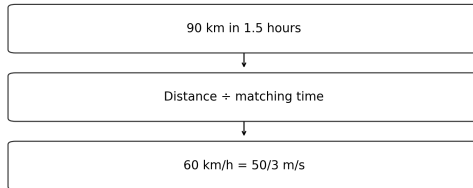


Ratios, unit conversion and successive percentages

Original skill preparation; versioned source scope

Method and conditions



- A rate compares quantities with their units.
- Fractions; unit conversion; percentage base.

Worked method 1

Read and reason

A rate compares quantities with their units.

$v = d/t = (90 \text{ km})/(1.5 \text{ h}) = 60 \text{ km/h}$. Convert using cancelling units:

$v = (60 \text{ km/h})(1000 \text{ m/km})/(3600 \text{ s/h}) = 50/3 \text{ m/s}$. Do not convert only the numerator of a compound rate.

Original context 1

Read and reason

Task context

Read and reason

Each task below states its own complete data. Values may differ from the worked example.

Attempt 1.1

Read and reason

Mix red and blue paint in ratio 4:7 to make 33 litres. Find each amount. Red paint costs 18 yuan per litre and blue 12. Find total cost.

Reasoning 1.1

Read and reason

There are 11 parts, so each is 3 L. Red volume $V_r = 33(4/11) = 12$ L; blue volume $V_b = 33(7/11) = 21$ L. Cost

$$C = p_r V_r + p_b V_b = (18 \text{ yuan/L})(12 \text{ L}) + (12 \text{ yuan/L})(21 \text{ L}) = 468 \text{ yuan}.$$

Attempt 2.1

Read and reason

A 400-yuan item falls 15% then rises 10%. Find the final price and the single overall percentage change.

Reasoning 2.1

Read and reason

Use successive multipliers.

$P = P_0(1 - 0.15)(1 + 0.10) = (400 \text{ yuan})(0.85)(1.10) = 374 \text{ yuan}$. Relative change
 $r = (P - P_0)/P_0 = (374 - 400)/400 = -0.065$, a 6.5% decrease.

Attempt 3.1

Read and reason

A pump supplies 0.15 litres per second. How long does 54 litres take? If a square has side 30 cm, give its area in square metres.

Reasoning 3.1

Read and reason

$t = V/q = (54 \text{ L})/(0.15 \text{ L/s}) = 360 \text{ s} = 6 \text{ min}$. Convert side before squaring:
 $A = s^2 = (0.30 \text{ m})^2 = 0.09 \text{ m}^2$; the area conversion factor is 10000, not 100.

Transfer and limits

Read and reason

Fractions; unit conversion; percentage base.

Check yourself

Read and reason

Close the worked reasoning. Explain why the method fits the final transfer task, reconstruct its conclusion, and state a condition that would change your answer. Then check the full reasoning in the reference.