Combining Transformations

Activity Overview

In this activity, students explore transformations of functions. Given a parent function f(x) they will explore the affects of a, b, c, and d in the general rule a·f(b(x-c)) + d. This activity is designed as a follow-up to the **Transforming Functions** activity. However, it can be used as a stand-alone activity without using **Transforming Functions** with a little editing of page 1 of the Student Handout.

Concepts

- Transformations of Functions

Teacher preparation

This activity allows students to explore geometric transformations (specifically, stretching and translating) as they are applied to functions. Students with some familiarity of families of functions may be helpful.

Classroom management tips

- This activity is designed to be student-centered with the teacher acting as a facilitator while students work cooperatively. The student worksheet is intended to guide students through the main ideas of the activity and provide a place to record their observations and reflections.
- Students will be asked to make calculations and graph functions. Therefore, a basic working knowledge of the TI-Nspire handheld is needed.
- The ideas contained in the following pages are intended to provide a framework as to how the activity will progress. Suggestions are also provided to help ensure that the objectives for this activity are met.

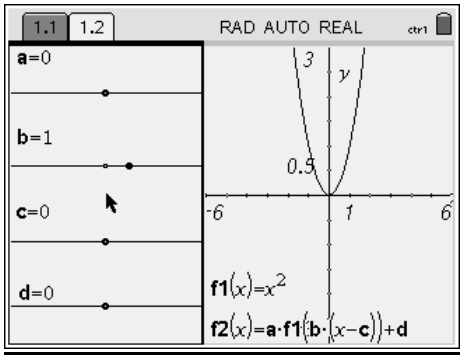
TI-Nspire Applications

Graphs & Geometry, Notes

Problem 1—Combining Transformations f(x) = **a**·f(**b**·(x-**c**)) + **d**

In this problem the students are asked to use the tables on pages 2-6 of the Student Handout to explore **a**·f(**b**·(x - **c**)) + **d** for different values of **a**, **b**, **c**, and **d** and different parent functions f(x).

For each row in the table, they are to give an example of a parent function that meets the criteria (e.g. $f(x) = x^2$ is an example of a parent function that meets the criteria of $f(x) = x^{even}$), sketch a graph of the example, and describe the domain and range of your example.



Students should use page 1.2 of the CombiningTranformations.tns file to check their work.

*Note: If you are using a handheld, the dotted graph of **f2**(x) may appear slowly.*

Note: You may want to "jigsaw" this activity by dividing up the table work on pages 2-6 of the Student Handout between groups. Each group is then responsible to "teach" their piece to the entire class.

At the end of this problem, the students are asked to complete the Check for Understanding on page 7 of the Student Handout. This may be done individually or as a group depending on the instructional goals of the teacher. One consideration might be whether this part of the activity is going to be used as formative or summative assessment.

After the students have completed the Check for Understanding, the teacher should then facilitate a discussion of their findings. This can be done as a large group or small group discussion.

Assessment and evaluation
Included in the Activity is a Check for Understanding (page 7 of the Student Handout) that can be used as an assessment and evaluation of the students.

Activities extensions

Teachers may want to use the trigonometric functions or add other functions to the student handout as extensions.

Student TI-Nspire document

CombiningTransformations.tns