

Sequences

Foundation and Higher tiers

Total marks: 87

Marks

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

Questions

Q	Skill	Spec	Tier	Grade	Calculator	Marks
1	Patterns of squares	A23	Foundation	2	No	3
2	Square, cube and triangular numbers	A24	Foundation	2	No	3
3	Term-to-term rules, forwards and backwards	A23	Foundation	3	No	3
4	Linear nth term	A25 A23	Foundation	3	No	4
5	Decreasing sequences	A25	Foundation	4	No	4
6	Position-to-term rule	A23	Foundation	4	No	3
7	Fibonacci type sequences	A24	Common	5	No	3
8	Comparing two linear sequences	A25 A17	Common	5	No	3
9	A sequence of fractions	A25	Foundation	5	No	2
10	Quadratic nth term	A25	Higher	7	No	3
11	Geometric progression with a surd ratio	A24 N8	Higher	7	No	4
12	Quadratic sequences from given terms	A25 A19	Higher	8	No	4
13	Term-to-term rules with decimals	A23 A24	Foundation	2	Yes	3
14	Using a sequence in context	A23	Foundation	3	Yes	3
15	Classifying three progressions and continuing each	A24	Foundation	3	Yes	4
16	Triangular numbers	A24	Foundation	4	Yes	3

Q	Skill	Spec	Tier	Grade	Calculator	Marks
17	A term-to-term rule with decimals	A23	Foundation	4	Yes	4
18	Fibonacci type sequences with decimals	A24	Foundation	4	Yes	3
19	Using a position-to-term rule	A23	Foundation	4	Yes	3
20	Patterns of hexagons	A23 A25	Foundation	4	Yes	5
21	Geometric progressions	A24	Common	5	Yes	4
22	Linear nth term with decimals	A25	Foundation	5	Yes	4
23	A geometric sequence in context	A24	Foundation	5	Yes	3
24	A linear sequence in context	A25 A23	Foundation	5	Yes	5
25	Missing terms of an arithmetic sequence	A25	Foundation	5	Yes	4
	Total					87

Question 1 A23 · Foundation · Grade 2 · 3 marks

Q	Answer	Mark	Comments
1(a)	Pattern 4 correct: 10 squares in an L shape, 5 high and 6 wide	B1	
1(b)	the sequence 4, 6, 8, 10, ... continued, or $2n + 2$	M1	oe, adds 2 each time
	22	A1	

Question 2 A24 · Foundation · Grade 2 · 3 marks

Q	Answer	Mark	Comments
2(a)	16 and 25	B1	
2(b)	27	B1	
2(c)	15 and 28	B1	

Question 3 A23 · Foundation · Grade 3 · 3 marks

Q	Answer	Mark	Comments
3(a)	7 and 11	B1	
3(b)	$(29 + 3) \div 2$ or 16	M1	oe, the inverse rule used once
	9.5	A1	oe

Question 4 A25 A23 · Foundation · Grade 3 · 4 marks

Q	Answer	Mark	Comments
4(a)	23	B1	
4(b)	$4n$	M1	or $4n + k$, any k
	$4n + 3$	A1	oe
4(c)	every term is odd and 102 is even	B1	oe, or $4n + 3 = 102$ gives $n = 24.75$, not a whole number

Question 5 A25 · Foundation · Grade 4 · 4 marks

Q	Answer	Mark	Comments
5(a)	$-5n$	M1	or $k - 5n$, any k
	$67 - 5n$	A1	oe
5(b)	$67 - 5n < 0$ or $n = 14$ or continues the sequence to 2	M1	oe
	-3	A1	

Question 6 A23 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
6(a)	3, 9, 19	B1	
6(b)	the 9th term is 163 and the 10th term is 201	M1	oe, or $2n^2 + 1 = 200$ leading to $n^2 = 99.5$, or $2n^2$ is even so every term is odd
	No, with a correct reason	A1	e.g. 200 is between 163 and 201, or 99.5 is not a square number, or all the terms are odd

Question 7 A24 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
7	uses a for the second term to get any two of $4 + a$, $4 + 2a$, $8 + 3a$	M1	oe, or a trial with a correct check
	$8 + 3a = 41$	M1	oe
	11	A1	

Question 8 A25 A17 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
8	$50 - 2n$	M1	oe, the n th term of B
	$3n + 5 = 50 - 2n$ or $n = 9$	M1	oe, or lists both sequences as far as the 9th term
	32	A1	

Question 9 A25 · Foundation · Grade 5 · 2 marks

Q	Answer	Mark	Comments
9	$2n - 1$ or $4n - 1$	M1	the numerator or the denominator
	$\frac{2n-1}{4n-1}$	A1	oe

Question 10 A25 · Higher · Grade 7 · 3 marks

Q	Answer	Mark	Comments
10	second difference 4, or $2n^2$	M1	
	subtracts $2n^2$: 2, 1, 0, -1, ...	M1	oe, or forms three equations in a , b and c
	$2n^2 - n + 3$	A1	oe

Question 11 A24 N8 · Higher · Grade 7 · 4 marks

Q	Answer	Mark	Comments
11(a)	$\frac{x}{3} = \frac{15}{x}$ or $x^2 = 45$	M1	oe
	$3\sqrt{5}$	A1	accept $\sqrt{45}$
11(b)	ratio $\sqrt{5}$, or 15×5	M1	oe, ft their x
	75	A1	

Question 12 A25 A19 · Higher · Grade 8 · 4 marks

Q	Answer	Mark	Comments
12	$4a + 2b = 2$	M1	
	$25a + 5b = 35$	M1	
	a correct method to eliminate a or b	M1	e.g. $10a + 5b = 5$ and subtracts
	$a = 2$ and $b = -3$	A1	

Question 13 A23 A24 · Foundation · Grade 2 · 3 marks

Q	Answer	Mark	Comments
13(a)	add 1.35	B1	oe, + 1.35
13(b)	$3.8 + 9 \times 1.35$ or $9 \times 1.35 = 12.15$	M1	oe, or the sequence continued correctly to at least the 7th term (11.9)
	15.95	A1	

Question 14 A23 · Foundation · Grade 3 · 3 marks

Q	Answer	Mark	Comments
14(a)	1.76	B1	
14(b)	the sequence continued to week 10 (3.98 km) and week 11 (4.35 km), or $(4 - 0.65) \div 0.37 (= 9.05\dots)$	M1	oe
	Week 11	A1	not week 10

Question 15 A24 · Foundation · Grade 3 · 4 marks

Q	Answer	Mark	Comments
15(a)	P: Fibonacci type; Q: arithmetic; R: geometric	B2	B1 for one correct
15(b)	P: 15.6; Q: 7.4; R: 12.15	B2	B1 for two correct

Question 16 A24 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
16(a)	78	B1	
16(b)	two consecutive triangular numbers added, e.g. $45 + 55 = 100$	M1	oe, a correct trial
	55 and 66	A1	

Question 17 A23 · Foundation · Grade 4 · 4 marks

Q	Answer	Mark	Comments
17(a)	7.94 and 10.028	M1	the 2nd and 3rd terms
	12.5336	A1	
17(b)	15.54... and 19.1...	M1	the 5th and 6th terms, ft their 4th term
	Yes, with 19.1... and 18.6	A1	

Question 18 A24 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
18	1.95, 3.15, 5.1	M1	the next three terms
	8.25, 13.35, 21.6	M1	the sequence continued to the 8th term
	No, with 34.95	A1	

Question 19 A23 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
19(a)	218.15	B1	
19(b)	173.75 and 84.95	M1	the 24th and 12th terms
	No, with 173.75 and 169.9	A1	oe, a correct comparison

Question 20 A23 A25 · Foundation · Grade 4 · 5 marks

Q	Answer	Mark	Comments
20(a)	22 sides or $4 \times 5 + 2$	M1	oe, or the perimeters 14.4, 24, 33.6 continued
	52.8	A1	
20(b)	$91.2 \div 2.4$ or 38	M1	oe, the number of sides
	$(38 - 2) \div 4$ or $4n + 2 = 38$	M1	oe, or the sequence 6, 10, 14, ... continued to 38
	9	A1	

Question 21 A24 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
21(a)	$\frac{48}{64}$ or 0.75 or $\frac{3}{4}$	M1	oe, the common ratio
	20.25	A1	oe
21(b)	continues the sequence: 20.25, 15.1875, 11.39...	M1	oe, at least two more correct terms
	8th term	A1	accept 8.54... seen as the 8th term

Question 22 A25 · Foundation · Grade 5 · 4 marks

Q	Answer	Mark	Comments
22(a)	$1.65n$	M1	or $1.65n + k$, any k
	$1.65n + 1.05$	A1	oe
22(b)	$1.65n + 1.05 = 50.55$ or $(50.55 - 1.05) \div 1.65$	M1	oe, ft their (a), or the sequence continued correctly
	$n = 30$, a whole number, so it is the 30th term	A1	or $1.65 \times 30 + 1.05 = 50.55$ with a conclusion

Question 23 A24 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
23(a)	1.36	B1	
23(b)	the sequence continued to 5.44 and 10.88, or $10 \div 0.085 (= 117.6...)$ compared with powers of 2	M1	oe, 1 cm = 10 mm used
	7	A1	

Question 24 A25 A23 · Foundation · Grade 5 · 5 marks

Q	Answer	Mark	Comments
24(a)	120.4	B1	
24(b)	$6.4n$	M1	or $6.4n + k$, any k , or $82 + 6.4(n - 1)$
	$6.4n + 75.6$	A1	oe
24(c)	$6.4n + 75.6 \leq 198$ or $(198 - 82) \div 6.4 (= 18.1...)$	M1	oe, ft their (b), or 197.2 for 19 chairs
	19	A1	

Question 25 A25 · Foundation · Grade 5 · 4 marks

Q	Answer	Mark	Comments
25(a)	$(13.18 - 4.6) \div 3$ or 2.86	M1	oe, the common difference
	7.46, 10.32 and 16.04	A1	
25(b)	$4.6 + 49 \times 2.86$ or $2.86 \times 50 + 1.74$	M1	oe, ft their difference
	144.74	A1	