

Linear equations

Foundation and Higher tiers | Total marks: 87

Marks

- M** Method mark, for a correct method. It can be implied by a correct answer.
- A** Accuracy mark, for a correct answer. It needs the method mark before it.
- B** A mark for a correct value or statement, with or without working.
- ft** Follow through: the mark is given for using an earlier wrong answer correctly.
- oe** Or equivalent.
- [a, b]** Any value from a to b inclusive.

Questions

Q	Skill	Spec	Tier	Grade	Calculator	Marks
1	One step equations	A17	Foundation	1	No	2
2	Forming and solving from a number puzzle	A21 A17	Foundation	2	No	2
3	Two step equations	A17	Foundation	3	No	4
4	Solving an equation with a graph	A17	Foundation	4	No	2
5	Spotting a mistake: the unknown on both sides	A17	Common	4	No	3
6	Equations with a bracket and the unknown on both sides	A17	Common	4	No	3
7	Equations with fractions	A17	Foundation	4	No	4
8	Forming an equation from angles at a point	A21 G3	Common	5	No	4
9	Forming an equation from an isosceles triangle	A21 G4	Common	5	No	4
10	Equations with a negative in front of a bracket	A17	Common	5	No	3
11	Forming an equation from a context	A21	Common	5	No	4
12	Equations with two fractions	A17	Foundation	6	No	3
13	Forming an equation from equal areas	A21 A4	Common	6	No	4
14	Equations with decimals	A17	Foundation	3	Yes	3
15	Solving an equation from a formula in context	A17 A2	Foundation	3	Yes	3
16	Equations with decimals, a bracket and a fraction	A17	Foundation	4	Yes	4

Q	Skill	Spec	Tier	Grade	Calculator	Marks
17	Forming and solving an equation from a shopping context	A21 A17	Common	4	Yes	3
18	Forming an equation from lengths	A21 A17	Common	4	Yes	4
19	Forming an equation from a number wall	A21 A17	Common	4	Yes	3
20	Forming an equation in context with a change of units	A21 A17	Common	4	Yes	3
21	Forming an equation from equal perimeters	A21 G16	Common	5	Yes	5
22	Forming an equation from a mean	A21 S4	Common	5	Yes	3
23	Solving an equation with a fraction and checking a claim	A17	Common	5	Yes	3
24	An equation with the unknown in the denominator	A17	Common	5	Yes	3
25	Forming an equation from vertically opposite angles	A21 G3	Common	5	Yes	4
26	Forming and solving an equation in context	A21	Common	6	Yes	4
	Total					87

Question 1 A17 · Foundation · Grade 1 · 2 marks

Q	Answer	Mark	Comments
1(a)	8	B1	
1(b)	36	B1	

Question 2 A21 A17 · Foundation · Grade 2 · 2 marks

Q	Answer	Mark	Comments
2	$(22 \times 2 - 8) \div 3$ or $\frac{(3n+8)}{2} = 22$	M1	oe
	12	A1	

Question 3 A17 · Foundation · Grade 3 · 4 marks

Q	Answer	Mark	Comments
3(a)	$5x = 35$	M1	oe
	7	A1	
3(b)	$18 - 6 = 3p$ or $-3p = -12$	M1	oe
	4	A1	

Question 4 A17 · Foundation · Grade 4 · 2 marks

Q	Answer	Mark	Comments
4(a)	2.5	B1	accept [2.4, 2.6]
4(b)	-1.5	B1	accept [-1.6, -1.4]

Question 5 A17 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
5(a)	-5 moved to the other side should be + 5, not - 5	B1	oe, such as 'he should add 5 to both sides'
5(b)	$4a = 16$	M1	oe
	4	A1	

Question 6 A17 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
6	$6y - 15$	M1	the bracket expanded correctly
	$4y = 22$	M1	oe, ft their expansion
	5.5	A1	oe, such as $\frac{11}{2}$

Question 7 A17 · Foundation · Grade 4 · 4 marks

Q	Answer	Mark	Comments
7(a)	$2x + 3 = 35$	M1	oe
	16	A1	
7(b)	$\frac{x}{4} = -4$	M1	oe, or $x + 24 = 8$
	-16	A1	

Question 8 A21 G3 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
8	$2x + 3x + 15 + x + 45 + 90 = 360$	M1	oe, an equation using 360
	$6x = 210$	M1	oe, ft their equation
	$x = 35$	A1	
	120°	A1	

Question 9 A21 G4 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
9	$3x - 4 = x + 10$	M1	the two equal sides put equal
	$x = 7$	A1	
	their x substituted into all three sides, or into $2(x + 10) + 2x + 1$	M1	sides 17, 17 and 15
	49	A1	

Question 10 A17 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
10	$5 - 6c + 8$ or $13 - 6c$	M1	the bracket expanded correctly with the sign
	$14 = 7c$	M1	oe, ft their expansion
	2	A1	

Question 11 A21 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
11	$x + 4$ and $2(x + 4)$	M1	oe, expressions for Tom and Sita
	$x + x + 4 + 2(x + 4) = 64$	M1	oe, an equation
	$x = 13$	A1	
	£34	A1	

Question 12 A17 · Foundation · Grade 6 · 3 marks

Q	Answer	Mark	Comments
12	$3(3x - 2) - 4(x + 1) = 12$	M1	oe, both fractions cleared
	$9x - 6 - 4x - 4 = 12$ or $5x = 22$	M1	oe, brackets expanded correctly
	4.4	A1	oe, such as $\frac{22}{5}$

Question 13 A21 A4 · Common · Grade 6 · 4 marks

Q	Answer	Mark	Comments
13	$(x + 7)(x - 2) = x^2 + 5x - 14$ or $(x + 1)(x + 2) = x^2 + 3x + 2$	M1	one area expanded correctly
	$x^2 + 5x - 14 = x^2 + 3x + 2$	M1	oe, both expanded and put equal
	$2x = 16$	M1	oe, ft their equation
	8	A1	

Question 14 A17 · Foundation · Grade 3 · 3 marks

Q	Answer	Mark	Comments
14(a)	$2.4x = 12.6$ or $(19.9 - 7.3) \div 2.4$	M1	oe
	5.25	A1	oe
14(b)	6.96	B1	

Question 15 A17 A2 · Foundation · Grade 3 · 3 marks

Q	Answer	Mark	Comments
15	$216.50 - 38$ or 178.5	M1	oe, or $42.5h = 178.5$
	$178.5 \div 42.5$ or 4.2	M1	oe
	4 hours 12 minutes	A1	M1 M1 A0 for 4.2 hours or 4 hours 20 minutes

Question 16 A17 · Foundation · Grade 4 · 4 marks

Q	Answer	Mark	Comments
16(a)	$x - 2.15 = 2.55$ or $3.6x - 7.74 = 9.18$	M1	oe
	4.7	A1	oe
16(b)	$y + 4.8 = 7.85$	M1	oe
	3.05	A1	oe

Question 17 A21 A17 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
17	$1.38n + 4 \times 2.65 = 20 - 1.12$ or $1.38n + 10.6 = 18.88$	M1	oe, any letter
	$8.28 \div 1.38$	M1	oe, ft their equation
	6	A1	

Question 18 A21 A17 · Common · Grade 4 · 4 marks

Q	Answer	Mark	Comments
18	$x + x + 0.48 + 2x - 0.31 = 3.75$ or $4x + 0.17 = 3.75$	M1	oe
	$4x = 3.58$ or $x = 3.58 \div 4$	M1	oe, ft their equation
	their x (0.895) substituted into $2x - 0.31$ or $x + 0.48$	M1	1.48 or 1.375
	148	A1	

Question 19 A21 A17 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
19	$x + 3.46$ or $2x + 2.31$	M1	oe, one brick in the middle row
	$3x + 5.77 = 14.32$	M1	oe, an equation for the top brick
	2.85	A1	

Question 20 A21 A17 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
20	$24t + 0.33 = 11.85$	M1	oe, any letter
	$11.52 \div 24$ or 0.48	M1	oe
	480	A1	

Question 21 A21 G16 · Common · Grade 5 · 5 marks

Q	Answer	Mark	Comments
21	$6x + 2.85$ or $4(x + 4.1)$	M1	oe, one perimeter
	$6x + 2.85 = 4x + 16.4$	M1	oe
	$x = 6.775$	A1	
	(their $x + 4.1$) ² or 10.875^2	M1	
	118.3	A1	accept 118.3 or [118.26, 118.27]

Question 22 A21 S4 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
22	$6x + 9.35$ or $x + 2x + 1.7 + 3x - 0.6 + 8.25$	M1	oe, the four numbers added
	$6x + 9.35 = 31.6$ or $\frac{6x+9.35}{4} = 7.9$	M1	oe
	3.71	A1	accept 3.71 or [3.708, 3.709]

Question 23 A17 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
23	$5x + 2.3 = 4(1.7x - 0.62)$ or $5x + 2.3 = 6.8x - 2.48$	M1	oe, the fraction cleared
	$1.8x = 4.78$	M1	oe, ft their equation
	No, with $x = 2.65...$ or 2.7	A1	x in [2.65, 2.66] seen

Question 24 A17 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
24	$9.12 = 3.8(2x - 1.3)$ or $2x - 1.3 = 2.4$	M1	oe
	$2x = 3.7$ or $7.6x = 14.06$	M1	oe
	1.85	A1	oe

Question 25 A21 G3 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
25	$3.5x + 12.8 = 5.2x - 28.85$	M1	oe, vertically opposite angles put equal
	$1.7x = 41.65$	M1	oe, ft their equation
	$x = 24.5$	A1	
	81.45	B1ft	180 – their angle (98.55)

Question 26 A21 · Common · Grade 6 · 4 marks

Q	Answer	Mark	Comments
26	$80 - 1.5h$ or $72 - 0.9h$	M1	oe, an expression for one battery level
	$80 - 1.5h = 72 - 0.9h$	M1	oe. M2 for $8 \div 0.6$
	13.3... or $13\frac{1}{3}$ hours	A1	oe
	13 hours 20 minutes	A1	