The Long and Short of It

Summary

Students will learn about decimals and compare them to whole numbers.

Materials

Whole number cards and decimal cards to be put in order

One per student:

- Spinners (pdf)

Large paper clips and pencils

- Recording sheet for spinner game (pdf)

"Plastic canvas" pieces cut into thousands, hundreds, tens, and ones

One set per pair of students:

- Long and Short of It! game sheet (pdf)
- Expanded Notation Cards (pdf)

Plastic money set

Laminated number lines (whole numbers and decimals included)

One per class:

Poster board and glue

Overhead models of money: $1.00, $.50, $.25, $.10, $.05, $.01

Additional Resources

Books

- *The $1.00 Word Riddle Book*

, by Marilyn Burns; ISBN 0-941355-02-0

- *How Much Is A Million?*

, by David M. Schwartz; ISBN 0-688099-335-02-0

Background for Teachers

The number system we use for everyday life is based on tens. We use ten symbols, called *digits*. Add punctuation (comma, decimal point, etc.) and you can write numbers for any situation. With just a handful of symbols, you can write quantities larger than the number of shells in the sea and smaller than the width of one hair on your head.

Whole numbers are 0, 1, 2, 3, 4, 5, 6, and so on. If a number has a *decimal* part, a part that is a *fraction*, or a *negative sign*, it is not a whole number.

Our number system is based on a simple pattern of tens. Each place has ten times the value of the place to its right. *Place value* tells you how much each digit stands for: *ones, tens, hundreds, thousands*, etc.

We arrange numbers into groups of three places called *periods*. The places within the periods repeat (hundreds, tens, ones; hundreds, tens, ones; etc.) In the U.S., we usually use commas to separate the periods.

Decimal numbers are numbers that are written using place value. We use a decimal point to separate the whole-number places from the places less than one. Comparing decimals is like comparing whole numbers. If you know how to compare two decimals (line up the decimals in a vertical line and compare the values of the digits) you also know how to put a group of decimals in order.

Intended Learning Outcomes

5. Make mathematical connections.
6. Represent mathematical situations.

Instructional Procedures

Invitation to Learn

Let students write a number on a paper. Digits should not exceed the ten thousands place. Invite four students to come to the front and form a line. Challenge the class to put the numbers (students holding cards) in order from least to greatest; only one switch allowed at a time (e.g., "John trade places with Sarah."). Continue this procedure until each set of four students has been placed in the correct order to form the line. Do the same procedure with decimal number cards. Decimals should only contain the tenths place.

Instructional Procedures

Lesson 1

Distribute *Spinners*, large paper clips, pencils, and *Data Recording Sheets*. Explain game rules and allow time for pairs to play the game. Partner A spins, then partner B. Write the number from each on the *Data Recording Sheet*. Discuss how this helps to teach periods and place value.

Demonstrate use of "plastic canvas" with an overhead projector to model place value. These can be used to model both whole numbers and decimal numbers.

Distribute *Expanded Notation Cards* for the *Long and Short of It!* game. Explain game rules. Allow time for pairs to play the game.

Create a poster as a class using *Expanded Notation Cards*.

Lesson 2

Demonstrate the comparison of whole numbers and decimals by using money models on an overhead projector. Model correct terminology (e.g., "twenty-three and forty-nine hundredths).Emphasize the use of "ths" when verbalizing decimals.

Distribute sets of plastic money. Ask students to show whole numbers and decimals by using money models.

Ask students to point to decimal amounts on their number lines.

Use whole number/decimal number cards to show how, when comparing decimal numbers or when adding or subtracting decimal numbers, the decimals *must* be lined up to give the correct sum or difference.

Extensions

Compare the populations of various counties in Utah. Put them in order of largest to smallest, or smallest to largest. Do the same with area in square miles of the counties.

Give each letter of the alphabet a money value (e.g., A = $0.01, B = $0.02, etc.). Challenge students to add the money value of their first and last name.

Family Connections

Assign students to choose ten items from the grocery store (can use ten items from a cash register receipt); list the items and add them together. Show how the decimals must be lined up to add correctly.

List the grocery items (from the activity above) from greatest to least in price.

Using a bathroom scale at home, weigh ten items that are more than five pounds. List them from heaviest to lightest, or lightest to heaviest.

Assessment Plan

Read numbers aloud (up to 100,000 place value). Using worksheets divided into periods and place values, have students write the numbers and compare their results.

Alternate method: Ask students to write on erasable cards divided into periods and place values, and hold them up for you to check.

When students have been taught lessons in decimals, follow the same procedure as above using

decimal numbers.
Give the students addition and subtraction problems with money, emphasizing the importance of lining up the decimals. Have them model the problems with plastic money.

Authors

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