TI-Nspire Activity: *Percent Percent*
By: Jean McKenny

Activity Overview
Prior to doing this activity with students it is strongly suggested that the activity Percent Up or Down be done. The Percent Up or Down activity is designed to help students understand the concept of percent increase verses percent decrease. This activity looks very similar to the other but it has "a different ending" as it deals with a different concept. The similarity in the two activities will cause students to have to "think harder" about what is really happening when changes are made to a rectangle.

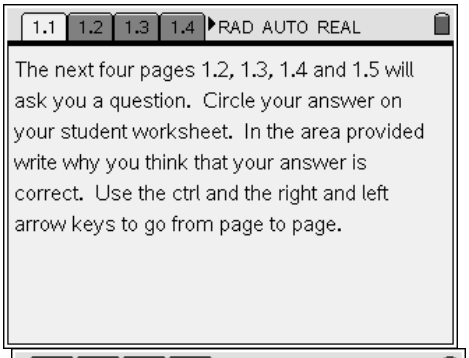
Concepts
Multiple Percents

Teacher Preparation
The teacher should download the file percentpercent.tns and transfer it to student handhelds. The teacher should also provide a copy of the student worksheet for the activity to each student.

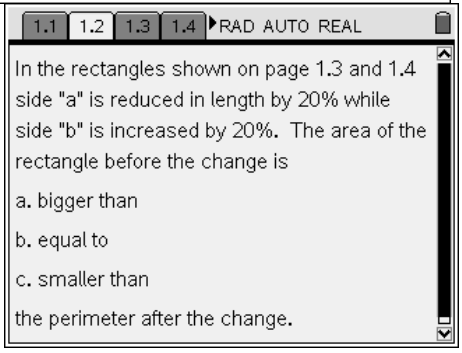
The Classroom.
The activity uses the notes and the graphs and geometry applications of the handheld.
*The **students should work individually** and **the teacher should NOT give students any help answering the first question in the activity.** The first question is a prompt designed to elicit student conceptual understanding or misunderstanding. The typical student may answer the question incorrectly. The activity then gives students an opportunity (later in the worksheet) to correct this incorrect answer. If students know how to use the handheld to "measure" the area of a rectangle, they should be reminded that the directions in the activity say NOT to measure the rectangles to answer the initial question on the worksheet. Later in the activity the areas will be "measured" for the students.*

The Document

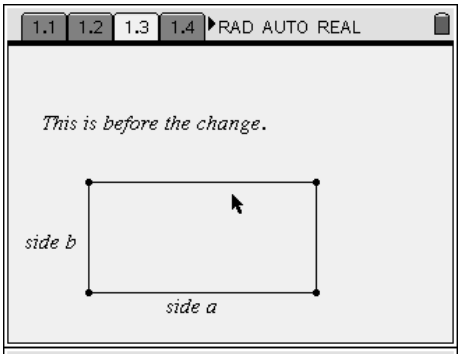
This page 1.1 explains what is to come in the activity.



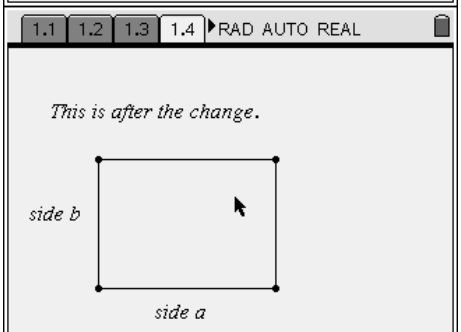
This page 1.2 is the prompt designed to elicit student conceptual understanding or misunderstanding. **Do not assist students in answering this question.** Students should be reminded that the directions say not to "measure" the rectangles in order to answer the question. The students should rely on prior math knowledge only to answer it.



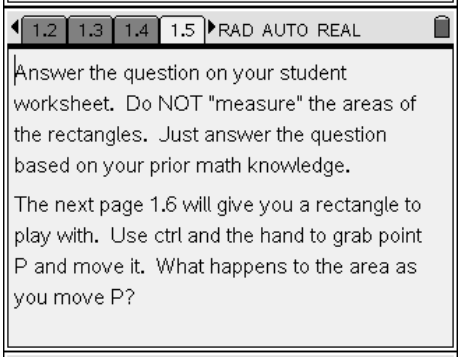
This page 1.3 provides a picture of the rectangle before the change.



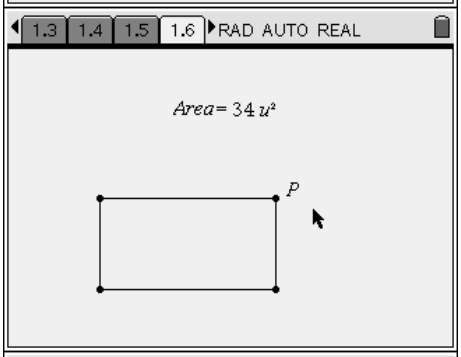
This page 1.4 provides a picture of the rectangle after the change. Students can go back and forth between pages 1.3 and 1.4 to see the before and after rectangles.



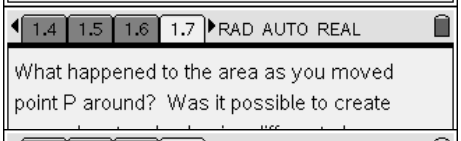
This page 1.5 directs the student to answer the initial question on the worksheet and NOT to measure the rectangle in order to answer it. It also provided beginning directions and questions for the next page.



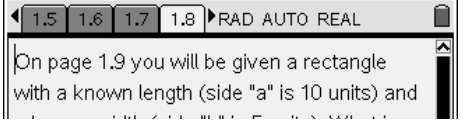
This page 1.6 gives students a rectangle so that they can (by grabbing and moving point P) see that many different rectangles with different shapes will have the same area. It is included to give students practice with grabbing and changing the rectangle. It can also give students an awareness of the different lengths and widths of rectangles and reinforce that the adjacent sides are usually different in length (exception would be a square).



This page 1.7 asks several questions that the student should answer on the student worksheet. The last question is designed to see if students realize that there would actually be an infinite number of possible rectangles with a fixed area.

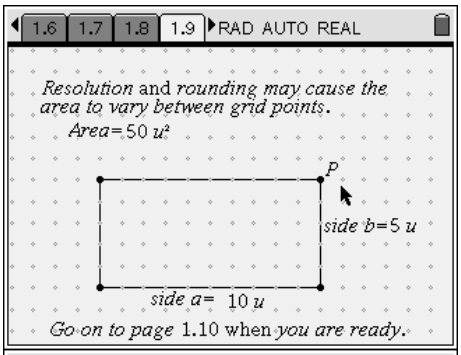


This page 1.8 is an introduction to having students actually calculate as well as manipulate a rectangle with initial sides of 10 (side a) and 5 (side b). The intent is that after students actually calculate 20% of 10 and 20% of 5 that they will realize that side

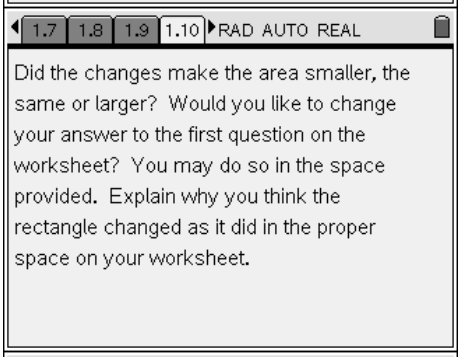


"a" is reduced by a larger amount than side "b" is increased. This may cause them to want to change the answer that they gave to the initial question on the worksheet. The questions on this page should be answered on the worksheet.

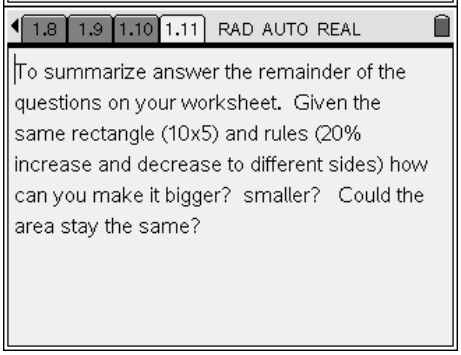
This page 1.9 is where the student can actually manipulate the rectangle and change it from a 10 X 5 to an 8 X 6. The area should change from 50 to 48 and cause the students to realize that the correct answer to the initial question in the worksheet should have been "a". The rounding and resolution built into this page may cause the calculated area in between grid points to be slightly incorrect. Students are alerted to this on page 1.9. Students will know when they are on the grid point as the side then looks like a "broken" line as shown in the picture of page 1.9 to the right.



This page 1.10 asks students what they discovered by making the actual changes and record answers on the worksheet. It also gives each student an opportunity to change his or her mind about the answer to the original prompt. Students can give the new answer. Students are asked why the rectangle changed as it did.



This summary page is designed to focus student thinking on the concept of multiplying percents. Students should know (especially if they did activity Percent Up or Down) that taking the same percent of a larger quantity will result in a larger number than taking the same percent of a smaller quantity. The perimeter (in Percent Up or Down) could only remain the same if the initial rectangle given was a square. However the area, because the percents are being multiplied will act differently. It is not possible to make the area larger or the same under the given rules. This may surprise some students, especially if they have previously done the Percent Up or Down activity. Some students may be ready for the generalization that L X W changes to 1.2L X .8W = .8L X 1.2W = .96 L X W. As a consequence the new rectangle will always have a smaller area.



Assessment and Evaluation

The teacher should quietly monitor the student worksheets during the activity. No help should be given to the students when they are answering the initial question on the worksheet. The activity is designed to measure if the student understands the concept and then as the activity continues the student misconception should be corrected. When the teacher collects the student worksheets s/he should pay particular attention to the student explanations as well as whether or not the answer is correct (Answer "a").