Place-Value Counter: Get to the Target

Description: Students use their knowledge of place value and their intuitive notions of rounding to operate an interactive numerical counter that operates like an odometer. Using buttons that increase or decrease the value of the counter by one, ten, one hundred, one thousand, or more, students work to reach given target values in as few button presses as possible.

Technology Strength: The interactive counter model provides an engaging kinesthetic and visual way for students to explore place-value concepts. The controls that allow students to increase and decrease the counter's numerical value highlight the role and importance of place value.

Objectives: Apply understanding of base-ten place value; develop intuitive notions of rounding

Prerequisites: Familiarity with place-value concepts applied to large numbers; ability to read numbers up to 1,000,000

Suggested Grade Level: 3 to 5

Sketchpad Level: Beginning

Suggested Duration: 60 minutes

Suggested Classroom Setting: Whole Class, Student Pairs. This activity, designed for use by student pairs, can be easily modified for whole-class use.

Preparation: Review the Activity Notes. Preview the sketch. Working through the steps on the worksheet and make a copy of the worksheet for each student.

Materials: None

Student Worksheet(s): Get to the Target

Student Sketch: Place Value Counter Target.gsp

Presentation Sketch: None

Vocabulary: Place value, rounding

Sketchpad Version: GSP5

Using the Sketch:

A counter operates like an odometer, following the conventions of base-ten place value. To start, the counter is set to 0.

When the rightmost + button is pressed once, the value of the counter increases to 1. Each subsequent press of this + button increases the number displayed in the counter by one. When the counter reaches 9, the next press of this button brings the counter to 10 (1 in the tens place and 0 in the ones place). Moving from right to left, the remaining + buttons increase the value of the counter by ten, one hundred, one thousand, ten thousand, one hundred thousand, and one million, respectively.

A table below the counter keeps track of the number of times each button is pressed. In the second illustration here, the table shows that a student has pressed the tens-place button nine times and the ones-place button ten times. Doing so has changed the counter's display to 100 because $(9×10) + (1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1) = 100$.

A Reset button clears the counter. students' challenge is to use different combinations of button presses to display the numbers 10, 100, and 1000.

Sketch Tips:

Sketch Tips show skills needed in this activity, and the step at which the skill is first used.
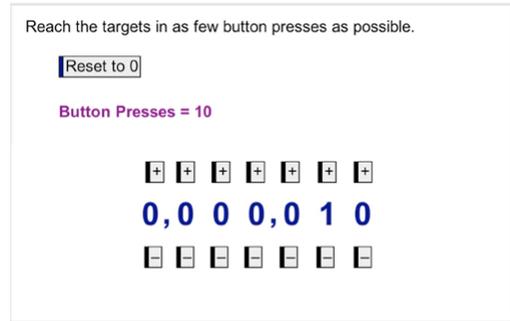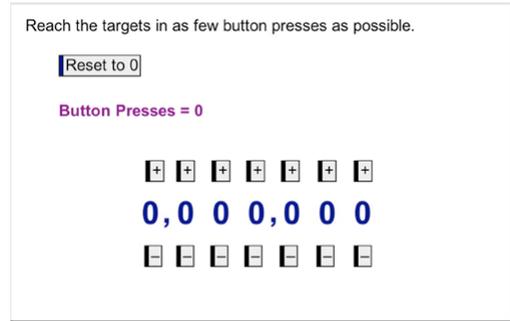
Sketch Tip	Tip Sheet or Tip Video
Step 1: Open, print, and save a document	Working with Documents
Step 1: Change to a different page using page tabs	Moving Between Pages