

Place Value with Decimals



The interactive white board tool for this lesson can be found on our website under Resources and Teacher Tools. (www.dreambox.com/teachertools)

With this tool, students compose decimal numbers using place value dials to understand the relationships between powers of ten. This tool empowers students to adjust a different dial for each place value: ones, tenths, hundredths, and thousandths. Similar to how the hour hand and minute hand on a clock move in concert, every dial is linked to the movement of the others.

Sample Lesson

- Objective:** Students compose numbers using multiple dials to develop an understanding of the relationship between the place values of whole numbers and decimal numbers.
- Background:** Students should have an understanding of place value with whole numbers before beginning this lesson. For example, they should understand that the number 250 is equivalent to 25 tens. Because the objective is to understand decimal place value relationships (i.e., 2.5 is equivalent to 25 tenths), our Curriculum Director, Dr. Tim Hudson created a short video explaining the importance of place value and how this manipulative develops understanding.



1. Bring up the DreamBox interactive white board lesson.
2. Begin with some context: “We’re looking through a telescope at some objects in outer space. But they’re blurry, so we need to bring them into focus by adjusting these dials to the number we’ve been given. I’ve never used these telescope dials before, so would anyone like to help me figure this out?” Call on a student to come to the board. Direct the student to manipulate the HUNDREDS dial. Ask the class, “What happens when we move the HUNDREDS dial?”



HUNDREDS dial to 2.5



HUNDREDS dial to 6.9



HUNDREDS dial back to 1

Possible responses:

- “The other dials move too.”
- “The tens dial moves around a whole rotation when you move from one number to the next.”

- “When you move the dial backward, the other dials move backward too.”
 - “The ONES dial really moves quickly when you move the HUNDREDS dial.”
 - “The TENTHS dial is moving so fast; I can’t tell how many times it rotated.”
 - “The ruler on the left moves up and down to a number in the hundreds.”
3. The teacher states, “Those are some interesting observations. I need another volunteer to move the TENS dial. Let’s watch what happens and write down your observations. In a moment I would like you to share your findings with a partner.”

Possible responses:

- “Every time the TENS dial moves, the HUNDREDS dial moves a little.”
 - “The HUNDREDS dial moves from one number to the next when the TENS dial goes all the way around.”
 - “The ONES dial goes around one time when the TENS dial moves to the next number.”
 - “The TENTHS dial still moves real fast.”
 - “The ruler on the top isn’t moving as far as when we moved the HUNDREDS dial.”
4. The teacher then asks, “What do think will happen when we move the ONES dial or the TENTHS dial? Discuss your predictions with your partner.” Ask students to share their findings with the class and then test each finding by moving the dials on the board. The point of this exercise is for the students to have solid understanding of how each dial and its place value relates to the others. (Example: When we move the HUNDREDS dial from one number to the next, the TENS dial moves 10 numbers (one revolution). The ONES dial moves 100 numbers (10 revolutions). The TENTHS dial moves 1000 numbers (100 revolutions).
5. After discussing the findings, the teacher resets all the dials to zero. Ask a volunteer to start the process of setting the dials by choosing to adjust a single dial and explain why they chose to start with that dial. (You may have to reload the interactive white board which will change the prompt or press “continue.” This is OK; you can say the telescope is now pointing in the direction of other space objects).

Possible responses:

- Student moves the HUNDREDS dial first. “If we move the HUNDREDS dial, it gets us farther faster because all the others dials move too.” Ask the class to critique this strategy and first step.
- Student moves the tenths dial initially but doesn’t see much progress. “I moved the TENTHS dial because we always start on this side when we add, but it will take a long time to make the HUNDREDS dial move.” Ask the class to critique this strategy and first step. Most likely, a conversation about efficiency and optimal moves will arise.
- Student moves the TENS or ONES dial. Ask the class to critique this strategy and first step. Most likely, some students will view this as an inefficient approach

even though the number can be composed.

- Ask for another volunteer to set a different dial. If the first student adjusted the hundreds dial, the next student may intuitively adjust the TENS dial. Allow each student to investigate the dial they select. When she sets the dial, ask students, “How are the other dials moving and will this affect our final answer?”



Possible responses if the student chooses the TENS dial:

- “The HUNDREDS dial moved as well as the TENS. I think this is OK because the ruler shows 830. That’s pretty close to our final destination.”
- “The ONES and TENTHS dials moved too. That’s OK because we can change them on the next set like we did with the TENS.”
- “The HUNDREDS dial moved a little. I want to wait to see what happens next.”

Repeat the last step for the two remaining dials. Take the time to discuss how each rotation affects the other dials and the ‘ruler.’ After the fourth dial has been adjusted, click the ‘done’ button to see if you arrived at your destination. If the answer is correct, one of the space objects will come into focus. If the answer is not correct, the dials will reset and you can discuss where the mistake was made and approach the problem again.



NOTE: Once students are confident with understanding how the dials work and how to build numbers with the dials. You can use one of the sample lessons on the DreamBox website to explore the relationship between decimal numbers when one of the dials is broken. Click here to access that lesson: [Decimal Lesson with Broken Dials](#)