

Exercise walk-through

E1.14

Using a calculator

IGCSE Mathematics

You must be able to

- enter a fraction whose numerator or denominator is itself a calculation
- interpret a calculator display, including a standard-form display such as $3.6\text{E}-5$
- round the displayed answer to a given number of significant figures or decimal places

1

The method

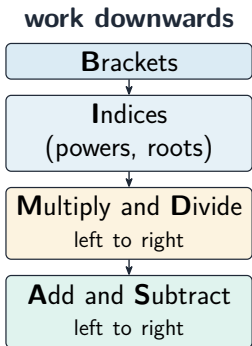
Method — The calculator obeys the order of operations — so you must add the brackets

- **Brackets round a whole line:** $\frac{4.2 + 7.8}{3.5 - 1.1}$ must be entered as $(4.2 + 7.8) \div (3.5 - 1.1)$, giving 5. Without brackets the calculator returns $4.2 + 2.23 \dots - 1.1$.
- **Roots and powers:** $\sqrt{6.4^2 + 4.8^2} = \sqrt{64} = 8$ — the whole sum must be inside the root.
- **Standard form:** a display of 3.6E-5 is $3.6 \times 10^{-5} = 0.000\,036$. Never write E in your answer.
- **Accuracy:** unless the question says otherwise, give a non-exact answer to 3 significant figures, and keep the full value in the calculator until the last step.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): show the substituted expression before the answer; a lone number from a calculator earns nothing if it is wrong.

Method — The calculator obeys the order of operations — so you must add the brackets

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): show the...



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

The order of operations, from brackets down to addition

Method — The calculator obeys the order of operations — so you must add the brackets

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): show the...

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



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



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

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

Standard form on a number line of powers of ten

2

Practice

Practice 2.1 ■ 2 marks

Use your calculator to find the exact value of $\frac{4.2 + 7.8}{3.5 - 1.1}$.

Solution 2.1

Method: The calculator obeys the order of operations — so you must add the brackets — p.4

Worked steps

■ enter as $(4.2 + 7.8) \div (3.5 - 1.1) = 12 \div 2.4$ **M1**

= 5

A1

Practice 2.2 ■ 2 marks

Work out $\sqrt{6.4^2 + 4.8^2}$.

Solution 2.2

Worked steps

$$\blacksquare 6.4^2 + 4.8^2 = 40.96 + 23.04 = 64 \quad \text{M1}$$

$$\sqrt{64} = 8$$

A1

Practice 2.3 ■ 2 marks

Work out $(2.5 \times 10^4) \times (4 \times 10^{-7})$, giving your answer in standard form.

Solution 2.3

Method: The calculator obeys the order of operations — so you must add the brackets — p.4

Worked steps

- multiply the numbers and add the powers: $2.5 \times 4 = 10$ and $10^4 \times 10^{-7} = 10^{-3}$ **M1**
- 10×10^{-3} is not in standard form, so adjust

$$= 1 \times 10^{-2}$$

A1

3

Exam-style

Exam-style 3.1 (a) ■ 2 marks

Use your calculator to find $\frac{17.4 - 3.9}{2.7 \times 1.25}$, giving your answer correct to 3 significant figures.

Solution 3.1 (a)

Method: The calculator obeys the order of operations — so you must add the brackets — p.4

Worked steps

$$\blacksquare \frac{13.5}{3.375} \quad \text{M1}$$

$$= 4.00$$

$$\text{A1}$$

Exam-style 3.1 (b) ■ 1 mark

Write your answer to part (a) correct to 1 decimal place.

Solution 3.1 (b)

Worked steps

- 4.00 to 1 decimal place

$$= 4.0$$

B1

Exam-style 3.2 ■ 2 marks

Work out $\sqrt[3]{1728} + \sqrt{2.25}$.

Solution 3.2

Worked steps

■ $\sqrt[3]{1728} = 12$ and $\sqrt{2.25} = 1.5$ **M1**

$$12 + 1.5 = \mathbf{13.5}$$

A1

Exam-style 3.3 ■ 1 mark

A calculator display shows $3.6\text{E}-5$. Write this number in ordinary form.

Solution 3.3

Method: The calculator obeys the order of operations — so you must add the brackets — p.4

Worked steps

- E-5 means $\times 10^{-5}$, so move the point 5 places left

$$= 0.000\,036$$

B1