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Standard Form

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Standard Form — Student Worksheet*. Question numbers match exactly: recognising standard form W1–W5, large numbers L1–L6, small numbers S1–S6, converting back O1–O6, ordering C1–C5, multiplication M1–M6, division D1–D6, addition and subtraction A1–A6, calculator work K1–K3, applications R1–R6, the Mixed Review MR1–MR12, and the examination questions Q1–Q8 of Part III.
Each solution names the step being used and works one stage at a time. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution shows the steps in order, exactly as the notes recommend: front numbers first, powers of 10 second, and an adjustment step at the end whenever the front number does not satisfy $1 \leq a < 10$. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones.

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4.1 Solutions — What is Standard Form?

Solution W1

A number in standard form is written $a \times 10^n$ where

$$\boxed{1 \leq a < 10 \quad \text{and} \quad n \text{ is an integer.}}$$

So a has exactly one non-zero digit before the decimal point, and n may be positive, negative or zero.

Solution W2

(a) 6.4×10^3: here $a = 6.4$, and $1 \leq 6.4 < 10$, so this $\boxed{\text{is}}$ in standard form.
(b) 47×10^5: $a = 47$ is too large. Correcting:

$$47 \times 10^5 = 4.7 \times 10^1 \times 10^5 = \boxed{4.7 \times 10^6}.$$

(c) 0.9×10^{-2}: $a = 0.9$ is less than 1. Correcting:

$$0.9 \times 10^{-2} = 9 \times 10^{-1} \times 10^{-2} = \boxed{9 \times 10^{-3}}.$$

(d) 1.0×10^7: $a = 1$, and the condition is $1 \leq a$, so $a = 1$ is allowed. This $\boxed{\text{is}}$ in standard form (usually written 1×10^7).

Solution W3

(a) 0.0072 is less than 1 $\Rightarrow$ $\boxed{\text{negative}}$ (in fact $n = -3$).
(b) 4 903 is greater than 10 $\Rightarrow$ $\boxed{\text{positive}}$ (in fact $n = 3$).
(c) 7.6 already lies between 1 and 10 $\Rightarrow$ $\boxed{n = 0}$.
(d) 0.85 is less than 1 $\Rightarrow$ $\boxed{\text{negative}}$ (in fact $n = -1$).

Solution W4

The claim is false: the $\times 10^n$ is not enough on its own, because the front number must also satisfy $1 \leq a < 10$. Two counterexamples (many others are possible):
a **too large:** 58×10^4, since $58 \geq 10$. Correctly,

$$58 \times 10^4 = 5.8 \times 10^1 \times 10^4 = \boxed{5.8 \times 10^5}.$$

a **too small:** 0.36×10^{-2}, since $0.36 < 1$. Correctly,

$$0.36 \times 10^{-2} = 3.6 \times 10^{-1} \times 10^{-2} = \boxed{3.6 \times 10^{-3}}.$$

Solution W5

Standard form always has *two* parts: a front number a and a power of 10. Writing 10^6 alone gives no value of a, so the required form $a \times 10^n$ is incomplete. Since $10^6 = 1 \times 10^6$, the correct presentation is

$$\boxed{1 \times 10^6}.$$

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Preview ends here

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