FOUNDATION & HIGHER

HIGHER EXTENDS

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

A25: nth term

Deduce and reason with nth terms of linear and quadratic sequences

20 marks · 25 minutes · Non-calculator

1) Show that the *n*th term of 5, 8, 11, 14, . . . is $3n + 2$

[Question 1: 2 marks]

2) Ali says the *n*th term of 10, 7, 4, 1, . . . is $3n + 7$. Explain his mistake and give the correct *n*th term.

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[Question 2: 2 marks]

3) Show that the nth term of 3, 9, 19, 33, . . . is $2n^2 + 1$

[Question 3: 3 marks]

4) Explain how the second difference of a quadratic sequence tells you the coefficient of n^2.

. . . . . .

. . . . . .

[Question 4: 2 marks]

5) Show that the 5th term of $2n^2 - n$ is 45

[Question 5: 1 marks]

6) Is 201 a term of the sequence $4n + 1$? Show your working.

. . . . . .

. . . . . .

[Question 6: 2 marks]

7) Show that the nth term of 0, 3, 8, 15, ... is $n^2 - 1$ and explain how it is linked to the square numbers.

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[Question 7: 2 marks]

8) Which becomes larger, $3n + 4$ or n^2? From which value of n? Explain.

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[Question 8: 3 marks]

9) Explain why the sequence with nth term $7 - 2n$ eventually has negative terms.

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[Question 9: 1 marks]

10) Show that the nth term of 4, 10, 18, 28, ... is $n^2 + 3n$

[Question 10: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown	Difference 3 (M1); 3 + 2 = 5 (C1).
2	$13 - 3n$	Sequence decreases so the difference is -3 (C1); B1.
3	Shown	Second difference 4 so $2n^2$ (M1); remainder 1 (M1); C1.
4	Explanation	Half the second difference (C1); because an^2 has second difference $2a$ (C1).
5	Shown	$50 - 5$ (C1).
6	Yes	$4n = 200$, $n = 50$ (M1); whole number (C1).
7	Shown	Each term is 1 less than a square number (C2).
8	n^2 from $n = 5$	$n = 4$ gives 16 and 16 (M1); $n = 5$ gives 25 and 19 (M1); n^2 grows faster (C1).
9	Explanation	It decreases by 2 each time (C1).
10	Shown	Second difference 2 so n^2 (M1); remainder $3n$ (C1).