Linear Sequences: the nth term

1. Find the first five terms of the sequence with n th term and state if the sequence is linear:
   a. $3n - 5$
   b. $10 - 4n$
   c. 2^{n^2}
2. Find the formula for the n th term of the following sequences:
   a. 3, 6, 9, 12, 15, …
   b. 8, 14, 20, 26, 32, …
   c. 6, 13, 20, 27, 34, …
   d. 7, 16, 25, 34, 43, …
   e. 7, 5, 3, 1, -1, …
   f. $\frac{1}{2}, \frac{7}{6}, \frac{11}{6}, \frac{5}{2}, \frac{19}{6}$, …
3. Hence determine (with working!) the 200th term of each of the sequences from Question 2.
4. Determine if the indicated term is in the sequence. Ensure you show working to explain why.
   a. Is 106 in the sequence with nth term $4n - 2$?
   b. Is 1009 in the sequence 4, 7, 10, 13, 16, …?
   c. Is 1500 in the sequence 4, 10, 16, 22, 28, …?

Solutions

1. Find the first five terms of the sequence with nth term:
   a. $3n - 5$ -2, 1, 4, 7, 10 **linear**
   b. $10 - 4n$ 6, 2, -2, -6, -10 **linear**
   c. 2^{n^2} 2, 16, 512, 65536, 33554432 **non-linear**
2. Find the formula for the nth term of the following sequences:

a.	3, 6, 9, 12, 15, …	**3n**	**600**
b.	8, 14, 20, 26, 32, …	**6n+2**	**1202**
c.	6, 13, 20, 27, 34, …	**7n-1**	**1399**
d.	7, 16, 25, 34, 43, …	**9n-2**	**1798**
e.	7, 5, 3, 1, -1, …	**9-2n**	**-391**
f.	$\frac{1}{2}, \frac{7}{6}, \frac{11}{6}, \frac{5}{2}, \frac{19}{6}$, …	**$\frac{4}{6}$ n - $\frac{1}{6}$**	**$\frac{799}{6}$**

3. Hence determine (with working!) the 200th term of each of the sequences from Question 2.
4. Determine if the indicated term is in the sequence. Ensure you show working to explain why.
   a. Is 106 in the sequence with nth term $4n - 2$? **422**
   b. Is 1009 in the sequence 4, 7, 10, 13, 16, …? **3028**
   c. Is 1500 in the sequence 4, 10, 16, 22, 28, …? **8998**