

E1.6 The four operations

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS order of operations 运算顺序 • brackets 括号 • mixed number 带分数
• improper fraction 假分数 • reciprocal 倒数

Objective

Build the skills to answer Extended exam questions on **the four operations** 四则运算 — working with **integers** 整数, **fractions** 分数 and **decimals** 小数 in the correct **order of operations** 运算顺序, including **brackets** 括号 and **negative numbers** 负数.

You must be able to:

- apply the order of operations, including brackets, powers and roots
- add, subtract, multiply and divide fractions and mixed numbers
- calculate with negative numbers, including subtracting a negative

1 Worked examples

■ Brackets first, then powers, then $\times \div$, then $+-$

work downwards

Brackets

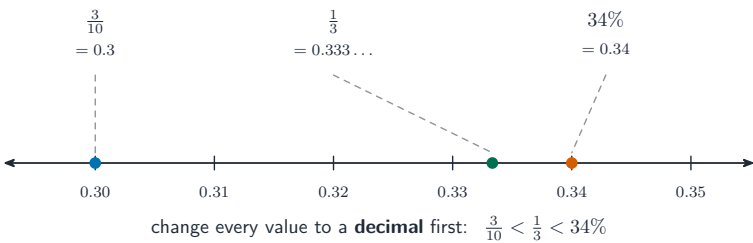
Indices (powers, roots)

Multiply and Divide
left to right

Add and Subtract
left to right

$$\begin{array}{l} -6 \times -3 + 7 \times 2 \\ \downarrow \text{multiply first: } -6 \times -3 = 18, \ 7 \times 2 = 14 \\ 18 + 14 \\ \downarrow \text{then add} \\ 32 \end{array}$$

Work down the ladder — never simply left to right



Subtracting a negative moves you to the right

- **Order:** $3 + 4 \times 2^2 = 3 + 4 \times 4 = 19$, but $(3 + 4) \times 2^2 = 7 \times 4 = 28$.
- **Mixed numbers:** turn them into improper fractions first. $2\frac{1}{4} \times 1\frac{1}{3} = \frac{9}{4} \times \frac{4}{3} = 3$.
- **Dividing fractions:** multiply by the reciprocal — $\div \frac{a}{b}$ becomes $\times \frac{b}{a}$.
- **Two minus signs:** $-6 - (-4) = -6 + 4 = -2$. Subtracting a negative adds.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the line showing the improper fractions, or the bracket evaluated first, is the method mark.

2 Practice

2.1 Work out $20 - 3 \times 4$. [1]

2.2 Work out $2\frac{2}{3} + 1\frac{1}{2}$, giving your answer as a mixed number. [2]

2.3 Work out $-5 \times (-3) + 2$. [2]

2.4 Work out $1.2 \div 0.4$. [1]

3 Exam-style questions

3.1 (a) Work out $(7 - 2)^2 \div 5$. [2]

(b) Work out $3\frac{1}{5} \div 1\frac{3}{5}$. [3]

3.2 At midnight the temperature was -4°C . By 3 a.m. it had fallen by a further 7°C . Find the temperature at 3 a.m. [1]
