

WA7MNALE1

Linear and non-linear equations and inequalities

Core + Challenge

Solving Two-Step Equations — Marking Key

I can solve linear equations with up to two operations using the balance model or backtracking, and verify my solution.

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

Section A Fluency: 16 Section B Core: 21 Section C Reasoning: 9 Section D Challenge: 9 **Total: 55**

Fluency: 1 mark each; accept an equivalent unsimplified answer for half credit at tutor's discretion.

A Fluency *answers and working*

/ 16 marks

Q	Answer	Working
1	$x = 4$	$2x = 8 \rightarrow x = 4$
2	$m = 3$	$5m = 15 \rightarrow m = 3$
3	$p = 5$	$3p = 15 \rightarrow p = 5$
4	$k = 5$	$4k = 20 \rightarrow k = 5$
5	$p = 17$	$2p = 34 \rightarrow p = 17$
6	$e = 12$	$\frac{e}{2} = 6 \rightarrow e = 12$
7	$y = 2$	$6y = 12 \rightarrow y = 2$
8	$n = 5$	$3n = 15 \rightarrow n = 5$
9	$x = 16$	$\frac{x}{4} = 4 \rightarrow x = 16$
10	$a = 7$	$7a = 49 \rightarrow a = 7$
11	$w = 10$	$2.5w = 25 \rightarrow w = 10$
12	$m = 18$	$\frac{m}{3} = 6 \rightarrow m = 18$
13	$k = 8$	$0.5k = 4 \rightarrow k = 8$
14	$t = 5$	$4t = 20 \rightarrow t = 5$
15	$k = \frac{1}{16}$	$2k = \frac{1}{8} \rightarrow k = \frac{1}{16}$
16	$n = 11$	$n + 4 = 15 \rightarrow n = 11$

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B

Core *answers, working and marks*

/ 21 marks

Q	Answer	Working / sample response	Marks
1	$3b + 5 = 62$; $b = 19$	$3b = 57$ <i>1 mark: equation</i> <i>1 mark: 19</i>	2
2	$4 + 2.5k = 29$; 10 km	$2.5k = 25$ <i>1 mark each</i>	2
3	(a) $s + 2(s + 2) = 25$ (b) 7 cm, 9 cm, 9 cm	$3s + 4 = 25 \rightarrow 3s = 21 \rightarrow s = 7$ <i>1 mark: equation</i> <i>1 mark: $s = 7$</i> <i>1 mark: all sides</i>	3
4	$220 - a = 187$; $a = 33$	$220 - 187$ <i>1 mark each</i>	2
5	185	$25 + 0.1t = 43.50 \rightarrow 0.1t = 18.50$ <i>1 mark: equation</i> <i>1 mark: 185</i>	2
6	$2a + 12 = 58$; \$23	$2a = 46$ <i>1 mark each</i>	2
7	8	$4n - 7 = 25 \rightarrow 4n = 32$ <i>1 mark: equation</i> <i>1 mark: 8</i>	2
8	$2w + 18 = 30$; 6 cm	$2w = 12$ <i>1 mark each</i>	2
9	9 weeks	$50 + 15w = 185 \rightarrow 15w = 135$ <i>1 mark: equation</i> <i>1 mark: 9</i>	2
10	6 hours	$12 + 8h = 60 \rightarrow 8h = 48$ <i>1 mark: equation</i> <i>1 mark: 6</i>	2

C

Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	Undo in reverse order	x was multiplied by 2 first, then 3 was added, so undo the + 3 first. <i>2 marks</i>	2
2	Must divide every term	Dividing the left side by 3 gives $p + \frac{7}{3}$, and the right side must also be divided. Easier: subtract 7 first. <i>2 marks</i>	2

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Q	Answer	Working / sample response	Marks
3	Yes – both sides equal 17	$5(4) - 3 = 17$; $2(4) + 9 = 17$ <i>1 mark each side</i>	2
4	$k = 5$	Backtracking: $11 + 9 = 20$, $\div 4 = 5$. Balance: $+9$ both sides $\rightarrow 4k = 20 \rightarrow k = 5$. <i>1 mark each method</i> <i>1 mark: justified preference</i>	3

D Challenge *solutions and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$x = 9$	$\frac{2x}{3} = 6 \rightarrow 2x = 18 \rightarrow x = 9$ <i>1 mark: working</i> <i>1 mark: 9</i>	2
2	18, 19, 20	$n + (n + 1) + (n + 2) = 57 \rightarrow 3n + 3 = 57 \rightarrow n = 18$ <i>1 mark: equation</i> <i>1 mark: $n = 18$</i> <i>1 mark: all three</i>	3
3	12 and 36	$b + 3b = 48 \rightarrow 4b = 48$ <i>1 mark: equation</i> <i>1 mark: both ages</i>	2
4	e.g. $4x + 3 = 13$	Any correct two-step equation with a matching context <i>1 mark: equation</i> <i>1 mark: story</i>	2