

# Zooming Decimals: Precision and Place Value

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**Description:** Students zoom in on a number line to reveal scales calibrated to tenths, hundredths, thousandths, and ten-thousandths. They reason about decimals and place value as they name with increasing precision the location of a point on the number line.

**Technology Strength:** The engaging animated model presents what is usually a thought experiment—the magnification of a number line—as a visual and kinesthetic simulation, helping students build mental models and conceptual understanding of decimal place value.

**Objectives:** Extend place-value understanding of whole numbers to decimals; use decimals to estimate and record a location on a number line with increasing precision; reason about decimals in a context-free situation

**Prerequisites:** Experience with thinking of whole numbers as having a relative magnitude and order independent of a context; some familiarity with place value and place-value terminology; some familiarity reading and writing decimal notation; experience using number lines

**Suggested Grade Level:** 3 to 6

**Sketchpad Level:** Beginning

**Suggested Duration:** 60 minutes

**Suggested Classroom Setting:** Whole Class

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

**Materials:** None

**Student Worksheet(s):** Zooming Decimals

**Student Sketch:** Zooming Decimals.gsp

**Presentation Sketch:** None

**Vocabulary:** Estimate, interval, precision

**Sketchpad Version:** GSP5

## Using the Sketch:

The model displays a 0—10 number line and a point, ringed in red, sitting on the line. As precisely as they can, students estimate the location of the point. Pressing a Zoom button magnifies the interval on which the point sits (here, the interval between 6 and 7). The magnified interval is itself marked in ten equal parts. Students identify these parts as tenths and use this new scale to more closely approximate the point's location.

Pressing a series of Zoom buttons magnifies intervals further. With each magnification, students identify the size of the newly marked parts—in succession, hundredths, thousandths, and ten-thousandths—and estimate the location of the point with increased precision. Pressing *Show Location* displays the value of the point's location to eight decimal places, emphasizing that the location of the point could be found to even greater precision if the number-line intervals were divided beyond ten-thousandths.

To create a new exercise, students press *Reset* and drag the point on the uppermost number line to a different location. It is also possible to change the number line's whole-number bounds from 0—10 to any other interval of 10 to help students develop fluency in naming decimals. A second model reverses the process, giving students a decimal value to start and asking them to locate it along the five scaled number lines.

## 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
Open, print, and save a document	Working with Documents
Change to a different page using page tabs	Moving Between Pages
Select, deselect, and drag objects with the <b>Arrow</b> tool	Using the Arrow Tool
Undo actions using <b>Edit   Undo</b>	Undoing and Redoing
Change the value of a number (parameter)	Changing Parameter

