

Exercise walk-through

Standard form ■ E1.8

eXercise

You must be able to

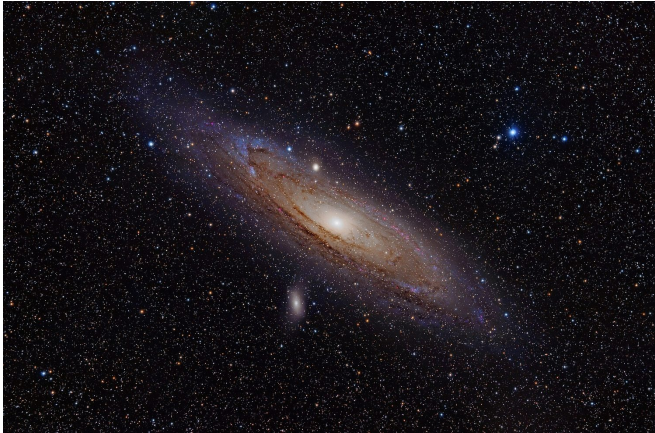
- write large and small numbers in standard form
- convert standard form back to an ordinary number
- multiply and divide numbers in standard form

Method — Standard form

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

Method — Standard form



Huge distances are written compactly in standard form

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

$6\,500\,000 \longrightarrow 6.5 \times 10^6$
point moves 6 places

$0.00042 \longrightarrow 4.2 \times 10^{-4}$
point moves 4 places

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

The exponent counts how many places the decimal point moves

Practice 2.1 ■ 1 mark

Write 63 000 in standard form.

Solution 2.1

Method: Standard form

Worked steps

$$6.3 \times 10^4 \text{ (B1).}$$

Practice 2.2 ■ 1 mark

Write 0.0045 in standard form.

Solution 2.2

Method: Standard form

Worked steps

$$4.5 \times 10^{-3} \text{ (B1).}$$

Practice 2.3 ■ 1 mark

Write 2.7×10^{-3} as an ordinary number.

Solution 2.3

Method: Standard form

Worked steps

0.0027 **B1**.

Exam-style 3.1 ■ 2 marks

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

Solution 3.1

Method: Standard form

Worked steps

$4 \times 2.5 = 10$ and $10^6 \times 10^{-3} = 10^3$, giving $10 \times 10^3 = 1 \times 10^4$ **M1** **A1** for 10×10^3 ;
for 1×10^4 — note the front must be adjusted to lie between 1 and 10.

Exam-style 3.2 ■ 2 marks

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

Solution 3.2

Method: Standard form

Worked steps

$8 \div 2 = 4$ and $10^5 \div 10^2 = 10^3$, giving 4×10^3 **M1** **A1** for 4×10^3 .

Exam-style 3.3 ■ 2 marks

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

Solution 3.3

Method: Standard form

Worked steps

$3 \times 10^4 = 30\,000$ and $5 \times 10^3 = 5\,000$, so the sum is $35\,000 = 3.5 \times 10^4$ **M1** **A1**
for 35 000; for 3.5×10^4 .