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Linear Simultaneous Equations

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 *Linear Simultaneous Equations — Student Worksheet*. Question numbers match exactly (SUB1–SUB7, EL1–EL8, GR1–GR5, HD1–HD7, WP1–WP7, SC1–SC5, the Mixed Review MR1–MR10, and the examination questions Q1–Q8).
Every solution labels the equations, names the operation performed at each stage, and finishes with a check in both original equations — exactly the layout you should reproduce in an examination. 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 follows the same pattern used in the notes: label the equations, choose the method *and say why it fits*, carry out the algebra one clearly-named step at a time, find *both* unknowns, and check.

4.1 Solutions — The Substitution Method

Solution SUB1

Equation (1) is already solved for y, so substitute $y = 2x + 3$ into (2):

$$x + (2x + 3) = 12 \implies 3x + 3 = 12 \implies 3x = 9 \implies x = 3.$$

Substitute back into (1): $y = 2(3) + 3 = 9$.
Solution: $x = 3$, $y = 9$. **Check in** (2)**:** $3 + 9 = 12$ ✓

Solution SUB2

Substitute $y = 5 - x$ into (2):

$$3x + (5 - x) = 11 \implies 2x + 5 = 11 \implies 2x = 6 \implies x = 3.$$

Then $y = 5 - 3 = 2$.
Solution: $x = 3$, $y = 2$. **Check in** (2)**:** $3(3) + 2 = 11$ ✓

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Solution SUB3

The x in (1) has coefficient 1, so make x the subject: $x = 9 - y$.
Substitute into (2):

$$4(9-y) - y = 21 \implies 36 - 4y - y = 21 \implies -5y = -15 \implies y = 3.$$

Then $x = 9 - 3 = 6$.
Solution: $x = 6$, $y = 3$. **Check in** (2): $4(6) - 3 = 24 - 3 = 21$ ✓

Solution SUB4

From (1): $y = 17 - 3x$.
Substitute into (2):

$$2x - 3(17 - 3x) = 15 \implies 2x - 51 + 9x = 15 \implies 11x = 66 \implies x = 6.$$

Then $y = 17 - 3(6) = 17 - 18 = -1$.
Solution: $x = 6$, $y = -1$. **Check in** (2): $2(6) - 3(-1) = 12 + 3 = 15$ ✓

Common Mistake

Notice the sign change in $-3(17 - 3x) = -51 + 9x$. Subtracting a bracket changes the sign of *every* term inside it — this is the single most common slip in substitution.

Solution SUB5

From (1): $x = 4 + 2y$.
Substitute into (2):

$$3(4 + 2y) + 5y = 45 \implies 12 + 6y + 5y = 45 \implies 11y = 33 \implies y = 3.$$

Then $x = 4 + 2(3) = 10$.
Solution: $x = 10$, $y = 3$. **Check in** (2): $3(10) + 5(3) = 30 + 15 = 45$ ✓

Solution SUB6

From (1): $y = 3 - 2x$.
Substitute into (2):

$$5x - 2(3 - 2x) = 21 \implies 5x - 6 + 4x = 21 \implies 9x = 27 \implies x = 3.$$

Then $y = 3 - 2(3) = -3$.

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Preview ends here

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