Speed & Ratio Success for PSLE

Fast Techniques to Tackle Challenging Word Problems

Complete Guide High-Scoring Topics Proven Methods

Contents

Why Speed & Ratio Questions Matter

Speed and Ratio problems typically account for 15-20% of total PSLE Mathematics marks. These questions often carry 3-5 marks each and separate top performers from average students.

High Marks
Typically 3-5 marks per question

Thinking Skills
Tests logical reasoning ability

Time Critical
Quick solving is essential

Speed, Distance & Time Mastery

Essential Formulas

Speed = Distance ÷ Time

Distance = Speed × Time

Time = Distance ÷ Speed

Memory Tip

Remember the triangle method: Draw a triangle with D at the top, S and T at the bottom. Cover the unknown to find the formula!

Basic Speed Calculations

Example 1: Finding Speed

Question: A car travels 240 km in 4 hours. What is its speed?

Solution:
Distance = 240 km
Time = 4 hours
Speed = Distance ÷ Time = 240 ÷ 4 = **60 km/h**

Example 2: Finding Time with Unit Conversion

Question: How long does it take to travel 150 km at 50 km/h?

Solution:
Distance = 150 km
Speed = 50 km/h
Time = Distance ÷ Speed = 150 ÷ 50 = **3 hours**

Catching Up Problems

Key Formula for Catching Up

Time to catch up = Head start distance ÷ Difference in speeds

Example 3: Catching Up Scenario

Question: Tom starts walking at 4 km/h. After 2 hours, Jerry starts cycling at 12 km/h on the same route. When will Jerry catch up with Tom?

Step-by-step Solution:

1. Tom's head start: 4 km/h × 2 h = 8 km
2. Difference in speeds: 12 - 4 = 8 km/h
3. Time to catch up: 8 km ÷ 8 km/h = **1 hour**
4. Jerry catches up 1 hour after he starts, which is 3 hours after Tom started.

Meeting Point Problems

"When Will They Meet?" Formula

Meeting time = Total distance ÷ Combined speeds

Example 4: Meeting From Opposite Directions

Question: Alice and Bob start 120 km apart and walk towards each other. Alice walks at 7 km/h and Bob at 5 km/h. When will they meet?

Solution:

1. Combined speed: 7 + 5 = 12 km/h
2. Total distance: 120 km

3. Meeting time: 120 ÷ 12 = **10 hours**

Ratio Mastery

Ratio problems in PSLE follow four main patterns. Mastering these will help you solve any ratio question confidently.

Concept 1: Constant Part

One part remains the same while others change. Make the unchanged part equal in both ratios.

Example: Constant Part Problem

Question: Ali and Billy have money in the ratio 5:6. After Billy spent £16, the ratio became 3:2. How much money does Billy have in the end?

Step-by-step solution:

```
Before: A : B = 5 : 6
After: A : B = 3 : 2
```

1. Make Ali's part the same in both ratios:
   Before: A : B = 5 : 6 = 15 : 18
   After: A : B = 3 : 2 = 15 : 10
2. Billy's difference: 18u - 10u = 8u = £16
3. Therefore: 1u = £2
4. Billy's final amount: 10u = 10 × £2 = **£20**

= Concept 2: Constant Total

The total remains the same (common in internal transfer problems).

Example: Internal Transfer

Question: Ali and Billy have money in the ratio 5:4. After Ali gave Billy £20, they have equal amounts. How much does Billy have in the end?

```
Before: A : B : Total = 5 : 4 : 9
After: A : B : Total = 1 : 1 : 2
```

1. Make totals equal: 5:4:9 = 10:8:18 and 1:1:2 = 9:9:18
2. Ali's change: 10u - 9u = 1u = £20
3. Billy's final amount: 9u = 9 × £20 = **£180**

↔ Concept 3: Constant Difference

The difference remains the same (common in age problems).

Example: Age Problem

Question: Ali and Billy's ages are in the ratio 4:7. In 3 years, their ages will be in the ratio 3:5. How old is Billy now?

```
Now: A : B : Difference = 4 : 7 : 3
Later: A : B : Difference = 3 : 5 : 2
```

1. Make differences equal: 4:7:3 = 8:14:6 and 3:5:2 = 9:15:6
2. Age increase: 9u - 8u = 1u = 3 years

3. Billy's current age: 14u = 14 × 3 = **42 years**

Concept 4: Everything Changed

Nothing remains constant. Use cross multiplication method.

Example: Complex Change

Question: Ali's money to Billy's money was 2:1. After Ali saved £60 and Billy spent £150, the ratio became 4:1. How much did Ali have at first?

1. Set up the ratios: A:B = 2u:1u initially
2. After changes: (2u + 60):(1u - 150) = 4:1
3. Cross multiply: 1(2u + 60) = 4(1u - 150)
4. Solve: 2u + 60 = 4u - 600
5. 2u = 660, so u = £330
6. Ali initially: 2u = 2 × £330 = **£660**

Advanced Problem-Solving Strategies

Bar Modelling for Speed Problems

Visual Strategy

Draw bars to represent distances covered by different objects. This makes complex speed problems much clearer!

Bar Model Example: Journey by Parts

Question: Sarah travels 120 km. She travels the first part at 40 km/h and takes 2 hours. She travels the remaining distance at 60 km/h. What is her average speed for the whole journey?

```
Bar Model Representation:
First part: [----80 km----] (40 km/h × 2 h)
Second part: [----40 km----] (120 − 80)
Total: [----120 km----]
```

1. First part distance: 40 × 2 = 80 km
2. Second part distance: 120 - 80 = 40 km
3. Second part time: 40 ÷ 60 = 2/3 hours
4. Total time: 2 + 2/3 = 8/3 hours
5. Average speed: 120 ÷ (8/3) = **45 km/h**

Common Mistakes to Avoid

⚠ Speed Problems

- Mixing up units (km/h vs m/s)
- Forgetting to account for head starts
- Adding speeds when objects move in same direction
- Not converting time units consistently

⚠ Ratio Problems

- Not identifying which concept applies
- Mixing up before and after ratios
- Forgetting to make common parts equal
- Calculation errors in cross multiplication

🎓 PSLE Examination Strategies

Time Management for Speed & Ratio Questions

3-Mark Questions (3-4 minutes)

- Basic speed/ratio calculations
- Simple before/after problems
- Unit conversions
- Single-step problems

5-Mark Questions (6-8 minutes)

- Catching up scenarios
- Complex ratio transformations
- Multi-step calculations
- "Everything changed" problems

Quick Question Recognition

Speed Problem Keywords

- "catches up with"
- "when will they meet"
- "how far ahead"
- "average speed"
- "journey by parts"

Ratio Problem Keywords

- "ratio of... to..."
- "after... spent/saved"
- "in... years time"
- "gave... to..."
- "became equal"

Solution Templates

Speed Problem Template

1. Identify what you're looking for (speed/distance/time)
2. Write down given information with units
3. Choose appropriate formula
4. Check units match throughout
5. Calculate and verify answer makes sense

Ratio Problem Template

1. Identify which of the 4 concepts applies
2. Write before and after ratios
3. Make common parts equal (if applicable)
4. Set up equation and solve

5. Check answer against original question

Practice Questions

Test your understanding with these PSLE-style questions. Solutions are provided at the end.

Speed Problems

Question 1 (3 marks)

A train travels at 80 km/h for 2.5 hours. How far does it travel?

Question 2 (4 marks)

Peter walks at 6 km/h and starts his journey at 8 am. His friend starts at 10 am from the same place and cycles at 18 km/h in the same direction. At what time will his friend catch up with Peter?

Ratio Problems

Question 3 (4 marks)

The ratio of boys to girls in a class is 3:4. After 6 more boys join the class, the ratio becomes 1:1. How many girls are there in the class?

Question 4 (5 marks)

Amy's money to Beth's money is in the ratio 5:3. After Amy spends £40 and Beth receives £20, the ratio becomes 7:5. How much money did Amy have initially?

Solutions

Question 1:
Distance = Speed × Time = 80 × 2.5 = **200 km**

Question 2:

Peter's head start = 6 × 2 = 12 km
Speed difference = 18 - 6 = 12 km/h
Catch up time = 12 ÷ 12 = 1 hour after 10 am = **11 am**

Question 3:
Before: B:G = 3:4, After: B:G = 1:1 = 4:4
Boys increase: 4u - 3u = 1u = 6 boys
Girls: 4u = 4 × 6 = **24 girls**

Question 4:
Set up: (5u - 40):(3u + 20) = 7:5
Cross multiply: 5(5u - 40) = 7(3u + 20)
Solve: 25u - 200 = 21u + 140
4u = 340, u = 85
Amy initially: 5u = 5 × 85 = **£425**

Quick Reference Guide

Speed Formulas

Basic: S = D ÷ T, D = S × T, T = D ÷ S

Catching up: Time = Head start ÷ Speed difference

Meeting: Time = Total distance ÷ Combined speeds

Average speed: Total distance ÷ Total time

Ratio Concepts

Constant Part: Make unchanged part equal

Constant Total: Internal transfers

Constant Difference: Age problems

Everything Changed: Cross multiplication

Common Unit Conversions

Time:
1 hour = 60 minutes
1 minute = 60 seconds

Distance:
1 km = 1000 m
1 m = 100 cm

Speed:
1 m/s = 3.6 km/h
1 km/h = 1000/3600 m/s

Ready for PSLE Success!

You now have the tools and techniques to tackle any Speed & Ratio problem in your PSLE examination.

Master the Formulas

Essential speed and ratio relationships

Apply Fast Techniques

Save time with proven methods

Score Top Marks

Excel in these high-scoring topics

Remember: Practice makes perfect!

Regular practice with these techniques will build your confidence and speed.

© 2024 PSLE Success Guide | Designed for Singapore Primary Mathematics Excellence

Focus on understanding the concepts, practise regularly, and success will follow!