DIFFERENTIATED LEARNING WITH DECIMALS
TORI SINCO, AVERY ELEMENTARY SCHOOL

Unit Overview
This unit incorporates differentiated instruction and technology to help students master the fifth grade standard on adding, subtracting, and multiplying decimals. Following a pre-test at the start of this unit, the teacher forms groups based on each student's ability and readiness. Throughout the unit, students engage in rigorous and authentic learning tasks, including: small-group instruction, math journaling, Khan Academy, Edmodo math discussions, Mathcasting (student-created math videos), and QR code scavenger hunts. These activities both encourage students to work collaboratively, and allow students to work at their own pace.

This document includes lesson plans for teacher-directed extra support, proficient and enrichment small group instruction, as well information about the different math rotations. Throughout the unit, be sure to create **Anchor Charts** with students to display around the classroom.

Standard Addressed
M.5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Before the Unit
Before beginning this unit, students take the **Pre-Assessment**. Using their performance on the pre-assessment, split students into three ability groups for this two-week unit. Refer to the **Guided Math Rotations** for a sample rotation schedule. Each rotation should last between 15 and 20 minutes, and students should visit two to three stations per day. The extra support groups work with the teacher more often, but every group should go to every station at least once per week.

Extra Support Group (Purple and Red Groups)

Week One
(Addition & subtraction)

Day 1	Model various decimal numbers using place value blocks (be sure students indicate which block equals a whole). Combine two models of place value blocks to obtain a sum for the two decimal numbers. After students have shown the concrete model, have them demonstrate their understanding of the algorithm by calculating the problem. Continue to repeat this process as time allows.
Day 2	Complete the activity from Day 1, but have students demonstrate their ability to model subtraction of decimals (i.e. model one decimal, and then take away from it another decimal number. Students may need to regroup and trade blocks. After students have shown the concrete model, have them demonstrate their understanding of the algorithm by calculating problem. Repeat this process as time allows.
Day 3	Use a place value chart (labeled with ones, tenths, and hundredths and centimeter cubes) to add decimals. Provide story problem scenarios and have the students model each addend on the chart. Then, have students model the sum in the bottom row of the chart. *(Note: Students will need to regroup the tenths into whole ones when necessary)*
Day 4	Have students model the following problem using place value blocks: *Sam hiked 0.56 mile in the morning and 1.45 miles in the afternoon. Sam wants to keep track of how many miles he hiked altogether and how much farther he hiked in the afternoon. What should he write down?* Discuss and troubleshoot student errors.
Day 5	Have students practice modeling and completing the algorithm for addition and subtraction of decimal numbers without the same number of places in the decimals. (example: 4.72 + 0.3)

Week Two
(Multiplication w/ continued review of addition and subtraction)

Day 1	Practice various problems involving the addition and subtraction of decimals. Include addition problems with up to three addends. *(Note: you can do this activity on whiteboards)*
Day 2	Have students watch the LearnZillion video on multiplication of decimals using the area model: http://learnzillion.com/lessons/557-multiply-decimals-by-decimals-using-an-area-model#resource-preview-modal_document_1341 Review modeling of the multiplication of decimals using small hundreds grids. Guide students to discover an algorithm for multiplying decimals (particularly the placement of the decimal) by looking at the models they complete.
Day 3	Have students use base ten blocks to model the multiplication of a decimal by a whole number and whole number by a decimal. Students should show the algorithm for the problem once they have demonstrated understanding of creating a model.

Day 4	QR code scavenger hunt – students utilize learning devices to scan each QR code and complete the math problem that appears. QR Code Hunt
Day 5	**Dump, Lump, Clump Problems**- provide students an envelope of various word problems involving decimals. They will need to determine which categories to use to sort the problems (i.e. addition, subtraction, and multiplication) and justify their choices verbally.

Proficient Group (Blue Group)

Week One
(Addition & subtraction)

Day 1	Have students model the following problem using place value blocks: *Sam hiked 0.56 mile in the morning and 1.45 miles in the afternoon. Sam wants to keep track of how many miles he hiked altogether and how much farther he hiked in the afternoon. What should he write down?* Discuss and troubleshoot student errors.
Day 2	Have students practice modeling and completing the algorithm for addition and subtraction of decimal numbers without the same number of places in the decimals. (example: 4.72 + 0.3)
Day 3	Have students model the addition and subtraction of decimals using place value blocks. (Make sure multiple problems require students to regroup or "trade-in" place value blocks)
Day 4	*It All Adds Up Task* from the Georgia Frameworks, Unit Two (page 77)
Day 5	Practice various problems involving the addition and subtraction of decimals. Include addition problems with up to three addends. *(Note: you can do this activity on whiteboards)*

Week Two
(Multiplication w/ continued review of addition and subtraction)

Day 1	Have students watch the LearnZillion video on multiplication of decimals using the area model: http://learnzillion.com/lessons/557-multiply-decimals-by-decimals-using-an-area-model#resource-preview-modal_document_1341 Review modeling of multiplying decimals using small hundreds grids. Guide students to discover an algorithm for multiplying decimals (particularly the placement of the decimal) by looking at the models they complete.
Day 2	**Grid Lock** multiplication of decimals task – students must locate the missing pieces of the hundreds grids. Students then determine the multiplication problem each grid is modeling.
Day 3	QR code scavenger hunt – students utilize learning devices to scan each QR code and complete the math problem that appears. QR Code Hunt
Day 4	*Multiplication Teasers* from the Georgia Frameworks, Unit 3(page 38). Students have the opportunity to calculate decimals mentally and determine the reasonableness of their

	answers.
Day 5	**Dump, Lump, Clump** of decimal word problems – provide students an envelope of various word problems involving decimals. They will need to determine which categories to use to sort the problems (i.e. addition, subtraction, and multiplication) and justify their choices verbally. *(Note: include multi-step word problems and those involving more than one operation)*

Enrichment Group: Green Group

Week One
(Addition & subtraction)

Day 1	Practice various problems involving the addition and subtraction of decimals. Include addition problems with up to three addends. *(Note: you can do this activity on whiteboards)*
Day 2	Provide students with several problems involving addition and subtraction of decimals that include errors and additional problems with no errors. Students must uncover the errors and explain how they would re-teach the student the concept or skill based on his/her error pattern.
Day 3	Students mentally estimate multiple solutions to the problem below. **Backpack Items** What combination of items could you put in a backpack so that the mass of the backpack comes close to, but does not exceed, the recommended maximum mass of 5 kg? You may include items more than once. Include the mass of the backpack (1.275 kg) in your total. Find different combinations of items. <table><tr><th>Backpack Item</th><th>Mass</th></tr><tr><td>math textbook</td><td>1.395 kg</td></tr><tr><td>binder</td><td>0.764 kg</td></tr><tr><td>workbook</td><td>0.102 kg</td></tr><tr><td>agenda</td><td>0.245 kg</td></tr><tr><td>paperback novel</td><td>0.140 kg</td></tr><tr><td>pencil</td><td>0.005 kg</td></tr><tr><td>calculator</td><td>0.075 kg</td></tr><tr><td>gym clothes</td><td>0.485 kg</td></tr><tr><td>shoes</td><td>0.598 kg</td></tr><tr><td>lunch</td><td>0.582 kg</td></tr><tr><td>pencil case and contents</td><td>0.302 kg</td></tr><tr><td>geometry set</td><td>0.109 kg</td></tr></table>
Day 4	*Road Trip Recording Sheet* from the Georgia Frameworks, Unit Three (page 67). Students work with a partner to complete the task. Each pair will need a learning device to utilize

	for Internet access.
Day 5	Continue Road Trip task from yesterday. Discuss findings with students.

Week Two

(Multiplication w/ continued review of addition and subtraction)

Day 1	LearnZillion video on multiplication of decimals using the area model: http://learnzillion.com/lessons/557-multiply-decimals-by-decimals-using-an-area-model#resource-preview-modal_document_1341 Review modeling of the multiplication of decimals using small hundreds grids. Guide students to discover an algorithm for multiplying decimals (particularly the placement of the decimal) by looking at the models they complete.
Day 2	QR code scavenger hunt – students utilize learning devices to scan each QR code and complete the math problem that appears. QR Code Hunt
Day 3	*Multiplication Teasers* from the Georgia Frameworks, Unit 3. (page 38) Students have the opportunity to calculate decimals mentally and determine the reasonableness of answers. (Extend for this group by providing factors to the thousands and repeating decimals)
Day 4	Students utilize file folders and aluminum foil to create a circuit board containing questions/answers about adding, subtracting and multiplying decimals. When students touch the wire to the question and the correct answer, the light bulb will light up. See **Circuit Board Instructions** for more details.
Day 5	Continue circuit board project from yesterday. Challenge students to include problems that require deeper thinking.

Math Journals

During the unit, students use math journals to explore problem solving skills independently and to reflect on their learning. Math journals are one of the centers used during small group instruction. Use the **Math Journal Examples** and **Math Journal Rubric** for this station.

Khan Academy

Khan Academy is a free online service with thousands of instructional videos that allow students to work at their own pace and level. Students can watch videos and practice problems while the program records their scores. Once students have a Khan Academy account, they add the teacher as a coach – giving the teacher the ability to make skill/activity recommendations to students, view their progress (skills mastered, skills on which they are struggling, time spent each day/week/month, recent answers, etc.), and instantly see groups of students struggling on a common skill. The teacher can utilize this information to differentiate instruction.

Edmodo

Edmodo allows students to communicate virtually, both inside and outside of the classroom. In this unit, students practice mathematics vocabulary activities on Edmodo during small group time. To create these activities, make a page with four vocabulary words and provide examples and non-

examples for each word. Then, for each word, students determine and write the definition, draw a picture, and provide additional examples. Students can comment on the vocabulary posts in Edmodo to discuss the words with their group members.

Zondle

Throughout the unit, students utilize [Zondle](#), a free website that allows teachers and students to create, play, and share games that support teaching and learning. This website also provides the rare opportunity to interact with students around the country through collaborative Team Play games. Our classroom connects with classrooms as far away as California through a Skype call and Zondle interactive game.

Mathcasts

At the end of the unit, students create Mathcasts to show what they have learned about decimals by explaining it to other students in the class and around the country. If you have iPads in the classroom you can use "Numberkiz," a free app where students can record their voice as they work out and explain a problem on an interactive whiteboard. Students can add their MathCasts to the teacher's website or share them in Edmodo.

Performance Tasks

To demonstrate their mastery of the unit and test their knowledge using real world examples, students will complete differentiated performance tasks.

- The extra support group of students completes the **Shopping Performance Task** where they compare prices of products at different grocery stores.

- The proficient group of students completes the **Paving the Way Performance Task**, using the **Paving the Way QR codes.**

- The enrichment group of students completes **The Grass is Always Greener Performance Task.** They will need to use **The Grass is Always Greener Scale Diagram** and **The Grass is Always Greener Price Quotes** to complete this task.