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# Rearranging Formulas

## 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 *Rearranging Formulas — Student Worksheet*. Question numbers match exactly: subject and inverse operations E1–E5, addition and subtraction B1–B6, multiplication and division M1–M6, multi-step rearrangements T1–T6, powers and roots P1–P7, fractions F1–F7, subject appearing more than once K1–K6, harder rearrangements H1–H4, applications A1–A5, the Mixed Review MR1–MR10, and the examination questions Q1–Q8 of Part III.
Each solution names the inverse operation being applied and shows one rearrangement per line. 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 states the operation being undone as well as the result, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones, with a substitution check on the ones where sign errors are most likely.

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## 4.1 Solutions — The Subject and Inverse Operations

**Solution E1**

The subject is the variable standing alone on one side of the equals sign:

**(a)** $\boxed{d}$ **(b)** $\boxed{u}$ **(c)** $\boxed{L}$ **(d)** $\boxed{k}$

In (b), note that $v$ is *not* the subject even though it appears first on the right — it is not on its own.

**Solution E2**

**(a)** subtracting 9 **(b)** multiplying by 7
**(c)** taking the square root (with $\pm$) **(d)** cubing

$$\boxed{+9 \leftrightarrow -9, \quad \div 7 \leftrightarrow \times 7, \quad x^2 \leftrightarrow \sqrt{\ }, \quad \sqrt[3]{\ } \leftrightarrow x^3}$$

## Solution E3

**(a)** Following BIDMAS, $x$ is first **multiplied by** 4, and then 1 **is added**.
**(b)** Undo in the *reverse* order — outside in:

$$\boxed{\text{first subtract 1, then divide by 4}}$$

This gives $y - 1 = 4x$ and then $x = \dfrac{y-1}{4}$.

## Solution E4

**The error:** the student repeated the operation instead of reversing it. In $T = k - 6$, the number 6 is being *subtracted* from $k$, so the inverse is to *add* 6 to both sides:

$$T = k - 6 \implies T + 6 = k \implies \boxed{k = T + 6}.$$

**Check:** $k - 6 = (T + 6) - 6 = T$ ✓

## Solution E5

Dividing both sides by 4 means dividing *every term* on each side, not just the first one:

$$\frac{R}{4} = \frac{4a + 8b}{4} = \frac{4a}{4} + \frac{8b}{4} = \boxed{a + 2b}.$$

Writing $a + 8b$ would leave the second term untouched, so the two sides would no longer balance. As a check with $a = 1$, $b = 1$: $R = 12$, and $\frac{12}{4} = 3 = 1 + 2(1)$ ✓, whereas $1 + 8(1) = 9$ ✗

## Common Mistake

The balance principle applies to the *whole* of each side. Every term must receive the same operation.

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# Preview ends here

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