

## SEQUENCES

### Teacher Notes

#### References

Foundation	A3 Sequences
Foundation Plus	A4 Sequences
Higher	A3 Sequences
Higher Plus	A3 Sequences and linear graphs

#### Introduction

In this activity students use the TI-Nspire to generate sequences using both term-to-term and sequence-to-term rules. By plotting terms against position for linear sequences they gain further insights.

#### Resources

The student instructions for this activity are all included in the TI-Nspire document **Sequences.tns**.

There are no separate student notes for this activity.

#### TI-Nspire skills students will need

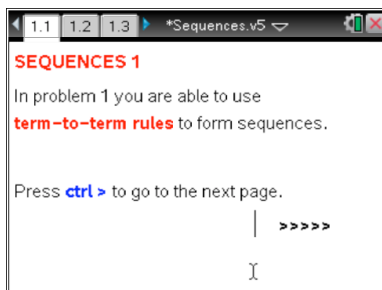
Transferring a document to the handheld.  
Opening a document on the handheld.  
Moving between pages of a document.  
Moving from one part of a split screen to another.  
Basic use of the calculator facility.

#### The activity

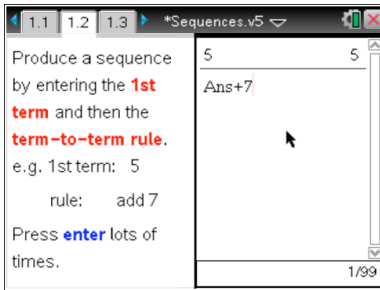
This activity is designed for use by students working individually on TI-Nspire handhelds, but it can also be demonstrated using the TI-Nspire Teacher Software projected onto a screen.

The TI-Nspire document is divided into four “problems” and the various pages are reproduced below with comments.

#### Problem 1. Term-to-term rules



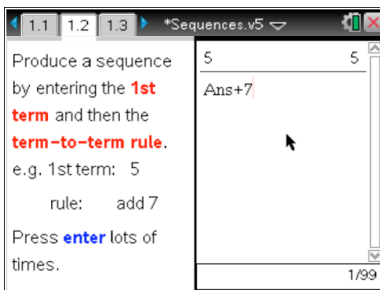
Page 1.1 is simply a TI-Nspire Notes page.



Page 1.2, like many of the later pages, shows a split screen with Notes on the left and, in this case, a Calculator page on the right.

To move between the two parts of the page it is necessary to press **ctrl** **tab**.

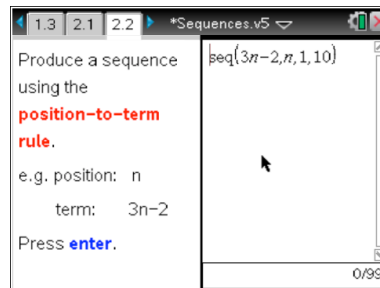
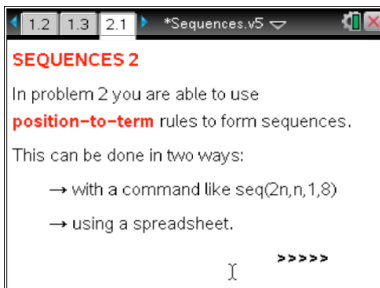
Notice you only need to enter +7 in the Calculator space and this forces TI-Nspire to add 7 onto the previous answer. Subsequent use of **enter** on its own, tells TI-Nspire to repeat the previous calculation: in this case adding on another 7 and extending the sequence



There are ten sequences on page 1.3 —it is necessary to scroll down to see the parts f) to j).

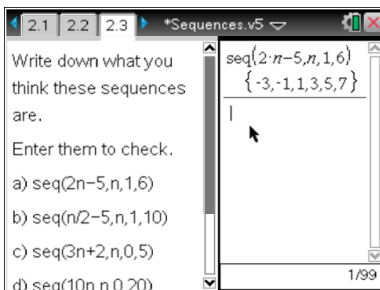
- |    |                            |                       |
|----|----------------------------|-----------------------|
| a) | 1, 5, 9, 13, 17, ...       | add four              |
| b) | 21, 18, 15, 12, ...        | subtract 3            |
| c) | 25, 15, 5, -5, -15 ...     | subtract 10           |
| d) | 0, 0.125, 0.25, 0.375, ... | add 0.125             |
| e) | 1, 0.93, 0.86, 0.79, ...   | subtract 0.07         |
| f) | 1, 2, 4, 8, 16, 32, ...    | double                |
| g) | 1, 10, 100, 1000, ...      | multiply by 10        |
| h) | 243, 81, 27, 9, ...        | divide by 3           |
| i) | 1, 3, 7, 15, 31, ...       | double and add 1      |
| j) | 2, 3, 5, 9, 17, ...        | double and subtract 1 |

### Problem 2. Position-to-term rules

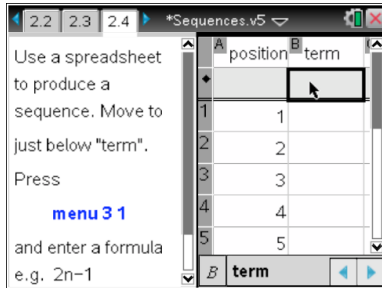


The command  $seq(3n-2,n,1,10)$  can be interpreted as:  
*the sequence of values of  $3n-2$  for values of  $n$  from 1 to 10.*

Notice the use of the TI-Nspire to check answers here. It is well worth encouraging students to write answers down before entering the sequence formula.

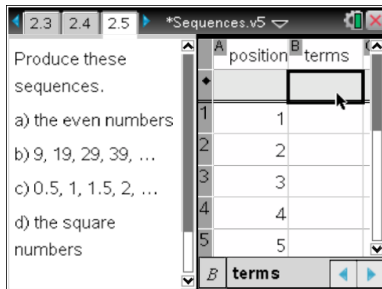
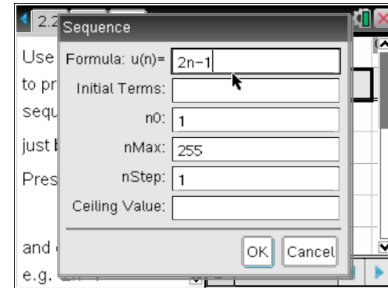


- |    |                     |                                 |
|----|---------------------|---------------------------------|
| a) | $seq(2n-5,n,1,6)$   | -3, -1, 1, 3, 5, 7              |
| b) | $seq(n/2-5,n,1,10)$ | -4.5, -4, -3.5, -3, ... -0.5, 0 |
| c) | $seq(3n+2,n,0,5)$   | 2, 5, 8, 11, 14, 17, 20         |
| d) | $seq(10n,n,0,20)$   | 0, 10, 20, 30, ... 200          |
| e) | $seq(n^2,n,1,10)$   | 1, 4, 9, 16, 25, ... 100        |



On page 2.4, by pressing **menu** **3** **1**, students use the *Generate Sequence* tool in the Data menu.

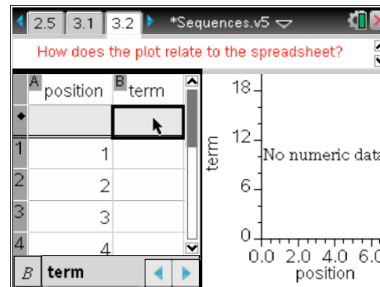
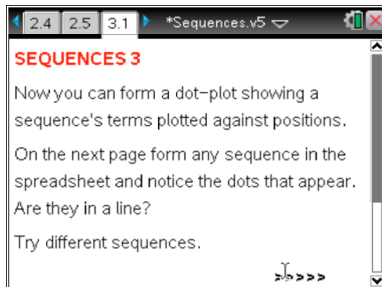
This opens the box on the right. Once the formula is entered just press **enter**.



For page 2.5 suitable formulae are:

- a)  $2n$
- b)  $10n-1$
- c)  $n/2$  or  $0.5n$
- d)  $n^2$

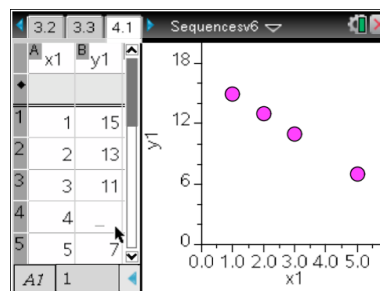
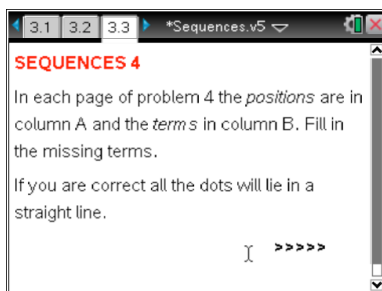
### Problem 3. Plotting terms against positions



The terms may be entered either using the *Generate Sequence* tool as in Problem 2, or by entering them manually, cell by cell.

It is well worth asking students to state clearly how the plot relates to the values in the spreadsheet.

### Problem 4. Missing terms



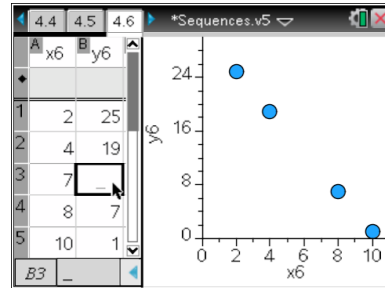
Here students are required to identify the sequence and then fill in the missing terms in column B of the spreadsheet.

Notice that in this problem the headings of the columns have been changed from position/term in order to emphasize the links to the graphs.

These problems can be solved either by identifying the term-to-term rule or the position-to-term rule. It is well worth discussing the alternative methods with students—which is easier to use here?

Also notice that from page 4.6 onwards things get much more difficult because the numbers in column A are no longer simply 1 to 5.

There are 10 pages of increasing difficulty.



Page	Missing numbers	Term-to-term rule	Position-to-term rule
4.1	7	Subtract 2	$17-2n$
4.2	3 9	Add 3	$3n-6$
4.3	6.5 10	Add 3.5	$3.5n-0.5$ or $(7n-1)/2$
4.4	19 14	Subtract 5	$29-5n$
4.5	11 14 17	Add 3	$3n+5$
4.6	10	Subtract 3	$31-3n$
4.7	22.5	Subtract 2.5	$50-2.5n$
4.8	2.75 3.5 3.75	Add 0.25	$0.25x+2$
4.9	2.45 2.3 2.21	Subtract 0.05	$2.5-0.05n$
4.10	7 2.5 1 -2	Subtract 1.5	$10-1.5n$

You may wish to show students that it is possible to plot a function using the position-to-term rule: press **menu** **4** **4** to choose the Plot function rule from the Analyse menu. A straight line is produced which passes through all the points. The significance of the y-intercept and gradient can then be discussed.

You may wish some students to get their handhelds to calculate the position-to-term rule on the plot. This can be done using the linear regression command from the Analyse menu (press **menu** **4** **6** **1** ).

