

WA8MNALE1

Linear and non-linear equations and inequalities

Core + Challenge

Writing and Solving Equations from Word Problems — Marking Key

I can define a variable, write an equation from a worded problem, solve it and check the answer makes sense in context.

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: 22 Section C Reasoning: 9 Section D Challenge: 11 **Total: 58**

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	$n + 5$	add 5
2	$3n - 4$	$\times 3$ then $- 4$
3	$n + 1$	consecutive
4	$2n + 1$	$n + (n + 1)$
5	$t + 6$	add 6
6	$4k + 3$	$4 \times k + 3$
7	$4s$	4 equal sides
8	6	$2n + 7 = 19 \rightarrow 2n = 12$
9	26	$\frac{n}{2} = 13$
10	10	$3n + 3 = 33$
11	23	$2n + 1 = 45 \rightarrow n = 22$
12	5	$2(2w + 3) = 26 \rightarrow 4w = 20$
13	11	$5w = 55$
14	10	$2d = 20$
15	12	$s + 3s = 48 \rightarrow 4s = 48$
16	24	$n + (n + 2) = 50$

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B

Core *answers, working and marks*

/ 22 marks

Q	Answer	Working / sample response	Marks
1	45, 46, 47	$n + (n + 1) + (n + 2) = 138$ $3n + 3 = 138 \rightarrow n = 45$ <i>1 mark: equation</i> <i>1 mark: all three numbers</i>	2
2	16.5 km	$4.80 + 1.90d = 36.15$ $1.90d = 31.35 \rightarrow d = 16.5$ <i>1 mark: equation</i> <i>1 mark: 16.5 km</i>	2
3	12 GB (both \$56)	$20 + 3g = 44 + g$ $2g = 24 \rightarrow g = 12$ Check: A = 20 + 36 = \$56, B = 44 + 12 = \$56 ✓ <i>1 mark: equation</i> <i>1 mark: 12 GB</i> <i>1 mark: check</i>	3
4	width 6.5 m, length 16 m	$2(w + 2w + 3) = 45 \rightarrow 6w + 6 = 45$ $w = 6.5$ $l = 2(6.5) + 3 = 16$; check $2(6.5 + 16) = 45$ ✓ <i>1 mark: equation</i> <i>1 mark: width</i> <i>1 mark: length</i>	3
5	Max 10, Lily 14	$(m + 3) + (m + 7) = 30$ $2m + 10 = 30 \rightarrow m = 10$; Lily 14 <i>1 mark: equation</i> <i>1 mark: both ages</i>	2
6	35, 37, 39	$n + (n + 2) + (n + 4) = 111$ $3n + 6 = 111 \rightarrow n = 35$ <i>1 mark: equation</i> <i>1 mark: numbers</i>	2
7	$x = 35$; 35°, 80°, 65°	$x + 2x + 10 + 3x - 40 = 180$ $6x - 30 = 180 \rightarrow x = 35$ <i>1 mark: $x = 35$</i> <i>1 mark: all angles</i>	2
8	14 trips	$50 - 3.20t = 5.20$ $3.20t = 44.80 \rightarrow t = 14$ <i>1 mark: equation</i> <i>1 mark: 14</i>	2
9	8 bikes	$32b + 20 = 276$ $32b = 256 \rightarrow b = 8$ <i>1 mark: equation</i> <i>1 mark: 8</i>	2

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Q	Answer	Working / sample response	Marks
10	12 goals (16 behinds)	$6g + (g + 4) = 88$ $7g = 84 \rightarrow g = 12$; check $72 + 16 = 88 \checkmark$ <i>1 mark: equation</i> <i>1 mark: 12</i>	2

C

Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$3n + 3 = 100$ has no whole-number solution	$3n + 3 = 100 \rightarrow n = 32\frac{1}{3}$, not whole. (The sum $3n + 3 = 3(n + 1)$ is always a multiple of 3, and 100 is not.) <i>1 mark: equation</i> <i>1 mark: explanation</i>	2
2	\$25	Kim has $2x + 12$, not $2(x + 12)$ (which means double of $x + 12$) $x + 2x + 12 = 87 \rightarrow 3x = 75$ $x = 25$: Jo \$25, Kim \$62 $\checkmark$ <i>1 mark: mistake</i> <i>1 mark: correct equation</i> <i>1 mark: \$25</i>	3
3	The answer is impossible: recheck	A width cannot be negative, so the equation or working must be wrong (or the situation is impossible). <i>1 mark: not valid</i> <i>1 mark: reason</i>	2
4	$n = 7$ (e.g. 5 tickets + \$12 fee = \$47)	Example: 5 movie tickets and a \$12 snack cost \$47. Find the ticket price. $5n = 35 \rightarrow n = 7$ <i>1 mark: suitable story</i> <i>1 mark: $n = 7$</i>	2

D

Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	Daughter 12, father 44	$d + 36 = 3(d + 4)$ $d + 36 = 3d + 12 \rightarrow 24 = 2d \rightarrow d = 12$ Father 44; check: in 4 years $48 = 3 \times 16 \checkmark$ <i>1 mark: equation</i> <i>1 mark: $d = 12$</i> <i>1 mark: father 44</i>	3
2	4, 5, 6, 7, 8	$n + (n + 1) + (n + 2) = (n + 3) + (n + 4)$ $3n + 3 = 2n + 7 \rightarrow n = 4$ $4 + 5 + 6 = 15 = 7 + 8 \checkmark$ <i>1 mark: equation</i> <i>1 mark: $n = 4$</i> <i>1 mark: numbers</i>	3

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Q	Answer	Working / sample response	Marks
3	(a) 9 km (b) Taxi B, by \$0.60	$4.20 + 1.80d = 6.00 + 1.60d \rightarrow 0.20d = 1.80 \rightarrow d = 9$ 12 km: A = \$25.80, B = \$25.20 <i>1 mark: equation</i> <i>1 mark: 9 km</i> <i>1 mark: B by \$0.60</i>	3
4	19 twenty-cent, 21 fifty-cent coins	$20n + 50(40 - n) = 1430 \rightarrow 2000 - 30n = 1430 \rightarrow n = 19$ Check: $\$3.80 + \$10.50 = \$14.30 \checkmark$ <i>1 mark: equation</i> <i>1 mark: both counts</i>	2