

The 7 core Singapore problem-solving heuristics — one worked example and one practice question each. Primary 4.

Singapore math is built on **heuristics** — repeatable thinking strategies that turn a wordy problem into a clear plan. The trick is matching the **right strategy to the question**. Work through each example below, then try the matching "**Your turn**" question. All practice answers are in the **Answer Key** at the end — check only after you have tried.

HEURISTIC 1

Draw a Model (Bar Model)

When to use it: sharing, ratio or "part-and-whole" problems where quantities can be drawn as bars.

Aaron and Ben share \$84. Aaron's share to Ben's share is 3 : 4. How much does Ben get?

1. Draw Aaron as 3 equal units and Ben as 4 equal units.
2. Total units = $3 + 4 = 7$ units = \$84.
3. 1 unit = $\$84 \div 7 = \12 .
4. Ben = 4 units = $4 \times \$12 = \48 .

Ben gets \$48

Your turn: Priya and Sara share \$60 in the ratio 2 : 3. How much does Sara get?

HEURISTIC 2

Make a List / Table

When to use it: "how many ways..." or coin/combination problems where you must count possibilities without missing any.

Using only 10-cent and 20-cent coins, how many different ways can you make exactly 50 cents?

1. List by number of 20-cent coins, from most to least.
2. Two 20c = 40c, then one 10c → 50c. (1 way)
3. One 20c = 20c, then three 10c → 50c. (1 way)
4. Zero 20c, then five 10c → 50c. (1 way)

3 ways

Your turn: Using only 5-cent and 10-cent coins, how many different ways can you make exactly 30 cents?

HEURISTIC 3

Guess and Check

When to use it: two unknowns with two conditions — classic "chickens and rabbits" / total items + total legs problems.

A farm has chickens (2 legs) and rabbits (4 legs). There are 25 animals and 70 legs in all. How many rabbits are there?

1. Guess 13 chickens, 12 rabbits: legs = $26 + 48 = 74$. Too many.
2. Try 15 chickens, 10 rabbits: legs = $30 + 40 = 70$. Correct!
3. Check the count: $15 + 10 = 25$ animals. ✓

10 rabbits

Your turn: A shop has bicycles (2 wheels) and tricycles (3 wheels). There are 12 cycles and 31 wheels in all. How many tricycles are there?

HEURISTIC 4

Look for a Pattern

When to use it: number sequences and figures that grow by a fixed step — find a rule, then jump to a later term.

A sequence begins 2, 5, 8, 11, ... What is the 10th number?

1. Step between numbers = +3 each time.
2. From the 1st to the 10th number there are 9 steps.
3. 10th number = $2 + (9 \times 3) = 2 + 27 = 29$.

The 10th number is 29

Your turn: A sequence begins 3, 7, 11, 15, ... What is the 8th number?

HEURISTIC 5

Work Backwards

When to use it: a chain of operations gives a final result and you must find the starting number — reverse each step.

I think of a number. I multiply it by 3, then add 4, and get 25. What was my number?

1. Reverse the last step: $25 - 4 = 21$.
2. Reverse the first step: $21 \div 3 = 7$.
3. Check forwards: $7 \times 3 = 21$, then $21 + 4 = 25$. ✓

The number is 7

Your turn: I think of a number. I add 5, then multiply by 2, and get 30. What was my number?

HEURISTIC 6

Before–After Concept

When to use it: money or items moved between two people. Spot what stays the same — here the **total is unchanged**.

Peter and Qing have \$120 altogether. Peter gives Qing \$15, and now they have equal amounts. How much did Peter have at first?

1. The total never changes: it is still \$120.
2. Equal amounts → each has $\$120 \div 2 = \60 after.
3. Peter had $\$60 + \15 (the \$15 he gave away) = \$75 at first.
4. Check: $\$75 - \$15 = \$60$; Qing $\$45 + \$15 = \$60$. ✓

Peter had \$75 at first

Your turn: Aini and Bala have \$100 altogether. Aini gives Bala \$10, and now they have equal amounts. How much did Aini have at first?

HEURISTIC 7

Make a Supposition (Assumption Method)

When to use it: scoring problems with marks gained and marks lost — assume one extreme, then adjust for the difference.

A quiz has 20 questions. Each correct answer scores 3 marks; each wrong answer loses 1 mark. Mei answered all 20 and scored 36 marks. How many did she get correct?

1. Suppose all 20 are correct: $20 \times 3 = 60$ marks.
2. Each wrong answer changes the score by $3 + 1 = 4$ marks (lose the 3, then drop 1).
3. Difference = $60 - 36 = 24$ marks → wrong = $24 \div 4 = 6$.
4. Correct = $20 - 6 = 14$. Check: $14 \times 3 - 6 \times 1 = 42 - 6 = 36$. ✓

14 correct answers

Your turn: A quiz has 15 questions. Each correct answer scores 4 marks; each wrong answer loses 2 marks. Sam answered all 15 and scored 36 marks. How many did he get correct?

Answer Key — "Your turn" questions

1. **Draw a Model:** 5 units = \$60, so 1 unit = \$12. Sara = 3 units = **\$36**. (Priya = \$24)
2. **Make a List:** $10c \times 3 = 30c$; $10c \times 2 + 5c \times 2$; $10c \times 1 + 5c \times 4$; $5c \times 6$. → **4 ways**.
3. **Guess and Check:** 5 bicycles (10 wheels) + 7 tricycles (21 wheels) = 31 wheels, 12 cycles. → **7 tricycles**.
4. **Look for a Pattern:** step = +4; 8th = $3 + (7 \times 4) = \mathbf{31}$.
5. **Work Backwards:** $30 \div 2 = 15$, then $15 - 5 = \mathbf{10}$.
6. **Before-After:** total \$100 unchanged → each \$50 after; Aini = $\$50 + \$10 = \mathbf{\$60}$ at first. (Bala \$40)
7. **Supposition:** all correct = 60; each wrong drops $4 + 2 = 6$; $(60 - 36) \div 6 = 4$ wrong; correct = $15 - 4 = \mathbf{11}$. Check: $11 \times 4 - 4 \times 2 = 44 - 8 = 36$. ✓

Free practice resource from [LearnBuddy](#) — an MOE-aligned AI tutor your child can talk to. Practise these heuristics with step-by-step voice tutoring, an AI that marks working (not just answers), and free past-year papers at [learnbuddy.sg](#). Aligned to the MOE Primary Mathematics syllabus; always check the latest syllabus at [moe.gov.sg](#).