Activity Title:
Turn Off The Extra Lights? Time Required: 45 minutes
By Sharon Dailey

Activity Overview:
In this exercise, students will review an electricity bill and use Nspire technology to represent the charges graphically using the *Graphs and Geometry* Application. Students will use the *Calculator* Application with the horizontal split screen to perform the necessary calculations. They also will use the *Calculator* Application and piecewise function template, defining the function to represent the total charge for the number of kilowatts used in the billing period. The piecewise function will be used to answer questions on the student worksheet. This activity is appropriate for Algebra II or Precalcululus.

Concepts:
- Function concepts
- Piecewise functions
- Value of a function

Teacher Preparation:
This activity offers the opportunity for students to use their understanding of piecewise functions at a local level, examining and representing a local electric bill. The students should have worked with piecewise function examples prior to this activity. **The teacher should have introduced students to the n-piece template for piecewise functions.**

This activity should provide ALL students with a new and deeper understanding of piecewise functions and the answer to an often asked question, "Yes, You Will Use Piecewise Functions In Everyday Life."

- Students may be asked to provide electric bills from home. The teacher may have them work on their own or on specifically selected bills. A sample bill is provided in the student worksheet.
- Students should have a basic understanding of operating a TI-Nspire calculator, inserting applications, calculating, and using the piecewise function template.
- Students will receive the *electric bill* tns. document which will guide them through the activity, asking them to insert appropriate pages as they complete this activity.
- Students will complete the accompanying worksheet. All answers to questions should be submitted in **sentence form** and the teacher should indicate to students the algebraic manipulation work required on the worksheet.

Classroom Management:

- This activity is designed to be student-centered. The teacher may act as a facilitator while students work independently or cooperatively. The teacher will inform students in which manner they are to work.
- The ready-to-use worksheet will provide a sample electric bill; questions on the worksheet and in the tns. document are referencing that bill. Other bills may be utilized by overlaying it on the worksheet prior to running it off and making any necessary changes. Page 1.3 of the document would have to be edited using the rates on the bill selected to be used in the activity.
- The file titled *electric bill SOL* shows the expected results of working through the activity.

TI-Nspire Applications:
Calculator, Graphs & Geometry

Activity Extensions:

- Students may work with gas bills and other utilility bills. Note in the case of gas bills, separate functions could be used for basic gas cost and distribution; PGA Charges and then the functions could be added together to get the total charge for the service, ex. $f1(x) + f2(x) = c(x)$, where x is the therms used. (See example gas utility bill in problem 2 on the electricbill SOL document.)
- If students are using their own bills they could figure the utility cost per sq. ft. and make comparisons within the classroom. Students could discuss reasons why some homes have such a variance in utility cost per sq.ft.
- Students could contact a real estate agent for a list of homes for sale that have listed average utility cost and square footage; set up a *list & spreadsheet* to calculate utility cost per square foot.