



stage 19:

decimals

Big Idea: Hierarchical Groupings with Parts-to-Whole of Equal Groupings

Decimals are introduced for the first time in Symphony Math Stage 19. Students will also experience fractions with denominators of 100. In Symphony Math, the topics of decimals and fractions are linked. They share visual models, and they are shown to represent the same concept.

Because Symphony Math makes sure the student has learned the prerequisites for each step in the progression of new skills, decimals may be seen as a new symbolic representation of previously learned concepts rather than a new concept that is unrelated to other material.

Why are These Concepts Important?

The Part-to-Whole combinations in Stage 19 highlight the structure of decimal numbers. In Stage 19, students are introduced to decimal numbers, which present a new system of representation for them. While fractions and decimals represent the same idea, decimal numbers depend on hierarchical groupings.

In Stage 17 students learn:

- * The whole is divided
- * There are a specific number of parts
- * The parts are of equal size
- * The parts equal the whole

In Stage 19, those equal parts are in groups of 10s and multiples of 10s. In this way, Stage 19 extends the place value behavior of numbers to non-whole numbers using the number line model. As students extend the base-ten system to non-whole numbers, they will see the same 0-1 number line divided into 10 equal parts and then 100 equal parts.

Extending the idea that 1 whole can also be ten tenths or one hundred hundredths, students see how decimal numbers are constructed as they extend the base-ten number system. A natural extension of this big idea is that a whole can be divided into 10 parts or 50 parts or in Stage 19, 100 parts. And that 100 of those parts will equal the same whole.

Students also encounter how fraction numbers and decimal numbers have a connection and can be used to name the same quantities. The number line model broken into both fractional parts and decimal parts helps students see equivalencies. Familiar fractions and Symphony Math models help students make important connections between fractions and decimals. In Stage 19, students are given opportunities to explore the ways in which fractions and decimals can both express any given amount with different looking representations.



Stage 19 Learning Progression

Concept	Standard	Example	Description
19.1: Sequencing Decimals	4.NF.5	0.4, 0.5, ?, 0.7	Student sequence decimals on a number line. The sequencing tasks, first with 10ths then with 100ths, ask students to show they associate quantities with numerals and order of magnitude. Hundredths are thus encountered as an extension of previous work with tenths, with the number line now being divided into 100 parts.
19.2: Identifying Decimals	4.NF.5	Find '36 hundredths'.	Students match the displayed quantity with its corresponding decimal numeral. Next they supply the missing name for the designated decimal amount. Thus students demonstrate they can identify decimal quantities.
19.3: Equivalence with 10ths and 100ths	4.NF.6	$3/10 = ?/100$	Students experience the equivalency of $6/10$ and $60/100$ and move on to corresponding decimal equivalencies of 0.6 and 0.60. In this way, students continue to experience that fractions and decimal numbers represent the same mathematical quantity.
19.4: Addition with 10ths and 100ths	4.NF.6	$3/10 + 6/100 = ?$	Once students experience and practice equivalencies with tenths and hundredths, they can use similar strategies to add fractions with these two different denominators. Building on Substage 19.3, students can change fractions with denominators of 10 into their equivalent fraction with a denominator of 100. They then use what they learned about adding fractions in Stage 17 and Stage 18 to combine them.
19.5: Decimal Notation with 10ths and 100ths	4.NF.6	$52/100 = ?$	Students look at fraction numbers with denominators of 10 and 100 and express them as decimal numbers. They may see $50/100$ and using the visual models, would create 0.50 as an equivalency. The calibrated number line helps students see decimals and fractions together, as both are labeled to show their identical locations.
19.6: Comparing Decimal Numbers	4.NF.7	$0.76 ? 0.8$	When considering the same whole, students compare decimal numbers to hundredths. Students can reason about their size by using visual models. When confronted with a comparison like 0.6 and 0.49, students apply lessons from Stage 19 to reason about their relative size, rather than be fooled into thinking more digits signifies a higher value, a common misconception.

Using the Extra Practice Worksheets

The Symphony Math Worksheets provide extended practice using the Multiples Ways of Knowing from the Symphony Math program. Students should work through all worksheets in the order given:

Worksheet	Purpose	Instructions
Manipulatives	Use a visual model to represent the concept.	Create bars, dot cards, or number lines for each item.
Bridge	Connect symbols to their visual representations.	Create objects, numbers, and symbols to complete each item.
Symbols	Understand the concept at the abstract level.	Create numbers and symbols to complete each item.
Apply	Extend understanding to real-life problem solving.	<ol style="list-style-type: none"> 1) Read the story presented at the top of the page. 2) Create a number model of the full solution. 3) Write the number sentence that matches the model.

Group Learning

The Symphony Math Extra Practice materials are designed to promote a conversation about the Big Ideas in math. One-on-one or small group instruction with the materials is recommended for students who need more time to make connections between the mathematical concepts in the Stage and the application of those concepts in their math curriculum.



Fraction Bars and Number Lines

