

1.1 Use arithmetic, factors and percentages with a correct base

Name: _____ Class: _____ Date: _____

Total: 24 marks

KEY WORDS integer 整数 • rational number 有理数 • percentage 百分比

Objective

Use arithmetic, factors and percentages with a correct base. Original GAC004-aligned practice, not an official assessment. Show the method as well as the result. All applied scenarios are invented classroom problems.

1 Key knowledge and worked examples

■ Key knowledge: operations and percentage changes need the right order and reference value

An **integer** 整数 is a whole number, including negative whole numbers and zero. A **rational number** 有理数 can be written as a ratio of integers with a nonzero denominator. Fractions need equivalent forms before addition; multiplying and dividing have equal priority and are worked left to right, as are addition and subtraction.

A **percentage** 百分比 compares a part or change with a stated base. Increasing by $r\%$ uses multiplier $1 + r/100$; decreasing uses $1 - r/100$. Reversing a percentage change means dividing by its multiplier, not applying the same percentage to the new amount. Round the final result as instructed rather than losing precision early.

■ Worked example: a decrease and increase use different bases



each multiplier uses the current amount

Known: an invented price of 80 units falls by 20%, then rises by 20%. Why use successive multipliers? Each change is calculated from the current price.

$$P_{new} = P_{old}(1 - r/100)$$

$$P_1 = 80(1 - 20/100) = 64$$

$$P_{new} = P_{old}(1 + r/100)$$

$$P_2 = 64(1 + 20/100) = 76.8$$

The price is not back at 80. The decrease was 16, while the later increase was 12.8, because the bases differ.

2 Practice

2.1 Evaluate $18 - 3(4 - 7)$, showing the bracket step. [2]

2.2 Calculate $\frac{3}{4} - \frac{2}{5}$ in simplest form. [2]

2.3 Find the highest common factor and lowest common multiple of 18 and 24. [3]

2.4 A price rises from 120 to 150 units. Calculate the percentage increase and the percentage decrease needed to return from 150 to 120. [3]

3 Exam-style questions

3.1 Two school bells ring every 12 and 18 minutes. They ring together at 09:00. (a) Find when they next ring together. (b) A supplier offers 48 pens for 36 units or 60 pens for 42 units. Compare unit prices and state which has the lower cost per pen. [6]

3.2 A club sells an item for 72 units after a 10% discount on its marked price. (a) Find the marked price. (b) A different offer takes 15% off the same marked price and then adds a 4-unit delivery charge. Find its total. (c) Compare the offers if the first has no delivery charge. Explain why adding 10% to 72 does not recover the marked price. [8]