys 4 pens and 3 notebooks and pays with a \$50 note. A pencil case costs \$9, but Ravi does not buy one. How much change should Ravi receive?

- A \$13
- B \$17
- C \$21
- D \$29
- E \$33

7

Mia thinks of a whole number. She multiplies it by 3, then subtracts 4, and her answer is 26. She then takes her original number and multiplies it by 5. What is her final result?

- A 30
- B 40
- C 44
- D 50
- E 66

8

A water tank was full at the start of the week. Two-fifths of the water was used on Monday, then 30 litres were used on Tuesday, leaving 90 litres in the tank. The tank stands 1 metre tall. How many litres did the tank hold when full?

- A 180
- B 185
- C 190
- D 195
- E 200

Challenge

9

A whole number is multiplied by 4 and the answer is less than 50. The same number multiplied by 7 gives an answer greater than 50. What is the sum of all the whole numbers this could be?

- A 8
- B 20
- C 38
- D 42
- E 50

10

When a tin of soup is half full, the soup and the tin together weigh 120 grams. When the same tin is one-quarter full, the soup and tin together weigh 65 grams. What do the soup and tin weigh together when the tin is three-quarters full?

- A 155 g
- B 165 g
- C 175 g
- D 185 g
- E 195 g

11

Liam gave half of his trading cards to Noah. Noah then gave one-third of the cards he had just received to Eli, and Eli received 12 cards. Eli already had 40 cards of his own. How many trading cards did Liam have to begin with?

- A 36
- B 48
- C 60
- D 72
- E 84

12

A workshop makes 18 wooden toys every hour and runs for 7 hours each day. An order for 900 toys must be filled. The workshop has 5 staff. Working full days only, how many days are needed to complete the order?

- A 6
- B 7
- C 8
- D 9
- E 10

Part B Thinking Skills

Verbal reasoning & logical deduction

These questions test whether a conclusion truly follows from what you are told. Two patterns appear again and again in the real test.

- **Conditional chains.** A run of “if ... then ...” statements links together. Follow them in order, like dominoes. Watch for soft words such as “likely” or “might”, which mean a step is not certain.
- **Syllogisms and one-way rules.** A rule like “all A are B” works in one direction only. It does *not* mean “all B are A”. The most common wrong answer reverses the rule, so check the direction carefully.

The wrong options are written to match the mistakes students actually make, so an answer that feels obvious is often the trap. Prove your choice before you commit to it.

WORKED EXAMPLE 1

If Priya misses the train, then she takes the bus. If she takes the bus, then she is late to class. If she is on time to class, she signs the register; if she is late, she cannot sign it.

Which one of the following is **not** possible?

- A Priya missed the train but signed the register.
- B Priya caught the train but was late to class.
- C Priya took the bus but signed the register.
- D Priya was on time to class without catching the train.

WORKING

Follow the chain of “if” statements like falling dominoes, then test each option against it.

Missing the train forces the bus, the bus forces being late, and being late means she *cannot* sign the register. So option C, taking the bus but still signing, breaks the chain and is not possible. The same chain makes option A impossible as well, so read every option before deciding which single one the question wants.

Notice that option D is fine: there could be other ways to reach class on time besides the train. The wrong options in these questions usually come from assuming a rule works backwards. Here, the correct answer is **C**.

WORKED EXAMPLE 2

Every student who joins the chess club has beaten the teacher at least once. Sam says: "Tara joined the chess club, so Tara has beaten the teacher." Una says: "Vic has beaten the teacher, so Vic has joined the chess club." Whose reasoning is correct?

A Sam only B Una only C Both D Neither

WORKING

The rule points in one direction only: club members have beaten the teacher. It does not say the reverse.

Sam follows the rule the right way, so his reasoning holds. Una runs the rule backwards: beating the teacher might happen for many reasons, and does not prove club membership. Una's reasoning fails.

The trap is to pick "Both" because the second statement sounds just as reasonable. A one-way rule cannot be flipped. The correct answer is **A**.

Practice

Each question has four options (A–D), as in the real Thinking Skills paper.

Core

1

If a parcel weighs more than 2 kg, it is given a large label. A parcel with a large label cannot fit in the small chute. Only parcels placed in the small chute are delivered the same day. Which one of the following is **not** possible?

- A A parcel weighing more than 2 kg was delivered the same day.
- B A parcel lighter than 2 kg was given a large label.
- C A parcel was delivered the same day without a large label.
- D A parcel lighter than 2 kg was not delivered the same day.

2

At a market, every stall that sells olives also sells bread, and no stall that sells bread sells ice cream. Which one of the following **must** be true?

- A A stall that sells bread also sells olives.
- B A stall that sells ice cream also sells bread.
- C A stall that sells ice cream does not sell olives.
- D Every stall sells olives.

3

Wei, Xan, Yara and Zo are cousins. Xan is twice as old as Zo. Wei is 3 years older than Xan. Yara is 2 years younger than Wei. Zo is 6 years old. How old is Yara?

- A 12
- B 13
- C 15
- D 16

4

To join the science club a student must pass the entrance quiz. Students who have won a science fair are also allowed to join without sitting the quiz. Ravi joined the science club, but he has never won a science fair. Which one of the following **must** be true?

- A Ravi won a science fair.
- B Ravi did not pass the entrance quiz.
- C Ravi is the youngest member of the club.
- D Ravi passed the entrance quiz.

5

Five houses stand in a row, numbered 1 to 5 from left to right, each a different colour. The yellow house is house 1. The green house is house 3. The blue house is next to the green house. The red house is somewhere to the left of the blue house. Which house is the white house?

- A House 5
- B House 2
- C House 4
- D It cannot be determined

6

In a coding game these rules always hold. If a robot turns left, its light flashes red. If a robot's light flashes red, the robot stops moving. Any robot that is still moving has a green light. Which one of the following is **not** possible?

- A A robot turned right and its light flashed red.
- B A robot was moving and its light was green.
- C A robot turned left and kept moving.
- D A robot stopped moving without turning left.

7

Every member of the choir can read music. Some people who can read music play the piano. No one in the choir plays the drums. Which one of the following **must** be true?

- A Everyone in the choir plays the piano.
- B Someone who plays the drums cannot be in the choir.
- C No one who can read music plays the drums.
- D Everyone who can read music is in the choir.

8

Priya and Tom are on the debating team. Their coach has said that anyone absent from two training sessions will be dropped from the team for the final. Priya is in the final, but Tom is not. Ravi says: "Tom must have been absent twice." Maya says: "Priya cannot have been absent twice." Whose reasoning is correct?

- A Ravi only
- B Both Ravi and Maya
- C Neither Ravi nor Maya
- D Maya only

Challenge

9

If Noor forgets her umbrella, she is likely to get wet. If she gets wet, then she changes her clothes at work. If she changes her clothes, then she is late to her first meeting. If she is on time to that meeting she leads it; otherwise a colleague leads it. Which one of the following is **not** possible?

- A Noor forgot her umbrella but led her first meeting.
- B Noor got wet but led her first meeting.
- C Noor remembered her umbrella but still got wet.
- D Noor forgot her umbrella but was on time to the meeting.

10

At a school these facts are known. Every student who studies Latin also studies History. Some students who study History also study Art. No student who studies Art studies Latin. Priya says: "A student who studies Latin does not study Art." Quan says: "A student who studies History does not study Latin." Whose reasoning is correct?

- A Priya only
- B Quan only
- C Both Priya and Quan
- D Neither Priya nor Quan

11

Four runners, P, Q, R and S, finished a race in some order with no ties. P finished ahead of exactly two runners. Q finished ahead of S. R did not finish first. In which position did Q finish?

- A 2nd
- B 3rd
- C It cannot be determined
- D 1st

12

On an island, every knight always tells the truth and every knave always lies, and each islander is one or the other. Two islanders speak. A says: "B is a knave." B says: "A and I are the same type." What are A and B?

- A A is a knave and B is a knight.
- B Both are knights.
- C A is a knight and B is a knave.
- D Both are knaves.

Homework

Complete both parts before the next lesson. The questions are fewer than in class but the same level of difficulty. Show your working for the Mathematics questions.

Mathematics multi-step worded problems

CORE

1

A jug was full of juice. One-quarter was poured out for breakfast, then 200 mL more was poured for a guest, leaving 250 mL in the jug. The jug can hold up to 1 litre. How much juice was in the full jug?

- A 450 mL
- B 500 mL
- C 550 mL
- D 600 mL
- E 700 mL

2

Cinema tickets cost \$15 for an adult and \$9 for a child. A family of 2 adults and 3 children buy tickets and pay with a \$100 note. A tub of popcorn costs \$8, but they do not buy one. How much change do they receive?

- A \$37
- B \$43
- C \$49
- D \$53
- E \$57

3

A choir has 24 members. Each member sings in 2 songs at a concert. Of those members, 9 also play an instrument in 1 song each. The choir rehearses 3 times a week. How many singing and playing performances are given in total?

- A 48
- B 51
- C 57
- D 66
- E 72

4

A grower has 250 apples and packs them into bags of 9. Each bag is sold for \$4. How many full bags can the grower pack?

- A 26
- B 27
- C 28
- D 29
- E 30

CHALLENGE

5

A whole number is multiplied by 3 and the answer is less than 40. The same number multiplied by 5 gives an answer greater than 40. What is the sum of all the whole numbers this could be?

- A 33
- B 45
- C 49
- D 55
- E 60

Thinking Skills verbal reasoning & logical deduction

CORE

1

If the alarm is set, the lights switch on at dusk. If the lights switch on, the gate locks. If the gate is unlocked, visitors may enter; if it is locked, they cannot. Which one of the following is **not** possible?

- A The alarm was set and visitors entered after dusk.
- B The alarm was not set and the gate was unlocked.
- C The lights stayed off but the gate was locked.
- D The gate was locked and no visitors entered.

2

Every member of the swim squad trains on Monday. Liang says: "Mia trains on Monday, so Mia is in the swim squad." Nina says: "Omar is not in the swim squad, so Omar does not train on Monday." Whose reasoning is correct?

- A Liang only
- B Nina only
- C Both Liang and Nina
- D Neither Liang nor Nina

3

In a zoo, every reptile is kept in the warm house, and no animal in the warm house is nocturnal. Which one of the following **must** be true?

- A Every animal in the warm house is a reptile.
- B No reptile is nocturnal.
- C Some reptiles are nocturnal.
- D No nocturnal animal is kept in the zoo.

4

Three siblings are Jo, Kit and Lee. Jo is older than Kit, and Lee is younger than Kit. The youngest sibling is 7 and the oldest is 12. Which of these could be Kit's age?

- A 6
- B 7
- C 9
- D 12

CHALLENGE

5

Three friends each either always tell the truth or always lie. Ada says: "Bo always lies." Bo says: "Cy always lies." Cy says: "Ada and Bo both always lie." Which one of the following **must** be true?

- A Ada always tells the truth.
- B Bo always tells the truth.
- C Cy always tells the truth.
- D All three always lie.

Answer key

For tutor use only. Do not photocopy this section for students.

Each answer shows the correct option and the reasoning, including the common error each wrong option is designed to catch. Numbers were checked before printing.

Diagnostic

Mathematical Reasoning (Q1–Q4)

- D** Work backwards. After the morning, two-fifths of the tray remained. Selling 18 more left 6, so two-fifths of the tray was $18 + 6 = 24$, and the whole tray was $24 \div (2/5) = 60$. The opening and closing times are not needed. Trap A (40): treats the three-fifths sold as if 6 were three-fifths of the tray. Trap B (45): forgets the 6 left over.
- C** Entry is $28 \times \$7 = \196 . With the bus, the cost is $\$196 + \$180 = \$376$. The \$120 already raised leaves $\$376 - \$120 = \$256$. The free helpers do not pay, so they add nothing. Trap D (\$277): adds $3 \times \$7$ for the free helpers. Trap A (\$196): forgets the bus.
- C** Total eggs are $158 + 173 = 331$. Dividing by 12 gives 27 full boxes with 7 eggs left over, which are not enough for another box. The \$5 price is not needed. Trap D (28): rounds up even though the last 7 eggs cannot fill a box.
- B** The Coastal train averages $240 \div 3 = 80$ km/h. The Valley train averages $350 \div 5 = 70$ km/h. The Coastal train is faster by $80 - 70 = 10$ km/h. The number of carriages is not needed. Trap A: correct gap but names the wrong train.

Thinking Skills (Q5–Q8)

- D** Being unprepared means he will not finish in time, and not finishing means he cannot earn a merit, so option D cannot happen. Option A is possible because not revising only makes him *likely* to be unprepared, not certain to be.
- B** The rule runs one way: orchestra members have passed the exam. Aisha uses it correctly. Carl reverses it; passing the exam does not require being in the orchestra, so his reasoning fails. Trap C tempts anyone who reads the rule as working both ways.
- A** A chilli stall sells no jam, and a honey stall always sells jam, so a chilli stall cannot sell honey. Option B reverses the honey-to-jam rule; option C contradicts the jam-and-chilli rule.
- C** Ed comes straight after Bo, and Di is ahead of Bo, so the only order that also keeps Cy off last place is Di, Cy, Bo, Ed. Ed finished last.

Part A – Mathematical Reasoning

Core (Q1–Q8)

- B** After giving a third away, two-thirds were left. Giving 8 more left 16, so two-thirds was $8 + 16 = 24$, and the whole bag was $24 \div (2/3) = 36$. The brother's 25 marbles are not needed. Trap A (24): forgets the 8 given to the friend. Trap E (72): treats the third given away as if it were the part kept.
- D** After lunch, three-quarters remained. Spending \$6 left \$15, so three-quarters was $\$6 + \$15 = \$21$, and the whole amount was $\$21 \div (3/4) = \28 . The \$5 from the day before is extra information. Trap A (\$21): stops at three-quarters of the money.
- C** In 5 more minutes it prints $24 \times 5 = 120$ pages. With the report, the total is $180 + 120 = 300$. The 500-sheet capacity is not needed. Trap A (205): adds 5 minutes to 180 instead of multiplying by 24.

- 4 **A** Fiction: $30 \times 3 = 90$. Non-fiction: $12 \times 2 = 24$. Total is $90 + 24 = 114$. The closing time is not needed. Trap D (150): wrongly gives all 30 students the 2 non-fiction books.
- 5 **C** $295 \div 40 = 7$ remainder 15, so 7 buses seat only 280 students. An eighth bus is needed for the remaining 15, giving 8 buses. The teacher detail does not change the seat count. Trap B (7): ignores the 15 students left without a seat.
- 6 **B** The pens cost $4 \times \$3 = \12 and the notebooks cost $3 \times \$7 = \21 , a total of \$33. Change from \$50 is $\$50 - \$33 = \$17$. The pencil case is a distractor. Trap A (\$13): swaps the quantities of pens and notebooks.
- 7 **D** Working backwards from 26: add 4 to get 30, then divide by 3 to get the original number, 10. Multiplying 10 by 5 gives 50. Trap A (30): stops after adding 4 and forgets the rest. Trap C (44): multiplies 26 by $5 \div 3$ region instead of finding the original number.
- 8 **E** After Monday, three-fifths of the water remained. Using 30 more left 90, so three-fifths was $30 + 90 = 120$ litres, and the full tank held $120 \div (3/5) = 200$ litres. The height is not needed. Trap A (180): forgets the 30 litres used on Tuesday.

Challenge (Q9–Q12)

- 9 **E** From $4 \times \text{number} < 50$, the number is at most 12 ($4 \times 12 = 48$). From $7 \times \text{number} > 50$, the number is at least 8 ($7 \times 8 = 56$, but $7 \times 7 = 49$). So the number is 8, 9, 10, 11 or 12, and their sum is 50. Trap D (42): leaves out 8, the smallest value.
- 10 **C** Going from one-quarter full to one-half full adds another quarter of the soup and gains $120 - 65 = 55$ g, so a quarter of the soup weighs 55 g and the full soup weighs 220 g. The empty tin weighs $120 - 110 = 10$ g. Three-quarters full is $10 + (3/4 \times 220) = 10 + 165 = 175$ g. Trap E (195): adds 55 g twice without finding the tin's own weight.
- 11 **D** Eli's 12 cards are one-third of what Noah received, so Noah received $12 \times 3 = 36$ cards. That 36 was half of Liam's cards, so Liam began with $36 \times 2 = 72$. Eli's own 40 cards are not needed. Trap A (36): stops at the number Noah received.
- 12 **C** Each day makes $18 \times 7 = 126$ toys. After 7 days, $7 \times 126 = 882$ toys are made, which is short of 900, so an eighth day is needed. The answer is 8 days. The number of staff is not needed. Trap B (7): rounds $900 \div 126$ down and ignores the 18 toys still owed.

Part B – Thinking Skills

Core (Q1–Q8)

- 1 **A** A heavy parcel gets a large label, which keeps it out of the small chute, and only the small chute gives same-day delivery, so option A cannot happen. Option B is allowed because the rule only says heavy parcels *must* have large labels, not that light ones cannot.
- 2 **C** An ice-cream stall sells no bread, and an olive stall always sells bread, so an ice-cream stall cannot sell olives. Option A reverses the olive-to-bread rule, and option B directly contradicts the bread-and-ice-cream rule.
- 3 **B** Zo is 6, so Xan is 12, Wei is $12 + 3 = 15$, and Yara is $15 - 2 = 13$. Trap A (12) stops at Xan's age; trap C (15) stops at Wei's age.
- 4 **D** There are only two ways in: pass the quiz or win the fair. Ravi did not win the fair, so he must have passed the quiz. Option A contradicts the question, and option C is never stated.
- 5 **A** Blue is next to green, so blue is house 2 or 4. If blue were house 2, red would need to be house 1, but house 1 is yellow, so blue is house 4. Red must be left of house 4 and the only free spot is house 2, leaving white for house 5.
- 6 **C** Turning left makes the light flash red, and a red light makes the robot stop, so a robot that turned left cannot still be moving. Option A is allowed because the rules never say that only a left turn causes a red light.

- 7 **B** Since no choir member plays the drums, anyone who plays the drums cannot be in the choir. Option A overstates “some” as “all”, option C wrongly extends the drum rule to all music readers, and option D reverses the choir-to-music rule.
- 8 **D** The rule says being absent twice leads to being dropped, so being in the final means Priya was not absent twice; Maya is right. Tom being out of the final does not prove he was absent twice, since there could be other reasons, so Ravi runs the rule backwards and is wrong.

Challenge (Q9–Q12)

- 9 **B** Getting wet forces the clothes change, which forces being late, which means a colleague leads the meeting, so option B cannot happen. Option A is possible because forgetting the umbrella only makes getting wet *likely*, not certain, and option C is fine because the umbrella is not the only way to get wet.
- 10 **A** No Art student studies Latin, which is the same as saying no Latin student studies Art, so Priya is right. Quan is wrong: Latin students do study History, so studying History does not rule out Latin. The trap is to accept both because each sounds plausible.
- 11 **D** P ahead of exactly two runners places P second. First place cannot be R or P, and it cannot be S because Q is ahead of S, so Q must be first. Trap C tempts those who do not pin down P’s position first.
- 12 **C** Suppose A is a knight. Then B is a knave, so B’s claim that they are the same type is false, which fits because they are different. This is consistent. Testing A as a knave leads to a contradiction, so the only answer is A a knight and B a knave.

Homework

Mathematics (Q1–Q5)

- 1 **D** After breakfast, three-quarters remained. Pouring 200 mL left 250 mL, so three-quarters was $200 + 250 = 450$ mL, and the full jug held $450 \div (3/4) = 600$ mL. The 1-litre capacity is not needed. Trap A (450 mL): stops at three-quarters of the juice.
- 2 **B** Adults cost $2 \times \$15 = \30 and children cost $3 \times \$9 = \27 , a total of \$57. Change from \$100 is $\$100 - \$57 = \$43$. The popcorn is a distractor. Trap E (\$57): gives the cost instead of the change.
- 3 **C** Singing performances: $24 \times 2 = 48$. Playing performances: $9 \times 1 = 9$. Total is $48 + 9 = 57$. The rehearsal detail is not needed. Trap A (48): forgets the instrument performances.
- 4 **B** $250 \div 9 = 27$ remainder 7, so 27 full bags are packed and 7 apples are left over. The price is not needed. Trap C (28): counts a bag for the 7 leftover apples.
- 5 **D** From $3 \times \text{number} < 40$, the number is at most 13 ($3 \times 13 = 39$). From $5 \times \text{number} > 40$, the number is at least 9 ($5 \times 9 = 45$, but $5 \times 8 = 40$ is not greater than 40). So the number is 9, 10, 11, 12 or 13, and their sum is 55. Trap A (33): leaves out the largest value and miscounts.

Thinking Skills (Q1–Q5)

- 1 **A** Setting the alarm switches the lights on at dusk, which locks the gate, and a locked gate keeps visitors out, so option A cannot happen. Option C is allowed because the rules never say the gate locks only when the lights are on.
- 2 **D** The rule says squad members train on Monday, nothing more. Liang runs it backwards: training on Monday does not prove squad membership. Nina makes the matching error: not being in the squad does not prove someone skips Monday training. Both are wrong.
- 3 **B** Reptiles live in the warm house, and nothing in the warm house is nocturnal, so no reptile is nocturnal. Option A reverses the reptile-to-warm-house rule, and option D overreaches, since nocturnal animals could be kept elsewhere.

- 4 **C** From the order Jo, Kit, Lee, Jo is the oldest at 12 and Lee is the youngest at 7, so Kit is between them. Only 9 fits. Trap B (7) is Lee's age and trap D (12) is Jo's age.
- 5 **B** If Cy told the truth, both Ada and Bo would lie, but a lying Ada would make "Bo always lies" false, forcing Bo to tell the truth, a contradiction. So Cy lies. Then Bo's claim that Cy lies is true, so Bo tells the truth, and Ada, who calls Bo a liar, must be lying. Only option B holds.

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