Sequence Investigation
ID: 11062

Activity Overview
In this activity, students will use a Calculator page to create an arithmetic sequence. Through this they will learn some of the vocabulary of sequences. Then students will then use slider functionality to explore the effect of each variable in the formula of the nth term of an arithmetic sequence. Students will learn how to graph a sequence using a scatter plot.

Topic: Sequence, Series & Functions
- *Sequence terminology*
- *Graphing arithmetic sequences*

Teacher Preparation and Notes
- *It would be beneficial for students to be familiar with navigating between pages (ctrl + ◄ or ctrl + ►), using sliders when they are minimized (click the associated up or down arrow), grabbing (ctrl + ⊙), and toggling (ctrl + tab) between applications on the same page.*
- *This activity can serve as a nice introductory activity to sequences. It is written for arithmetic, but everything is adaptable for geometric series. The TI-Nspire document (.tns file) can be used by itself or the teacher can provide the worksheet for students to record their answers.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "11062" in the quick search box.***

Associated Materials
- *Alg2Week03_GraphSeq_worksheet_TI-Nspire.doc*
- *Alg2Week03_GraphSeq.tns*
- *Alg2Week03_GraphSeq_Soln.tns*

Suggested Related Activities
- *Geometric Sequence & Series — 8674*
- *Working with Sequence and Series — 9808*
- *Arithmetic Sequences & Series — 8642*
- *Spreading Doom — 10074*
- *Sequence & Series Introductory Quiz — 10486.*

Problem 1 – Create a sequence

Students use a calculator page to create an arithmetic sequence. They are introduced to the vocabulary of "term of a sequence."

If the student presses an operation, like +, immediately after a result is shown, then an iterative process will begin. For example, it will say **Ans + –3,** and when (enter) is pressed, the line changes to **the number + –3**. Pressing (enter) again will add –3 to the answer again.

If done correctly, the sequences created by all students should be arithmetic sequences with 5 terms and a common difference of –3. The only difference is the starting value.
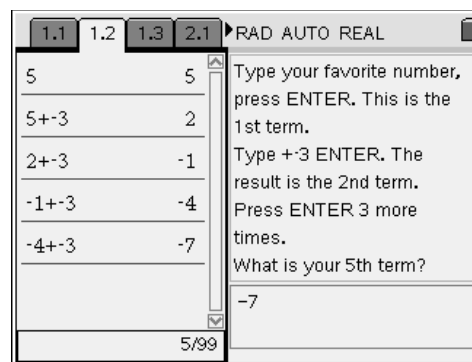
Problem 2 – Graphically and numerically explore *n*th term formula

Students explore the variables in the formula of the *n*th term of an arithmetic sequence on pages 2.2, 3.1, and 4.1 using minimized sliders. Each page focuses on a different variable. Column A is the values of the terms and column B is the number of the term.

Students should determine the following:

  a1 is the first term
 *d* is the common difference
  n is the number of terms

Then they need to determine the effect each variable has on the graph. Students may respond graphically: *a1* makes the graph go up or down, *d* changes the slope and *n* puts more data points on the graph.
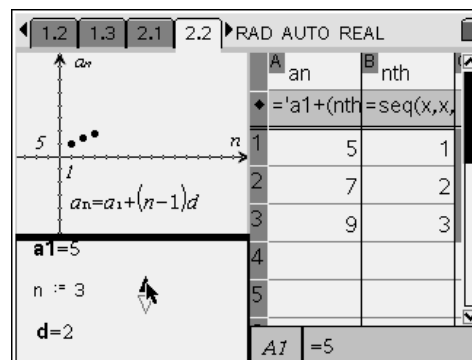
Problem 3 – Graphing a sequence as a scatter plot

Students will use page 5.2 to generate terms of a sequence. Column A will list the number of the term and column B will list the value of each term.

The information for the sequence dialog box of column B is shown at the right. Ceiling Value should be left blank. Note also that, unlike column A, students do not need to enter an initial value because $a_1 = 5 + 2(1-1) = 5 + 2 \cdot 0 = 5$.
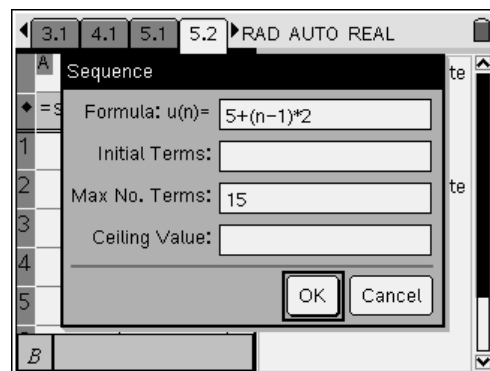
On page 5.4, students are to graph the sequence. They can press (ctrl) + (G) to hide the function entry bar enabling them to see more of the graphing area.
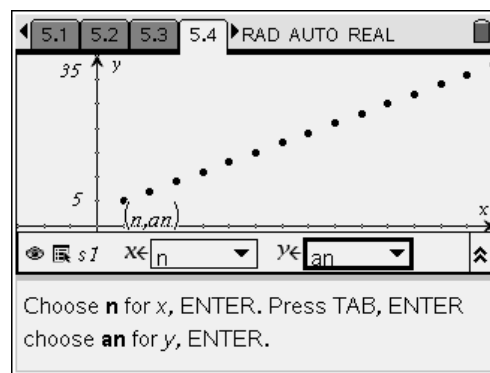
Extension – Graphing a sequence on a Data & Statistics page

Students are to generate the terms of their sequence from the Problem 1 using the spreadsheet on page 6.2. Once again, there will be only 5 terms. Common mistakes include forgetting to label the columns **n** and **an**.

They should use what they learned to graph the sequence. Students have two options. The first option is described on page 6.1. With the cursor in column A, selecting **Quick Graph** from the Data menu will split the screen and graph the sequence on the right side using a *Data & Statistics* screen. Students will then need to select **an** for the *y*-axis.

Note that if the cursor is in column B when **Quick Graph** is selected, **an** instead of **n** will be placed on the *x*-axis.

The second option is to add a Data & Statistics page, clicking the bottom (*x*-axis) to select **n** and then click the left side (*y*-axis) to select **an**.