

Ordering Decimals

Student Probe

Which decimal is larger, 0.37 or 0.365?

Answer: 0.37

Students' most common error is to select the number with more digits.

Lesson Description

In this lesson, students will use a number line and 10 x 10 grids to order decimals. The lesson is intended to develop conceptual understanding of how decimal numbers are constructed and to promote discussion about the relative size of decimal numbers. The use of multiple representations of the numbers is encouraged.

Rationale

Putting a list of decimal numbers in order is closely related to ordering fractions and understanding fraction to decimal equivalences. As students gain familiarity with decimals, they frequently misapply whole number ideas. Most commonly they assume that the more digits in a number, the greater it is. Once they understand that digits to the far right in a decimal number are quite small, they may incorrectly think that the more digits, the smaller the number. A deep understanding of the relative size of decimals will help students estimate for accuracy and be able to determine the reasonableness of answers, an important skill when using calculators and making real world applications.

Preparation

Prepare Decimal Number Lines and Ten by Ten Grids worksheets for each student.

At a Glance

What: Ordering decimals

Common Core State Standards: CC.5.NBT.3b.

Read, write, and compare decimals to thousandths. (b) Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.

Mathematical Practices:

Construct viable arguments and critique the reasoning of others.

Attend to precision.

Look for and make use of structure.

Who: Students who cannot order decimals.

Grade Level: 5

Prerequisite: whole number place value

Vocabulary: Decimal place value

Prerequisite Skills: Number Lines, Decimals

Delivery Format: Individual, pairs, small group, whole group

Lesson Length: 15-30 minutes

Materials, Resources, Technology: Visual display for worksheets, markers, Base Ten Blocks (optional)

Student Worksheets: [Decimal Number Lines](#) (.pdf), [Ten by Ten Grids](#) (.pdf)

Lesson

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>1. I have listed four decimal numbers on the board: 3.5, 3.125, 3.4, 3.75, 3.66</p> <p>Predict the order of the decimal numbers from least to most and place them on the first number line on your Decimal Number Line worksheet.</p>	Answers will vary.	Monitor students. Model the number line placement, if necessary, but do not correct students' predictions at this time.
<p>2. Compare your predictions with your partner's.</p>	Answers will vary.	Monitor students. Do not correct students' predictions at this time.
<p>3. Look at your Ten by Ten Grids worksheet. How many squares are in each 10 x 10 grid? How do you know?</p>	100, because $10 \cdot 10 = 100$.	Count the squares with the students. It is suggested that students count by rows (10, 20, 30, ..., 100).
<p>4. What part of a whole does each square represent?</p>	$\frac{1}{100}$	Refer to Naming Fractions .
<p>5. Let's write these decimal parts as fractions. (Model, as necessary.)</p>	$0.5 = \frac{5}{10}$ $0.125 = \frac{125}{1000}$ $0.4 = \frac{4}{10}$ $0.75 = \frac{75}{100}$ $0.66 = \frac{66}{100}$	Monitor. Assist students who are having difficulty.
<p>6. Now, on your Ten by Ten Grids worksheet, we are going to shade the decimal part of each number. We will do 3.5 together. (Model how to shade 0.5 on the first grid.)</p>	Shade 0.5, 0.125, 0.4, 0.75, and 0.66 on the Ten by Ten Grids Worksheet.	Monitor students as they work. Model another example, if necessary. (0.125 may be difficult for some students. Shade $12\frac{1}{2}$ squares.)

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
7. Looking at your shaded 10 x 10 grids, let's place the decimal parts in order from least to greatest. How do you know?	0.125, 0.4, 0.5, 0.66, 0.75 More of the square is shaded.	Model. Count the shaded squares, if necessary.
8. Based on what we have just done, place the numbers on the second number line on your Decimal Number Line worksheet.		Model. Monitor students as they place the decimals on the number line in the appropriate places.
9. Look at your predictions. Were you correct?	Answers will vary.	
10. Why do they go in this particular order? Tell me another way you know.	Answers will vary, but listen for " $\frac{125}{1000} < \frac{4}{10}$ ", etc. "0.125 is to the right of 0.4 on the number line", etc.	Refer to Equivalent Fractions .
11. What do you notice? (Require them to use tenths, hundredths, and thousandths when discussing decimal digits.)	This number (digit) is smaller than that number (digit)	
12. Repeat with another list of numbers, keeping the numbers between two consecutive whole numbers.		

Teacher Notes

1. To reduce student confusion, always say decimal numbers properly. For example, when referring to the number 3.5, say, "Three and five tenths", rather than, "Three point five". Proper oral communication of the number will reinforce students' understanding of the place value represented.
2. Base ten blocks may be used in this lesson. Represent the decimal part of the number using the large cube for the unit, the flat for tenths, the rod (stick) for hundredths, and the small cube for thousandths.
3. It is important to maintain a strong link between the verbal pronunciation of the decimal number, the 10 x 10 grid representation, and the number line representation, and the base ten representation (if using Base ten blocks).

Variations

None

Formative Assessment

Which number is larger: 4.307 or 4.21?

Explain how you know.

Answer: 4.307 is larger than 4.21 because $\frac{210}{1000} < \frac{307}{1000}$.

Reference

Russell Gersten, P. (n.d.). *RTI and Mathematics IES Practice Guide - Response to Intervention in Mathematics*. Retrieved August 25, 2011, from rti4success.

Van de Walle, J. A., & Lovin, L. H. (2006). *Teaching Student-Centered Mathematics Grades 5-8 Volume 3*. Boston, MA: Pearson Education, Inc.