



Differentiation in Investigation 2

Mathematics in This Investigation

The mathematics focuses on adding decimals by reasoning about place value, equivalents, and representations.

Additional Resource: *Adding Decimals*, pages 132–133 (See Curriculum Unit 6)

Understanding the Mathematics

Students correctly add decimals by reasoning about place value and using what they know about addition. They understand they have to pay attention to the decimal point and the value of each digit when they add. They might use addition strategies they learned for whole numbers, such as adding by place or adding on the second number in parts. Students may also use decimal equivalents to add (e.g., writing all the numbers as thousandths.) Since students understand what decimals are, they're able to judge whether or not the sum they've found is reasonable.

Option: Assign the **Extension** activity.

Partially Understanding the Mathematics

Students correctly add decimals, mostly by shading in the decimals on hundredths grids and then combining them. They are beginning to use some reasoning about place value, but do not consistently pay attention to the place value of each digit. They may use reasoning to correctly add 0.5 and 0.35, but they have a more difficult time trying to reason about adding 0.375 and 0.05. As students keep adding decimal numbers, using reasoning or representations, they are beginning to get better at estimating whether or not their sum is reasonable.

Option: Assign the **Practice** activity.

Not Understanding the Mathematics

Using hundredths grids, students are able to add decimals that have the same number of digits (e.g., $0.5 + 0.3$ or $0.45 + 0.25$). When not using the grids, they usually treat decimals as whole numbers. They ignore the decimal point, add the numbers, and put a decimal point somewhere in the sum. Because they are still developing an understanding of what decimals represent, they have no idea whether or not their answers are reasonable.

Option: Assign the **Intervention** activity.

Investigation 2 Quiz

In addition to your observations and students' work in Investigation 2, the Quiz (R49) can be used to gather more information.

Name _____ Date _____

Decimals on Grids and Number Lines

Quiz

Choose the correct answer.

1. Which number shows the total shaded part of the grids?

A. 1.85

B. 1.45

C. 0.45

D. 0.145

2. $0.76 + 1.55 =$

A. 2.21 B. 2.31 C. 23.1 D. 231

3. Which sum is the greatest?

A. $0.25 + 0.9$ C. $0.075 + 0.55$

B. $0.825 + 0.15$ D. $0.5 + 0.6$

4. Hana bought 1.135 pounds of bananas, 2.8 pounds of apples, and 0.88 pound of grapes. What was the total weight of the fruit?

A. 4.815 pounds C. 3.715 pounds

B. 3.815 pounds D. 1.251 pounds

5. Circle 2 or more cards whose sum is 1. Show how you figured it out.

0.575 0.4 0.375 0.05 0.55

Answers will vary. Review students' work.

Use after Session 2.8. Unit 6 **R49**

Intervention



Adding Decimals on Grids

Use anytime after Session 2.3.

Math Focus Points

- Using representations to add tenths, hundredths, and thousandths

Vocabulary: tenths, hundredths



Materials: Decimal Cards, Set A; colored pencils; T63; R50

Name _____ Date _____



Decimals on Grids and Number Lines

Adding Decimals on Grids



Answers will vary. Review students' work.

_____ + _____ = _____

_____ + _____ = _____

_____ + _____ = _____

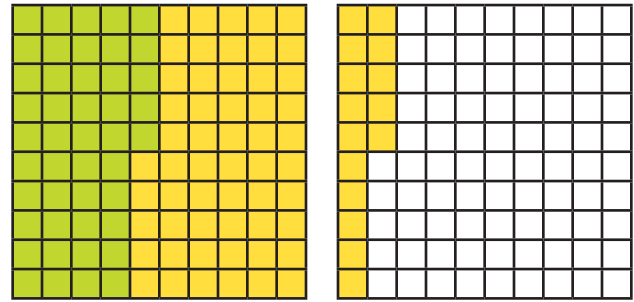
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R50 Unit 6 Use anytime after Session 2.3.

Give each student a copy of Adding Decimals on Grids (R50). Begin with $0.45 + 0.7$. Show students where to write this problem under the first pair of grids.

Shade the first grid to show 0.45. Then switch to another color. Continue from where you left off and shade another 0.7. When you fill the first grid, use the second grid.

When students are done, ask a volunteer to show the shaded grids. You may wish to use the transparency of Hundredths Grids (T63) turned sideways.



Ask students to explain how the shading for 0.45 was done. Then ask them to explain how the shading for 0.7 was done. Some students might think of 0.7 as 7 columns. Other students might think of 0.7 as 0.70: 70 little squares. **How much is shaded in all?** Have students write the sum on R50.

Give Decimal Cards, Set A to each pair of students. Have them remove 0, $\frac{1}{2}$, and 1 from the set, then have them mix up the cards and place them facedown. Ask each partner to pick a card. Students should work independently on R50 to find the sum of these two decimals. When they are done, ask partners to compare the results and try to resolve any discrepancies. Continue in this manner, providing extra copies of R50 as needed.

ELL English Language Learners

Model Thinking Aloud Write several decimals greater than 1 on the board. Model how to read each of the decimals being sure to emphasize the word *and* for the decimal point. As you read the decimal, move your finger across the decimal from left to right, pausing at the decimal point as you say *and*. For example: **One and fifteen hundredths.**

Additional Resource

Student Math Handbook pages 63–65



Practice



Decimal Addition

Use anytime after Session 2.6.

Math Focus Points

- Adding decimals to the thousandths through reasoning about place value, equivalents, and representations

Materials: Decimal Cards, Sets A and B; M12; M17; R51

Name _____ Date _____

Decimals on Grids and Number Lines

Decimal Addition

Find each sum.

1. $3.2 + 1.9 = \underline{5.1}$ 2. $2.45 + 2.15 = \underline{4.6}$

3. $0.613 + 2.05 = \underline{2.663}$ 4. $0.9 + 0.15 + 1.3 = \underline{2.35}$

5. Find each sum. Then circle the sum that is greater.
 $6.5 + 1.703 = \underline{8.203}$ $4.8 + 4.08 = \underline{8.88}$

6. Find each sum. Then circle the sum that is closer to 1.
 $0.505 + 0.4 = \underline{0.905}$ $0.05 + 0.92 = \underline{0.97}$

7. Tyler bought 0.319 pound of Swiss cheese, 0.85 pound of Cheddar cheese, and 1.122 pounds of American cheese. What was the total weight of the cheese?
2.291 pounds

Use anytime after Session 2.6. Unit 6 R51

In this activity, students practice various strategies for adding decimals.

Last weekend, it rained 1.176 inches on Saturday and 0.81 inch on Sunday. Figure out the total rainfall for the weekend. When you are done, discuss your work with your partner. After pairs have shared their work, ask a volunteer to explain the strategies each partner used.

Students might say:



"I added the ones, then the tenths, then the hundredths, and then the thousandths. Then I put it all together. [Charles] wrote everything in thousandths and lined up the numbers like adding whole numbers."

$1 + 0 = 1$	1.176
$0.1 + 0.8 = 0.9$	$+ \underline{0.810}$
$0.07 + 0.01 = 0.08$	1.986
$0.006 + 0 = 0.006$	
$1 + 0.9 + 0.8 +$	
$0.006 = 1.986$	

Discuss other strategies. Then have pairs add $0.95 + 2.45$. When students are finished, ask whether they used the same strategy they used earlier or switched to another strategy.

Students might say:



"For this problem, you can do it in your head. I took 5 hundredths from 2.45 and gave it to 0.95. Then all I had to add was $1 + 2.4 = 3.4$."

Distribute copies of Decimal Addition (R51).

ELL English Language Learners

Partner Talk Review the words *tenths*, *hundredths*, and *thousandths* with students. Have pairs explain their strategies. Beginning English Language Learners may only be able to say phrases like "I added" or complete the activity with a partner from their language group in their native language.

Additional Resource



Student Math Handbook

Game: Close to 1 SMH G1

Materials: Decimal Cards, Sets A and B; M25

Extension



Adding Many Decimals

Use anytime after Session 2.3.

Math Focus Points

- Adding decimals to the thousandths through reasoning about place value, equivalents, and representations

Materials: Decimal Cards, Sets A and B

In this activity, students add four, five, or six decimals.

Write $0.4 + 0.65 + 0.175 + 0.35 = \underline{\hspace{2cm}}$ on the board. **Solve this problem. Use clear notation so that your partner can understand what you did. Exchange papers and correct each other's work.**

Give students time to complete these tasks. Then call on volunteers to explain their partner's work.

Students might say:



"[Margaret] circles all the ones and adds them. Then she circles the tenths and adds them. Then she adds the hundredths, and then the thousandths. Then she adds everything all up."

$0.4 + 0.65 + 0.175 + 0.35$	0
$0.4 + 0.65 + 0.175 + 0.35$	1.4
$0.4 + 0.65 + 0.175 + 0.35$	0.17
$0.4 + 0.65 + 0.175 + 0.35$	0.005
	1.575

Students might say:



"[Martin] says he usually writes the decimals up and down, and lines up the decimal point. But he said these numbers were easy to add mentally.
 $0.65 + 0.35 = 1$, and
 $0.175 + 0.4 = 0.575$.
 So the answer is 1.575."

Distribute Decimal Cards, Sets A and B to each pair of students or small groups. Have students play the game *Greatest Decimal Sum* as follows. For each round, mix the cards and place them facedown. Deal four cards to each player. Players work independently to add his or her four decimals. Each player checks another player's paper. The player with the greater (or greatest) sum gets a point. If there is a tie, no one gets a point.

Play two rounds with four cards per player. Then, play two rounds with five cards per player. Finally, play two rounds with six cards per player. The player with the greatest number of points after six rounds wins.

ELL English Language Learners

Provide a Word List Write the words *ones*, *tenths*, *hundredths*, and *thousandths* on the board. Provide a place-value chart and review the placement of each. As students discuss their work with one another, have them use the place-value chart to help them name the decimals.

Additional Resource

Student Math Handbook pages 64–65

