FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

A23: Generating sequences

Reason with term-to-term and position-to-term rules

20 marks · 25 minutes · Non-calculator

1) Show that the 4th term of $n^2 + 2n$ is 24

[Question 1: 1 marks]

2) Explain why 100 is not a term of the sequence $3n + 2$

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[Question 2: 2 marks]

3) Explain why knowing only "add 4 each time" does not tell you a whole sequence.

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[Question 3: 1 marks]

4) Show that 50 is a term of the sequence $n^2 + 1$

[Question 4: 2 marks]

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5) For the 10th term of $2n + 3$, Ben writes $2 \times 10 + 3 = 23$ and Kim writes $2 \times (10 + 3) = 26$. Who is right? Explain.

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[Question 5: 2 marks]

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6) $u_{n+1} = 2u_n - 3$ and $u_1 = 4$. Show that $u_4 = 11$

[Question 6: 2 marks]

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7) Explain why every term of $5n - 1$ ends in 4 or 9

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[Question 7: 2 marks]

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8) Show that every term of $2n^2 + 1$ is odd.

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[Question 8: 2 marks]

9) Do the sequences $3n + 1$ and $4n - 2$ have a term in the same position that is equal? Show your working.

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[Question 9: 2 marks]

10) Can a term of $4n + 2$ be a multiple of 4? Explain.

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[Question 10: 2 marks]

11) Explain why every term of $\frac{n+1}{n}$ is greater than 1 for positive integers n.

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[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown	$16 + 8$ (C1).
2	Explanation	$3n = 98$ (M1); 98 is not a multiple of 3 (C1).
3	Explanation	The first term is also needed (C1).
4	Shown	$n^2 = 49$ (M1); $n = 7$, a whole number (C1).
5	Ben	Multiply n by 2 then add 3 (C1); B1.
6	Shown	$u_2 = 5$, $u_3 = 7$ (M1); C1.
7	Explanation	$5n$ ends in 0 or 5 (C1); subtract 1 (C1).
8	Explanation	$2n^2$ is even (C1); even +1 is odd (C1).
9	Yes, $n = 3$	$3n + 1 = 4n - 2$ gives $n = 3$ (M1); both 10 (C1).
10	No	$4n + 2 = 2(2n + 1)$ (M1); $2n + 1$ is odd so only one factor of 2 (C1).
11	Explanation	$\frac{n+1}{n} = 1 + \frac{1}{n}$ (M1); $\frac{1}{n} > 0$ (C1).