Unit title	Sequences and Limits
Topic	Formula Iteration
Name and email address of person submitting unit	Christine.Farnsworth@sunderland.ac.uk
Aims of Unit	To examine the behaviour of number sequences formed using an iteractive procedure and to generalise and justify the results obtained.
Indicative content	Using either a calculator, spreadsheet or LOGO software, students will examine the behaviour of a flow chart sequence i.e. input 1 → divide by 2 → subtract 3 → write down the next term in the sequence → return to divide by 2 … Students will then examine the effect of changing numbers within the flowchart sequence.
Resources needed	Calculators/computer software (spreadsheets or LOGO)
Teachers notes	Students will be encouraged to prove the results found.

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Sequences and Limits

The number sequence

$\bar{2}.5 \quad \bar{4}.25 \quad \bar{5}.125 \quad \bar{5}.5625 \ldots\ldots$

can be generated from the following rule:-

$$x_{i+1} = \frac{x_i}{2} - 3 \qquad \text{where } x_1 = 1$$

Use a calculator or a spreadsheet or use a LOGO procedure to determine the first 20 terms of the sequence. Describe the behaviour of the sequence.

Investigate other sequences generated by the rule:

$$x_{i+1} = \frac{x_i}{n} - m \qquad \text{where } x_1 = a \text{ and } a, m \text{ and } n \in \mathrm{R}$$

What happens to these sequences when i becomes large?

What general statements can be made concerning the rule and the number sequences generated by the rule? Try to justify any general rules that you find.