EXPERT TUITION

Maths Questions By Topic:

Algebra
Mark Scheme

Edexcel GCSE (Foundation)

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Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	Explanation	C1	for explanation **Acceptable examples** the sequence is going +1, +2 so the next term is +3 1 +1= 2, 2 +2= 4, 4 +3= 7 add the current term position to the term to get the next term add the two previous terms and add 1 **Not acceptable examples** you add 1 each time the number goes up by 3 7 is wrong it should be 8 because you double each time	The pattern may be just seen on the sequence given
(b)	36	M1 A1	for finding the next term of 10 + 5 (=15) **or** for ¸ × 8 × (8 + 1) oe cao	
2 (a)	$2a + 2d$	B1	cao	Accept $2 \times a + 2 \times d$
(b)	$y(6y - 5)$	B1	cao	Accept $y \times (6y - 5)$
(c)	11	M1	for isolating x terms, eg $4x = 37 + 7$ or $4x = 44$ **or** for $x - \frac{7}{4} = \frac{37}{4}$ **or** for 37 + 7 = 44 followed by "44" ÷ 4 (= 11)	
		A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
3 (a)	Explanation	C1	for explanation, eg AB cannot be zero (cm) **or** shows AB to be zero, eg $4 \times 0.5 - 2 = 0$	Accept say 'AB would then be 0'
(b)	2.5	P1	for a correct expression for AD, eg $3(4x - 2)$ **or** $12x - 6$ **OR** $2(3AB + AB) = 64$ oe **or** $3AB + AB = 32$ oe **or** $AB = 8$ **OR** for an equation with mixed variables, eg. $6AB + 2(4x - 2) = 64$	May be seen on diagram
		P1	for forming a correct equation in x, eg $4x - 2 + 4x - 2 + 3(4x - 2) + 3(4x - 2) = 64$ **or** $4x - 2 = 8$ **or** $4x - 2 + 3(4x - 2) = 32$	
		A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
4	Line Drawn	B3	for a correct line drawn between $x = -2$ and $x = 3$	Accept freehand line drawn
		(B2	for a correct straight-line segment through at least 3 of (–2, –6), (–-1, –4), (0, –2), (1, 0), (2, 2), (3, 4) **or** for all of the above points plotted but not joined **or** for a single line drawn with a positive gradient through (0, –2) **and** clear intention to use a gradient of 2, eg a line through (0, –2) and (0.5, 0)	Ignore any incorrect points Table of values x | –2 | –1 | 0 | 1 | 2 | 3 y | –6 | -4 | –2 | 0 | 2 | 4
		(B1	for at least 2 correct points stated or plotted **or** a single line drawn with positive gradient through (0, –2) **or** a single line with gradient 2)	Ignore any incorrect points Coordinates may be in a table or working Do not accept $y = -2$ drawn
5 (i)	−4	B1	cao	
(ii)	(0, 3)	B1	cao	

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Question		Answer	Mark	Mark scheme	Additional guidance
6	(a)	(2, 3)	B1	cao	
	(b)	(0,−1)	B1	cao	
	(c)	C at (–2,1)	B1	cao	If more than one point marked accept if labelled, otherwise not, unless clear
7	(a)	11	B1	cao	
	(b)	22	M1	Starts to find input using inverse operations, 41 + 3 (= 44) **or** sight of +3 **and** ÷2 **or** derivation of equation eg $2n - 3 = 41$	+3 and ÷2 could be seen in a flow diagra Evidence could be provided by algebraic statement, numerical statements or by diagrams
			A1	cao	
8	(a)	$x^2 - 4x$	B1	cao	
	(b)	$5(3y - 2)$	B1	cao	
	(c)	9	M1	for a correct first stage, eg. expanding brackets, $7 \times f - 7 \times 5$ (= 28) oe **or** for division of both sides by 7, eg. $\frac{7(f-5)}{7} = \frac{28}{7}$	
			A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
9	$3n - 2$	B2 (B1	for $3n - 2$ oe for $3n + k$ where $k \neq -2$ or is absent unambiguously shown)	Accept a different variable, eg. $3x - 2$ $n = 3n - 2$ gets B1 only $n + 3$ gets NO marks
10	B C D A	B2 B1	cao for two or three correct)	
11 (a)	$q = \frac{p-7}{6}$	M1 A1	for a correct first step, showing a method of subtraction of 7 from both sides or division of all terms by 6 eg $p - 7 = 6q + 7 - 7$ **or** $\frac{p}{6} = \frac{6q}{6} + \frac{7}{6}$ oe for $q = \frac{p-7}{6}$ **or** $q = \frac{p}{6} - \frac{7}{6}$	 Allow $1\frac{1}{6}$ for $\frac{7}{6}$ Award for answer without "$q =$"
(b)	m^6	B1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	*A* plotted at (3, 2)	B1	cao	Accept a cross or dot or A written at (3, 2) with or without labelling provided not ambiguous
(b)	(–1, 0)	B1	cao	Could be shown on the diagram
13 (a)	$10ab$	B1	cao	
(b)	$8x + y$	M1	for $8x$ or y	Accept $1y$ for 1 or 2 marks
		A1	for $8x + y$	
14 (a)	45	B1	cao	
(b)	50	M1	for an attempt to find the gradient eg "25" ÷ "0.5" ft their readings from the travel graph; use of speed-time formula eg 25 ÷ 30 (ignore units if shown)	could be shown in working or on the graph using any acceptable triangle; could be shown by multiples of 25, 0.5 or multiples of ft figures
		A1	cao	
15	18	P1	for process to solve $x - 1 = 2$, eg. $x = 2 + 1$ (= 3) or for $2x = 6$	Can award mark for $3 - 1 = 2$
		P1	for 2×9	
		A1	cao	
16	$3 \leq p < 1$	C2	for $-3 \leq p < 1$ or $p \geq -3$, $p < 1$ oe	Accept use of a letter other than p.
		(C1	for $-3 \leq p$ or for $p < 1$ or for $-3 < p \leq 1$ oe)	
17 (a)	p^{10}	B1	cao	
(b)	$2x^4y^2$	M1	for any two of $12 \div 6$ (= 2), x^{7-3} (= x^4), y^{3-1} (= y^2) in a product or written as a fraction with complete and correct cancelling of at least two terms	
		A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
18 (a)	4	B1	cao	
(b)	8	B1	cao	
(c)	3	M1	for a correct first step eg subtracting 2 from both sides **or** dividing all terms by 6	Division by 6 must be ALL terms
		A1	cao	
19 (a)	$10m - 15$	B1	for $10m - 15$ oe	Accept any reversing of order in the expression
(b)	$3(n + 4)$	B1	for $3(n + 4)$ oe	Accept any answer in reverse order
20	8.5	P1	for process to use the area of *PQRS* to find the length of *PQ,* eg $10y = 45$ **or** $45 \div 10$ (= 4.5)	Sets up equation for area
		P1	for process to use the perimeter of *ABCD*, eg $2x + 2 \times$ "4.5" = 26 **or** $26 - 2 \times$ "4.5" (= 17) **or** $26 \div 2$ (= 13)	Uses perimeter of *ABCD*
		P1	for process to use length of *BC* to find length of *AB*, eg solves $2x + 2 \times$ "4.5" = 26 **or** $(26 - 2 \times$ "4.5"$) \div 2$ **or** "13" – "4.5"	
		A1	for 8.5 **or** $8\frac{1}{2}$	Accept $\frac{17}{2}$
21 (a)	1, –4	B1	cao	Brackets are given on the answer line, ignore any extra brackets seen
(b)	–1 and 3	B2	for both correct answers	
		(B1	for one correct solution or $(x + 1)(x - 3)$ or (–1, 3))	

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Question	Answer	Mark	Mark scheme	Additional guidance
22 (a)	–2, –1	B1	cao	
(b)	Point at (2, 3)	B1	cao	Allow without label provided unambiguous; allow if the cross is nearer to (2, 3) than other points.
(c)	Line drawn	B1	cao	Label not required; allow hand-drawn line. Allow any length provided intention is clear.
23	30	M1	$2 \times 9 + 3 \times 4$	May be shown in stages but an intention to add 2×9 and 3×4 must be clear
		A1	cao	
24	10	B1	cao	
25 (a)	6 or –6	M1	for $12^2 + 2 \times -3 \times 18$ (= 36)	Terms may be partially evaluated.
		A1	for 6 or –6, accept ±6	Only one value is required for full marks
(b)	$s = \frac{v^2 - u^2}{2a}$	M1	for subtracting u^2 from both sides or dividing all terms by $2a$ as the first step	Must see this step carried out, not just the intention shown
		A1	$s = \frac{v^2 - u^2}{2a}$ oe	
26	$x = 4.5, y = -1.5$	M1	correct process to eliminate one variable (condone one arithmetic error)	
		M1	(dep) for substituting found value in one of the equations **OR** correct process after starting again (condone one arithmetic error)	
		A1	for $x = 4.5, y = -1.5$ oe	Fractions do not need to be in simpleast form

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Question	Answer	Mark	Mark scheme	Additional guidance
27 (a)	$12t$	B1	$12t$	Accept $t12$ but **not** $12 \times t$ or $t \times 12$
(b)	$7a$	B1	$7a$	Accept $a7$ or $7 \times a$ or $a \times 7$ Partial simplification of $5a + 2a$ or $8a - a$ does NOT get the mark
28 (a)	14	M1	for 4×5 and 3×-2, the substitution may be seen in two separate calculations, eg 4×5 (= 20) and 3×-2 (= −6)	
		A1	cao	
(b)	$4e^2 + 8e$	B2	for $4e^2 + 8e$	
		(B1	for $4e^2$ or $8e$)	Note: $4e^2 + 8e = 12e^3$ for example gets B1 only
(c)	11	M1	for a correct first step eg $3 \times m - 3 \times 4 = 21$ oe **or** $m - 4 = 21 \div 3$ (= 7) oe	Showing ÷3 by each side of equation is sufficient
		A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
29	(22, 20)	P1	for process to find width or height of diagram eg 38 − 6 (= 32) **or** 36 – 7 (= 29)	Figures may be shown on the diagram
		P1	for process to find length of side of square eg "32" . 4 (= 8) **or** process to find half width of diagram eg "32" ÷ 2 (= 16)	
		P1	for process to find x coordinate eg 6 + 2 × "8" (= 22) **or** 6 + "16" (= 22) **or** (6 + 38) ÷ 2 (= 22)	If (6 + 38) ÷ 2 leads to an answer other than 22, award P2 only
		P1	for process to find y coordinate eg 36 – 2 × "8" (= 20) **or** 36 – "16" (= 20) **or** 7 + 8 + "29"– 3 × "8" (= 20)	
		A1	cao SC: award 4 marks for (20, 22)	Award for P3 for (22, y) or (x, 20) or x = 22 or y = 20
30	Line drawn	B3	for a correct line between x = −3 and x = 3	
		(B2	for a correct straight-line segment through at least 3 of (−3, 13), (−2, 9), (−1, 5), (0, 1), (1, −3), (2, −7), (3, −11) **or** for all of these points plotted but not joined **or** for a line drawn with a negative gradient through (0, 1) **and** clear intention to use a gradient of −4, eg line through (0,1) and (0.5, −1)	Ignore any incorrect points Table of values x −3 −2 −1 0 1 2 3 y 13 9 5 1 −3 7 11
		(B1	for at least 2 correct points stated or plotted **or** for a line drawn with a negative gradient through (0, 1) **or** a line with gradient −4)	Ignore any incorrect points coordinates may be in a table or in working

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Question	Working	Answer	Mark	Notes
31		42	B1	cao
32		47	B1	cao
33		$L = 5a + 3$	M1	for expression $a - 1 + a + a + a + a + 4$ **or** L= an expression in a
			M1	for $5a + 3$ **or** $L = a + a + a - 1 + a + a + 4$ oe
			A1	for $L = 5a + 3$
34 (a)		$(6 , -2)$	B1	cao
(b) i		Correct point	B1	cao for point marked at (2, 9)
(b) ii		Yes with reasoning	B1	Yes with correct substitution $4\times2+1=9$ **or** by drawing correct line on diagram
(c)		Correct line	B1	for drawing line $x = -2$ cao
35		14:21:42	P1	for 2 out of 3 expressions in one letter eg from x, $x+7$ $2x+14$ **or** see a set of numbers to show interpretation of the relationships, eg 10, 17, 34
			P1	(dep) for sum of their 3 expressions =77 eg $x + x+7+2x+14 = 77$ oe **or** 2 systematic correct trials including addition
			P1	for a correct process to isolate their term in x **or** $x=14$
			A1	for ratio 14:21:42 oe

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Question	Working	Answer	Mark	Notes		
36		Shows reasoning to reach $y=3$	M1 M1 M1 A1	forms equation eg $2x + 6 = 5x - 9$ isolates x and number terms $3x = 15$ substitutes "5" into side length eg $2 \times 5 + 6$ (=16) $48 \div 16 = 3$ **or** $16 \times 3 = 48$	$48 \div 3$ (=16) forms equation $2x+6=$"16" **or** $5x - 9 =$ "16" isolates x and number terms $2x =$ "10" **or** $5x =$ "25" shows $x=5$ for both solutions	$3(2x + 6) = 48$ **or** $3(5x - 9) = 48$, condone missing bracket Isolates x and number terms $6x =$ "30" **or** $15x =$ "75" forms the second equation $x=5$ from 2 different equations.
37		Comment	B1	for correct mathematical comment eg line segments not a curve **or** should draw freehand **or** should not use a ruler, **or** should be a curve NB Do not accept statements about scale or plotting accuracy.		

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Question	Working	Answer	Mark	Notes
38 (a)		56*ef*	B1	cao
(b)		12.5	B1	oe
39 (a)		36	M1	demonstrates the start of a method that could lead to the answer, eg recognition of square numbers, **or** use of differences, **or** diagrams
			A1	cao
(b)		80	M1	demonstrates the start of a method that could lead to the answer, eg repeated addition of 4, **or** 20 × 4
			A1	ca
40		$-\frac{1}{2}$	M1	for substitution with operations shown e.g. $1 + -3 \times \frac{1}{2}$ **or** $1 - \frac{3}{2}$ **or** $1\frac{1}{2}$ **or** $-1\frac{1}{2}$
			A1	oe
41 (a		9.5	M1	expands brackets or divides by 4 as a first step
			A1	oe
(b)		−2, $-\frac{1}{2}$, 0, 1,	B2	ca
			(B1)	(for the numbers −2, −1, 0, 1 (accept with −3 and/or 2 only), or 4 correct with no incorrect)
42		$x^2 + 6x = 1$	M1	writes the area using algebraic terms e.g. $(x + 3) \times (x + 3)$ or at least two correct area expressions, may be written on the diagram or x given as $\sqrt{10} - 3$
			M1	expands and includes the given 10 e.g. $x^2 + 3x + 3x + 9 = 10$; condone one error in the four terms when expanding or $10 - 3\sqrt{10} - 3\sqrt{10} + 9 + 6\sqrt{10} - 18$ (=1) condone 1 error in the 6 terms
			A1	rearranges to give the given equation or shows surd expression simplifies to 1
43		comparison	M1	starts to manipulate expression e.g. $3y = 9x - 6$ or $3y = 9x - 5$
			A1	gives equation(s) which can be used to show that the gradients of the two lines are the same e.g. $y = 3x - 5/3$

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Question	Working	Answer	Notes
44 (a)		18	M1 Evidence of interpretation of pattern, eg. further diagrams drawn or numerical sequence for numbers of triangles 6, 8, 10 etc A1
(b)		No with reason	C1 No with reason eg. No , pattern number 6 will have 7 squares; always one more square than pattern number
45		7	M1 Correct method to isolate terms in x A1
46		$m^2 + 10m + 21$	M1 for at least 3 terms out of a maximum of 4 correct from expansion A1
47		$x = 21,\ y = 50$	P1 process to start solving problem eg. form an appropriate equation P1 complete process to isolate terms in x A1 for $x = 21$ P1 complete process to find second variable A1 $y = 50$

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Question	Working	Answer	Notes		
48 (a)		drawing	C1	drawing of pattern number 4	
(b)		42	C1 C1	shows a process of working towards pattern number 20 cao	
(c)		$n + 2$	C1 C1	begins process of stating algebraic expression eg n $n + 2$ oe	
49		explanation	M1 M1 M1 M1 C1	works with volume eg 240000 uses conversion 1 litre = 1000 cm^3 uses 8000 eg vol ÷ 8000 (=30) uses "30" eg "30" × 2.50 for explanation and 75 stated	begins working back eg 70÷2.50 (=28) uses conversion 1 litre = 1000 cm^3 uses 8000 eg "28"× 8000 (=224000) works with vol. eg 224000 for explanation with 240000 and 224000
50		x^2+2x-3	M1 A1	starts expansion: at least 3 terms correct with signs, or four terms correct ignoring signs for x^2+2x-3	
51		$(x+4)(x-4)$	B1	for $(x+4)(x-4)$	
52		$x=7$, $y=-3$	M1 M1 A1	for correct process to eliminate one variable (condone one arithmetic error) (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) for both correct solutions	

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Question	Working	Answer	Notes
53 a		(4, 5)	B1
b		(1, 4)	B1
c		Correct line	B1
54 a		−2	M1 For subtraction of 7 from both sides or division of all terms by 3 as first step of solution A1 cao
b		8	M1 For substitution 3×6 − 2×5 A1 cao
55		D: $15 - x$ P: $\frac{20+x}{2}$	M1 For writing a correct expression for D or P before sweets are eaten $20 - x$ or $20 + x$ A1 One correct expression A1 Both correct expressions
56 a		$y(y+27)$	B1
b		t^6	B1
c		w^5	B1
57 (a)		72	B1 cao
(b)		65	B1 cao

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Question	Answer	Mark	Mark scheme	Additional guidance
58 (a)	$4m$	B1	cao	
(b)	$3p$	B1	cao	
59	15	B1	14 to 16	
60 (a)	c^3	B1	ca	
(b)	d^{12}	B1	ca	
61 (a)	12	M1	for a correct factor tree for either 60 **or** 84 with no more than one arithmetic error **or** for listing factors of 60 **or** 84, at least 4 correct for either (with no more than 1 incorrect in either list), could be in factor pairs **or** for the prime factors of 60 (2, 2, 3, 5) **or** 84 (2, 2, 3, 7)	Condone the use of 1 in any factor tree 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84
		A1	for 12 or 2×2×3 oe SC B1 for answer of 4 or 6, if M0 scored	2,2,3 is not enough, it must be a product
(b)	120	M1	for a correct factor tree for either 24 **or** 40 with no more than one arithmetic error **or** for at least 3 multiples of both 24 and 40 (can include 24 and 40) **or** for the prime factors of either 24 (2, 2, 2, 3) **or** 40 (2, 2, 2, 5) **or** for a common multiple from their lists (≠ 120)	Condone the use of 1 in any factor tree 24: 24, 48, 72, 96, 120, … 40: 40, 80, 120, … For the list not containing 120, accept the first 3 correct multiples or one error in the first 4 multiples
		A1	for 120 or 2×2×2×3×5 oe	
62	80	M1	for a complete method eg $\frac{20}{15} \times 60$ **or** 20×4 **or** $20 \div \frac{1}{4}$	
		A1	cao	

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63 (a)	(10), 5, (2), 1, 2, (5), 10	B2 (B1	for all 4 values correct for 2 or 3 correct values)	
(b)	Graph	M1	ft (dep on B1) for plotting at least 5 of their points correctly	
		A1	for a fully correct curve drawn	Accept a freehand curve drawn that is not made of line segments
(c)	–0.65 to –0.8 and 2.65 to 2.8	M1	for $y = 4$ drawn **or** intersection with $y = 4$ **or** $y = x^2 – 2x – 2$ drawn **or** 1 correct value (ft a quadratic)	If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate
		A1	ft a quadratic graph **or** for answers in the range 2.65 to 2.8 **and** –0.65 to –0.8	
64	2, 9	M1	for $(x \pm 2)(x \pm 9)$ **or** for $(x + a)(x + b)$ where either $ab = −18$ or $a + b = −7$ **or** one correct answer	Sight of one correct answer as the final answer can gain one mark with or without working
		M1	for $(x + 2)(x – 9)$	
		A1	cao	

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65	$6e$	B1		
66 (a)	12	B1	cao	
(b)	4	B1	cao	
67 (a)	–13	M1	for substitution eg 3×5 and 4×-7 **or** 15 and –28	3×5 (= 15) and 4×-7 (= –28) may be seen separately but both must be seen for the award of M1 35 and 4–7 do not get the mark unless multiplication is shown eg 35 = 15 is evidence of multiplication and should not be seen as choice
		A1	cao	
(b)	5	M1	for $38 = 3 \times 6 + 4y$ **or** $38 - 18$ (=20) **or** for a complete method to make y the subject eg $y = \frac{T - 3x}{4}$	eg $y = (T - 3x) \div 4$
		A1	cao	
68 (a)	13, (6), 5, 4, –3	B2	for all 4 values correct	
		(B1	for 2 or 3 correct values)	
(b)	Correct graph	M1	ft (dep on B1) for plotting at least 4 of the points from their table correctly	
		A1	for a fully correct curve drawn	Accept a freehand curve drawn that is not made of line segments Line sections outside the required range can be ignored.
69	2	B1	cao	

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70 (a)	43	B1	cao	
(b)	– 20 or ÷ 3	B1	for ÷ 3 **or** – 20 **or** $\times \frac{1}{3}$ **or** + –20	
71 (a)	19	B1	cao	
(b)	12.4 to 12.8	M1	for a complete method, eg attempts to read from the graph at a factor of 80 **and** scales up to 80 **or** attempts to read from the graph at two numbers that sum to 80 **and** finds the sum of their readings **or** 1 stone = "6"kg **and** 80 ÷ "6"	
		A1	for an answer in the range 12.4 to 12.8 **or** ft correct reading from graph	
72 (a)	$T = 4n - 5$	M1	for $2n$ **or** $n - 5$ **or** T = a linear expression in n	Allow variables other than n
		M1	for $n + 2n + n - 5$ oe **OR** for T = an expression in n with 2 of 3 ages correct eg $T = n + n^2 + n - 5$	Each age must be an expression in n
		A1	for $T = 4n - 5$ oe eg $T = n + 2n + n - 5$	
(b)	$5m - 3m = 2m$	B1	for $5m - 3m = 2m$ indicated	

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73	Shown (supported)	M1	for substitution eg $4 \times 110 + 12$	
		A1	for 452	
		M1	(dep M1) for method to find value(s) needed for comparison eg $\frac{"452" - 442}{442} \times 100$ **OR** $\frac{5}{100} \times 442$ oe (= 22.1) **and** "452" – 442 (= 10) **OR** $\frac{5}{100} \times 442 + 442$ oe (= 464.1) **and** "452"	
		C1	shown with correct comparable values eg 2.2(6...)(%) **OR** 22.1 **and** 10 **OR** 452 **and** 464.1	
74 (a)	F	B1	cao	
(b)	D	B1	cao	
75	Shown (supported)	M1	for method to find at least two terms, eg $2 \times 4^2 - 1$ (= 31) **and** $40 - 3^2$ (= 31)	1 7 17 31 49 71 97 127 161 199 39 36 31 24 15 4 –9
		M1	for generating at least three correct terms of each sequence	
		A1	for generating at least the terms 1, 7, 17, 31, 49 of the first sequence **and** at least the terms 39, 36, 31, 24, 15, 4 of the second sequence	

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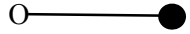
76	$7y$	B1	for $7y$ oe	Accept $7 \times y$ oe Accept a formula, eg. $P = 7y$ but **not** $y = 7y$
77 (a)	$7ab$	B1	for $7ab$	
(b)	y^3	B1	cao	
(c)	$\frac{e}{f}$	M1	for a correct first step, eg. numerator of $e^3 \times f$ or denominator of $e^2 \times f^2$ **OR** $e \div f$ or $e \times f^{-1}$ **OR** relevant crossings out for all the e's **and** all the f's	
		A1	for $\frac{e}{f}$ or ef^{-1}	
78	23	M1	for substitution eg. 7×5 and 3×-4 or $7(5) + 3(-4)$	7×5 (= 35) and 3×-4 (= −12) may be seen separately but both must be seen for the award of M1
		A1	cao	
79 (a)	$n > 2$	M1	for a method to isolate terms in n in any inequality or equation eg. $14n - 11n > 6$ or $n = 2$	Ignore incorrect inequality sign and accept "=" sign
		A1	cao	
(b)		M1	for $-2 - 3 < x \leq 4 - 3$ $(-5 < x \leq 1)$	A circle around −5 and 1 implies M1
		M1	for drawing a line from −5 to 1 **or** (indep) for an open circle at either −2 or −5 **or** (indep) for a closed circle at 4 or 1	A line from −5 to 1 implies M2 if no working shown
		A1	cao	

EXPERT TUITION

<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Mark scheme</th><th>Additional guidance</th></tr>
<tr><td>80</td><td>Graph</td><td>B3

(B2

(B1</td><td>for a correct line between $x = -2$ and $x = 4$

for a correct straight line segment through at least 3 of
$(-2, -7)$, $(-1, -5)$, $(0, -3)$, $(1, -1)$, $(2, 1)$, $(3, 3)$, $(4, 5)$

or for all of these points plotted but not joined

OR for a line drawn with a positive gradient through $(0, -3)$ and clear intention to use a gradient of 2, eg line through $(0,-3)$ going across 2 squares and up 4 squares)

for at least 2 correct points stated or plotted

OR for a line drawn with a positive gradient through $(0, -3)$

OR a line with gradient 2)</td><td>Ignore any incorrect points. Points need not be plotted for a correct line (segment) drawn

Table of values
<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td>–7</td><td>–5</td><td>–3</td><td>–1</td><td>1</td><td>3</td><td>5</td></tr></table>
Ignore any incorrect points
Coordinates may be in a table or in working</td></tr>
<tr><td>81 (a)

(b)</td><td>24, 39

8a</td><td>B1

M1

A1</td><td>cao

for a complete method to find the next 2 terms,
eg. $a + 2a$ (= $3a$) and $2a$ + “$3a$” (= $5a$)
$8a$ oe</td><td>

SC: B1 for 3, 5, 8 seen if M0 scored</td></tr>
</table>

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
82 (a)	$4m$	B1	cao	
(b)	$8np$	B1	cao	
83 (a)	Explanation	C2	full explanation eg explains that both 19 and 22 are terms in the sequence **or** solves $3n + 4 = 21$ to find $n = 17/3$ oe **Acceptable examples** 19 is in the sequence and 19 + 3 is more than 21 The 5th term is 19 and the 6th term is 22 7, 10, 13, 16, 19, 22 17 is not in the 3 times table Because 21 is in the 3 times table and the sequence is plus 4	7, 10, 13, 16, 19, 22, ...
		(C1	for substituting to find a term in the sequence **or** forming an equation eg $3n + 4 = 21$ **or** for a partial explanation or an explanation with some ambiguity) **Acceptable examples** The closest number is 22 $3 \times 6 = 18$, 18 + 4 is higher than 21 19 is in the sequence so 21 can't be in the sequence. Starting at 7 and adding 3 each time won't lead to 21 It's the 3 times table plus 4 21 is in the 3 times table **Not acceptable examples** Adding 4 each time won't lead to 21 It doesn't end up at 21, it goes past it	

EXPERT TUITION

Question		Answer	Mark	Mark scheme	Additional guidance
83	(b)	terms given	B1	states two terms eg 7,11 **or** 8,16 **or** 5, 7	
		explanation	C1	explanation eg add one more each time, doubling **Acceptable examples** Add 3 and add 4 The difference goes up by one each time It doubles +1, +2, +1, +2 or indicates +1, +2 repeats itself **Not acceptable examples** It goes up by 1 each time It doubles so $2n$ +1, +2, +3, +4 so $2n + 1$	May be indicated on the sequence with no contradictory statement made
84	(a)	38	B1	cao	
	(b)	6	M1	starts process to find input using inverse operations eg $28 + 2$ **or** sight of $+2 \div 5$ **or** by forming an equation eg $x \times 5 - 2 = 28$	$+2 \div 5$ could be seen in a flow diagram
			A1	cao	
85	(a)	8	M1	for a correct first step eg $3x - 12 = 12$ **or** $3(x - 4) \div 3 = 12 \div 3$	
			A1	cao	
	(b)	$3b(3 - b)$	M1	for $3(3b - b^2)$ **or** $b(9 - 3b)$ **or** $3b$(two term linear expression)	
			A1	cao	

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
86	7	P1	process to use gradient eg $y = 3x + c$ **or** $c = -6$ **or** $\frac{15-9}{d-5}$ **or** $(15 - 9) \div 3$ **or** (6, 12)	Condone use of a letter other than d, for d
		P1	(dep) full process to rearrange equation formed to isolate d eg rearrangement of $15 = 3d - 6$ or $3 = \frac{15-9}{d-5}$ **or** for $5 + \frac{15-9}{3}$	Must show processes to get as far as $d =$ Award P2 for an answer of (7, 15)
		A1	cao	
87 (a)	$10x^2 - 11x - 6$	M1	for 3 out of no more than 4 terms correct with correct signs **or** 4 correct terms ignoring signs	$10x^2 - 15x + 4x - 6$ NB: $10x^2 - 11x$ and $-11x - 6$ are indicative of 3 correct terms.
		A1	cao	
(b)	$(x + 1)(x + 3)$	M1	for $(x \pm 1)(x \pm 3)$ **or** for $(x + a)(x + b)$ where either $ab = 3$ or $a + b = 4$	
		A1	cao	

EXPERT TUITION

Question		Answer	Mark	Mark scheme	Additional guidance
88	(a)	17	B1	cao	
	(b)	12	B1	cao	
	(c)	5.5	B1	Accept $\frac{11}{2}$, $5\frac{1}{2}$ oe	
89	(a	m^7	B1	cao	
	(b)	$125n^3p^9$	B2	cao	Allow multiplication signs
			(B1	for 2 of 3 terms correct in a single product)	$125n^3p^x$ or $125n^xp^9$ where $x \neq 0$ or an^3p^9 where a is a number
	(c)	$8q^6r^3$	B2	cao	Allow multiplication signs
			(B1	for 2 of 3 terms correct in a single product)	$8q^6r^x$ or $8q^xr^3$ where $x \neq 0$ or aq^6r^3 where a is a number
90		$y = 3x - 6$	M1	for a correct method to find the gradient of the line, or $m = 3$ **OR** identifies -6 as the intercept in words or in a partial equation **OR** $y - b = m(x - a)$ where $m \neq 3$ and (a, b) is a correct coordinate	Just ringing -6 is insufficient
			M1	for $y = 3x + c$ **or** (L=) $3x - 6$ **or** $y =$ "3"$x - 6$ **OR** $y - y_1 = 3(x - x_1)$ **or** $y - b =$ "3"$(x - a)$ where (a, b) is a correct coordinate	Award of this mark implies the first M1 c must be seen either as a letter or a number
			A1	accept $y = 3x + -6$ oe	

EXPERT TUITION

Question		Answer	Mark	Mark scheme	Additional guidance
91	(a)	0, –4, –6, –4, 0	B2 (B1	fully correct figures At least 2 correct figures)	
	(b)	Graph	M1 A1	(dep B1) for at least 5 points correctly plotted ft from (a) fully correct graph	 Must be a curve
	(c)	2.6 and –1.6	M1 A1	for $y = -2$ drawn **or** intersections with $y = -2$ **or** $y = x^2 - x - 4$ drawn **or** 1 correct value ft a quadratic graph **or** for answers in the range 2.5 to 2.7 **and** –1.5 to –1.7	If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate

EXPERT TUITION

Question	Working	Answer	Mark	Notes
92 (a)		$15fg$	B1	cao
(b)		t^2	B1	cao
(c)		$4n$	B1	cao
93 (a)		Example	M1	Chooses two odd numbers and substitutes into $2(a + b)$ oe
			C1	Calculates $2(a + b)$ correctly to arrive at a number that is a multiple of 4
(b)		Reasoning	C1	States $a + b$ is even or $2a$ is even or $2b$ is even
			C1	Completes argument.
94		$1\frac{1}{2}$	M1	for correct expansion of the bracket or dividing all terms by 3 as a first step eg $3x - 3$ or $(5x - 6)/3 = 3(x - 1)/3$
			M1	for isolating terms in x on one side of an equation eg $5x - 6 - 3x = -3$ or both constants on one side of an equation, eg $5x = 3x - 3 + 6$, ft $5x - 6 = 3x - 1$
			A1	for $1\frac{1}{2}$ oe
95 (a)		6	B1	cao
(b)		5	B1	cao
(c)		Shown	M1	for writing 100^a or 1000^b as a power of 10 ($=10^{2a}$ or 10^{3b}) or $10^{2a + 3b}$ or $100 = 10^2$ and $1000 = 10^3$
			C1	for complete chain of reasoning leading to conclusion

EXPERT TUITION

Question	Working	Answer	Mark	Notes
96 (a)		±6	M1	for one value (6 or −6) or $\sqrt{36}$ or an embedded answer eg $2 \times 6^2 = 72$
			A1	±6
(b)	$6x^2 - 4x + 3x - 2$	$6x^2 - x - 2$	M1	for at least 3 terms correct out of a maximum of 4 from expansion, or 4 terms correct ignoring signs.
			A1	cao
(c)		$(x + 3)^2$	B1	for $(x + 3)^2$ or $(x + 3)(x + 3)$

EXPERT TUITION

Question	Working	Answer	Mark	Notes
97 (a)		$3p$	B1	cao
(b)		$2m^3$	B1	cao
(c)		$10 - 4c + 6d$	M1	for $-4c$ or $6d$ (accept $+-4c$)
			A1	for $10 - 4c + 6d$
98 (a)		29	B1	answer in the range 29 to 30
(b)		186 to 195	M1	for changing 6ft 3 inches to inches e.g. $6 \times 12 + 3$ (= 75) or changing 1ft to 30 cm
			M1	for a method to convert to cm, e.g. 25 →63 then × 3, $6 \times 30 + \frac{1}{4} \times 30$
			A1	for answer in the range 186 to 195 or ft from correct use of graph
99		0.0733(03...)	M1 A1	for correct numerator (3.4496.....) or correct denominator (47.0596) or 0.073 for 0.0733(03.....)
100 (a)		$5(1 - 2m)$	B1	cao
(b)		$2ab(a + 3b)$	M1	for $2a(ab + 3b^2)$ or $2b(a^2 + 3ab)$ or $ab(2a + 6b)$ or $2ab$(2 term expression with terms in a or b or ab, can include constants), eg $2ab(1a + 3ab)$, $2ab(1 + 3b)$
			A1	for $2ab(a + 3b)$

EXPERT TUITION

Question	Working	Answer	Mark	Notes
101		$x = -8$, $x = 3$	M1	for factorisation or for substitution into quadratic formula $(x \pm a)(x \pm b)$ where product of a and $b = 24$, eg $(x \pm 4)(x \pm 6)$ or difference of a and $b = 5$, eg $(x \pm 2)(x \pm 7)$
				$\frac{-5 \pm \sqrt{5^2 - 4 \times 1 \times -24}}{2}$ oe (condone one sign error)
			M1	for $(x + 8)(x - 3)$ or for $\frac{-5 \pm \sqrt{121}}{2}$ oe
			A1	cao
102 (a)		$5n - 2$	B2	for $5n - 2$ oe
			[B1	for $5n + k$, k may be 0]
(b)		No (supported)	C1	for No with evidence, e.g. $3 \times 4^2 = 48$, $\sqrt{48}$ is not an integer, he has multiplied by 3 first but should have squared first

EXPERT TUITION

Question	Working	Answer	Notes
103 (a)		$p + c$	B1
(b)		$\frac{14}{3}$	M1 adds 5 to both sides of equation A1 oe
104		11	M1 process of substitution demonstrated eg $5\times3 + 2\times-2$ A1 cao
105 (a)		$3(f + 3)$	B1 cao
(b)		$(x - 5)(x + 3)$	M1 for $(x \pm 5)(x \pm 3)$ A1 cao
106		$p=qr-sr$	M1 for multiplying all 3 terms by r or isolating p/r term A1 oe
107 (a)		$4n+2$	M1 start to deduce nth term from information given eg $4n+k$ where $k\neq2$ A1 cao
(b)		No (supported)	M1 start to method that could lead to a deduction eg uses inverse operations C1 for a convincing argument eg 34 is 107 so NO; $(108-5)\div3$ is not an integer

EXPERT TUITION

Question	Working	Answer	Notes
108 (a)		$6f$	B1
(b)		$16mn$	B1
(c)		$2t^2$	B1 cao
109 (a)		(0, –1)	B1
(b)		× marked at (3, 0)	B1
(c)		(–0.5, 0.5)	B1
110 (a)		1.5	M1 for rearranging, eg $11 - 5 = 4c$ A1 1.5 oe
(b)		–3	M1 for a first step of either dividing both sides by 5, eg $\frac{5(e+7)}{5} = \frac{20}{5}$ or for expanding the bracket, eg $5\times e + 5\times 7 = 20$ A1 cao
(c)		m^6	B1 cao
111		$t = \frac{w-11}{3}$	M1 for $3t = w - 11$ or $\frac{w}{3} = \frac{3t}{3} + \frac{11}{3}$ A1 for $t = \frac{w-11}{3}$ oe

EXPERT TUITION

Question	Working	Answer	Notes
112 (a)		6.4 – 6.6	B1 for 6.4 – 6.6
(b)		9.8	B1 for 9.75 – 9.85
(c)		5, 9	B1 cao
113 (a)		rule stated	C1 for rule stated, eg number doubles
(b)		32	B1 cao
(c)		22, 29	B1 cao
114 (a)		$4x + 6y$	M1 for $4x$ or $6y$ A1 for $4x + 6y$ or $2(2x + 3y)$
(b)		$5(2x – 3)$	B1 cao
(c)		4	M1 for method to isolate terms in p on one side and constants on the other side A1 cao
115 (a)		$13y - 1$	M1 for expansion of one bracket A1 for full simplification
(b)		$35u^3w^7$	B1 for 2 of 35, u^3 and w^7 correct B1 cao

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Question	Answer	Mark	Mark scheme	Additional guidance
116 (a)	$4ab$	B1		
(b)	$3x + 8$	M1	for method to collect terms eg $3x$ or 8	May be seen in working. Accept if no ambiguity.
		A1	for $3x + 8$	
117 (a)	$y^2 + 5y$	B1	cao	
(b)	$2(2a - 3)$	B1	cao	
(c)	2.9	M1	for a correct first stage eg. expanding the brackets, $2 \times 5x - 2 \times 4$ ($= 10x - 8$) **or** division of both sides by 2, eg $\frac{2(5x-4)}{2} = \frac{21}{2}$	
		M1	for isolating terms in x eg $10x = 21 + 8$	
		A1	oe	
(d)	$20\,e^3f^4$	M1	for any two of 4×5 (=20), e^{2+1} ($=e^3$), f^{1+3} ($=f^4$) in a product or written as individual terms	Do not award if there is contradiction
		A1	cao	
118	12	P1	for a process to find the fifth term eg $3a + 5a$ ($=8a$)	
		P1	for setting up the equation eg $a + 2a + 3a + 5a + [8a] = 228$	[8a] allow use of what is clearly indicated as the missing term
		A1	cao	$\frac{228}{19}$ or $\frac{228}{1+2+3+5+8}$ scores P1 P1 $\frac{228}{1+2+3+5+[8]}$ scores P0 P1
119	Sketch	M1	correct shape in one of the required quadrants **or** correct graph where the lines touch the axes	
		A1	fully correct shape	Lines do not need to extend to the ends of the axes if the intention is clear

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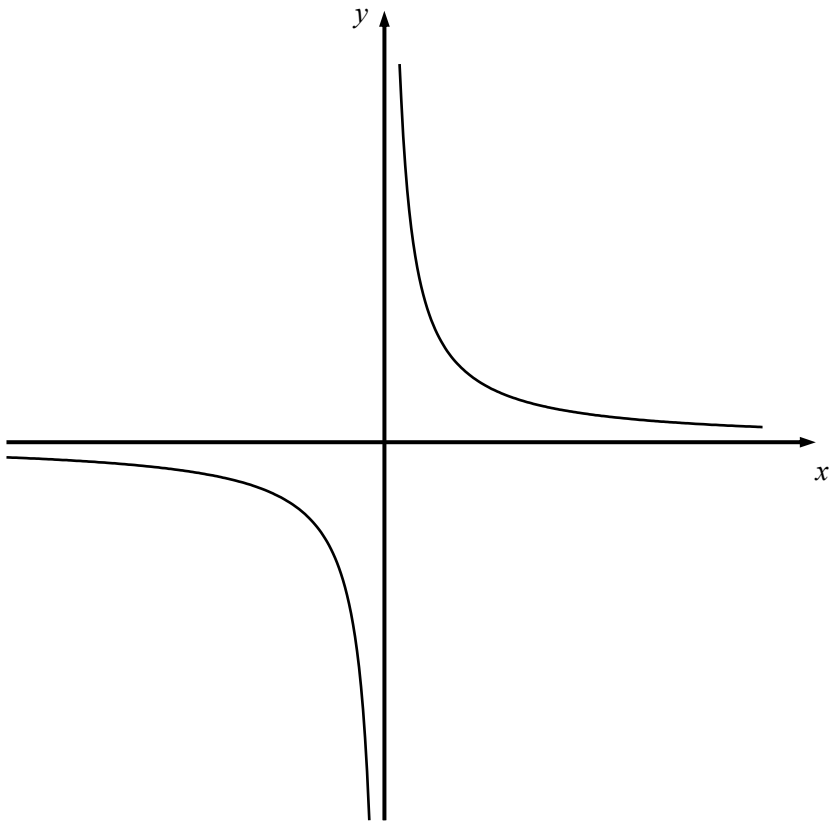
Qu 119 Example



EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
120 (a)(i)	20, 15	B1	cao	Working may be seen near the sequence
(ii)	11	B1	cao	Working may be seen near the sequence
(b)	39	B1	cao	
121 (a)	$5x + y$	M1	for method to collect terms, eg $5x$ or y	May be seen in working. Accept if no ambiguity. Accept $1y$.
		A1	cao	
(b)	3	M1	for subtracting 7 from both sides or dividing each term by 5 as a first step, eg $5p = 15$ or $5p = 22 - 7$ or $\frac{5p}{5} + \frac{7}{5} = \frac{22}{5}$	Must be carried out, not just intention. Division by 5 must be all terms.
		A1	cao	
122 (a)	n^8	B1	cao	
(b)	cd^3	M1	for partial simplification, eg c or d^3	May be seen as simplification in original fraction
		A1	for cd^3	Accept c^1d^3
(c)	$x > \frac{14}{5}$	M1	for $5x > 14$ or $5x = 14$ or critical value, $\frac{14}{5}$ oe	Must see carried out correctly, ie at least $5x > 7 \times 2$ not just intention seen. Allow other signs for this mark.
		A1	$x > \frac{14}{5}$ or $x > 2\frac{4}{5}$ or $x > 2.8$	
123 (a)	-2, 4	B1	cao	
(b)	0.55 to 0.65, 3.35 to 3.45	M1	for correct method, eg marking intercepts with x-axis or one correct answer or both solutions given as a coordinate eg (0.6, 3.4) or (0.6, 0) (3.4, 0)	If answers are stated as coordinates, award M1 for both coordinates and M0 for one coordinate.
		A1	for answers in the ranges 0.55 to 0.65 and 3.35 to 3.45	With no extras

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
124	35	M1 A1	for 4 × 8 (=32) cao	Award this mark if used ambiguously eg 4 × 8 + 3 = 4 × 11 as long as 4 × 8 is stated
125	21, 28	B2 (B1	both correct one correct in the correct position **or** for 15 + 6 (= a) or a + 7 (= b) where $a \neq 21$ and $b \neq 28$)	May be written alongside the given sequence but if contradiction accept the answer line. If both correct, accept in either order. May be seen as "+6" next to the sequence
126 (a)	−10, −6, 2, 6	B2 (B1	for 4 values correct −10, −6, (−2), 2, 6, (10) for 2 or 3 values correct)	
(b)	Graph drawn	M1 A1	(ft from (a) if B1 awarded) for at least 5 points correctly plotted. correct graph drawn from $x = -1$ to 4	
127	17	M1 A1	for correctly expanding the bracket, as part of an equation to get $4x - 24 = 44$ **or** for dividing both sides of the equation by 4 as a first step, eg $\frac{4(x-6)}{4} = \frac{44}{4}$ oe cao	Award M1 for an embedded value of 17 if not identified as the answer
128 (a)	$x^2 - 4x - 45$	M1 A1	for 3 of 4 terms correct **or** 4 terms correct ignoring signs cao	3 terms correct can be implied, eg $x^2 - 4x + c$
(b)	$3x(3x + 2)$	B2 (B1	for $3x(3x + 2)$ for $3(3x^2 + 2x)$ **or** $x(9x + 6)$ **or** $3x(ax + b)$ where a and b are integers **or** $(3x + 2)$ as a factor)	

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
129	$11e + 5f$	M1	for either $11e$ or $5f$	
		A1	for $11e + 5f$	
130 (a)	example	C1	example given eg 40, 80, etc.	
(b)	No with reason	C1	for No with reason **Acceptable examples** 80 and 88 are both in the sequence 80 is in the sequence and 85 is 5 more 24, 32, ….. 80, 88, …. 85 is not in the 8 times table 85 is an odd number $8n+16=85$ so n is not a whole number. **Not acceptable examples** adding 8 each time will not lead to 85 (insufficient) it goes past 85 Yes …..	No can be implied from their statement
131 (a)	330	M1	for $4 \times 70 + 50$ oe	May be seen as sum of four 70s and a 50 $n \times (70 + 50)$ or ambiguous working gets 0 marks
		A1	cao	
(b)	9	M1	for use of inverse operations eg $(680 – 50) \div 70$ **OR** rearranges an equation to solve eg $70x + 50 = 680$ rearranged to isolate x term. **OR** ft (a) eg $((680 – \text{“}330\text{”}) \div 70) + 4$	Need not have brackets; can be written in an incorrect order if the intention is clear A correct but embedded answer gets 1 mark
		A1	cao or ft their (a)	

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Question	Answer	Mark	Mark scheme	Additional guidance
132	$x = \frac{y-4}{2}$	M1 A1	for correct first step to rearrange eg $y - 4 = 2x + 4 - 4$ or $\frac{y}{2} = \frac{2x+4}{2}$ or ambiguously shown eg $x = y - 4 \div 2$ or answer given as $\frac{y-4}{2}$ oe	May be seen in different equivalent forms but must be carried out, not just intention seen. Could be shown as a flow diagram but must have correct inverse operations
133	$x = 1, y = -2$	M1 M1 A1	for a correct method to eliminate either x or y or method leading to substitution (condone one arithmetic error) (dep M1) for substituting found value in one of the equations **OR** correct method after starting again (condone one arithmetic error) cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
134 (a)	Full working seen	M1	for an initial step with the expressions eg doubling $2x + 1$ or $x + 2$ **or** halving $4x$ **or** for identifying CD as $x + 2$ **or** for identifying DE as $2x + 1$	May be seen in working or on diagram
		M1	for an expression for the total perimeter, eg $4x + 2 \times (2x + 1) + 2 \times (x + 2)$	
		C1	for full simplification and equating to 18	
(b)	1.2	M1	for isolating terms in x can ft an equation stated in (a) provided in form $ax + b = c$	$10x = 18 - 6$
		A1	for 1.2 oe	Accept $\frac{12}{10}$ or $\frac{6}{5}$

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Question	Answer	Mark	Mark scheme	Additional guidance
135 (a)	Inequality shown	B2	for fully correct solution with all three aspects with no ambiguity Aspect 1: circle at 4 Aspect 2: circle not shaded Aspect 3: arrow pointing left or line extending beyond −5, starting from their circle	Circling the number 4 alone scores B0 Aspect 1 and Aspect 2 must relate to the same circle.
		(B1	for any two aspects)	
(b)	4,5,6,7	B2	for all four numbers in any order	
		(B1	for 2 or 3 correct values with no errors **or** 4 correct values with one extra)	
(c)	$x \geq 6$	M1	for a correct intention to subtract 5 from both sides **or** a correct intention to subtract x from both sides	Can work with an equation for both M marks
		M1	for a full method to solve the inequality **or** showing a critical value of 6	Award 2 marks for an answer of x ? 6 where ? is an = or any incorrect inequality symbol, or for an answer shown as just 6.
		A1	cao	

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Question	Answer	Mark	Mark scheme	Additional guidance
136 (a)	2, −4, 2, 8	B2	all 4 values correct	
		(B1	for 2 or 3 correct values)	
(b)	Graph	M1	(dep B1) for at least 5 points plotted correctly ft from part a	
		A1	for a fully correct curve drawn	Accept freehand curves drawn that are not line segments; there must be some attempt to draw the minimum point below $y = -4$.
(c)	−2.6 or 1.6	B1	for 1 correct value, ft a non linear graph	Award for −2.6 or 1.6 or both values but do not award the mark if a correct value is given with an incorrect value. Accept 1.56 or −2.56 Note for ft to be applied the graph may be joined by line segments.
137	$6n - 1$	M1	for $6n + k$, where $k \neq -1$ or missing	Accept a different variable for M1 only
		A1	oe	Note $n = 6n - 1$ gets M1 only

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
138 (a)(i)	30	B1	cao	
(ii)	Explanation	C1	for explanation, eg increase by 7, add 7, states $7n - 5$	
(b)	65	B1	cao	
139	D, F, A	C2	for all 3 correct	
		(C1	for 1 or 2 correct)	
140	6	P1	for a process to set up an equation in x, eg $\frac{1}{2} \times 3x \times 3x = 162$	Must be a complete equation
		P1	for a process to simplify to x^2 eg $x^2 = 162 \times 2 \div 9$ or $x^2 = 36$	Can ft their equation if a quadratic
		A1	cao	
141	$9p + 13$	M1	for method to expand one bracket, eg $5 \times p + 5 \times 3$ $(= 5p + 15)$ or $2 \times 1 - 2 \times 2p$ $(= 2 - 4p)$ or $-2 \times 1 - 2 \times -2p$ $(= -2 + 4p)$	If an attempt is made to multiply by -2 in the second brackets then it must be done consistently.
		A1	cao	
142	3.8	M1	for a correct first step, eg $5 - x = 2(2x - 7)$ or $5 - x = 4x - 14$ or $\frac{5}{2} - \frac{x}{2} = 2x - 7$	Method must show LHS $\times 2$ and both terms on RHS $\times 2$ or $5 - x$ and both terms on RHS $\times 2$
		M1	(dep) for isolating terms in x eg $4x + x = 14 + 5$ or $-\frac{x}{2} - 2x = -7 - \frac{5}{2}$	eg $-4x$ both sides with -5 both sides or $+x$ both sides with $+14$ both sides
		A1	oe	Accept $\frac{19}{5}$, $3\frac{4}{5}$ oe but not $\frac{-19}{-5}$ oe

EXPERT TUITION

Question	Answer	Mark	Mark scheme	Additional guidance
143	$g = 2T^2 - 6$	M1	for $T^2 = \frac{g+6}{2}$ **or** $\sqrt{2} \times T = \sqrt{g+6}$	
		M1	(dep) for $T^2 \times 2 = g + 6$ **or** $\left(\sqrt{2} \times T\right)^2 = g + 6$ oe	Can only award this mark if the first M mark has been awarded.
		A1	for $g = 2T^2 - 6$ oe	

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Question	Working	Answer	Mark	Notes
144		$2y$	B1	for $2y$
145 (a)		(–2) **–1.5** **–1** **–0.5** (0) **0.5**	B2 [B1	for a fully correct table for 2 or 3 correct entries]
(b)		Correct line	M1	for correctly plotting at least 5 of their points (provided B1 scored in part (a)) or for a straight line with gradient 0.5 or for a straight line through (0,–1) with a positive gradient
			A1	for a correct line between $x = –2$ and $x = 3$
(c)		2.6	B1	for answer in the range 2.5 to 2.7 or ft a single straight line with positive gradient
146 (a)		$4(m + 3)$	B1	for $4(m + 3)$ or $2(2m + 6)$
(b)		term, expression	B1 B1	for 'term' in the 1st space for 'expression' in the 2nd space
147 (a)		$3n + 1$	M1	for a method to deduce the nth term, eg. $3n + k$, where k is an integer or k is omitted or for $n = 3n + 1$
			A1	for $3n + 1$ oe (accept n replaced by another letter)
(b)		No (supported)	C1	for using (their expression in (a)) = 90 or shows that 88 or 91 is in the sequence
			C1	for an answer of "No" and a convincing argument eg. pattern number 30 has 91 counters or $(90 – 1) \div 3$ (= 29.66…) or shows that the next term after 88 is 91 Note: no ft from (a)
148		$x = 1.5$, $y = 3.5$	M1	for correct method to eliminate one variable (condone one arithmetic error)
			M1	(dep) for substituting found value in one of the equations or correct method after starting again (condone one arithmetic error)
			A1	for both $x = 1.5$ and $y = 3.5$

EXPERT TUITION

Question	Working	Answer	Mark	Notes
149		$12p + 18b$	M1 A1	$12p$ or $18b$ or $p + b$ $12p + 18b$
150 (a)		11	M1 A1	substitutes $v = 2$ eg 4 x 2 + 3 or 8 + 3 cao
(b)		$v = \frac{T-3}{4}$	M1 A1	correct first step to rearrange by isolating $4v$ or dividing each term by 4, eg $T - 3 = 4v$ fully correct answer
151		$x = -\frac{2}{3}$ $y = -2$	M1 M1	for a method to eliminate one variable (condone one arithmetic error) (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error)
			A1	$x = -\frac{2}{3}$ oe and $y = -2$
152 (a)		12, 4, 2, 1.2, 1	B2 (B1)	for fully correct table (allow fractions or decimals) for 3 or 4 of 12, 4, 2, 1.2, 1
(b)		Correct curve	M1 A1	ft (dep on B1 in (a)) for plotting at least 6 points from their table correctly for a fully correct curve

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Question	Working	Answer	Notes
153 (a)		$7x$	B1
(b)		$8y^2$	B1
154 (a)		8	B1
(b)	11 + 4 = 15 15 ÷ 3 = 5	5	M1 Start of method A1
(c)	in 0 1 2 3 4 out -4 -1 2 5 8	2	M1 For complete method that leads to answer e.g table of values or $x = 3x - 4$ C1 For 2 or for statement that the equation has a unique solution
155 (a)	8, 13, 21,	34	B1 cao
(b)	$a, b, a+b, a+2b, 2a+3b$	Shown	M1 Method to show by adding pairs of successive terms $a+2b, 2a+3b$ shown C1
(c)	$3a + 5b = 29$ $a + b = 7$ $3a + 3b = 21$ $b = 4$, $a = 3$	$a = 3$ $b=4$	P1 Process to set up two equations P1 Process to solve equations A1

EXPERT TUITION

Question	Working	Answer	Notes
156 (a)		5	B1 cao
(b)		12	B1 cao
(c)		d^5	B1
157		38 15	B1 cao P1 (47 - 2) ÷ 3 A1 cao
158		– 4 and –10	M1 for repeated subtraction of 6 oe A1 – 4 A1 –10
159		y = 2x + 1	M1 for a complete method to find the gradient M1 for a method to find the c in $y = mx + c$ A1
160		$(x - 1)(x + 4)$	M1 $(x \pm 1)(x \pm 4)$ A1 $(x - 1)(x + 4)$ oe
161		*A* and *D*	C1 in any order

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Question	Working	Answer	Notes
162		60 litres with evidence	M1 reads from graph, eg 30*l* = 6.6 gals or 6 gals = 27*l* C1 60 litres with sufficient evidence
163 (a)		9	M1 for – 12 and ÷ 7.80 A1 cao
(b)		$T = 7.8y + 12$	C1 for $7.8y + 12$ or T = linear expression in y C1 $T = 7.8y + 12$ oe
164 (a)		diagram	C1 line drawn from –2 to 3 C1 cao
(b)		$y < 2.25$	M1 for clear intention to subtract 7 from both sides of inequality or equation or divide all terms of inequality or equation by 4 or $4y < 9$ or 2.25 oe A1 $y < 2.25$ oe as final answer
165		$4n - 7$	M1 method to deduce *n*th term e.g. $4n + k$ A1 for $4n - 7$ oe
166		$t = 3(y + 2a)$	M1 adding $2a$ to both sides or multiplying each term by 3 A1 $t = 3(y + 2a)$ or $t = 3y + 6a$

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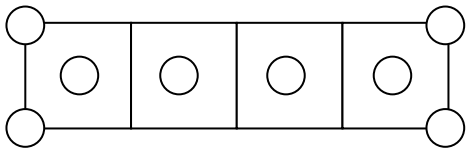
Question		Working	Answer	Mark	Notes
167	(a)		Diagram	1	B1 for correct addition to diagram
	(b)		13, 16	1	B1 cao
	(c)		37	1	B1 cao
	(d)		24	1	B1 cao
168	(a)		−7	2	M1 for substitution eg $4 \times 2 - 3 \times 5$ A1 cao
	(b)		9	2	M1 for substitution eg $30 = 4x - 3 \times 2$ or $\frac{30+6}{4}$ or $y + 3t = 4x$ oe A1 cao
169	(a)		$7x$	1	B1 cao
	(b)		$6y$	1	B1 cao
	(c)		$8e - 2e^2$	2	B2 or any correct two term factorised form (B1 for $8e$ **or** $-2e^2$)
170			−2	3	M1 for expanding brackets e.g. $4x + 12\ (= 2x + 8)$ or divide by 4 as a first step e.g. $x + 3 = \frac{2x}{4} + \frac{8}{4}$ M1 ft their equations which have to be of the form $ax + b = 2x + 8$ **or** $x + 3 = ax + b$ for isolating terms in x **and** numbers e.g. $4x - 2x = 8 - 12$ seen as part of their solution oe A1 cao

167a



Question	Working	Answer	Mark	Notes
171 (a)			1	B1 cao
(b)		20	1	B1 cao
(c)	(i)	15	2	B1 cao
(c)	(ii)	Response		B1 for "divide 45 by 3" or "divide 30 by 2" or "a third of the squares are grey" oe
172 (a)		$3h$	1	B1
(b)		$3pr$	1	B1
(c)		$2x + 7y$	2	M1 for $2x$ or $7y$ A1 for $2x + 7y$
(d)		22	2	M1 for correct substitution e.g. $2 \times 5 + 4 \times 3$ A1 cao
173 (a)		30 minutes or ½ hour	1	B1 for 30 minutes or ½ hour
(b)		4	1	B1 cao
(c)		5 30 pm	1	B1 for 5 30(pm) or 17 30
174 (a)		Diagram	2	B2 for fully correct solution with all three aspects with no ambiguity Aspect 1: circle at 3 Aspect 2: circle not shaded Aspect 3: arrow pointing left indicating extension beyond −4 or line extending beyond −4 (B1 for any two aspects)
(b)		$x \geqslant 5$	2	M1 for intention to add 7 to both sides (of inequality or equation) or to divide all 3 terms by 4 as a first step, or ($x =$) 5 A1 for $x \geqslant 5$ oe

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Question		Working	Answer	Mark	Notes
175	(a)		15	1	B1 cao
	(b)		6	1	B1 cao
	(c)		3	2	M1 for intention to subtract 7 from both sides or divide all terms by 2 as a first step A1 cao
***176**	(a)		4.5	1	B1 cao
	(b)		Comparison (supported)	3	M1 for correct use of graph to convert 0°F into °C A1 for –17.5 to –18 C1 (dep M1) for correct comparison of relative temperatures with units correct. eg freezer is warmer with –18°C or ft using their converted temperature with correct units. OR M1 for correct use of graph to convert −10°C into °F A1 for 14 C1 (dep M1) for correct comparison of relative temperatures with units correct. eg freezer is warmer with 14°F or ft using their converted temperature with correct units.
177	(a)		3 (5) 7 (9) 11, 13	2	B2 for 3, 7, 11, 13 (B1 for 2 or 3 correct values)
	(b)		Graph drawn	2	M1 (may ft from (a) if B1 awarded) for at least 5 points correctly plotted A1 for correct graph from $x = 0$ to $x = 5$

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Question		Working	Answer	Mark	Notes
178	(a)		p^7	1	B1 cao
	(b)		$-5m + 10$	2	M1 for $3m + 12$ or $-8m - 2$ or $8m + 2$ A1 for $-5m + 10$ or $10 - 5m$ or $-5(m - 2)$ or $5(2 - m)$
	(c)		$n(n - 7)$	1	B1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
179	(a)		$3t$	1	B1 for $3\times t$ or $3t$
	(b)		$5ef$	1	B1 cao
	(c)		$4x + 6y$	2	M1 for $4x$ or $6y$ A1 cao
180	(a)		28 – 29	1	B1 answer in range 28 – 29
	(b)		8 – 8.5	1	B1 answer in range 8 – 8.5
	(c)		250 – 259	3	M1 for use of conversion graph to change 250 km to miles (eg 140 – 160 miles) or 100 miles to km (eg 150 – 170 km) M1 (dep) for addition of 100 miles or 250 km in consistent units A1 for answer in the range 250 – 259 (miles)
181	(a)		$6n + 5$	2	B2 for $6n + 5$ (B1 for $6n + k$, where k is an integer or absent)
	(b)		no with explanation	2	M1 for "$6n + 5$" = 121 or any other valid method, eg counting on 6s to get to 119 (or more) A1 for no with complete explanation, eg $6n = 116$ will not give a whole number

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Question		Working	Answer	Mark	Notes
182	(a)		11	1	B1 cao
	(b)		+ 8 or × 3	1	B1 for + 8 or × 3
183	(a		5.8 to 6	1	B1 for an answer in the range 5.8 to 6
	*(b)		No (supported)	3	M1 for a correct conversion of any amount (lb to kg or kg to lb) excepting that in (a) M1 (dep M1) for a complete method to convert 100 kg (from 25×4) to lb (to compare with 200 lb) or to convert 50 lb (from 200÷4) to kg (to compare with 25 kg) C1 for "no" and a comparison with a converted weight of 212 - 228 pounds or 88 - 94 kg
184	(a		2, 1	1	B1 cao
	(b)		–2, 3	1	B1 cao
	(c)		Point marked	1	B1 for point marked at (–3, –1)
	(d)		Line $x = 3$ drawn	1	B1 for line $x = 3$ drawn
185	(a		9	1	B1 cao
	(b)		50	1	B1 cao
186	(a		–7	2	M1 for 2 × 4 + 3 × –5 or 8 – 15 oe A1 cao
	(b)		36	1	B1 cao

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Question		Working	Answer	Mark	Notes
187	(a)		$2(4x + 3)$	1	B1 cao
	(b)		$y(y - 2)$	1	B1 cao
	(c)		p^5	2	M1 for $\frac{p^{3+4}}{p^2}\left(=\frac{p^7}{p^2}\right)$ or $p^{3-2} \times p^4$ $(=p^1 \times p^4)$ or $p^3 \times p^{4-2}$ $(=p^3 \times p^2)$ A1 cao

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Question		Working	Answer	Mark	Notes
188	(a)		$3m$	1	B1 cao
	(b)		$7e$	1	B1 cao
	(c)		$15g$	1	B1 cao
189	(a)		31	2	M1 for $3 \times 5 + 2 \times 8$ **or** 15 and 16 A1 cao
	(b)		$6x + 8y$	2	M1 for $6x$ **or** $8y$ A1 for $6x + 8y$ oe as final answer
***190**			Amsterdam with figures	3	B1 for a correct conversion from miles to km or km to miles eg 8 km = 5 miles eg 28 miles = 44 km M1 for a correct method to convert 280 miles to km or 500 km to miles **or** 420 – 460 (km) **or** 300 − 320 (miles) C1 (dep on M1) for statement with correct conclusion and correct conversions (420 – 460 km or 300 – 320 miles)
***191**			No with reason	3	M1 for 17, 20 .**or** + 3 **or** $3n + 2$ M1 for method to show that 34 is not in the sequence eg continue sequence to at least 32 eg attempt to solve $3n + 2 = 34$ C1 (dep on M2) for statement with conclusion eg No with 32, 35 shown eg $n = 32 \div 3$ which is not a whole number

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Question		Working	Answer	Mark	Notes
192	(a)		$e(3e + 5)$	1	B1 for $e(3e + 5)$
	(b)		4	3	M1 for intention to expand brackets eg $7k - 21$ **or** division of all terms on RHS by 7 as a first step M1 for correct method to isolate terms in k in an equation A1 cao
	(c)		$a = 2f - 1$	2	M1 for a correct first step eg intention to multiply both sides by 2 A1 cao

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Question		Working	Answer	Mark	Notes
193	(a)		19	1	B1 cao
	(b)		203	1	B1cao
	(c)		Explanation	1	B1 for any correct reason, e.g. terms are all odd but 372 is even or use of nth term $4n - 1$ or not 1 less than a multiple of 4
194	(a)		$3ac$	1	B1 cao
	(b)		p^3	1	B1 cao
	(c)		$8x - 7y$	2	M1 for $8x$ or $\pm 7y$ A1 cao
195	(a)		-7	2	M1 for 3×-5 ($= -15$) **and** 4×2 (=8) A1 cao
	(b)(i)		$10p$	2	B1 for $10p$ oe
	(b)(ii)		$10p - 7$		B1ft for "$10p$" $- 7$ Note "$10p$" MUST be an algebraic expression
196	(a)		$2m^2 + 6m$	1	B1 cao
	(b)		$3xy(y - 2)$	2	B2 for $3xy(y - 2)$ (B1 for $3x(y^2 - 2y)$ or $3y(xy - 2x)$ or $xy(3y - 6)$ or $3xy$(a two term algebraic expression))

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Question		Working	Answer	Mark	Notes
197			26	2	M1 for correct substitution into expression $4\times5 + 2\times3$ A1 cao
198	(a)		$4b$	1	B1 for $4b$ oe
	(b)		$5n$	1	B1 for $5n$ cao
	(c)		$3cd$	1	B1 for $3cd$ oe algebraic simplified form
	(d)		$5x+6y$	2	M1 $5x$ or $6y$ A1 cao
199			4	2	M1 for correct order of operations +7 then ÷3 A1 cao OR M1 for forming the equation $3x - 7 = 5$ and showing intention to add 7 to both sides or divide each term by 3 as a first step A1 cao NB Embedded solutions get M1 mark provided the equation or working is complete.
200	(a)		14	1	B1 cao
	(b)		5	2	M1 for intention to subtract 4 from each side or divide each term by 3 as a first step **or** embedded answer. A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
201		<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>–4</td><td>–1</td><td>2</td><td>5</td><td>8</td></tr></table>	$y = 3x + 2$ drawn	4	B1 for axes scaled and labelled **(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points from their table must be correctly plotted) A1 for correct line between $x = –2$ and $x = 2$ **(No table of values)** M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3x + 2$ drawn A1 for correct line between $x = –2$ and $x = 2$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of 3 **OR** line drawn with y intercept at 2 M1 for line drawn with gradient of 3 **AND** with y intercept at 2 A1 for correct line between $x = –2$ and $x = 2$ [SC B2 (indep of B1) for correct line segment between x=0 and x=2 – ignore any additional incorrect line segment(s)]

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Question		Working	Answer	Mark	Notes
202	(a)(i)		(-2, -3)	2	B1 cao
	(a)(ii)		Cross at (5, 2)		B1 professional judgement
	(b)		y = 3	1	B1 for correct line (at least 2cm spanning the *y* axis) with professional judgement
203	(a)(i		27	2	B1 cao
	(a)(ii)		Add 5		B1 add 5 or states rule is 5n - 3 (may be exemplified on diagram)
	(b)		Reason	1	B1 for correct reason Eg all numbers in sequence end in 2 or 7 **or** continuation of sequence to beyond 45 with statement **or** 42, 47 with statement
204	(a)		6	1	B1 cao
	(b)		21	1	B1 cao
	(c)		5	1	B1 cao
205	(a)		10	1	B1 cao
	(b)	$9 + 4 \times 5$ $= 9 + 20$	29	2	M1 for evidence of correct start to order of evaluation, 3×3 **or** 9 **or** 20 A1 cao
	(c)		125	1	B1 cao
	(d)		4	1	B1 accept - 4 or ±4
206	(a)		3	1	B1 cao
	(b)		5	1	B1 cao
	(c)		18	2	M1 for "30" – "12" seen with at least one correct A1 cao (SC : B1 for 25 **and** 12 seen with an answer of 13)

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Question		Working	Answer	Mark	Notes
207	(a)		10	1	B1 cao
	(b)		8.5	1	B1 accept $\frac{17}{2}$ or $8\frac{1}{2}$
	(c)		32	1	B1 cao
	(d)		$6 + 3t$	1	B1 for $6 + 3t$

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Question		Working	Answer	Mark	Notes
208		x – 2 -1 0 1 2 3 4 y 4 4.5 5 5.5 6 6.5 7	$y = ½ x + 5$ drawn	3	**(Table of values / calculation of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for correct line between $x = −2$ and $x = 4$ **(No table of values)** M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted **OR** line segment of $y = ½ x + 5$ drawn A1 for correct line between $x = −2$ and $x = 4$ **(Use of y=mx+c)** M1 for line drawn with gradient of 0.5 **OR** line drawn with a y intercept of 5 M1 for line drawn with gradient of 0.5 **AND** with a y intercept of 5 A1 for correct line between $x = −2$ and $x = 4$ SC : B2 for the correct line from $x = 0$ to $x = 4$

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Question		Working	Answer	Mark	Notes
209	(a)		98 145 358 709 835	1	B1 cao
	(b)		–8 –5 –1 4 7	1	B1 cao
	(c)	(0.2, 0.25, 0.4, 0.5, 0.75) $(\frac{4}{20}, \frac{5}{20}, \frac{8}{20}, \frac{10}{20}, \frac{15}{20})$ (20%, 25%, 40%, 50%, 75%)	0.2 $\frac{1}{4}$ 40% 0.5 $\frac{3}{4}$	2	M1 for two correct conversions into the same form A1 cao If no method seen SCB1 for correct numbers in the reverse order
210	(a)		$4a$	1	B1 for $4a$ oe as a single term
	(b)		$3cd$	1	B1 for $3cd$ oe as a single term
	(c)		$7ef$	1	B1 for $7ef$ oe as a single term
	(d)		3	1	B1 cao
	(e)		2	2	M1 for intention to subtract 7 from each side or divide each term by 5 or embedded method A1 cao
211	(a)(i)		(4, 3)	2	B1 cao
	(ii)		(–4, –1)		B1 cao
	(b)		(0, 1)	2	M1 for (0, 1) marked on the graph or (0, y) or (x, 1) A1 cao

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Question		Working	Answer	Mark	Notes
212	(a)(i)		19	2	B1 cao
	(ii)		Add 4		B1 for add 4 (+4) oe or $4n - 1$ (or $\times 4 - 1$)
	(b)	$15 - 10 = 5$ $5 \times 4 = 20$	20	2	M1 for $(15-10)\times 4$ or $4 + 4 + 4 + 4 + 4$ or 59, 39 or $(4\times 15 - 1) - (4\times 10 - 1)$ or '59' – '39' from a list A1 cao
213	(a)		$3f$	1	B1 for $3f$ or $f3$ or $3 \times f$ or $f \times 3$
	(b)		$6m$	1	B1 for $6m$ or $m6$
	(c)		$4a + 5h$	2	B2 for $4a + 5h$ or $5h + 4a$ (B1 for $4a$ or $5h$ or $4a + 5h = 9ah$)
214	(a)		7	1	B1 ca
	(b)		12	1	B1 cao
	(c)	$5w = 10 + 6$ $w = 16 \div 5$ or $w - \frac{\cdot}{5} = \frac{10}{5}$ oe	16/5 oe	2	M1 for $5w - 6 + 6 = 10 + 6$ oe or $w - \frac{6}{5} = \frac{10}{5}$ oe A1 for $\frac{16}{5}, 3\frac{1}{5}, 3.2$, oe

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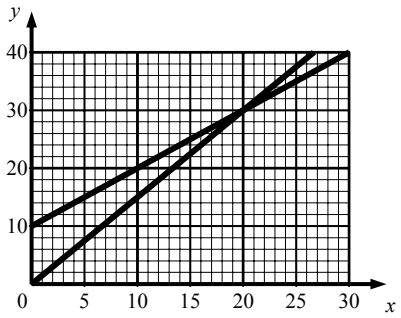
Question		Working	Answer	Mark	Notes
215	(a)(i)		(2, 3)	2	B1 cao
	(ii)		(–3, 1)		B1 cao
	(b)		Point plotted at (3, –4)	1	B1 cao
216*	(a)		10	1	B1 cao
	(b)	 **Miles** 0 10 20 30 40 50 **Ed** 0 15 30 45 60 75 **Bill** 10 20 30 40 50 60	Ed is cheaper up to 20 miles, Bill is cheaper for more than 20 miles	3	M1 for correct line for Ed intersecting at (20,30) ±1 sq tolerance **or** $10 + x = 1.5x$ oe C2 (dep on M1) for a correct full statement ft from graph eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion ft from graph eg. cheaper at 10 miles with Ed ; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) **OR** (continued on next page)

EXPERT TUITION

Question		Working	Answer	Mark	Notes
216 (contd)					**OR** M1 for correct method to work out Ed's delivery cost for at least 2 values of n miles where $0 < n \leq 50$ **or** for correct method to work out Ed and Bill's delivery cost for n miles where $0 < n \leq 50$ C2 (dep on M1) for 20 miles linked with £30 for Ed and Bill with correct full statement eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion eg. cheaper at 10 miles with Ed; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) SC: B1 for correct full statement seen with no working eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles QWC Decision and justification should be clear with working clearly presented and attributable

EXPERT TUITION

Question		Working	Answer	Mark	Notes
217	(a)		$6y - 15$	1	B1 cao
	(b)		$4x(2x + y)$	2	B2 cao (B1 for $x(8x + 4y)$ **or** $2x(4x + 2y)$ **or** $4(2x^2 + xy)$ **or** $4x(ax + by)$ where a, b are positive integers **or** $ax(2x + y)$ where a is a positive integer **or** $4x(2x + y)$)
	(c)	$10t = gh$ $h = \frac{10t}{g}$	$\frac{10t}{g}$	2	M1 for clear intention to multiply both sides of the equation by 10 (eg. ×10 seen on both sides of equation) **or** clear intention to divide both sides of the equation by g (eg. ÷ g seen on both sides of equation) **or** $10t = gh$ **or** $\frac{t}{g} = \frac{h}{10}$ **or** fully correct reverse flow diagram eg. ← ×10 ← ÷g ← A1 for $\frac{10t}{g}$ oe
218	(a)	$2 \times 5 \times 2 = 20$ $300 \div 20 =$	15	3	M2 for $300 \div (2 \times 5 \times 2)$ oe (M1 for 2 Ò5 Ò2 **or** 20 seen **or** $300 \div (2 \times 5)$ **or** 30 seen A1 cao
	(b)	$c = \frac{30 \times 40}{150} =$	8	2	M1 for $\frac{30 \times 40}{150}$ **or** 1200 seen A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Additional Guidance
219	(a)		(6, 7)	1	B1 cao
	(b)		(3, 5.5)	2	M1 Clear attempt to find the mean of either x or y coordinates of P and Q A1 cao **OR** M1 identifies the midpoint of PQ on the diagram A1 cao SC B1 for exactly one coordinate correct
	(c)		(6, 0)	2	M1 for B correctly placed on the x axis A1 for (6, 0)
					Total for Question: 5 marks
220	(a)		Correct diagram	1	B1 4 identical shapes to the previous patterns
	(b)		60	2	M1 continues pattern 6, 12, 18, as far as the 10th A1 cao **OR** M1 indicates that the number of sticks is 6 times the pattern number A1 cao **OR** M1 doubles 30 sticks for pattern number 5 A1 cao
	(c)	123 ÷ 6 leaves a remainder of 3, so 'no'	No + justification	2	M1 Attempts to divide 120 by 6 A1 'No' + comment on remainder **OR** M1 Starts at 6 and builds up to 120 and 126 A1 'No' + sight of 120 and 126
					Total for Question: 5 marks

EXPERT TUITION

Question		Working	Answer	Mark	Additional Guidance
221	(a)		$6x$	1	B1 cao
	(b)		$y \geq -2$	2	M1 attempt to isolate y A1 cao
					Total for Question: 3 marks
222	(a)	$5p = 20$	4	2	M1 add 16 to both sides A1 cao
	(b)	$-4-5=5q-2q$	-3	2	M1 for correct method isolate $\pm 3q$ A1 cao
	(c)	$6x-3-10-6x=$	-13	2	M1 at least one expansion correct A1 cao
					Total for Question: 6 marks
223	(a)		$5(x-2y)$	1	B1 cao
	(b)		$3p(q-4p)$	2	B2 $3p(q-4p)$ (B1 correct partial factorisation, for example, $p(3q-12p)$, $12p(\frac{1}{4}q-p)$, $p(aq+bp)$ where a and b are numbers
					Total for Question: 3 marks

EXPERT TUITION

Question		Working	Answer	Mark	Notes
224	(a)		(2, 1)	1	B1 cao
	(b)		(0, 5)	1	B1 cao
	(c)		(1, 3)	1	B1 cao
	(d)		Point	1	B1 for point marked, eg at (4, 5) or (4, 3) or (5, 5) or (7, 6) or (3, 4) or (4, 7)
225	(a)		12	1	B1 cao
	(b)		45	1	B1 cao
	(c)		16	2	M1 for correct order of inverse operations –12 then ÷3 or for forming the equation $3x + 12 = 60$ and showing intention to subtract 12 from both sides or divide each term by 3 as a first step A1 cao
226	(a)		10	1	B1 cao
	(b)		7	2	M1 for 11 20 – 11 00 (= 20) or 11 57 – 11 30 (= 27) or 57 – 20 (=37) or 57 – 27 (=30) A1 cao
	(c)		12	1	B1 cao
227	(a)		5, 4, (3), 2, 1, (0)	2	M1 for 1 or 2 or 3 correct entries A1 cao
	(b)		Line drawn	2	M1 plots 5 of their points correctly or a straight line with gradient –1 or a straight line through (0, 4) A1 correct line between $x = -1$ and $x = 4$
228			72	4	M1 for "x" + 24 or "x" – 24 or for "g" and 5"g" M1 for forming an appropriate equation eg $x + 24 = 5(x - 24)$ or for $(5g - g) \div 2 = 24$ or $g = 12$ M1 for correct operations to isolate x terms and non-x terms in an equation of the form $ax + b = cx + d$ or $ax + b = c(x + d)$ or $x = 36$ or for $6 \times$ "12" oe A1 cao

EXPERT TUITION

Question	Working	Answer	Mark	Notes
229 (a)		6	1	B1 cao
(b)		8	1	B1 cao
230 (a)		10, 8, (6), 4, 2, (0)	2	B2 for fully correct table (B1 for 2 or 3 entries correct)
(b)		line drawn	2	B2 for correct straight line between $x = -1$ and $x = 4$ (B1 for a single straight line which passes through (0, 8) or for a single straight line with negative gradient –2 or for at least 5 points from their table plotted correctly)
231 (a)		n^4	2	M1 for $\frac{n^{10}}{n^6}$ oe or $n^3 \times n$ oe or $\frac{n^7}{n^3}$ oe A1 cao
(b)		$5(y - 3)$	1	B1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
232	(a)		35	1	B1 cao
	(b)		30	1	B1 cao
	(c)		50	2	M1 for 35 – 10 (= 25) or 40 – 15 (= 25) or 35 + "30" – 15 oe A1 for 50 or f.t. from (b) + 20
233	(a)		drawing	1	B1 cao
	(b)		9	1	B1 cao
	(c)		Yes (supported)	1	C1 for Yes with reason eg "the number of squares is always even (and 50 is even)" oe
	(d)		38	1	B1 cao
234	(a)		$5m$	1	B1 cao
	(b)		$4pr$	1	B1 cao
	(c)		$7x + 3y$	2	B2 for $7x + 3y$ oe (B1 for $7x$ or $3y$ seen)
235	(a)		20.3	2	M1 for $\frac{50}{1.57^2}$ oe A1 for answer in range 20.2 to 20.3
	(b)		68.04	2	M1 for (m =) $1.8^2 \times 21$ oe A1 cao
	(c)		2.61	3	M2 for a complete method to find 145% of 1.8, eg. $\frac{145}{100} \times 1.80$ oe (M1 for a method to find 45% of 1.8, eg. $\frac{45}{100} \times 1.80$ (= 0.81) or for a multiplication factor of 1.45) A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
236	(a)		$\frac{32}{9}$	2	B1 cao B1 cao
	(b)		$+7$ or $\times\frac{10}{3}$	1	B1 for $+7$ or $\times\frac{10}{3}$
237	(a)		5	1	B1 cao
	(b)		2.8	1	B1 oe
	(c)		1.5	2	M1 for the intention to subtract 3 from both sides or divide each term by 4 as a first step A1 1.5 oe
238	(a)		Diagram	1	B1 cao
	(b)		15	2	M1 sequence written out and continued or diagram drawn or $2n+1$ given as the nth term A1 cao
	(c)		Explanation	1	B1 explanation eg answer must be odd or use of $2n + 1$ or pattern 17 has 35 circles
239	(a)		Odd	1	B1 cao
	(b)		$5n$	1	B1 cao
	(c)		$\frac{t}{4}$	1	B1 oe
240			19	2	M1 for $2 \times 6.5 + 3 \times 2$ **or** 13 and 6 A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
241			32 64 29	4	M1 for $2y$ or $y - 3$ M1 for adding their three expressions and setting equal to 125 M1 for correct method to solve $ay + b = 125$ A1 Ali 32, Bhavara 64 and Ceris 29
242	(a)		n^2	1	B1 cao
	(b)		a^7	1	B1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
243	(a)		$5e$	1	B1 cao
	(b)		$7gh$	1	B1 cao
	(c)		$a + 6d$	2	M1 for a or $6d$ A1 cao
244	(a)(i)		19	2	B1 cao
	(ii)		Reason		B1 explanation, e.g. add 4 each time
	(b)		43	1	B1 cao
	(c)		Yes with reason	1	B1 reason eg 1 less than 80 and 80 is a multiple of 4, or generate series to 79, or 79 is the 20^{th} term, oe
245			$T = 6d + 15f$	3	M1 for $6d$ or $15f$ or T = a linear expression in d and/or f M1 for $6d + 15f$ oe or $T = 6d$ (+ kf) oe or $T = 15f$ (+ kd) A1 $T = 6d + 15f$ oe
246	(a)		–0.5	2	M1 for intention to subtract 19 from both sides or divide all terms by 8 as a first step A1 for –0.5 oe
	(b)		3	2	M1 for a correct operation to collect the c terms or the number terms on one side of the equation e.g. $2c – c + 5 = 8$, $2c + 5 – 5 = c + 8 – 5$ A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
***247**		1155 ÷ 15 = 77 $x + 2x + x - 7 = 77$ $4x - 7 = 77$ $4x = 84$ $x = 21$ OR $15x + (15 \times 2x) + 15(x - 7) = 1155$ $60x - 105 = 1155$ $60x = 1260$ $x = 21$	Redlands 21 St Samuels 42 Francis Long 14	5	M1 for $2x$ or $x-7$ M1 for 1155 ÷ 15 (= 77) M1 (dep M2) for equation summing their three expressions to '77' A1 for 21,42 and 14 C1 for fully correct answer with correct labels OR M1 an expression for the cost of the pupils from Redlands M1 for expression for the cost of the pupils from either St Samuels or Francis Long M1 (dep M2) for equation summing their three expressions to 1155 A1 for 21,42 and 14 C1 for fully correct answer with correct labels

EXPERT TUITION

Question		Working	Answer	Mark	Notes
248	(a)		22	1	B1 cao
	(b)		18	1	B1 cao
	(c)		3.4	2	M1 for intention to subtract 7 from both sides or divide all terms by 5 as a first step. A1 for 3.4 oe
249	(a)			1	B1 cao
	(b)		17, 21	1	B1 for 17, 21 cao
	(c)		$4n + 1$	2	B2 for $4n + 1$ oe (B1 for $4n + k$, $k \neq 1$, or k is absent or $n = 4n + 1$)
	(d)		12	2	M1 for $(50 - 1) \div 4$ **or** evidence of using their formula from part (c) if in the form an+b **or** repeated addition of 4 (at least 3) ft table in part (b) **or** 49 seen A1 cao
250	(a)		$3(x + 2)$	1	B1 cao
	(b)		$7y - 16$	2	M1 for any intention to expand a bracket eg $5y - 10$ or $2y - 6$ A1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
251		<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>-7</td><td>-5</td><td>-3</td><td>-1</td><td>1</td><td>3</td></tr></table>	Straight line from (–2, –7) to (3, 3)	4	**(Table of values)** C1 for axes scaled and labelled M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** C1 for axes scaled and labelled M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x - 3$ drawn A1 for correct line between $x = -2$ and $x = 3$ **(Use of $y = mx+c$)** C1 for axes scaled and labelled M1 for line drawn with gradient of 2 OR line drawn with a y intercept of –3 M1 for line drawn with gradient of 2 AND with a y intercept of –3 A1 for correct line between $x = -2$ and $x = 3$ [SC B2 (indep of C1) for the correct line between $x = 0$ and $x = 3$, ignore any additional incorrect line segment(s)]

EXPERT TUITION

Question		Working	Answer	Mark	Notes
252	(a)		(1, 4)	1	B1 cao
	(b)		cross at (−3, 2)	1	B1 for cross at (−3, 2)
	(c)		$x = 3$	1	B1 cao
253			Graph completed	2	B1 for line from (2.5, 45) to (3.5, 45) B1 ft line of correct gradient to axis (after 1½ hour)
254	(a)		92.3521	1	B1 cao
	(b)		p^6	1	B1 cao
	(c)		t^5	1	B1 cao
	(d)		6	1	B1 cao
255	(a)		⅔	2	M1 for intention to subtract 4 from both sides or divide each term by 3 or $3p = 2$ written in the workspace A1 for ⅔ accept answer to two decimal places rounded or truncated
	(b)		−4, −3, −2, −1, 0	2	B2 for all 5 correct values; ignore repeats, any order (B1 for 4 correct (and no incorrect) values or all five correct values and –5)
256			2.064(285714…)	2	M1 for substitution of 0.7 into expression or 2.89 or 2.06 seen A1 for 2.064(285714…) or $\frac{289}{140}$

EXPERT TUITION

Question	Working	Answer	Mark	Notes
257 (a)(i)		25, 22	2	B1 cao
(ii)		Subtract 3		B1 for correct description Eg. 'subtract 3' **or** 'goes down by 3' oe **or** 'take-away 3' **or** -3 **or** $43 - 3n$ seen
(b)		23	2	M1 for +5 seen **or** for continuing sequence for at least 2 terms (condone one arithmetic error) **or** $5n - 17$ A1 cao
258		(12) 10	1	B1 cao
		80 (27)	1	B1 cao
259		eg. 18, 4, 5	3	M1 for two different factors of 40 M1 for 3 numbers where the sum lies between 20 and 30 **AND** (where one is 9 or 18 **or** two are different factors of 40 A1
260 (i)		$x + 4$	1	B1 for $x + 4$ oe
(ii)		$2x$	1	B1 for $2x$ oe
261 (a)		9	1	B1 cao
(b)		5	1	B1 cao
(c)		17	2	M1 for clear intention to expand bracket or divide both sides by 2 as the first step eg. $2y - 2\times5 = 24$ **or** $y - 5 = 24 \div 2$ A1 for 17
(d)		$5(3p + 8)$	1	B1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
262	(a)		$5m$	1	B1 for $5m$ or $5\times m$ or $m\times 5$ or $m5$
	(b)		$9p$	1	B1 for $9p$ or $p9$
	(c)		$4tw$	1	B1 for $4tw$ or $4wt$ or $tw4$ or $wt4$ (condone $4\times tw$ and $4\times wt$)
263	(a)	4×3	12	1	B1 cao
	(b)		5	2	M1 for $4 \times 2 - 3$ A1 cao
264		$3x - 6 = x + 7$ $2x = 13$	6.5	3	M1 for $3\times x - 3\times 2$ ($=3x - 6$) or $\frac{x}{3} + \frac{7}{3}$ seen M1 for correct method to isolate the terms in x or the number terms on opposite sides of an equation A1 for 6.5 oe

EXPERT TUITION

Question		Working	Answer	Mark	Notes
265	(a)		8, 10	1	B1 cao
	(b)		24	1	B1 cao
	(c)		reason	1	B1 for a valid reason that demonstrates the understanding that the number of triangles is twice the pattern number
266	(a)	$2 \times 8 = 16$ $16 + 7$	23	2	M1 for correct substitution of 8 into the expression $2f$ A1 cao
	(b)	$3 \times -2 + 5 \times 4$	14	2	M1 for correct substitution into the formula A1 cao
267	(a)		30	1	B1 for 30 minutes oe
	(b)		20	1	B1 cao
	(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis
268	(a)		$x = 3$ drawn	1	B1 for $x = 3$ drawn [Note: each line drawn must be a single line segment satisfying $x = 3$]
	(b)		$y = x$ drawn	1	B1 for $y = x$ drawn [Note: each line drawn must be a single line segment satisfying $y = x$]
	(c)	Gradient = $\frac{3-0}{0--2}$	1.5	2	M1 for a method to find the gradient of the given line A1 for 1.5 oe
269	(a		n^8	1	B1 for n^8 (accept n^{5+3})
	(b)		n^5	1	B1 for n^5 (accept n^{7-2})

EXPERT TUITION

Question		Working	Answer	Mark	Notes
270	(a)		$3x + 12$	1	B1 for $3x + 12$ or $12 + 3x$
	(b)		$x^3 + 2x$	2	M1 for the intention to multiply both terms in the bracket by x A1 for $x^3 + 2x$ OR B2 for $x^3 + 2x$ [B1 for x^3 or $2x$ seen]
	(c)		$x(x - 6)$	1	B1 for $x(x - 6)$ or $(x - 6)x$

EXPERT TUITION

Question		Working	Answer	Mark	Notes
271	(a)		32 and 10	2	B1 for 32 in the correct place B1 for 10 in the correct place
	(b)	10×3×2=60 or 10 ×3 +30 = 60	×2 or +30	1	B1 for ×2 or +30
272	(a)	$y = 4 \times 7.5 + 5.4$	35.4	2	M1 for 4 ×7.5 + 5.4 A1 cao
	(b)	$18.8 = 4x - 2.4$ $x = \frac{18.8 + 2.4}{4}$	5.3	2	M1 for intention to add 2.4 to 18.8 or to subtract -2.4 from 18.8 or to divide 18.8 and (-)2.4 by 4 A1 cao
273	(a)		56	1	B1 for 56 (accept answer in the range 55 to 57)
	(b)	Barry's Bricks £50 Bricks ArUs £65 65 − 50	15	3	M1 for 50 or 65 (accept 64 – 66) M1 for 65 – 50 (accept 64-66 for 65) A1 for 15 (accept answer in range 14 to 16)

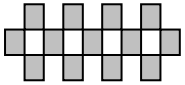
EXPERT TUITION

Question		Working	Answer	Mark	Notes
274	(a)		–1, 0, 1, 2, 3	2	B2 for all 5 correct values; ignore repeats, any order (B1 for 4 correct (and no incorrect values) eg. 0, 1, 2, 3 **or** one additional value, eg –1, 0, 1, 2, 3, 4)
	(b)		$-4 < x \leq 3$	2	B2 for $-4 < x \leq 3$ **or** > -4 **and** ≤ 3 (B1 for $-4 < x$ **or** $x > -4$ **or** $x \leq 3$ **or** $3 \geq x$ **or** > -4 **or** ≤ 3 **or** $-4 \leq x < 3$) (NB Accept the use of any letter)
	(c)	$3y - 2 > 5$ $3y > 7$	$y > \frac{7}{3}$	2	M1 for clear intention to add 2 to both sides (of inequality or equation) or clear intention to divide all terms by 3 **or** $3y > 7$ **or** $3y < 7$ **or** $3y = 7$ A1 $y > \frac{7}{3}$ **or** $y > 2\frac{1}{3}$ **or** $y > 2.\dot{3}$ NB. final answer **must** be an inequality (SC B1 for $\frac{7}{3}$ oe seen if M0 scored)
275	(a)		$2(2x + 5y)$	1	B1 cao
	(b)		$x(x + 7)$	1	B1 cao

EXPERT TUITION

Question		Working	Answer	Mark	Notes
276	(a)		$3c$	1	B1 $3c$ oe
	(b)		$6ef$	1	B1 $6ef$ oe
	(c)		$7p + 5t$	2	B2 for $7p + 5t$ (B1 for either $7p$ or $5t$)
277	(a)	$3.5 \times 12 - 5$	37	2	M1 for $3.5 \times 12 - 5$ or $42 - 5$ A1 cao
	(b)	$3.5 \times -9 - -6$	–25.5	2	M1 for $3.5 \times -9 - -6$ **or** $3.5 \times -9 + 6$ **or** sight of –31.5 A1 for –25.5 **or** $-\frac{51}{2}$ **or** $-25\frac{1}{2}$

EXPERT TUITION

Question		Working	Answer	Mark	Notes
278	(a)			1	B1 for correct pattern
	(b)		31	2	M1 for correct diagram of pattern number 10 with or without shading A1 cao **OR** M1 for any 4 consecutive terms in the sequence 4, 7, 10, ... A1 cao **OR** M1 for use of $3n + 1$ with $n = 10$ A1 cao
	(c)		No with appropriate reason	2	M1 for attempt to divide 45 by 3 A1 for 'No' and comment that this is the number needed for pattern number 15 **OR** M1 for starts at 4 and builds up correctly to 46 or 55 A1 for 'No' and comments that 55 are needed for pattern 18 or 46 are needed for pattern 15 oe **OR** M1 for use of $3n + 1$ with $n = 18$ A1 for 'No' and comments that 55 are needed for pattern 18 oe **OR** M1 for $3n + 1 = 46$ A1 for 'No' and comments 46 are needed for pattern 15 oe

EXPERT TUITION

<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>279</td><td>(a)

(b)

(c)</td><td></td><td>19

8

$2\frac{1}{4}$</td><td>1

1

2</td><td>B1 cao

B1 cao

M1 for $4m = 15 - 6$ or clear attempt to subtract 6 from both sides of the equation
A1 for $2\frac{1}{4}$ or 2.25 or $\frac{9}{4}$</td></tr>
<tr><td>280</td><td></td><td><table><tr><td>x</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>-5</td><td>-2</td><td>1</td><td>4</td><td>7</td></tr></table></td><td>Straight line from (–1, –5) to (3, 7)</td><td>3</td><td>(Table of values)
M1 for at least 2 correct attempts to find points by substituting values of x.
M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted)
A1 for correct line between –1 and 3

(No table of values)
M2 for at least 2 correct points (and no incorrect points) plotted
OR line segment of $y = 3x–2$ drawn (ignore any additional incorrect segments)
(M1 for at least 3 correct points plotted with no more than 2 incorrect points)
A1 for correct line between –1 and 3

(Use of y=mx+c)
M2 for line segment of $y = 3x–2$ drawn (ignore any additional incorrect segments)
(M1 for line drawn with gradient of 3 OR line drawn with a y intercept of –2 and a positive gradient)
A1 for correct line between –1 and 3</td></tr>
</table>

EXPERT TUITION