

# Problem-Solving and Data Analysis

SAT · SAT · SAT

## Scope and prerequisites

Digital SAT framework; original paper practice is nonadaptive and gives no scaled-score prediction.

- Use ratios, rates and percentages
- Interpret distributions and compare centre and spread
- Calculate probabilities and assess sample claims

Prerequisites: Fractions; unit conversion; percentage base.

## Explain and choose the method

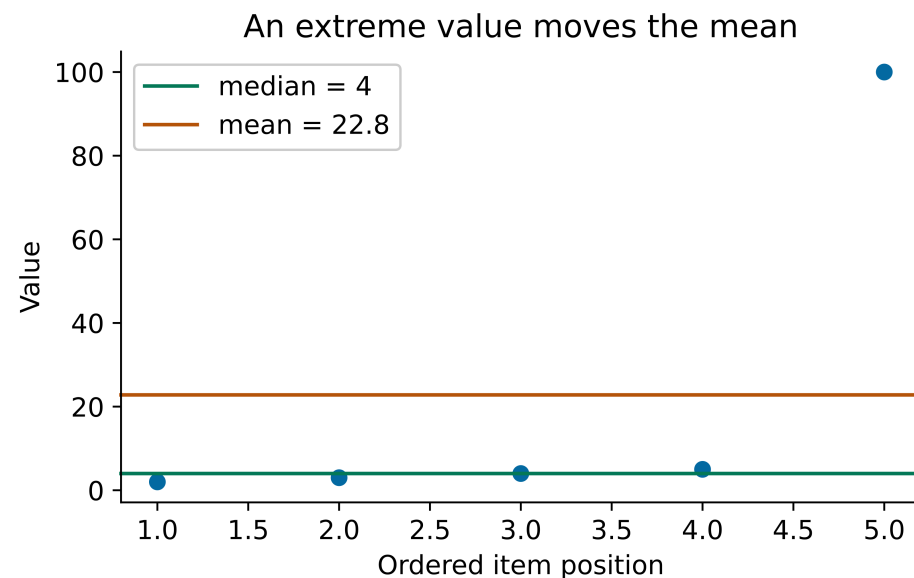
Percent change uses the original value as the denominator. Percentage points compare percentages directly.

Convert units explicitly. A rate denominator describes the amount of time or distance used.

The median resists extreme values more than the mean. Spread describes variation, not the average.

A random sample supports generalisation to its sampling population. Random assignment concerns causal comparison, a different issue.

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 worked example from existing native teaching; transfer tasks use their own data.*

Existing worked example: A price of 80 falls by 20%:  $80 \times 0.8 = 64$ . It then rises by 20%:  $64 \times 1.2 = 76.8$ . The final value is below 80 because the two percentage changes use different bases.

## Complete original context

Every transfer question states all data it needs.

## Independent practice and checked reasoning

This overview is completed through the detailed skill sequence: 13, 14, 15, 16, 17. Work those references and sheets in order; this orientation does not replace them.

### ■ Transfer 1

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: There are 11 parts, so each is 3 L. Red volume  $V_r = 33(4/11) = 12 \text{ L}$ ; blue volume  $V_b = 33(7/11) = 21 \text{ L}$ . Cost  $C = p_r V_r + p_b V_b = (18 \text{ yuan/L})(12 \text{ L}) + (12 \text{ yuan/L})(21 \text{ L}) = 468 \text{ yuan}$ .

### ■ Transfer 2

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

Reasoning: 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.

### ■ Transfer 3

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:  $t = V/q = (54 \text{ L})/(0.15 \text{ L/s}) = 360 \text{ s} = 6 \text{ min}$ . 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.

## Limits and next use

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A sample from volunteers is not automatically representative, even when it is large.

All tasks here are public original practice with authored guidance. They are not official questions or fresh diagnostics. Existing protected tests and mocks remain separate.