Sequences

Teacher Notes

Create a new blank document and save it as: **sequence.** Open a new calculator page.

Starter activity

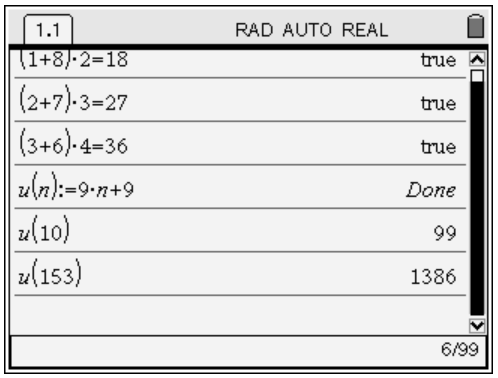
[This could either be used solely to introduce the activity or a whole lesson could be allowed to give students the opportunity to explore the possibilities as a full investigation].

Investigation:
Some numbers can be written as multiples of the sum of their digits.
For example: 12 → (1 + 2) × 4 = 12
Investigate other examples, form them into families.

[*Commentary*: initially the solutions can either be grouped as sets of examples using a multiple of 2, then 3, then 4 etc. or they can be grouped in sets of multiplication tables, notably 9 → (2) × 1 = 9, 18 → (1 + 8) × 2 = 18, 27 → (2 + 7) × 3 = 27, etc.

Students can extend into many digits or fractional multiples].

Students can use the blank calculator page to check their statements:
Type (1+8) × 2 = 18 and press **enter**. The handheld will say **true**.



Main activity 1

The Starter will have set up the sequence 18, 27, 36, 45, ... as an object of interest.
[We will write sequences vertically for this activity].
Students should make a table in their books as follows:

n	u(n)=				
0					
1	18				
2	27				
3	36				
4	45				
10					
86					
153					

Discuss: what would the 10th number in the sequence be? The 86th? The 153rd?
How could I find a rule to work out any number in the sequence?
Students should fill their estimates into their table.

(A good procedure is to notice that each extra line in the sequence requires one extra 9, so the number must be 9 x the number of terms i.e. 9n. If we work the sequence backwards, the 0th term must be 9, so we must have had 9 to start with, so the rule is 9n+9.
We can write this rule as u(n)=9n+9, which we read as "u of n equals 9 n plus 9".
On the calculator page define this rule:
Type u(n):=9n+9 and press **enter**.
Test the estimates in the table using the rule. E.g. Type u(10) and press **enter**.
Students should change their entries in their table if needed.

Plenary

Quick questions to confident with the vocabulary:
"What's the 27th terms in the sequence?" [Students find u(27)]
"What's the value of u(61)" [Students find u(61)] etc.

Main activity 2

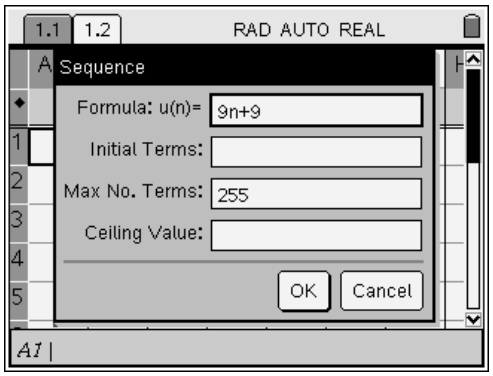
Students can now develop their capacity to find the nth terms of a variety of sequences. Here are possible examples:

- 3, 5, 7, 9, ...
- 7, 10, 13, 16, ...
- 1, 5, 9, 11, ...
- 2, 6, 12, 20, ...

[The last one is quadratic and will give the opportunity for students to develop their thinking].
Students should write all of these sequences vertically into their table from the last activity.

In each case, students should estimate the 10th, the 86th and the 153rd numbers and write them into their table.
Then they formulate a rule u(n) and write it into their table.
Then define the rule on the calculator page and use it to check their estimates.

Plenary



Students should open a new Lists & Spreadsheets page.
With the cursor in cell A1 choose **menu/Data/Generate Sequence**
Type the rule for the first sequence into the first line of the wizard and press **enter**.
Explore the sequence and check all of the entries in the table.

Repeat the procedure to check the other sequences in columns B, C D etc.