FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... Class .....

A23: Generating sequences

Solve problems using term-to-term and position-to-term rules

20 marks · 25 minutes · Non-calculator

1) $u_{n+1} = 2u_n + k$, $u_1 = 3$ and $u_3 = 21$. Find k.

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[Question 1: 3 marks]

2) A sequence uses the rule "multiply by 3 then subtract 1". The 4th term is 41. Find the first term.

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[Question 2: 3 marks]

3) Find the smallest number that is a term of both $5n + 3$ and $7n - 9$

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[Question 3: 3 marks]

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4) Matchstick patterns use 4, 7, 10, ... matches. How many matches are in pattern 20? Which pattern uses 100 matches?

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[Question 4: 3 marks]

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5) Is 120 a term of the sequence $n^2 + 2n$? Show how you decide.

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[Question 5: 2 marks]

6) Ali saves £5 in week 1 and £3 more each week than the week before. In which week does he first save more than £50 in that week?

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[Question 6: 3 marks]

7) $u_{n+1} = u_n^2 - 3$ and $u_1 = 2$. Find u_{100}.

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[Question 7: 3 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	3	$u_2 = 6 + k$ (P1); $12 + 3k = 21$ (P1); A1.
2	2	Reverse: $(41 + 1) \div 3 = 14$ (P1); 5 (P1); 2 (A1).
3	33	Lists terms 8, 13, 18, ... and -2, 5, 12, ... (P1, P1); 33 (A1).
4	61; pattern 33	$3n + 1$ (P1); 61 (A1); 33 (A1).
5	Yes, $n = 10$	Trial or factorise (P1); A1.
6	17	$5 + 3(n - 1) > 50$ (P1); $n > 16$ (P1); A1.
7	1	$u_2 = 1$, $u_3 = -2$, $u_4 = 1$ (P1); alternates (P1); even terms are 1 (A1).