E1.6 The four operations

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

KEY WORDS order of operations • brackets • mixed number • improper fraction • reciprocal

Objective

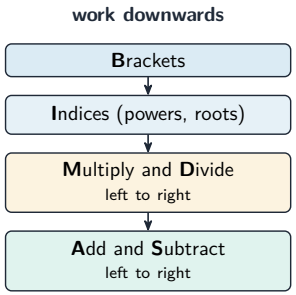
Build the skills to answer Extended exam questions on **the four operations** – working with **integers**, **fractions** and **decimals** in the correct **order of operations**, including **brackets** and **negative numbers**.

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 Key knowledge and worked examples

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



$-6 \times -3 + 7 \times 2$

↓ multiply first: $-6 \times -3 = 18$, $7 \times 2 = 14$

$18 + 14$

↓ then add

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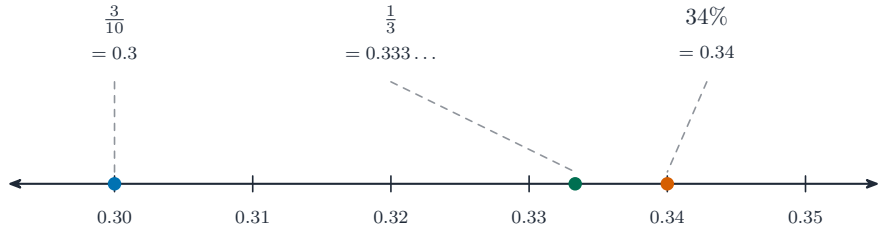
Work down the ladder – never simply left to right



change every value to a **decimal** first: $\frac{3}{10} < \frac{1}{3} < 34\%$

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 $-4\,^\circ\mathrm{C}$. By 3 a.m. it had fallen by a further $7\,^\circ\mathrm{C}$. Find the temperature at 3 a.m. [1]