

► Grade 4 Topic 12: Understand and Compare Decimals

Big Conceptual Idea: [Number and Operations- Fractions](#) (pp. 121-125)

Prior to instruction, view the *Topic 12 Professional Development Video* located in Pearson Realize online. Read the Teacher's Edition (TE): *Cluster Overview/Math Background* (pp. 623A-623F), the *Topic Planner* (pp. 623I-623K), all 6 lessons, and the *Topic Assessments* (pp. 669-670A).

<p>Mathematical Background: Read Cluster Overview- (TE, pp. 623A-623F)</p>	<p>Topic Essential Questions: How can you write a fraction as a decimal? How can you locate points on a number line? How can you compare decimals?</p> <p><i>Reference TE (p. 623) and Answering the Topic Essential Questions (TE, pp. 667-668) for key elements of answers to the Essential Questions.</i></p>
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Topic 12
Understand and Compare Decimals

Number of lessons: **6**

A/D/E: **4 days**

NVACS Focus:
NF.C, MD.A

Total Days: ~10

[4th grade Curriculum Pacing Framework: Balanced Calendar](#)

The lesson map for this topic is as follows:

12-1	12-2	12-3	12-4	12-5	12-6	Assessment
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4 A/D/E days used strategically throughout the topic

Instructional note:

This topic is the last of the cluster group for standard 4.NF.C, “understand decimal notation for fractions, and compare decimal fractions” (Nevada Academic Content Standards (NVACS), 2010). Focus instruction on standards 4.NF.C.5-7, “express a fraction with a denominator 10 as an equivalent fraction with a denominator of 100, use decimal notation for fractions with denominators of 10 and 100, and compare two decimals to hundredths by reasoning about their size” (NVACS, 2010).

“A significant goal of instruction in decimal and fraction numeration should be to help students see that both systems represent the same concepts” (Van de Walle, et al., 2010, p. 329). There are different ways to help students see the connection between fractions and decimals. “Use familiar fraction concepts and models to explore rational numbers that are easily represented by decimals, see how the base-ten system can be extended to include numbers less than 1 as well as large numbers, help children use models to make meaningful transitions between fractions and decimals” (Van de Walle, et al., 2010, p. 329). “Deliberate attention must be given to helping students see that using a decimal is a way of extending the place value system to include numbers less than 1” (Small, 2014, p. 59). One way to see the connection between decimal and fraction numeration is by using tools like place value blocks or hundredths grids. Models are important when students are beginning to understand fractional concepts.

“The role of the decimal point is to designate the units position, and it does so by sitting just to the right of that position” (Van de Walle, et al., 2010, p. 331). “Often students ask why there is no “oneths” place, and one can see why they might ask this. One way to help students is to emphasize that the decimal point is actually in its own column; it is a “marker” that goes with the ones. The line of symmetry goes through the ones column and is not to the right of it” (Small, 2014, p. 59).

Common misconceptions when students are comparing decimals is “ $0.4 < 0.19$ because $4 < 19$ ”. The problem is that the units are different: The 4 is 4 tenths, but the 19 is 19 hundredths. Many students will understand this if the analogy is made to measurement units or using visual models” (Small, 2014, p. 61). Consider using base-10 blocks with students who may struggle with these ideas. Use the “flat” representing to represent the “whole” or one, a “long” representing a tenth, and the “unit” representing the hundredth to explore and compare fractions.

Focus Math Practice 7: Look for and make use of structure

Focus opportunities for students to develop *Mathematical Practice 7* behaviors, as this is the focus of the Math Practices and Problem Solving. Reference the Teacher’s Edition and the NVACS (2010, p. 8).

Note: The purpose of the curriculum guides is for additional considerations. Therefore, not all components may have additional notes included in this guide.

Essential Academic Vocabulary Use these words consistently during instruction.	
New Academic Vocabulary: (First time explicitly taught)	Review Academic Vocabulary: (Vocabulary explicitly taught in prior grades or topics)
tenth hundredth decimal decimal point	

Additional terminology that students may need support with: fractions, numerator, denominator, digit

***Collaborative Team Conversations (CTC)**

Consider using *one* of the following as part of the formative assessment process at the lesson level to **collect student work** to analyze for **evidence of mathematical understanding**:

Guiding question: "Are students using various strategies to make connections between decimals and fractions?"

Lesson	Evidence	Look for
12-4	<i>Solve & Share</i> (student work samples)	Focus CTC around the big idea: <ul style="list-style-type: none"> student strategies and models within a multi-step problem. student understanding of the relationship between tenths and hundredths.
12-6	<i>Quick Check</i> (digital platform)	Focus CTC around the big idea: <ul style="list-style-type: none"> students sequencing of decimals on a number line and accurate comparisons of decimals within different place value units. Printable version available under "Teacher Resources".

Learning Cycle Assessments (summative)	<i>Topic Assessments</i> SE pp. 667-670	Use <i>Scoring Guide</i> TE pp. 667-670A
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Standards listed in **bold** indicate a focus of the lesson.

NVACS (Content and Practices)	Mathematical Development of the Big Idea	Instructional Clarifications & Considerations
Lesson 12-1: Fractions and Decimals		
<p>4.NF.C.6</p> <p>MP.2 MP.3 MP.4</p>	<p>Access Prior Learning: In previous topics, students encountered fractions with denominators of 10 and 100. They compared these fractions to other fractions and found equivalent fractions.</p> <p>Beginning of the Big Idea: In this lesson, students will learn to write these fractions in decimal form. Students will also relate money to decimals and write money amounts with the dollar sign and decimal point.</p>	<p>Note: Consider making an anchor chart with various representations of fractions and decimals. Add to the anchor chart as you progress through the lesson.</p> <p>Solve & Share: Consider having tools like place value blocks, counters and representations, like the hundredths grid paper available for students to use.</p> <p>Look Back: Consider including the <i>Look Back!</i> with the <i>Solve & Share</i> problem.</p> <p>Visual Learning: Consider reading the <i>Prevent Misconceptions</i> before teaching the lesson (TE, p. 628). In the <i>Visual Learning</i>, students encounter decimals. Consider having grid paper and place-value blocks available for students to use as the discussion is taking place.</p> <p>Convince Me: Consider facilitating a discussion around the <i>Convince Me!</i> as students connect equivalency to the problems. Consider having grid paper or place-value blocks for students to use. Verbalize six-tenths and sixty-hundredths, to show they are the same value although they have different place-value positions.</p> <p>Another Example: In the <i>Another Example!</i>, students represent money using fractions and decimals. Consider having tools, including money or the hundredths grid available for students to use during the discussion.</p> <p>Independent Practice/Math Practices and Problem Solving: Consider facilitating a discussion around item 10 as it re-visits estimation of fractions.</p> <p style="text-align: right;"><i>-continues on next page-</i></p>

		<p>Assess and Differentiate/Intervention Activity: Consider doing the <i>Intervention Activity</i> with all students as students make connections by using a place-value chart to represent decimal values. Consider using place-value charts with students to see where decimals are in relation to whole numbers discussed in Topic 1.</p>
Lesson 12-2: Fractions and Decimals on the Number Line		
<p>4.NF.C.6</p> <p>MP.1 MP.2 MP.4 MP.6 MP.7</p>	<p>Access Prior Learning: In the previous topic, students represented equivalent fractions on a number line.</p> <p>Beginning of the Big Idea: In this lesson, students will locate given decimals on a number line and name the decimal at a given point.</p>	<p>Solve & Share: Consider giving students an opportunity to use tools and other representations to write decimal numbers. Students need to pay attention to the whole and the number of parts.</p> <p>Look Back: Consider facilitating a discussion around the <i>Look Back!</i>, as students connect the new number line to the number lines in the <i>Solve & Share</i>. Consider emphasizing that fractions are equal parts of the whole.</p> <p>Visual Learning: Consider reading the <i>Prevent Misconceptions</i> prior to teaching the lesson (TE, p. 634). In the <i>Visual Learning</i>, students learn to use two different strategies to find decimals on a number line.</p> <p>Note: Consider facilitating a discussion around Part C in the <i>Visual Learning Animation</i> as students learn that there are infinite rational numbers on a number line.</p> <p>Convince Me: Consider using the <i>Convince Me!</i> to facilitate a discussion as students determine which decimal is not placed correctly on a number line and explain.</p> <p>Independent Practice/Math Practices and Problem Solving: Consider facilitating a discussion around the "Higher Order Thinking" item 24, whole group, as students can see there are many numbers on a number line.</p> <p>Many problems in the <i>Independent Practice</i> have students work with numbers greater than one. Consider choosing items 7-12 for students to complete.</p>
Lesson 12-3: Compare Decimals		
<p>4.NF.C.7 4.MD.A.2</p> <p>MP.2 MP.3 MP.5</p>	<p>Access Prior Learning: In the previous topics, students learned that the digit in one place of a whole number represents 10 times as much as it represents in the place to its right.</p> <p>Developing the Big Idea: In this lesson, students compare decimals by using place value understanding and models.</p>	<p>Look Back: Consider facilitating a discussion around the <i>Look Back!</i> as students think about the comparison of decimals referring to the same whole. Students will make connections between fractions and decimals.</p> <p>Visual Learning: Consider reading the <i>Prevent Misconceptions</i> before teaching the lesson (TE, p. 640).</p> <p>Another Example: Consider facilitating a discussion around the <i>Another Example!</i> as students are using new representations of place-value blocks. For example, the flat is now 1 instead 100.</p> <p>Assess and Differentiate/Intervention Activity: Consider having all students do the <i>Intervention Activity</i> as students will be comparing 0.09 to 0.99 by using a place-value chart, other representations or tools. Consider extending this activity by asking students, "How would it be different if you were to compare 0.9 to 0.99?"</p>
Lesson 12-4: Add Fractions with Denominators of 10 and 100		
<p>4.NF.C.5</p> <p>MP.1 MP.3 MP.4 MP.5</p>	<p>Access Prior Learning: In the previous topics, students learned how to find equivalent fractions by multiplying and using models. Students also learned how to add and subtract fractions with like denominators.</p> <p>Beginning of the Big Idea: In this lesson, students add fractions with denominators of 10 and 100, renaming fractions to have common denominators.</p>	<p>Solve & Share: Consider removing the grid, but have grid paper and place-value blocks available for students to use.</p> <p>Look Back: Consider facilitating a discussion around the <i>Look Back!</i> as students think about how much remains after the <i>Solve & Share</i> discussion. Consider giving students the opportunity to solve with fractions and then convert the answer to a decimal.</p> <p>Visual Learning: Consider having students use grid paper or place-value blocks to solve the problem before introducing the procedure.</p> <p>Independent Practice/Math Practices and Problem Solving: Students do not need to do all the problems in their Student Edition. Ask students to complete the <i>Quick Check</i> items (marked with a pink check mark) first and continue on to other items as appropriate. Consider providing students multiple opportunities to use various strategies, tools and models to complete the problems.</p> <p style="text-align: right;"><i>-continues on next page-</i></p>

		Item 25 is a rate problem. Consider facilitating a discussion around this item as students may find difficulty in answering the question. *CTC: <i>Solve & Share</i> (student work samples)
Lesson 12-5: Solve Word Problems Involving Money		
4.MD.A.2 4.NF.C.6 MP.1 MP.2 MP.4 MP.7 MP.8	Access Prior Learning: In second grade, students used coins and bills to represent money amounts. In previous topics, students developed fluency for addition and subtraction with whole numbers. In 12-1, students wrote money amounts using dollar signs and decimal points. Developing the Big Idea: In this lesson, students use bills and coins to represent money amounts and to do computations.	Solve & Share: Consider modifying the problem by changing \$24 to \$24.50. This will give students the opportunity to work with decimals and change. Look Back: Consider having students complete the <i>Look Back!</i> while they work on the <i>Solve & Share</i> as the <i>Look Back!</i> reinforces estimation. Another Example: In the <i>Another Example!</i> , students use models to divide dollar amounts. Consider giving students opportunity to use concrete tools to solve the problem. Refrain from showing students the long division algorithm. Students will have an opportunity to learn long division in future grades. Independent/Math Practices and Problem Solving: Consider having students work on items 7 and 9 as students estimate.
Lesson 12-6: Math Practices and Problem Solving- Look For and Use Structure		
4.NF.C.7 4.MD.A.2 MP.7 MP.1 MP.2 MP.3 MP.4 MP.6	Access Prior Learning: In previous topics, students have used MP7: Look for and Use Structure. Developing the Big Idea: In this lesson, students will focus on thinking habits good problem solvers use when they look for and use structures.	Visual Learning: The <i>Visual Learning</i> reinforces some common fraction-decimal equivalence. For example, instead of using $\frac{1}{2}$ the animation uses 0.5. Consider facilitating a discussion around the relationships between fractions and decimals. Assess and Differentiate/Intervention Activity: Consider facilitating a discussion with all students, as students see the equivalence between fractions and decimals on a number line. Independent Practice/Math Practices and Problem Solving: Consider facilitating a discussion around items 6-11, as students use patterns to solve money problems. Students will see more pattern work in Topic 14.

References

- Common Core Standards Writing Team. (2011, May 29). *Progressions for the Common Core State Standards in Mathematics (draft). K, Counting and Cardinality; Grades K-5, Operations and Algebraic Thinking*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.
- Council of Chief State School Officers. (2010). The Nevada Academic Content Standards. Retrieved from http://www.doe.nv.gov/uploadedFiles/nde.doe.nv.gov/content/Standards_Instructional_Support/Nevada_Academic_Standards/Math_Documents/mathstandards.pdf.
- Small, M. (2014). *Uncomplicating fractions to meet common core standards in math, K-7*. New York, NY: Teachers College Press, Nelson Education.
- Van de Walle, J.A., Karp, K., Bay-Williams, J. (2010). *Elementary and middle school mathematics: Teaching developmentally*. New York, NY: Pearson.