

C1.6 The four operations

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS reciprocal • denominator • ratio • mixed number
• factor

Objective

Use the four operations to solve Core IGCSE Mathematics problems.

You must be able to:

- Apply the order of operations with signed numbers
- Calculate exactly with fractions and mixed numbers
- Interpret a calculation and check its size

1 Key knowledge and worked examples

■ **Key knowledge: The four operations**

Do brackets first, then powers, then multiplication and division from left to right, then addition and subtraction. Adding a negative decreases a value; subtracting a negative increases it. For fractions, use a common denominator to add or subtract. Multiply numerators and denominators; to divide, multiply by the reciprocal. Convert mixed numbers before calculating.

■ **Worked example: The four operations**

brackets

powers

multiply
/
divide

Calculate $1\frac{1}{2} \div \frac{3}{4} - \frac{1}{3}$.

- Convert: $1\frac{1}{2} = 3/2$.
- Divide by multiplying the reciprocal: $Q = (3/2)(4/3) - 1/3 = 2 - 1/3$.
- Common denominator: $Q = 6/3 - 1/3 = 5/3 = 1\frac{2}{3}$.
- For signed integers, $-6 - (-4) = -6 + 4 = -2$.

■ **Method check**

Evaluate brackets before multiplication or division. Convert mixed numbers to improper fractions before multiplying or dividing.

2 Practice

2.1 Calculate $-8 + 5$ and $-3 \times (-4)$. [2]

2.2 Calculate $18 - 2(3 + 4)$. [2]

2.3 Calculate $5/6 - 1/4$. [2]

2.4 Calculate $2.4 \times 0.5 + 0.36 \div 0.6$. [2]

3 Exam-style questions

3.1 Apply the the four operations methods below. Show working and include units where appropriate.

(a) The temperature is -7°C and rises by 12°C . Find the new temperature. [2]

(b) It then falls by 8°C . Find the final temperature. [2]

(c) A recipe uses $3/4$ kg flour for one batch. Find the flour needed for $2\frac{1}{2}$ batches. [2]

3.2 A baker has $4\frac{1}{2}$ kg of flour. Each cake uses $\frac{3}{8}$ kg.

(a) Find the maximum number of whole cakes the baker can make. [3]

(b) The baker makes 10 cakes, then receives another $\frac{3}{4}$ kg of flour. Find the new amount of flour and the number of further whole cakes possible. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- $Q = -8 + 5 = -\mathbf{3}$; two negative factors give $P = \mathbf{12}$.

2.2

- Brackets first: $Q = 18 - 2(7) = 18 - 14 = \mathbf{4}$.

2.3

- Use denominator 12: $Q = 10/12 - 3/12 = \mathbf{7/12}$.

2.4

- Multiply and divide first: $Q = 1.2 + 0.6 = \mathbf{1.8}$.

3.1

(a)

- $T = -7 + 12 = \mathbf{5^\circ\text{C}}$.

(b)

- $T = 5 - 8 = -\mathbf{3^\circ\text{C}}$.

(c)

- $F = (3/4)(5/2) = 15/8 = \mathbf{1\frac{7}{8}}$ kg.

3.2

(a)

- Use $N = \text{total/per cake}$.
- $N = (9/2) \div (3/8) = (9/2)(8/3) = \mathbf{12}$.
- There is no fraction of a cake or flour left at this maximum.

(b)

- Flour left after ten cakes: $m = 9/2 - 10(3/8) = 3/4$ kg.
- New flour $m_n = 3/4 + 3/4 = \mathbf{3/2}$ kg.
- Further cakes $N = (3/2) \div (3/8) = \mathbf{4}$.