

E1.8 Standard form

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS standard form • power • integer

Objective

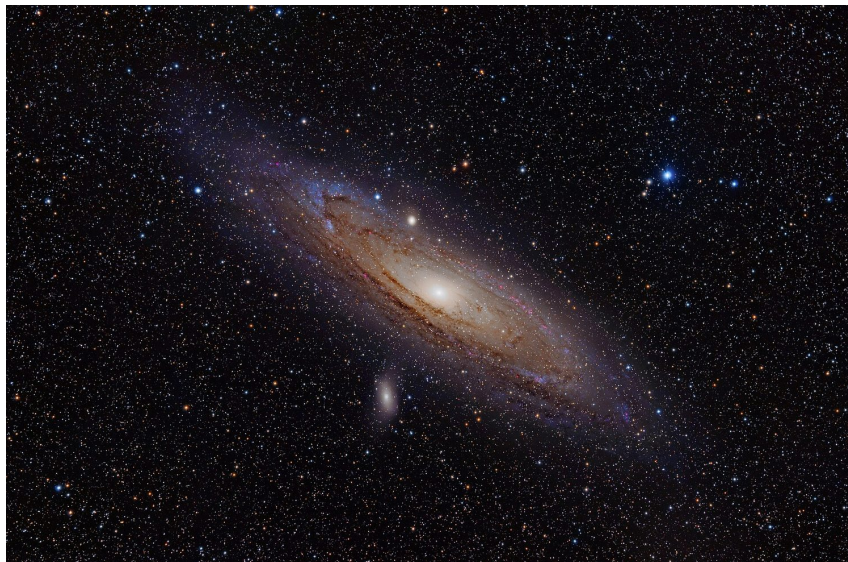
Build the skills to answer Extended exam questions on **standard form** writing numbers as $A \times 10^n$ and calculating with them.

You must be able to:

- write large and small numbers in standard form
- convert standard form back to an ordinary number
- multiply and divide numbers in standard form

1 Key knowledge and worked examples

■ Standard form



$A \times 10^n$ where $1 \leq A < 10$ and n is an integer

- **Convert:** $4\,500\,000 = 4.5 \times 10^6$; $0.00072 = 7.2 \times 10^{-4}$.

Standard form: $A \times 10^n$, **with** $1 \leq A < 10$

$$\boxed{6\,500\,000} \longrightarrow \boxed{6.5 \times 10^6}$$

point moves 6 places

$$\boxed{0.00042} \longrightarrow \boxed{4.2 \times 10^{-4}}$$

point moves 4 places

standard form: $a \times 10^n$ with $1 \leq a < 10$

Standard form $A \times 10^n$: the power of ten is the number of places the point moves

- **Multiply:** $(3 \times 10^5) \times (2 \times 10^{-2}) = 6 \times 10^3$ (multiply the fronts, add the powers).

Answer shapes: **M1** a correct method, **A1** the correct answer.

2 Practice

2.1 Write 63 000 in standard form. [1]

2.2 Write 0.0045 in standard form. [1]

2.3 Write 2.7×10^{-3} as an ordinary number. [1]

3 Exam-style questions

3.1 Work out $(4 \times 10^6) \times (2.5 \times 10^{-3})$, giving your answer in standard form. [2]

3.2 Work out $\frac{8 \times 10^5}{2 \times 10^2}$, giving your answer in standard form. [2]

3.3 Work out $(3 \times 10^4) + (5 \times 10^3)$, giving your answer in standard form. [2]

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- $63\,000 = \mathbf{6.3 \times 10^4}$

2.2

- $0.0045 = \mathbf{4.5 \times 10^{-3}}$

2.3

- $2.7 \times 10^{-3} = \mathbf{0.0027}$

3.1

- $4 \times 2.5 = 10$ and $10^6 \times 10^{-3} = 10^3$
- $10 \times 10^3 = 1 \times 10^4$
- $\mathbf{1 \times 10^4}$ – the front must lie between 1 and 10

3.2

- $8 \div 2 = 4$ and $10^5 \div 10^2 = 10^3$
- $\mathbf{4 \times 10^3}$

3.3

- $3 \times 10^4 = 30\,000$ and $5 \times 10^3 = 5\,000$
- $35\,000 = \mathbf{3.5 \times 10^4}$