Solving Equations-Answers

Key Stage 3: 2003 Paper 1 Level 3-5

1.

Tier & Question					Simplifying	
3-5	4-6	5-7	6-8			
14	9	3			Correct response	Additional guidance
				1m	$8k + 7$	× *Use of multiplication sign in simplified expressions* eg, for the first mark • $8 \times k + 7$
				1m	$2k + 5$	× *Partially simplified expressions*

2.

Tier & Question					Solving	
3-5	4-6	5-7	6-8			
21	16	9	1		Correct response	Additional guidance
				1m	2	! *Throughout the question, incorrect notation* eg, as an answer for the first mark • $k = \times 2$ Withhold one mark only for the first occurrence
				1m	$2\frac{1}{2}$ or equivalent	
				2m	$4\frac{1}{2}$ or equivalent	
				or 1m	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects variables on one side of the equation and numbers on the other eg ▪ $2t + 4 = 13$ ▪ $3t = t + 9$ ▪ $3t - t = 13 - 4$ ▪ $2t = 9$	! *Method used is trial and improvement* Note that no partial credit can be given
				1m	-1	

Key Stage 3: 2003 Paper 2 Level 3-5

3.

Tier & Question				Ages		
3-5	4-6	5-7	6-8			
14	7	2			Correct response	Additional guidance
a	a	a		2m	Gives complete correct interpretations for both Barry and Carol, by referring to both the following aspects: The given context of age The meaning of the given numbers and operations eg, for Barry ▪ One year younger (than Tina) ▪ Aged one less (than T) eg, for Carol ▪ Twice as old (as T) ▪ Double her age ▪ 2 × Tina years old	! *Incomplete interpretation* Do not accept as complete an interpretation that lacks reference to one of the two aspects eg, for Barry • Tina minus 1 [no reference to the given context] • Younger [no reference to the −1] • One year different [ambiguous reference to subtraction] eg, for Carol • Twice Tina [no reference to the given context] • Much older than Tina [no reference to the × 2] • 2 Tina's age [no reference to the multiplication] ! *Interpretation using comparison with age of person other than Tina* Accept provided the interpretation is unambiguous eg, accept as complete and correct for Barry • Four years younger than Ann
				or 1m	Gives a complete correct interpretation for either Barry or Carol by referring to both aspects or Gives interpretations for both Barry and Carol that give the meaning of the given numbers and operations but contain no reference to the given context of age eg ▪ For Barry, Tina minus 1 For Carol, Twice Tina	

Tier & Question						Ages (cont)
3-5	4-6	5-7	6-8			
14	7	2			Correct response	Additional guidance
b	b	b		2m	Gives all three correct expressions in their simplest forms eg ▪ $n + 4$, n, $2n + 1$	✓ *1n or n1 for n in a fully simplified expression* × *n 0 as a fully simplified expression for n* ! *Use of multiplication sign* If a multiplication sign is used, an expression cannot be accepted as fully simplified eg, for Carol, do not accept as fully simplified • $2 \times n + 1$
				or 1m	Gives any two correct expressions in their simplest forms or Gives all three correct expressions, even if not simplified	
c	c	c		1m 1m	61 62	× *Incomplete processing* eg, for the first mark • $2 \times 30 + 1$ eg, for the second mark • 2×31 × *Incorrect notation* eg, for the first mark • $61n$

Key Stage 3: 2003 Paper 1 Level 4-6

4.

Tier & Question						Simplifying
3-5	4-6	5-7	6-8			
14	9	3			Correct response	Additional guidance
				1m	$8k + 7$	× *Use of multiplication sign in simplified expressions* eg, for the first mark • $8 \times k + 7$
				1m	$2k + 5$	× *Partially simplified expressions*

5.

Tier & Question					Solving	
3-5	4-6	5-7	6-8			
21	16	9	1		Correct response	Additional guidance
				1m	2	! *Throughout the question, incorrect notation* eg, as an answer for the first mark • $k = \times 2$ Withhold one mark only for the first occurrence
				1m	$2\frac{1}{2}$ or equivalent	
				2m	$4\frac{1}{2}$ or equivalent	
				or 1m	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects variables on one side of the equation and numbers on the other eg ▪ $2t + 4 = 13$ ▪ $3t = t + 9$ ▪ $3t - t = 13 - 4$ ▪ $2t = 9$	! ***Method used is trial and improvement*** Note that no partial credit can be given
				1m	-1	

Key Stage 3: 2003 Paper 2 Level 4-6

6.

Tier & Question				Drawing		
3-5	4-6	5-7	6-8			
11	6	1			Correct response	Additional guidance
a	a	a		1m	Draws a rectangle of area 12 eg ▪ 1 by 12 ▪ 2 by 6 ▪ 3 by 4 ▪ 1.5 by 8	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear ✓ *Edge of grid used as edge of shape*
b	b			1m	Draws a rectangle of area 12, with different dimensions from one credited in part (a)	
c	c	b		1m	Draws a triangle of area 6 eg ▪ Base 6, perpendicular height 2 ▪ Base 4, perpendicular height 3 ▪ Base 5, perpendicular height 2.4	

Key Stage 3: 2004 Paper 1 Level 3-5

7.

Tier & Question				Magic square		
3-5	4-6	5-7	6-8			
18	13	6			Correct response	Additional guidance
a	a	a		2m	Gives all six correct values, ie 13 12 5 2 10 18 15 8 7	× *Incomplete processing*
				or 1m	Gives at least three correct values	
b	b	b		2m	Gives all three correct values, ie $a = 16$, $b = 4$, $c = 9$	
				or 1m	Gives the correct value for b or the correct value for c	

Key Stage 3: 2004 Paper 2 Level 3-5

8.

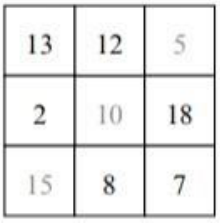
Tier & Question						ABC
3-5	4-6	5-7	6-8		Correct response	Additional guidance
4						
				1m	34	
				1m	8	
				1m	4	

9.

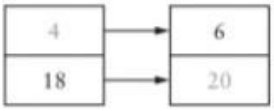
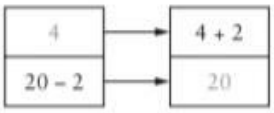
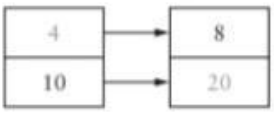
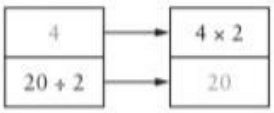
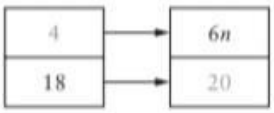
Tier & Question					Same area	
3-5	4-6	5-7	6-8		Correct response	Additional guidance
21	14	8	1			
	a	a		1m	8	
	b	b		2m	3, with no evidence of an incorrect method	
				or 1m	Shows the value 12 or Forms a correct equation in w eg ▪ $4w = \frac{1}{2}(6 \times 4)$ ▪ $4 \times w = 3 \times 4$ or Shows a correct method with not more than one computational error eg ▪ $6 \times 4 \div 2 \div 4$ ▪ $\frac{3 \times 4}{4}$ ▪ $6 \times 4 \div 2 = 20$ *(error)*, $20 \div 4 = 5$ ▪ $6 \div 2$	✗ *Conceptual error* eg • $6 \times 4 = 24$, $24 \div 4 = 6$

<u>Key Stage 3: 2004 Paper 1 Level 4-6</u>

10.

Tier & Question				Magic square		
3-5	4-6	5-7	6-8			
18	13	6			Correct response	Additional guidance
a	a	a		2m	Gives all six correct values, ie  *or* 1m Gives at least three correct values	× *Incomplete processing*
b	b	b		2m	Gives all three correct values, ie $a = 16$, $b = 4$, $c = 9$ *or* 1m Gives the correct value for b or the correct value for c	

11.

Tier & Question					Functions	
3-5	4-6	5-7	6-8			
	15	8	1		Correct response	Additional guidance
	a	a	a	1m	Gives both correct values, ie 	✓ *Incomplete processing* eg, for part (a) • 
	b	b	b	1m	Gives both correct values, ie 	eg, for part (b) •  × *Incorrect notation* eg, for part (a) • 
	c	c	c	2m	Gives two different correct functions Examples of correct functions are shown below eg ▪ $\frac{n}{5}$ ▪ $\sqrt{n}$ ▪ $n - 20$ ▪ $\frac{n-10}{3}$	! *Unconventional notation for* $\sqrt{n}$ eg • $n\sqrt{}$ Condone ! $n \rightarrow 5$ Accept as a correct function, provided nothing that could be an incorrect operation is shown eg, do not accept • $n \rightarrow +5$
				or 1m	Gives one correct function	× *For 2m, same functions written with different symbols or same functions but unsimplified* eg • $\frac{n}{5}$ and $n + 5$ • $\frac{n}{5}$ and $n \times 0.2$ • $n - 20$ and $n - 10 + 30$
				U1		

12.

Tier & Question					Rearrange	
3-5	4-6	5-7	6-8			
	20	13	6		Correct response	Additional guidance
		a	a	1m	$a - 4$	
				1m	$\frac{c}{4}$	✓ $c \div 4$
				1m	$4k + 3$	
		b	b	2m	Rearranges correctly eg ▪ $\frac{w}{5} - 2$ ▪ $\frac{w - 10}{5}$	✓ *For 2m, negative denominator* eg • $\frac{10 - w}{-5}$! *For 2m, use of division sign* Accept provided there is no ambiguity eg, accept • $w \div 5 - 2$ • $(w - 10) \div 5$ eg, do not accept • $w - 10 \div 5$
				or 1m	Shows or implies a correct first step of algebraic manipulation eg ▪ $2 + t = \frac{w}{5}$ ▪ $10 + 5t = w$ ▪ $5t = w - 10$ ▪ $w - 10 \div 5$	

Key Stage 3: 2004 Paper 2 Level 4-6

13.

Tier & Question					Same area	
3-5	4-6	5-7	6-8			
21	14	8	1		Correct response	Additional guidance
	a	a		1m	8	
	b	b		2m	3, with no evidence of an incorrect method	
				or 1m	Shows the value 12 or Forms a correct equation in w eg ▪ $4w = \frac{1}{2}(6 \times 4)$ ▪ $4 \times w = 3 \times 4$ or Shows a correct method with not more than one computational error eg ▪ $6 \times 4 \div 2 \div 4$ ▪ $\frac{3 \times 4}{4}$ ▪ $6 \times 4 \div 2 = 20$ *(error)*, $20 \div 4 = 5$ ▪ $6 \div 2$	✖ *Conceptual error* eg • $6 \times 4 = 24$, $24 \div 4 = 6$

14.

Tier & Question					Medicine	
3-5	4-6	5-7	6-8			
	20	13	6		Correct response	Additional guidance
		a	a	2m	Indicates a correct value, with appropriate units, with a correct method shown eg ▪ 80 ÷ 16, 5ml ▪ $\frac{20 \times 4}{12 + 4}$, 0.005 litres	✖ *For 2m, incorrect or incomplete method* eg • 20 ÷ 4 = 5ml
				or 1m	The only error is to omit units or to give incorrect units or Units of ml are given and the method shows or implies correct substitution and understanding of algebraic notation for both multiplication and division eg ▪ 20 × 4 ÷ 16, answer 50ml ▪ 20 × 4 = *100 (error)*, 12 + 4 = 16 100 ÷ 16 = 6.25ml ▪ $\frac{20 \times 4}{12 + 4} = \frac{8}{16}$ (*error* in numerator) = 0.5ml ▪ Answer of 10.6(...)ml or 10.7ml or 11ml (only error is to omit necessary brackets when processing) or An answer of 5ml, or equivalent, is given with no working	! *Units other than ml are given* Accept provided the pupil shows such a change is intended and the change has been carried out correctly eg, accept • 20 × 4 ÷ 16 = 50, answer 0.05 litres
		b	b	2m	12 (years)	
				or 1m	Shows a correct equation with the values 15 and 30 correctly substituted eg ▪ $15 = \frac{30y}{12 + y}$ ▪ $15(12 + y) = 30 \times y$ ▪ $1 = \frac{2y}{12 + y}$ or Shows the correct answer of 12 embedded, even if an incorrect value is chosen subsequently as the answer eg ▪ $15 = \frac{30 \times 12}{12 + 12}$, answer 15	! *Use of ? or other symbol for y* Accept if consistent eg, for 1m accept • $15 = \frac{30 \times ?}{12 + ?}$! *Units given within an equation* Condone eg, for 1m accept • $15\text{ml} = \frac{30\text{ml} \times y}{12 + y}$

Key Stage 3: 2005 Paper 1 Level 3-5

15.

Tier & Question				Completing		
3-5	4-6	5-7	6-8			
18	11	4			Correct response	Additional guidance
				1m	32	! *For the first and second marks, incomplete processing* Penalise only the first occurrence eg, for the first and second marks • 4 × 8 48 ÷ 4 Mark as 0, 1
				1m	12	
				1m	Gives a correct expression in x with a value of 48 when x is 8 eg ▪ $6x$ ▪ $x + 40$ ▪ $3x + 24$	! *For the third mark, unconventional notation* Condone eg, for the third mark accept • $6 \times x$ • $x6$

16.

Tier & Question				Equations		
3-5	4-6	5-7	6-8			
21	14	7			Correct response	Additional guidance
				1m	5	! *Incorrect notation* eg, for the first mark • $\times 5$ Penalise only the first occurrence
				1m	3	! *Incomplete processing* eg, for the first mark • $\frac{15}{3}$ Penalise only the first occurrence

Key Stage 3: 2005 Paper 1 Level 4-6

17.

Tier & Question						Completing	
3-5	4-6	5-7	6-8				
18	11	4				Correct response	Additional guidance
				1m	32	! *For the first and second marks, incomplete processing* Penalise only the first occurrence eg, for the first and second marks • 4 × 8 48 ÷ 4 Mark as 0, 1	
				1m	12		
				1m	Gives a correct expression in x with a value of 48 when x is 8 eg ▪ $6x$ ▪ $x + 40$ ▪ $3x + 24$	! *For the third mark, unconventional notation* Condone eg, for the third mark accept • $6 \times x$ • $x6$	

18.

Tier & Question						Equations	
3-5	4-6	5-7	6-8				
21	14	7				Correct response	Additional guidance
				1m	5	! *Incorrect notation* eg, for the first mark • ×5 Penalise only the first occurrence	
				1m	3	! *Incomplete processing* eg, for the first mark • $\frac{15}{3}$ Penalise only the first occurrence	

19.

Tier & Question					Solving an equation	
3-5	4-6	5-7	6-8		*Refer to the new algebra general guidance*	
	21	14	6		**Correct response**	**Additional guidance**
				2m	$\frac{25}{4}$ or equivalent	× *For 2m,* $\frac{25}{4}$ *seen but with incorrect further working* eg • $\frac{25}{4} = 6.1$
				or **1m**	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects variables on one side of the equation and numbers on the other eg ▪ $2t = 25 - 2t$ ▪ $-25 + 2t = -2t$ ▪ $2t + 2t = 100 - 75$ ▪ $75 + 4t = 100$ ▪ $4t = 25$ ▪ $25 \div 4$ seen	! *Method used is trial and improvement* Note that no partial credit can be given

Key Stage 3: 2005 Paper 2 Level 4-6

20.

Tier & Question					*Refer to the new algebra general guidance*	**Solutions**
3-5	4-6	5-7	6-8			
	25	17	9		**Correct response**	**Additional guidance**
		a	a	1m	Indicates No and gives a correct explanation The most common correct explanations:	
					Show that the two sides of the equation are not equal when $y = 17$ eg ▪ $14 \times 17 - 51 = 187$, but $187 + 4 \times 17 = 255$ ▪ $14y - 51 = 187$, so it will go over when you add the $4y$ ▪ The equation simplifies to $10y = 238$, but $10 \times 17 = 170$	✓ *Minimally acceptable explanation* eg • $187 \neq 255$ • $14 \times 17 - 51 \neq 187 + 4 \times 17$ • $14 \times 17 - 51 = 187$ so you don't need $4y$ • $14y - 51 = 187 + 0$ × *Incomplete or incorrect explanation* eg • When you substitute $y = 17$ into both sides, you get different answers • $14 \times 17 - 51 = 187$ • $14 \times 17 - 51 = 187$, but $187 + 4 \times 17 = 225$ *(error)*
					Show the correct solution or show a correct method for solving the equation that demonstrates that the solution cannot be 17 eg ▪ $14y - 51 = 187 + 4y$ $10y = 238$ $y = 23.8$ ▪ $(187 + 51) \div 10 \neq 17$	✓ *Minimally acceptable explanation* eg • 23.8 or equivalent seen • $10y = 238$, so $y \neq 17$ × *Incorrect explanation* eg • $18y = 238$ $y = 13.2$ • $10y = 136$ $y = 13.6$
					Show or imply that $y = 17$ is a correct solution to $14y - 51 = 187$ eg ▪ $14 \times 17 - 51 = 187$, but there is another 4×17 to add to the 187 on the other side	✓ *Minimally acceptable explanation* eg • If $y = 17$, $14y - 51 = 187$, without $+ 4y$ • The left-hand side is 187, but the other side is 187 plus something × *Incomplete explanation* eg • If $y = 17$, $14y - 51 = 187$

Tier & Question				*Refer to the new algebra general guidance*	**Solutions (cont)**	
3-5	4-6	5-7	6-8			
	25	17	9		**Correct response**	**Additional guidance**
		b	b	**1m**	Indicates No and gives a correct explanation The most common correct explanations:	
					Show that the two sides of the equation cannot be equal when $y = 17$ eg ▪ $3 \times 17^2 = 867$, not 2601 ▪ $y^2 = \frac{2601}{3}$ $= 867$, but $17 \times 17 = 289$ ▪ If $y = 20$, $3y^2 = 1200$ which is still smaller than 2601, so y can't be 17 ▪ 17^2 ends in a 9, then this number × 3 ends in a 7, so it can't be 2601	✓ *Minimally acceptable explanation* eg • 867 • $3 \times 289 \neq 2601$ • $y^2 = 867$, but $17^2 \neq 867$ • 17^2 ends in 9, then × 3 ends in 7 ✗ *Incomplete explanation* eg • $3 \times 17^2 \neq 2601$ • When you substitute $y = 17$ into the equation, you don't get 2601 • $3 \times 17 \times 17$ is far too small to be 2601
					Show the correct solution or show a correct method for solving the equation that demonstrates that the solution cannot be 17 eg ▪ $3y^2 = 2601$ $y^2 = 867$ $y = \pm 29.(\ldots)$	✓ *Minimally acceptable explanation* eg • It's $\pm 29.(\ldots)$ • $\sqrt{\frac{2601}{3}} \neq 17$! *Only positive solution shown* Condone eg, accept as minimal • It's $29.(\ldots)$ ✗ *Incorrect explanation* eg • $y^2 = 1300.5$ $y = 36.(\ldots)$
					Address the misconception eg ▪ $(3 \times 17)^2 = 2601$, so $3 \times 17^2 \neq 2601$ ▪ Square 17 first, then × 3 and your answer is much smaller than 2601	✓ *Minimally acceptable explanation* eg • $(3 \times 17)^2 = 2601$ • 17^2 then $\times 3 \neq 2601$ • They've squared $3y$, not just y • You do the power, then multiply • True for $(3y)^2$ • $9y^2 = 2601$ ✗ *Incomplete explanation* eg • $3 \times 17^2 \neq 2601$

Key Stage 3: 2006 Paper 1 Level 3-5

21.

Tier & Question						Solving
3-5	4-6	5-7	6-8			
17	11	5			Correct response	Additional guidance
				1m	4	! *Incorrect notation* eg, as an answer for the first mark • $k = \times 4$ Penalise only the first occurrence
				1m	−7	! *Incomplete processing* eg, as an answer for the first mark • $k = \frac{8}{2}$ Penalise only the first occurrence

Key Stage 3: 2006 Paper 2 Level 3-5

22.

Tier & Question						Values
3-5	4-6	5-7	6-8			
17	11	3			Correct response	Additional guidance
				2m	Gives all three correct values in the correct positions, ie 18, 30 and 100	! *Incorrect notation* eg, for the value of $8 + k$ • $18k$ Withhold 1 mark only for the first occurrence
				or 1m	Gives two correct values in the correct positions or Shows all three values 18, 30 and 100, even if their positions are incorrect or Shows correct substitutions, interpreting the addition, multiplication and squaring correctly, but fails to process or processes incorrectly eg ▪ $8 + 10$, 3×10, 10×10 seen	

Key Stage 3: 2006 Paper 1 Level 4-6

23.

Tier & Question						Solving
3-5	4-6	5-7	6-8			
17	11	5			Correct response	Additional guidance
				1m	4	! *Incorrect notation* eg, as an answer for the first mark • $k = \times 4$ Penalise only the first occurrence
				1m	-7	! *Incomplete processing* eg, as an answer for the first mark • $k = \frac{8}{2}$ Penalise only the first occurrence

24.

Tier & Question						Operations
3-5	4-6	5-7	6-8			
	16	10	3		Correct response	Additional guidance
				2m	Gives all four correct operations, ie − ÷ + ×	
				or 1m	Gives any two correct operations	

25.

Tier & Question						Finding y
3-5	4-6	5-7	6-8			
	17	11	4		Correct response	Additional guidance
				2m	$6\frac{1}{2}$ or equivalent	
				or 1m	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects unknowns on one side of the equation and numbers on the other eg ▪ $14 = 2y + 1$ ▪ $3y + 13 = 5y$ ▪ $14 - 1 = 5y - 3y$ ▪ $13 = 2y$ ▪ $13 \div 2$	

26.

Tier & Question						Values
3-5	4-6	5-7	6-8			
17	11	3			Correct response	Additional guidance
				2m	Gives all three correct values in the correct positions, ie 18, 30 and 100	! *Incorrect notation* eg, for the value of $8 + k$ • $18k$ Withhold 1 mark only for the first occurrence
				or 1m	Gives two correct values in the correct positions or Shows all three values 18, 30 and 100, even if their positions are incorrect or Shows correct substitutions, interpreting the addition, multiplication and squaring correctly, but fails to process or processes incorrectly eg ▪ $8 + 10$, 3×10, 10×10 seen	

27.

Tier & Question						Balancing
3-5	4-6	5-7	6-8			
	17	9	2		Correct response	Additional guidance
	a	a	a	1m	5	
	b	b	b	1m	35	! *Answers to parts (a) and (b) transposed but otherwise correct* Mark as 0, 1

Key Stage 3: 2007 Paper 1 Level 3-5

28.

Tier & Question					$x = 8$	
3-5	4-6	5-7	6-8			
16	9	1			Correct response	Additional guidance
a	a	a		1m	Indicates only 40, ie ☐ ☐ ✓ ☐ ☐	
b	b	b		1m	Indicates only 16, ie ☐ ☐ ✓ ☐ ☐	
c	c	c		1m	Indicates only 64, ie ☐ ☐ ☐ ✓ ☐	

29.

Tier & Question					Positive and negative	
3-5	4-6	5-7	6-8			
22	15	7			Correct response	Additional guidance
a	a	a		1m	18	
b	b	b		1m	2	
c	c	c		1m	Indicates the equation $y = x^2$, ie — — (—) —	

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30.

Tier & Question						***a* and *b***
3-5	4-6	5-7	6-8		**Correct response**	**Additional guidance**
13	6			1m	Gives a pair of numbers for a and b, such that $b = a + 4$ eg ▪ $a = 5$ $b = 9$ ▪ $a = 1.5$ $b = 5.5$	× *Values embedded* eg • $4 + 5 = 9$ • $a = 4 + 5$ $b = 9$
				1m U1	Gives a pair of numbers for a and b, such that $b = a + 4$, different from any previously credited	

31.

Tier & Question					**Solving**	
3-5	4-6	5-7	6-8		**Correct response**	**Additional guidance**
27	20	11		1m	14	! *Incorrect notation* eg, as an answer for the first mark • $x = \times 14$ Penalise only the first occurrence
				1m	13	! *Incomplete processing* eg, as an answer for the first mark • $x = \frac{448}{32}$ Penalise only the first occurrence

Key Stage 3: 2007 Paper 1 Level 4-6

32.

Tier & Question						$x = 8$
3-5	4-6	5-7	6-8			
16	9	1			Correct response	Additional guidance
a	a	a		1m	Indicates only 40, ie ☐ ☐ ✓ ☐ ☐	
b	b	b		1m	Indicates only 16, ie ☐ ☐ ✓ ☐ ☐	
c	c	c		1m	Indicates only 64, ie ☐ ☐ ☐ ✓ ☐	

33.

Tier & Question						Positive and negative
3-5	4-6	5-7	6-8			
22	15	7			Correct response	Additional guidance
a	a	a		1m	18	
b	b	b		1m	2	
c	c	c		1m	Indicates the equation $y = x^2$, ie 	

34.

Tier & Question				Equation		
3-5	4-6	5-7	6-8		Correct response	Additional guidance
	22	14	6	2m	$\frac{1}{2}$ or equivalent	
				or		
				1m	Shows or implies a correct first step of algebraic manipulation that removes the brackets eg ▪ $2 \times 2n + 2 \times 5 = 12$ ▪ $4n + 10 = 12$ ▪ $2n + 5 = 6$ ▪ $4n = 2$ ▪ $2n = 1$ ▪ $2 \div 4$ ▪ $1 \div 2$	

<u>Key Stage 3: 2007 Paper 2 Level 4-6</u>

35.

Tier & Question				***a* and *b***		
3-5	4-6	5-7	6-8		Correct response	Additional guidance
13	6			1m	Gives a pair of numbers for a and b, such that $b = a + 4$ eg ▪ $a = 5$ $b = 9$ ▪ $a = 1.5$ $b = 5.5$	× *Values embedded* eg • $4 + 5 = 9$ • $a = 4 + 5$ $b = 9$
				1m U1	Gives a pair of numbers for a and b, such that $b = a + 4$, different from any previously credited	

36.

Tier & Question				Solving		
3-5	4-6	5-7	6-8		Correct response	Additional guidance
27	20	11		1m	14	! *Incorrect notation* eg, as an answer for the first mark • $x = \times 14$ Penalise only the first occurrence
				1m	13	! *Incomplete processing* eg, as an answer for the first mark • $x = \frac{448}{32}$ Penalise only the first occurrence

37.

Tier & Question						Completing rules
3-5	4-6	5-7	6-8			
	22	13	2		Correct response	Additional guidance
				1m	Gives two correct values in the correct order, and a correct expression in x eg ▪ 3, 1, $3x + 1$ ▪ 1, 9, $x + 9$ ▪ -2, 21, $-2x + 21$	× *For the first mark, given example repeated* ! *Unconventional notation* eg, for $x + 9$ • $1 \times x + 9$ Condone
				1m	Gives two correct values in the correct order, and a correct expression in x eg ▪ 4, 3, $4x - 3$ ▪ -2, -21, $-2x - -21$ ▪ x, 3, $x^2 - 3$	
				1m	Gives two correct values in the correct order, and a correct expression in x eg ▪ 2, 11, $\frac{x}{2} + 11$ ▪ 0.5, 5, $2x + 5$ (or $\frac{x}{0.5} + 5$) ▪ 1, 9, $x + 9$	

38.

Tier & Question						Relationships
3-5	4-6	5-7	6-8			
	24	15	4		Correct response	Additional guidance
				1m	9	! *Incomplete processing* eg, for the first mark • $10 - 1$ eg, for the second mark • 10^2 Penalise only the first occurrence
				1m	100	

39.

Tier & Question					Values	
3-5	4-6	5-7	6-8			
	27	18	7		Correct response	Additional guidance
	a	a	a	1m	15	
	b	b	b	1m	$5\frac{1}{2}$ or equivalent	
		c	c	1m	Indicates that $e > 5$ eg ▪ It has to be higher than 5 ▪ Any number over 5	✓ *Minimally acceptable indication* eg • > 5 • Above 5 • More than half of 10 ! *Range includes 5* eg • 5 or over Condone × *Negative values of f excluded* eg • $5 < e \leq 10$ • Between 5 and 10 × *Incorrect indication* eg • e can be 6, 7, 8 and so on • e must be 5.1 or more × *Incomplete indication* eg • $e = 10 - f$ • $f \leq e$

Key Stage 3: 2008 Paper 1 Level 3-5

40.

Tier & Question					Substituting	
3-5	4-6	5-7	6-8			
21	14	5			Correct response	Additional guidance
				2m	Completes all three statements correctly eg ▪ 3, 6 3, 9 3, 1 ▪ 1, 4 2, 6 6, 2 ▪ 4, 7 4, 12 4, $\frac{4}{3}$ ▪ 0, 3 0, 0 0, 0	✓ *Negatives, fractions or decimals* ! *Decimal answers rounded or truncated* Accept answers rounded or truncated to two decimal places or better × *Incomplete processing* eg, for the last part • 3, $\frac{3}{3}$ • 6, $\frac{6}{3}$
				or		
				1m	Completes two statements correctly	

41.

Tier & Question					Solving	
3-5	4-6	5-7	6-8			
25	17	8			Correct response	Additional guidance
				1m	3	! *Incorrect notation* eg, as an answer for the first mark • × 3 • $3x$ Penalise only the first occurrence
				1m	−5	! *Incomplete processing* eg, as an answer for the first mark • $\frac{15}{5}$ Penalise only the first occurrence

Key Stage 3: 2008 Paper 2 Level 3-5

42.

Tier & Question					Values	
3-5	4-6	5-7	6-8			
22	14	5			Correct response	Additional guidance
a	a	a		1m	6	! *Incomplete processing* Penalise only the first occurrence eg, for parts (a) and (b) • 9 – 3 4 – 6 Mark as 0, 1
b	b	b		1m	–2	

Key Stage 3: 2008 Paper 1 Level 4-6

43.

Tier & Question					Substituting	
3-5	4-6	5-7	6-8			
21	14	5			Correct response	Additional guidance
				2m	Completes all three statements correctly eg ▪ 3, 6 3, 9 3, 1 ▪ 1, 4 2, 6 6, 2 ▪ 4, 7 4, 12 4, $\frac{4}{3}$ ▪ 0, 3 0, 0 0, 0	✓ *Negatives, fractions or decimals* ! *Decimal answers rounded or truncated* Accept answers rounded or truncated to two decimal places or better × *Incomplete processing* eg, for the last part • 3, $\frac{3}{3}$ • 6, $\frac{6}{3}$
				or 1m	Completes two statements correctly	

44.

Tier & Question						Solving
3-5	4-6	5-7	6-8			
25	17	8			Correct response	Additional guidance
				1m	3	! *Incorrect notation* eg, as an answer for the first mark • × 3 • $3x$ Penalise only the first occurrence
				1m	−5	! *Incomplete processing* eg, as an answer for the first mark • $\frac{15}{5}$ Penalise only the first occurrence

45.

Tier & Question						Equation
3-5	4-6	5-7	6-8			
	27	18	9		Correct response	Additional guidance
				2m	−12	
				or		
				1m	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects unknowns on one side of the equation and numbers on the other eg ▪ $2x = x - 12$ ▪ $12 + 2x = x$ ▪ $6 + x = -6$ ▪ $2x - x = -6 - 6$ ▪ $12 + x = 0$	! *Method used is trial and improvement* Note that no partial credit can be given

Key Stage 3: 2008 Paper 2 Level 4-6

46.

Tier & Question						Values
3-5	4-6	5-7	6-8			
22	14	5			Correct response	Additional guidance
a	a	a		1m	6	! *Incomplete processing* Penalise only the first occurrence eg, for parts (a) and (b) • 9 – 3 4 – 6 Mark as 0, 1
b	b	b		1m	−2	

47.

Tier & Question					Value of x	
3-5	4-6	5-7	6-8			
	20	11	1		Correct response	Additional guidance
	a	a	a	1m U1	Indicates … one particular number, ie ☑ ☐ ☐ ☐ ☐	
	b	b	b	1m U1	Indicates … any number at all, ie ☐ ☐ ☐ ☐ ☑	

48.

Tier & Question					Perimeters	
3-5	4-6	5-7	6-8			
	25	16	6		Correct response	Additional guidance
	a	a	a	1m	$7a + 3$	! *Unsimplified expression or unconventional notation* eg • $\frac{42a + 18}{6}$ • $(42 \times a + 18) \div 6$ Condone × *Necessary brackets omitted* eg • $42a + 18 \div 6$
	b	b	b	1m	5	
	c	c	c	1m	24	! *Units given* Ignore, even if incorrect for a perimeter eg, accept • 24cm • $24cm^2$ × *Incomplete processing* eg • 4 x 6

Key Stage 3: 2009 Paper 1 Level 3-5

49.

Tier & Question				Finding *b*		
3-5	4-6	5-7	6-8			
24	17	8		Mark	Correct response	Additional guidance
				2m or 1m	2 Shows or implies that a = 5 and shows the intention to substitute this value into the second equation eg • $5 + 7 = 10 + b$ • $b = 12 - 10$ or Shows a complete correct method with not more than one computational error eg • $b = 11 - 6 + 7 - 10$ • $a = 11 - 6 = 6$ *(error)* $6 + 7 = 10 + b$ $b = 3$	× ***Conceptual error*** eg • $a = 11 + 6 = 17$

Key Stage 3: 2009 Paper 2 Level 3-5

50.

Tier & Question 3–5	4–6	5–7	6–8	Finding x and y		
17	8			Mark	Correct response	Additional guidance
				1m	652	
				1m	442	

51.

Tier & Question 3–5	4–6	5–7	6–8	Value		
24	15	6		Mark	Correct response	Additional guidance
				1m	196	× *Incomplete processing*
				1m	4	
				1m	1225	

Key Stage 3: 2009 Paper 1 Level 4-6

52.

Tier & Question 3–5	4–6	5–7	6–8	Finding b		
24	17	8		Mark	Correct response	Additional guidance
				2m or 1m	2 Shows or implies that a = 5 and shows the intention to substitute this value into the second equation eg • $5 + 7 = 10 + b$ • $b = 12 - 10$ or Shows a complete correct method with not more than one computational error eg • $b = 11 - 6 + 7 - 10$ • $a = 11 - 6 = 6$ *(error)* $6 + 7 = 10 + b$ $b = 3$	× ***Conceptual error*** eg • $a = 11 + 6 = 17$

53.

Missing lengths

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	20	11	3	2m or 1m	Gives both correct lengths, ie $x = 10$ and $y = 3.9$ or equivalent Gives $y = 3.9$ or equivalent or Gives the two values transposed, ie $x = 3.9$ or equivalent and $y = 10$ or Shows a complete correct method with not more than one computational error eg • $x = 10$, $10 - 6.1 = 4.9$ *(error)* • $4 \times 6.1 = 24.4$, $40 - 24.4 = 16.6$ *(error)* $16.6 \div 4 = 4.15$, $4.15 + 6.1 = 10.25$ • $40 \div 4 = 20$ *(error)* $20 - 6.1 = 13.9$	

54.

Counters

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	21	12	4			
	a	a	a	2m or 1m	Gives the value 3, with no evidence of an incorrect method Shows or implies a correct equation for the bags and shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects variables on one side of the equation and numbers on the other eg • $6y + 1 = 4y + 7$ $6y - 4y = 7 - 1$ • $-2y + 7 = 1$ • $6y - 6 = 4y$ • $2y = 6$	! ***Method used is trial and improvement*** Note that no partial credit can be given
	b	b	b	2m or 1m U1	5 Gives an answer of 4.(...) or Shows or implies a correct inequality using the expressions for the bags eg • $4k > k + 12$ • $3k > 12$ • $k > 4$	! ***Method used is trial and improvement*** Note that no partial credit can be given

55.

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Shape rules Additional guidance
	24	15	7	2m	Completes all three rules correctly, ie $H = \underline{N} + 1$ $A = \underline{H} \times 2$ $\underline{A} = 2N + 2$	! ***Throughout the question, unconventional notation*** eg, for the first rule • $1\,N + 1$ Condone ! ***Throughout the question, words used instead of letters*** eg, for the second rule • $A = \underline{Height} \times 2$ Penalise only the first occurrence ! ***For the second rule, N + 1 used*** Accept provided there is no ambiguity eg, accept • $(N + 1) \times 2$ eg, do not accept • $N + 1 \times 2$ ✓ ***For the third rule, 2H used***
				or 1m	Completes two rules correctly	

Key Stage 3: 2009 Paper 2 Level 4-6

56.

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Finding x and y Additional guidance
	17	8		1m	652	
				1m	442	

57.

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Value Additional guidance
	24	15	6	1m	196	x ***Incomplete processing***
				1m	4	
				1m	1225	

Key Stage 3: 2010 Paper 1 Level 3-5

58.

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	ab Additional guidance
17	7					
a	a			1m	Completes the row for 5 correctly eg • $a + b$ • $b + a$ • $3b - 2a$ • $a + 3$ • $b + 2$ • $2 \times a + 1$	! ***Unsimplified expression or unconventional notation*** eg, in part (a) • $b + b + b - a - a$ • $1a + 1b$ Condone × ***Responses given are not algebraic*** eg, do not accept • 3 + 2 for 5 • $2 \times 2 + 2 \times 2$ for 8
				1m	Completes the row for 8 correctly eg • $2b + a$ • $4 \times a$ • $a + 6$ • $b + 5$ • $a \times b + a$ • $2 \times a \times a$	
				U1		
b	b			1m	Gives $a = 3$	
				1m	Gives $b = 4$	! ***Follow-through*** Accept follow-through as 7 – their value for a
				U1		

59.

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Largest value Additional guidance
24	14	5				
a	a	a		1m	Indicates only $10 - y$, ie 	! ***Correct expression indicated but incorrect values shown*** Condone
b	b	b		1m	Indicates only y^2, ie 	
c	c	c		1m	Gives a value such that $y < 1.5$	✓ ***Fractions, decimals and negative values***
				U1		

60.

Tier & Question						
3–5	4–6	5–7	6–8			***ab***
17	7			Mark	Correct response	Additional guidance
a	a			1m	Completes the row for 5 correctly eg • $a + b$ • $b + a$ • $3b - 2a$ • $a + 3$ • $b + 2$ • $2 \times a + 1$	! ***Unsimplified expression or unconventional notation*** eg, in part (a) • $b + b + b - a - a$ • $1a + 1b$ Condone × ***Responses given are not algebraic*** eg, do not accept • 3 + 2 for 5 • $2 \times 2 + 2 \times 2$ for 8
				1m	Completes the row for 8 correctly eg • $2b + a$ • $4 \times a$ • $a + 6$ • $b + 5$ • $a \times b + a$ • $2 \times a \times a$	
				U1		
b	b			1m	Gives $a = 3$	
				1m	Gives $b = 4$	! ***Follow-through*** Accept follow-through as 7 – their value for a
				U1		

61.

Tier & Question						
3–5	4–6	5–7	6–8			Largest value
24	14	5		Mark	Correct response	Additional guidance
a	a	a		1m	Indicates only $10 - y$, ie 	! ***Correct expression indicated but incorrect values shown*** Condone
b	b	b		1m	Indicates only y^2, ie 	
c	c	c		1m	Gives a value such that $y < 1.5$	✓ ***Fractions, decimals and negative values***
				U1		

62.

Equation

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	19	10	1			
	a	a	a	1m	980	
	b	b	b	1m	112	

63.

Values

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	22	13	4			
	a	a	a	1m	Gives two different values of x that are less than or equal to zero eg • −1 then −2 • $-\frac{1}{4}$ then −0.1 • 0 then −10	
	b	b	b	1m	4	! *Range of answers given* Condone eg, accept • y is less than or equal to 4

64.

Ringing expressions

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	26	17	8			
	a	a	a	1m	Indicates $2n + 2$, ie 	
	b	b	b	1m	Indicates $n(n + 2)$, ie 	

Key Stage 3: 2010 Paper 2 Level 4-6

65.

Tier & Question				Kite perimeter		
3–5	4–6	5–7	6–8			
	19	11	2	Mark	Correct response	Additional guidance
	a	a	a	1m	40	
	b	b	b	2m	24	
				or		
				1m	Shows a correct equation eg • $4n + 4 = 100$ • $n + n + n + 2 + n + 2 = 100$ • $4n = 96$ or Shows or implies a complete correct method with not more than one computational error eg • $(100 - 4) \div 4$ • $\frac{96}{4}$	× ***Necessary brackets omitted*** eg • $100 - 4 \div 4$ × ***For 1m, method used is trial and improvement***

Key Stage 3: 2011 Paper 1 Level 4-6

66.

Tier & Question			Thinking a b		
4–6	5–7				
12	3	Mark	Correct response	Additional guidance	
		1m	Gives both correct values, ie $a = 6$ $b = 4$	

67.

Tier & Question 4–6	5–7	Mark	Ticket price Correct response	Additional guidance
19	10	2m	Gives both correct prices eg One adult: £5 One child: £3.50	✓ *Unambiguous indication* ✗ *For 2m, incorrect or ambiguous indication of the cost of the tickets* eg • C = 3.5, A = 5 ! *Money* See general guidance on page 14
		or 1m	Gives one correct price eg • Child (£)3.5(0) • Adult (£)5 or Shows a complete correct method with not more than one computational error eg • 20.5 − 17 = 2.5 *(error)* 2.5 × 2 = 5 17 − 5 = 12 12 ÷ 2 = 6 or Forms two correct equations eg • $2a + 3c = 20.5$ $2a + 2c = 17$	✗ *Method does not show the calculation of the child ticket*

Key Stage 3: 2011 Paper 2 Level 4-6

68.

Tier & Question 4–6	5–7	Mark	Finding values Correct response	Additional guidance
16	6	2m	Gives all five values correct and in the correct positions, ie y | $2y$ | y^2 3 | 6 | 9 2 | 4 | 4 6 | 12 | 36	✓ *Values of −6 and −12*
		or 1m	Gives at least three values correct and in the correct positions	✓ *For 1m, follow-through from their $y = 6$, providing their $y = 0$ or their $y = 1$*

69.

When is it true?

Tier & Question		Mark	Correct response	Additional guidance
4–6	5–7			
18	8			
		2m	Completes the table correctly, ie	✓ ***Unambiguous indication*** eg • ✓ for true, × for false

	$n = 4$	$n = 5$	$n = 6$	$n = 7$
n is greater than 5			✓	✓
$2n$ is equal to 10		✓		
$2 + n$ is less than 8	✓	✓		
n^2 is less than 30	✓	✓		

	or	
	1m	Completes two rows of the table correctly