Kenmore-Town of Tonawanda UFSD

We educate, prepare, and inspire all students to achieve their highest potential

Grade 4 Module 6
Parent Handbook

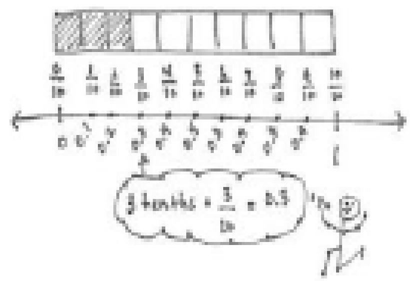
The materials contained within this packet have been taken from the Great Minds curriculum Eureka Math.

Eureka Math™ Tips for Parents

Grade 4
Module 6

Decimal Fractions

Students explore decimal numbers and their relationship to decimal fractions (1/10, 1/100, etc.), learning to express a given quantity in both fraction and decimal forms. Students build on the work they did with fractions in Module 5, apply the same reasoning to decimal numbers, and set the stage for decimal operations in Grade 5.



Number line and tape diagram models of decimal and fraction relationships

New Terms in this Module:

Decimal number: number written using place value units that are powers of 10

Decimal expanded form: e.g., (2 x 10) + (4 x 1) + (5 x 0.1) + (9 x 0.01) = 24.59

Decimal fraction: a fraction with a denominator of 10, 100, 1,000, etc.

Decimal point: period used to separate the whole number part from the fractional part of a decimal number

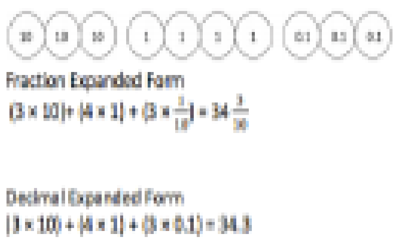
Fraction expanded form: e.g., (2 x 10) + (4 x 1) + (5 x 1/10) + (9 x 1/100) = 24 59/100

Hundredth: place value unit such that 100 hundredths equals 1 one

Tenth: place value unit such that 10 tenths equals 1 one

Familiar Terms:

Expanded Form Fraction



3 tens, 4 ones, and 3 tenths: Fraction Expanded Form and Decimal Expanded Form

What Came Before this Module: Students explored fraction equivalence, compared and represented fractions and mixed numbers, and added and subtracted fractions and mixed numbers.

What Comes After this Module: Students build their skills with measurement as they relate multiplication to the conversion of measurement units. They solve unit conversion problems using multiple strategies.

How You Can Help at Home:

- Continue to practice and review multiplication and division math facts—this greatly supports work with fractions.
- In any decimal number, ask your student the value of each digit, e.g., the 4 in 5.4 is 4 tenths.

Key Common Core Standards:

- ***Understand decimal notations for fractions, and compare decimal fractions.***
  - Express a fraction with denominator 10 as an equivalent fraction with denominator 100.
  - Use decimal notation for fractions with denominators 10 or 100.
  - Compare two decimals to hundredths by reasoning about their size.
- ***Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.***
  - Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals.

Prepared by Erin Schweng, Math Coach

Hundreds	Tens	Ones	.	Tenths	Hundredths
3	7	8		7	3

3 hundreds + 7 tens + 8 ones + 7 tenths + 3 hundredths

Place Value Chart with decimal numbers to the hundredths, showing how to decompose the number 378.73

Spotlight on Math Models:

Place Value Chart

You will often see this mathematical representation in *A Story of Units*.

A Story of Units has several key mathematical "models" that will be used throughout a student's elementary years.

Students have seen place value charts as early as Grade 1 in *A Story of Units*. In Module 1 of Grade 4, we made extensive use of the place value chart to the millions, practicing our skills with large whole numbers such as renaming units and comparing numbers. Now that we are working with fractions and decimal numbers, we focus on the part of the place value chart (above) that supports this learning.

Students use the chart to model numbers in the form of a provided template or a quick hand-drawn sketch as they work on a problem. In Module 6, we spend a considerable amount of time and effort learning to write decimal numbers in expanded form and the place value chart works as an important organizing tool. The chart is a powerful reminder of what each digit in each place value represents.

The chart is also a useful tool to pictorially support students in renaming numbers. Just as 12 is 1 ten 2 ones or 12 ones, 0.79 is 7 tenths 9 hundredths or 79 hundredths. Renaming units is an important skill, previously practiced with whole numbers and now extended to decimal numbers supporting such concepts as comparing, ordering, rounding, and adding decimal numbers.

Sample Problem from Module 6:

(Example taken from Module 6, Lesson 7)

Use the place value chart to answer the following questions. Express the value of the digit in unit form.

hundreds	tens	ones	.	tenths	hundredths
8	2	7		6	4

a. The digit _______ is in the hundreds place. It has a value of ____________________________.

b. The digit _______ is in the tens place. It has a value of ____________________________.

c. The digit _______ is in the tenths place. It has a value of ____________________________.

d. The digit _______ is in the hundredths place. It has a value of ________________________.

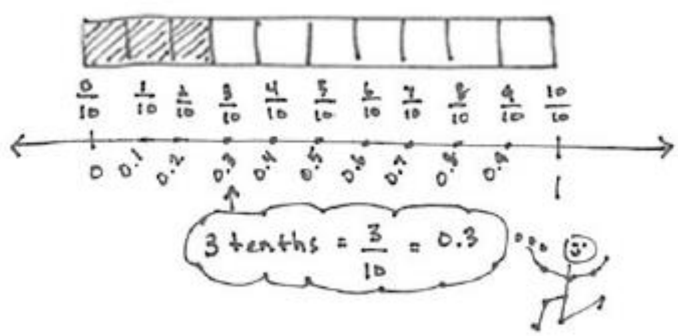
Grade 4 • Module 6

Decimal Fractions

OVERVIEW

This 20-day module gives students their first opportunity to explore decimal numbers via their relationship to decimal fractions, expressing a given quantity in both fraction and decimal forms. Utilizing the understanding of fractions developed throughout Module 5, students apply the same reasoning to decimal numbers, building a solid foundation for Grade 5 work with decimal operations. Previously referred to as whole numbers, all numbers written in the base ten number system with place value units that are powers of 10 are henceforth referred to as decimal numbers, a set which now includes tenths and hundredths, (e.g., 1, 15, 248, 0.3, 3.02, and 24.345).

In Topic A, students use their understanding of fractions to explore tenths. At the opening of the topic, they use metric measurement to see tenths in relation to different whole units: centimeters, meters, kilograms, and liters. Students explore, creating and identifying tenths of various wholes, as they draw lines of specified length, identify the weight of objects, and read the level of liquid measurements. Students connect these concrete experiences pictorially as tenths are represented on the number line and with tape diagrams as pictured below.



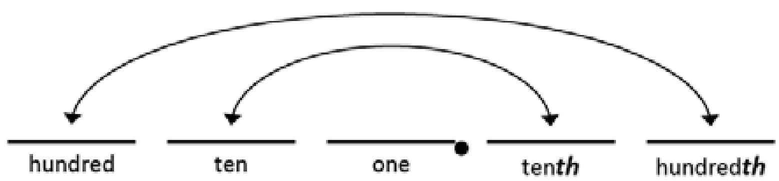
Students express tenths as decimal fractions and are introduced to decimal notation. They write statements of equivalence in unit, fraction, and decimal forms, (e.g., 3 tenths = $\frac{3}{10}$ = 0.3) (**4.NF.6**). Next, students return to the use of metric measurement to investigate decimal fractions greater than 1. Using a centimeter ruler, they draw lines that measure, for example, $2\frac{4}{10}$ or $6\frac{8}{10}$ centimeters. Using the area model, students see that numbers containing a whole number and fractional part, i.e., mixed numbers, can also be expressed using decimal notation provided that the fractional part can be converted to a decimal number (**4.NF.6**). Students use place value disks to represent the value of each digit in a decimal number. Just as they wrote whole numbers in expanded form using multiplication, students write the value of a decimal number in expanded form using fractions and decimals,
e.g., 2 ones 4 tenths = $2\frac{4}{10} = (2 \times 1) + (4 \times \frac{1}{10})$ and $2.4 = (2 \times 1) + (4 \times 0.1)$. Additionally, students plot decimal numbers on the number line.

Students decompose tenths into 10 equal parts to create hundredths in Topic B. Through the decomposition of a meter, students identify 1 centimeter as 1 hundredth of a meter. As students count up by hundredths, they realize the equivalence of 10 hundredths and 1 tenth and go on to represent them as both decimal fractions and as decimal numbers (**4.NF.5**). Students use area models, tape diagrams, and number disks on a place value chart to see and model the equivalence of numbers involving units of tenths and hundredths. They express the value of the number in both decimal and fraction expanded forms.

$$31\tfrac{46}{100} = (3 \times 10) + (1 \times 1) + \left(4 \times \tfrac{1}{10}\right) + \left(6 \times \tfrac{1}{100}\right)$$
$$31.46 = (3 \times 10) + (1 \times 1) + (4 \times 0.1) + (6 \times 0.01)$$

Close work with the place value chart helps students see that place value units are not symmetric about the decimal point—a common misconception that often leads students to mistakenly believe there is a *oneths* place. They explore the placement of decimal numbers to hundredths and recognize that the place value chart is symmetric about the ones column. This understanding helps students recognize that, even as we move to the units on the right side of the decimal on the place value chart, a column continues to represent a unit 10 times as large as that of the column to its right. This understanding builds on the place value work done in Module 1 and enables students to understand that 3.2, for example, might be modeled as 3 ones 2 tenths, 32 tenths, or 320 hundredths. Topic B concludes with students using their knowledge of fraction equivalence to work with decimal numbers expressed in unit form, fraction form, and decimal form (**4.NF.6**).

Symmetry with respect to the ones place



The focus of Topic C is comparison of decimal numbers (4.NF.7). To begin, students work with concrete representations of measurements. They see measurement of length on meter sticks, of mass using a scale, and of volume using graduated cylinders. In each case, students record the measurements on a place value chart and then compare them.

Mass of Rice Bags (kilograms)

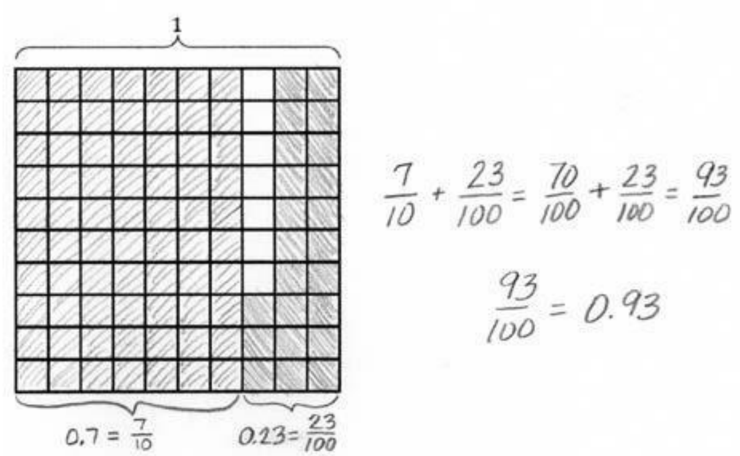
Rice Bag	ones	.	tenths	hundredths
A	0	.	1	0
B	0	.	6	5
C	0	.	7	
D	0	.	4	6

0.7 kg, 0.65 kg, 0.46 kg, 0.1 kg

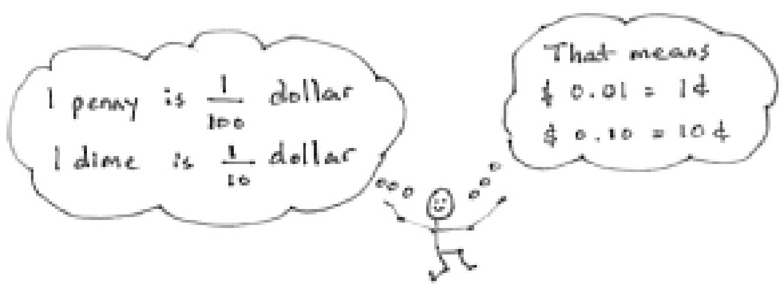
They use their understanding of metric measurement and decimals to answer questions, such as, "Which is greater? Less? Which is longer? Shorter? Which is heavier? Lighter?" Comparing the decimals in the context of measurement supports students' justification of their comparisons and grounds their reasoning, while at the same time setting them up for work with decimal comparison at a more concrete level.

Next, students use area models and number lines to compare decimal numbers and use the <, >, and = symbols to record their comparisons. All of their work with comparisons at the pictorial level helps to eradicate the common misconception that is often made when students assume a greater number of hundredths must be greater than a lesser number of tenths. For example, when comparing 7 tenths and 27 hundredths, students recognize that 7 tenths is greater than 27 hundredths because, as in any comparison, one must consider the *size of the units*. Students go on to arrange mixed groups of decimal fractions in unit, fraction, and decimal forms in order from greatest to least, or least to greatest. They use their understanding of different ways of expressing equivalent values to arrange a set of decimal fractions as pictured below.

Topic D introduces the addition of decimals by way of finding equivalent decimal fractions and adding fractions. Students add tenths and hundredths, recognizing that they must convert the addends to the same units (**4.NF.5**). The sum is then converted back into a decimal (**4.NF.6**). They use their knowledge of like denominators and understanding of fraction equivalence to do so. Students use the same process to add and subtract mixed numbers involving decimal units. They then apply their new knowledge to solve word problems involving metric measurements.



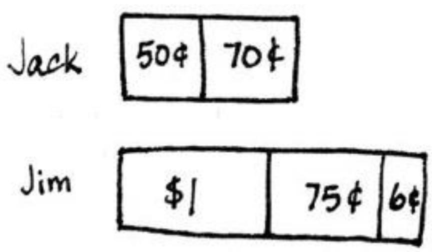
Students conclude their work with decimal fractions in Topic E by applying their knowledge to the real world context of money. They recognize 1 penny as $\frac{1}{100}$ dollar, 1 dime as $\frac{1}{10}$ dollar, and 1 quarter as $\frac{25}{100}$ dollar.



They apply their understanding of tenths and hundredths to write given amounts of money in both fraction and decimal forms. To do this, students decompose a given amount of money into dollars, quarters, dimes, and pennies and express the amount as a decimal fraction and decimal number. Students then add various numbers of coins and dollars using Grade 2 knowledge of the equivalence of 100 cents to 1 dollar. Addition and subtraction word problems are solved using unit form, adding dollars and cents. Multiplication and division word problems are solved using cents as the unit

(**4.MD.2**). The final answer in each word problem is converted from cents into a decimal using a dollar symbol for the unit.

For example, *Jack has 2 quarters and 7 dimes. Jim has 1 dollar, 3 quarters, and 6 pennies. How much money do they have together? Write your answer as a decimal.*



1 dollar 20 cents + 1 dollar 81 cents

= 2 dollars $\underset{100 \quad 1}{101}$ cents

= 3 dollars 1 cent

= $3.01

They have $3.01 together.

Terminology

New or Recently Introduced Terms

- Decimal expanded form (e.g., (2 × 10) + (4 × 1) + (5 × 0.1) + (9 × 0.01) = 24.59)
- Decimal fraction (fraction with a denominator of 10, 100, 1,000, etc.)
- Decimal number (number written using place value units that are powers of 10)
- Decimal point (period used to separate the whole number part from the fractional part of a decimal number)
- Fraction expanded form (e.g., $(2 \times 10) + (4 \times 1) + (5 \times \frac{1}{10} + \ 9 \times \frac{1}{100} = 24\frac{59}{100})$
- Hundredth (place value unit such that 100 hundredths equals 1 one)
- Tenth (place value unit such that 10 tenths equals 1 one)

Familiar Terms and Symbols

- Expanded form (e.g., 100 + 30 + 5 = 135)
- Fraction (numerical quantity that is not a whole number, e.g.,$\frac{1}{3}$)

Suggested Tools and Representations

- 1-liter container with milliliter marks
- Area model
- Centimeter ruler
- Decimal place value disks (tenths and hundredths)
- Digital scale
- Meter stick
- Number line
- Place value chart with decimals to hundredths
- Tape diagram
- Whole number place value disks (hundreds, tens, and ones)

Grade 4 Module 6 Topic A

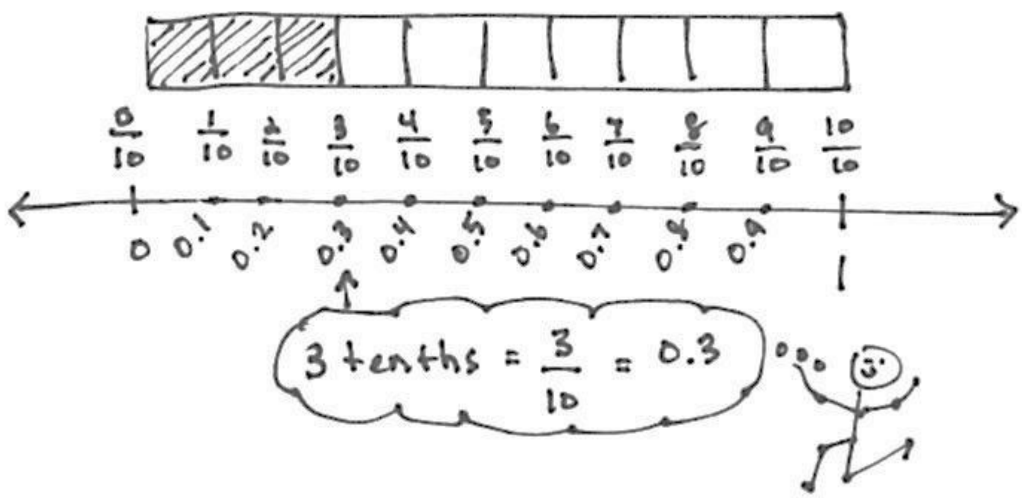
Exploration of Tenths

Focus Standard:

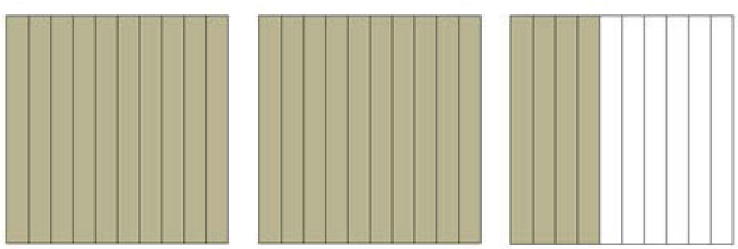
4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram*.

Recommended Instructional Days: 3

In Topic A, students use their understanding of fractions to explore tenths. In Lesson 1, students use metric measurement and see tenths in relation to one whole in the context of 1 kilogram, 1 meter, and 1 centimeter. Using bags of rice, each weighing $\frac{1}{10}$ kilogram, students see that the weight of 10 bags is equal to 1 kilogram. Through further exploration and observation of a digital scale, students learn that $\frac{1}{10}$ kilogram can also be expressed as 0.1 kilogram, that $\frac{2}{10}$ kilogram can be expressed as 0.2 kilogram, and that all expressions of tenths in fraction form (up to one whole) can be expressed in decimal form as well. Students then use their knowledge of pairs to 10 to determine how many more tenths are needed to bring a given number of tenths up to one whole. To bring together this metric measurement experience through a more abstract representation, tenths are represented on the number line and with tape diagrams as pictured below. Students express tenths as decimal fractions, are introduced to decimal notation, and write statements of equivalence in unit, fraction, and decimal forms, e.g., 3 tenths = $\frac{3}{10}$ = 0.3 (**4.NF.6**). Finally, meters and centimeters are decomposed into 10 equal parts in a manner similar to that in which 1 kilogram was decomposed.



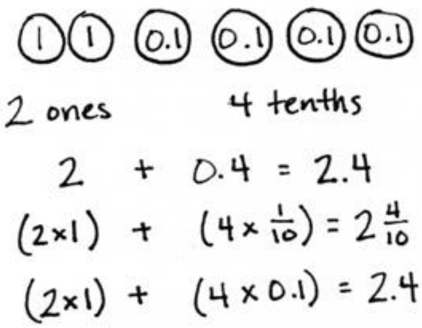
In Lesson 2, students return to the use of metric measurement, this time to investigate decimal fractions greater than 1. They draw lines using a centimeter ruler that measure, e.g., $2\frac{4}{10}$ or $6\frac{8}{10}$ centimeters, and recognize that those numbers can also be expressed in unit form as 24 tenths centimeters or 68 tenths centimeters. Students represent decimal numbers using the area model and see that numbers containing ones and fractions, i.e., mixed numbers, can also be expressed using decimal notation, e.g., 2.4 or 6.8; they also write more sophisticated statements of equivalence, e.g., $24\frac{4}{10} = 2 + \frac{4}{10}$ and 2.4 = 2 + 0.4 (**4.NF.6**).

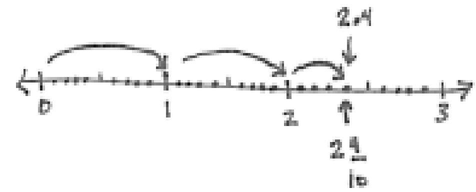


2 ones **4 tenths**

In Lesson 3, students work with place value disks and the number line to represent and identify decimal numbers with tenths as a unit. To explore the place value of each unit in a decimal number with tenths, students use number disks to rename groups of 10 tenths as ones. Next, students learn to record the value of each digit of a mixed number in fraction expanded form, followed by decimal expanded form, e.g., 2 ones 4 tenths = $2\frac{4}{10} = (2 \times 1) + (4 \times \frac{1}{10})$ and 2.4 = (2 × 1) + (4 × 0.1).

Finally, students model the value of decimal fractions within a mixed number by plotting decimal numbers on the number line.





**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 1

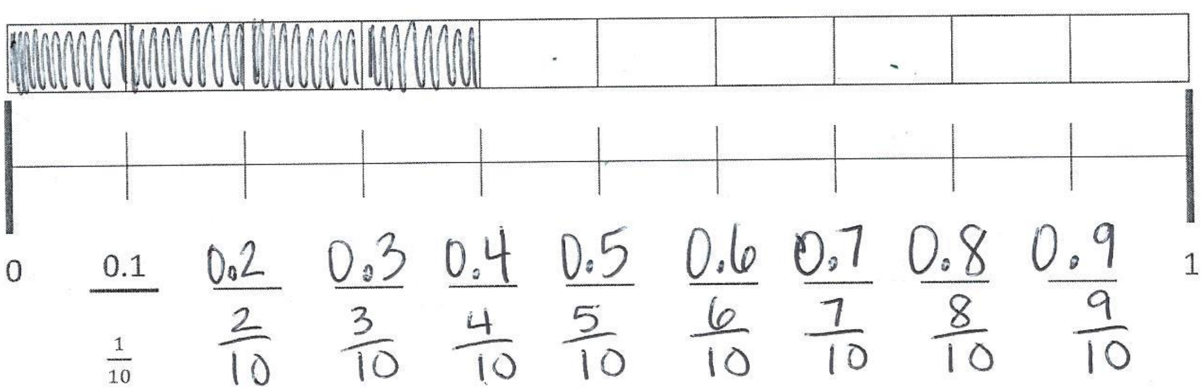
Objective: Use metric measurement to model the decomposition of one whole into tenths.

Homework Key

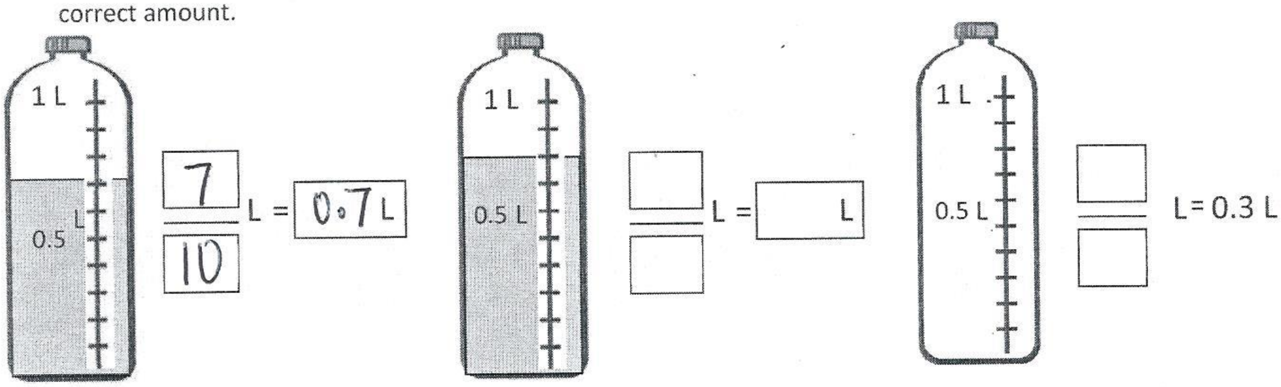
1. First 4 units shaded; 0.2, 0.3, ..., 0.9;
   $\frac{0}{10}, \frac{2}{10}, \frac{3}{10}, \ldots, \frac{10}{10}$; 0.4 circled
2. $\frac{7}{10} = 0.7$; $\frac{8}{10} = 0.8$; $\frac{3}{10}$;
   third container $\frac{3}{10}$ shaded
3. $\frac{7}{10}$; 0.6
4. $\frac{5}{10}$; 0.5; 1
5. a. $\frac{6}{10}$; 0.6
   b. $\frac{7}{10}$; 0.7
   c. $\frac{2}{10}$; 0.2
6. Lines drawn to matching values

Homework Sample

1. Shade the first 4 units of the tape diagram. Count by tenths to label the number line using a fraction and a decimal for each point. Circle the decimal that represents the shaded part.



2. Write the total amount of water in fraction form and decimal form. Shade the last bottle to show the correct amount.



Lesson 2

Objective: Use metric measurement and area models to represent tenths as fractions greater than 1 and decimal numbers.

Homework Key

1. Line segments drawn to given lengths
   a. $2\frac{6}{10}$ cm
   b. $3\frac{5}{10}$ cm
   c. $1\frac{7}{10}$ cm
   d. $4\frac{3}{10}$ cm
   e. $2\frac{2}{10}$ cm

2. Models shaded appropriately
   a. 2.4
   b. $3.8; 3 + \frac{8}{10} = 3 + 0.8 = 3.8$
   c. $4.1; 4 + \frac{1}{10} = 4 + 0.1 = 4.1$
   d. $1.4; 1 + \frac{4}{10} = 1 + 0.4 = 1.4; 3.6$
   e. $3.3; 3 + \frac{3}{10} = 3 + 0.3 = 3.3; 1.7$

Homework Sample

1. For each length given below, draw a line segment to match. Express each measurement as an equivalent mixed number.
   a. 2.6 cm $2\frac{6}{10}$ cm

Lesson 3

Objective: Represent mixed numbers with units of tens, ones, and tenths with number disks, on the number line, and in expanded form.

Homework Key

1. a. 14; 1 one and 4 tenths disks drawn; 1.4; 0.6
   b. 25; 2 ones and 5 tenths disks drawn; 2.5; 0.5
2. a. Answer provided
   b. Disks drawn appropriately
      $(5 \times 10) + (3 \times 1) + (7 \times \frac{1}{10}) = 53\frac{7}{10}$
      $(5 \times 10) + (3 \times 1) + (7 \times 0.1) = 53.7$
   c. Disks drawn appropriately
      $(3 \times 10) + (2 \times 1) + (3 \times \frac{1}{10}) = 32\frac{3}{10}$
      $(3 \times 10) + (2 \times 1) + (3 \times 0.1) = 32.3$
   d. Disks drawn appropriately
      $(8 \times 10) + (4 \times 1) + (8 \times \frac{1}{10}) = 84\frac{8}{10}$
      $(8 \times 10) + (4 \times 1) + (8 \times 0.1) = 84.8$
3. a. 4.6 plotted with endpoints 4 and 5; 4.6; $(4 \times 1) + (6 \times \frac{1}{10})$ or $(4 \times 1) + (6 \times 0.1)$; 0.4
   b. 24.5, $24\frac{5}{10}$; $(2 \times 10) + (4 \times 1) + (5 \times \frac{1}{10})$ or $(2 \times 10) + (4 \times 1) + (5 \times 0.1)$; 0 .5
   c. 63.6 plotted with endpoints 63 and 64; 63.6; $63\frac{6}{10}$; 0.4
   d. 71.3 plotted with endpoints 71 and 72; 71.3; $(7 \times 10) + (1 \times 1) + (3 \times \frac{1}{10})$ or
      $(7 \times 10) + (1 \times 1) + (3 \times 0.1)$; 0.7
   e. 90.9 plotted with endpoints 90 and 91; 90.9; $90\frac{9}{10}$; 0.1

Homework Sample

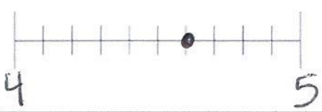
1. Circle groups of tenths to make as many ones as possible.

a. How many tenths in all?	Write and draw the same number using ones and tenths.
0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 / 0.1 0.1 0.1 0.1 0.1	1 0.1 0.1 0.1 0.1
	Decimal Form: 1.4
There are 14 tenths.	How much more is needed to get to 2? 6 tenths or 0.6

Lesson 3 (continued)

Homework Sample

3. Complete the chart.

Point	Number Line	Decimal Form	Mixed Number (ones and fraction form)	Expanded Form (fraction or decimal form)	How much to get to the next one?
a.		4.6	$4\frac{6}{10}$	$(4 \times 1) + (6 \times \frac{1}{10})$	$\frac{4}{10}$ or 0.4

Grade 4 Module 6 Topic B

Tenths and Hundredths

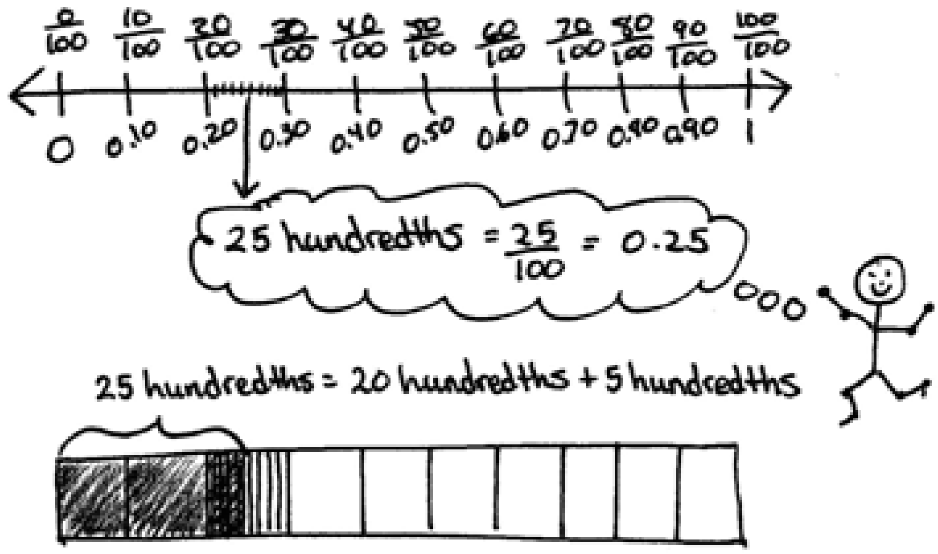
Focus Standards:

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.)

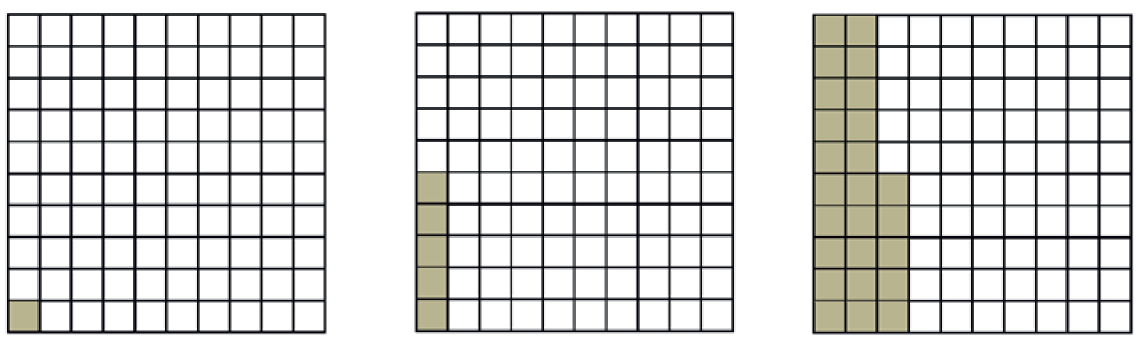
4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

Recommended Instructional Days: 5

In Topic B, students decompose tenths into 10 equal parts to create hundredths. In Lesson 4, they once again use metric measurement as a basis for exploration. Using a meter stick, they locate 1 tenth meter and then locate 1 hundredth meter. They identify 1 centimeter as $\frac{1}{100}$ meter and count $\frac{1}{100}$, $\frac{2}{100}$, $\frac{3}{100}$, up to $\frac{10}{100}$, and, at the concrete level, realize the equivalence of $\frac{10}{100}$ meter and $\frac{1}{10}$ meter. They represent $\frac{1}{100}$ meter as 0.01 meter, counting up to $\frac{25}{100}$ or 0.25, both in fraction and decimal form. They then model the meter with a tape diagram and partition it into tenths, as they did in Lesson 1. Students locate 25 centimeters and see that it is equal to 25 hundredths by counting up, $\frac{10}{100}$, $\frac{20}{100}$, $\frac{21}{100}$, $\frac{22}{100}$, $\frac{23}{100}$, $\frac{24}{100}$, $\frac{25}{100}$. They represent this as $\frac{20}{100}+\frac{5}{100}=\frac{25}{100}$ and, using decimal notation, write 0.25. A number bond shows the decomposition of 0.25 into the fractional parts of $\frac{2}{10}$ and $\frac{5}{100}$.

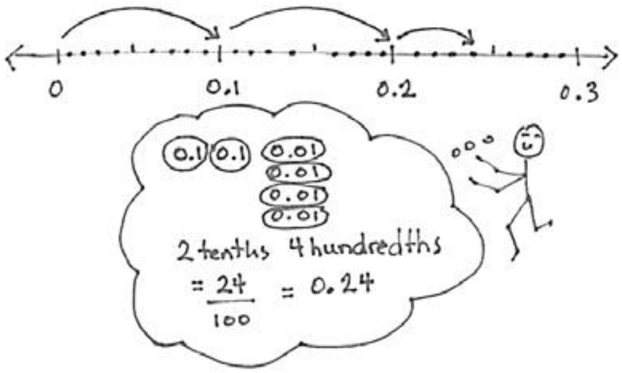


In Lesson 5, students relate hundredths to the area model (pictured below), to a tape diagram, and to number disks. They see and represent the equivalence of tenths and hundredths pictorially and numerically.

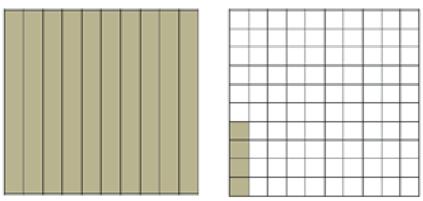


1 hundredth = $\frac{1}{100}$ = 0.01 **5 hundredths = $\frac{5}{100}$ = 0.05** **25 hundredths = $\frac{25}{100}$ = 0.25**

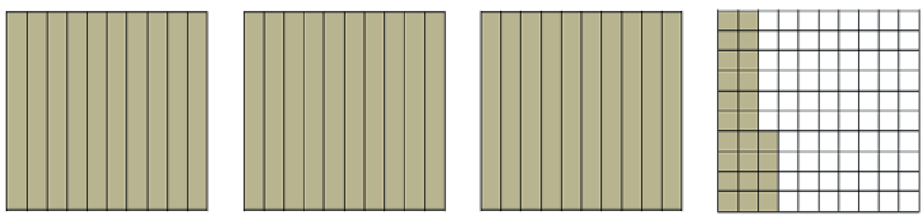
Students count up from $\frac{1}{100}$ with number disks just as they did with centimeters in Lesson 4. This time, the 10 hundredths are traded for 1 tenth, and the equivalence is expressed as $\frac{1}{10}=\frac{10}{100}=0.1$ = 0.10 (**4.NF.5**, **4.NF.6**). The equivalence of tenths and hundredths is also realized through multiplication and division, e.g., $\frac{1}{10}=\frac{1 \, x \, 10}{10 \, x \, 10}=\frac{10}{100}$ and $\frac{10}{100}=\frac{10 \div 10}{100 \div 10}=\frac{1}{10}$, establishing that 1 tenth is 10 times as much as 1 hundredth. They see, too, that 16 hundredths is 1 tenth and 6 hundredths, and that 25 hundredths is 2 tenths and 5 hundredths.



In Lesson 6, students draw representations of three-digit decimal numbers (with ones, tenths, and hundredths) with the area model.

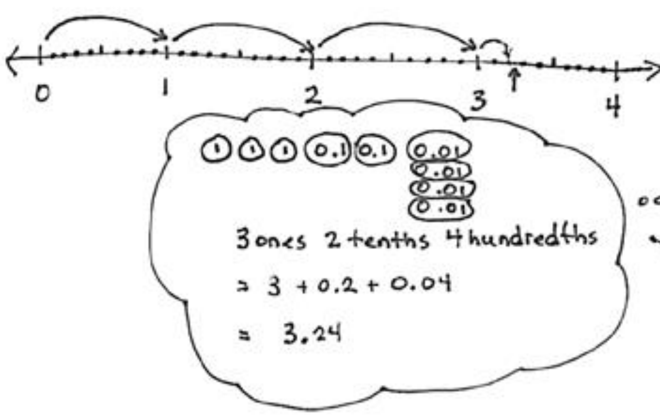


1 one 4 hundredths = $1\frac{4}{100}$ = 1.04



3 ones 24 hundredths = $3\frac{24}{100}$ = 3.24

Students also further extend their use of the number line to show the ones, tenths, and hundredths as lengths. Lesson 6 concludes with students coming to understand that tenths and hundredths each hold a special place within a decimal number, establishing that 3.80 and 3.08 are different and distinguishable values.



In Lesson 7, decimal numbers to hundredths are modeled with disks and written on the place value chart, where each digit's value is analyzed.

Hundreds	Tens	Ones	•	Tenths	Hundredths
3	7	8		7	3
3 hundreds	7 tens	8 ones		7 tenths	3 hundredths

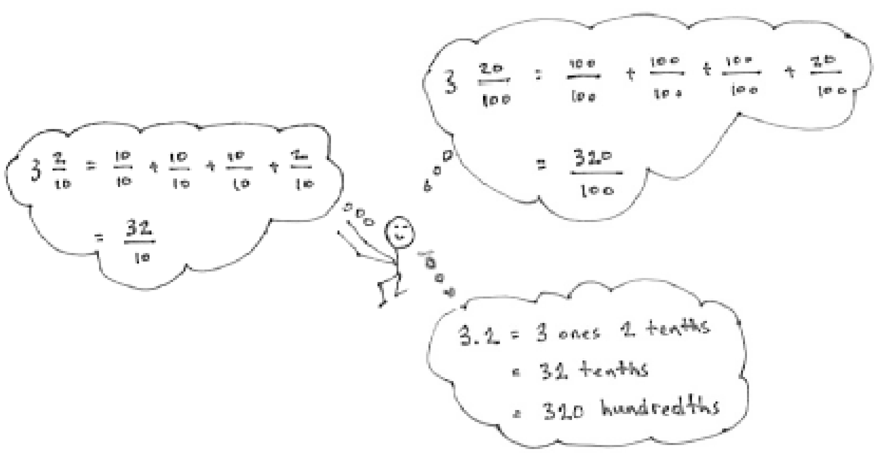
The value of the total number is represented in both fraction and decimal expanded form as pictured below.

$$(3 \times 100) + (7 \times 10) + (8 \times 1) + \left(7 \times \frac{1}{10}\right) + \left(3 \times \frac{1}{100}\right) = 378\frac{73}{100}$$

$$(3 \times 100) + (7 \times 10) + (8 \times 1) + (7 \times 0.1) + (3 \times 0.01) = 378.73$$

In the Debrief, students discuss the symmetry of the place value chart around 1, seeing the ones place as the "mirror" for tens and tenths and hundreds and hundredths, thereby avoiding the misconception of the "oneths" place or the decimal point itself as the point of symmetry. This understanding helps students recognize that, even as we move to the decimal side of the place value chart, a column continues to represent a unit 10 times as large as that of the column to its right.

In Lesson 8, students use what they know about fractions to represent decimal numbers in terms of different units. For example, 3.2 might be modeled as 3 ones 2 tenths, 32 tenths, or 320 hundredths. Students show these renamings in unit form, fraction form, and decimal form.



**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 4

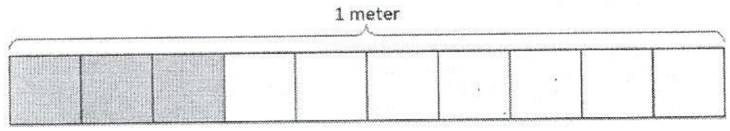
Objective: Use meters to model the decomposition of one whole into hundredths. Represent and count hundredths.

Homework Key

1. a. 30 cm
   b. $\frac{3}{100}$ m
   c. $\frac{3}{10}$ or $\frac{30}{100}$ m
   d. 0.3 or 0.30 m
   e. $\frac{3}{10}$ or $\frac{30}{100}$ m
2. a. 50
   b. 50
   c. 100
3. a. Answer provided.
   b. $\frac{3}{10}$ m + $\frac{8}{100}$ m = $\frac{38}{100}$ m = 0.38 m; number bond showing $\frac{3}{10}$ and $\frac{8}{100}$ is 0.38
   c. $\frac{4}{10}$ m + $\frac{6}{100}$ m = $\frac{46}{100}$ m = 0.46 m; number bond showing $\frac{4}{10}$ and $\frac{6}{100}$ is 0.46
4. a. Shaded appropriately; 0.09 m
   b. Shaded appropriately; 0.15 m
   c. Shaded appropriately; 0.41 m
5. a. Number bond showing $\frac{2}{10}$ and $\frac{3}{100}$ is 0.23 m
   b. Number bond showing $\frac{3}{10}$ and $\frac{8}{100}$ is 0.38 m
   c. Number bond showing $\frac{8}{10}$ and $\frac{2}{100}$ is 0.82
   d. Number bond showing $\frac{7}{10}$ and $\frac{6}{100}$ is 0.76

Lesson 4 (continued)

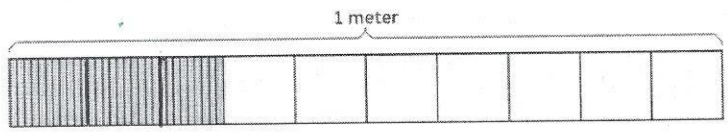
1. a. What is the length of the shaded part of the meter stick in centimeters?



30cm

b. What fraction of a meter is 3 centimeters? $\frac{3}{100}$m

c. In fraction form, express the length of the shaded portion of the meter stick.



$\frac{3}{10}$ or $\frac{30}{100}$m

d. In decimal form, express the length of the shaded portion of the meter stick.

0.3 or 0.30m

e. What fraction of a meter is 30 centimeters?

$\frac{3}{10}$ or $\frac{30}{100}$m

5. Draw a number bond, pulling out the tenths from the hundredths, as in Problem 3 of the Homework. Write the total as the equivalent decimal.

a. $\frac{23}{100}$ m

$\frac{2}{10}$ $\frac{3}{100}$

0.23

b. $\frac{38}{100}$ m

c. $\frac{82}{100}$

d. $\frac{76}{100}$

Lesson 5

Objective: Model the equivalence of tenths and hundredths using the area model and number disks.

Homework Key

1. a. 10, 10, 40; model shaded appropriately; 0.4 or 0.40

   b. 10, 10, 6; model shaded appropriately; 0.6

2. a. 3, 6; 0.36; $\frac{36}{100}$; model shaded appropriately

   b. 8, 2; 0.82; $\frac{82}{100}$; model shaded appropriately

3. a. 1 group of 10 disks circled; 14, 1, 4; number bond showing $\frac{1}{10}$ and $\frac{4}{100}$ is 0.14

   b. 2 groups of 10 disks circled; 24, 2, 4; number bond showing $\frac{2}{10}$ and $\frac{4}{100}$ is 0.24

4. a. 04; 4; 4 (0.01) disks drawn

   b. 13; 1, 3; 1 (0.1) disk and 3 (0.01) disks drawn

   c. $\frac{41}{100}$, 41; 4 (0.1) disks and 1 (0.01) disk drawn

   d. $\frac{9}{10}$; 9; 9 (0.1) disks drawn

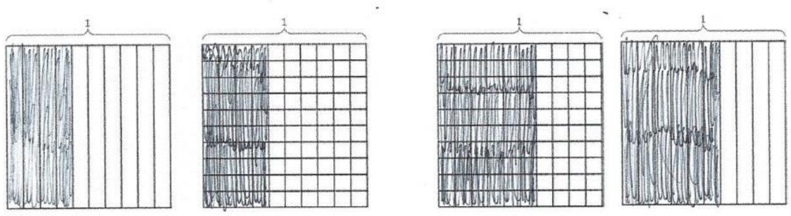
   e. $\frac{63}{100}$; 63; 6 (0.1) disks and 3 (0.01) disks drawn

   f. $\frac{90}{100}$; 90; 9 (0.1) disks drawn

Homework Samples

1. Find the equivalent fraction using multiplication or division. Shade the area models to show the equivalency. Record it as a decimal.

   a. $\frac{4 \times 10}{10 \times 10} = \frac{40}{100}$ b. $\frac{60 \div 10}{100 \div 10} = \frac{6}{10}$

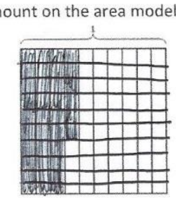


2. Complete the number sentences. Shade the equivalent amount on the area model, drawing horizontal lines to make hundredths.

   a. 36 hundredths = 3 tenths + 6 hundredths

   Decimal form: 0.36

   Fraction form: $\frac{36}{100}$



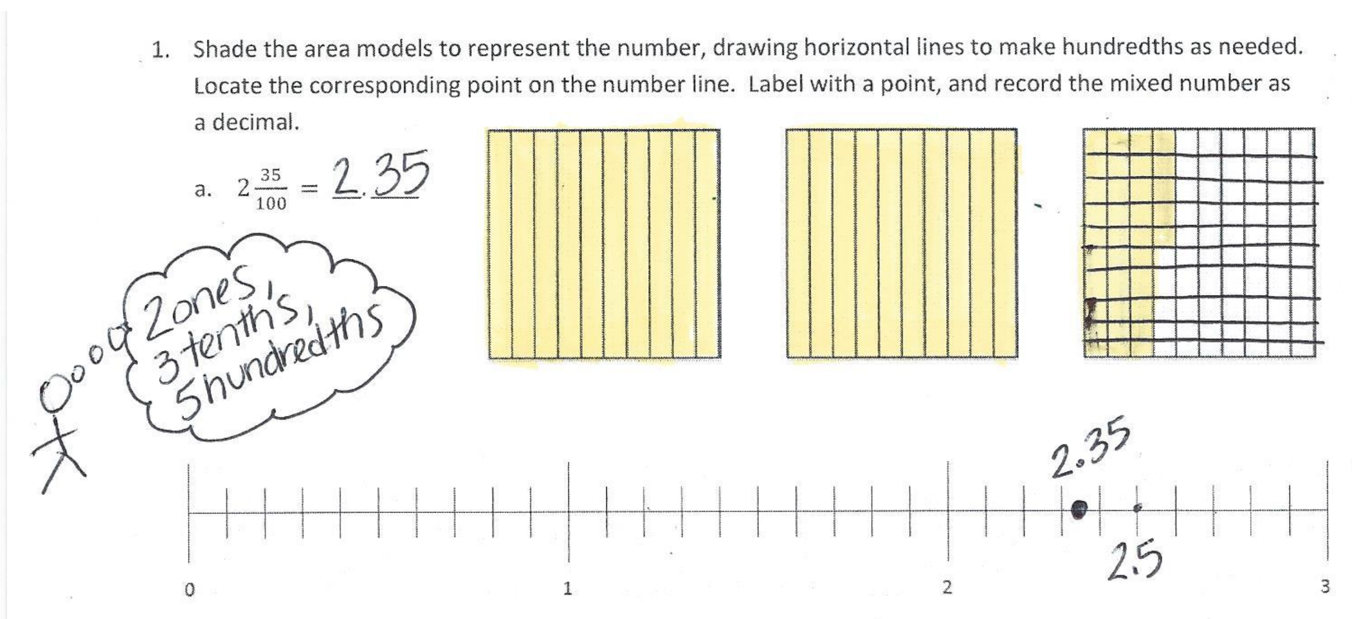
Lesson 6

Objective: Use the area model and number line to represent mixed numbers with units of ones, tenths, and hundredths in fraction and decimal forms.

Homework Key

1. a. 2.35; model shaded appropriately; point plotted accurately on number line
   b. 3.17; model shaded appropriately; point plotted accurately on number line
2. a. 5.9 plotted accurately on number line
   b. 3.25 plotted accurately on number line
3. a. $2\frac{2}{100}$; 2.02
   b. $2\frac{16}{100}$; 2.16
   c. $3\frac{7}{100}$; 3.07
   d. $1\frac{18}{100}$; 1.18
   e. $9\frac{62}{100}$; 9.62
   f. $6\frac{20}{100}$; 6.20
4. Lines drawn to matching values

Homework Sample


1. Shade the area models to represent the number, drawing horizontal lines to make hundredths as needed. Locate the corresponding point on the number line. Label with a point, and record the mixed number as a decimal.

a. $2\frac{35}{100}$ = 2.35

Lesson 7

Objective: Model mixed numbers with units of hundreds, tens, ones, tenths, and hundredths in expanded form and on the place value chart.

Homework Key

1. a. $30 + 0.4 + 0.02 = 30.42$
   b. $400 + 0.03 = 400.03$

2. a. 8, 8 hundreds
   b. 2, 2 tens
   c. 6, 6 tenths
   d. 4, 4 hundredths
   e. 3, 3 hundreds
   f. 4, 4 tens
   g. 1, 1 tenth
   h. 9, 9 hundredths

3.

$25\frac{3}{10}$	$(2 \times 10) + (5 \times 1) + (3 \times \frac{1}{10})$ $20 + 5 + \frac{3}{10}$	$(2 \times 10) + (5 \times 1) + (3 \times 0.1)$ $20 + 5 + 0.3$
$39\frac{7}{100}$	$(3 \times 10) + (9 \times 1) + (7 \times \frac{1}{100})$ $30 + 9 + \frac{7}{100}$	$(3 \times 10) + (9 \times 1) + (7 \times 0.01)$ $30 + 9 + 0.07$
$40\frac{6}{10}$	$(4 \times 10) + (6 \times \frac{1}{10})$ $40 + \frac{6}{10}$	$(4 \times 10) + (6 \times 0.1)$ $40 + 0.6$
$208\frac{90}{100}$	$(2 \times 100) + (8 \times 1) + (90 \times \frac{1}{100})$ $200 + 8 + \frac{90}{100}$	$(2 \times 100) + (8 \times 1) + (9 \times 0.1)$ $200 + 8 + 0.9$
$510\frac{7}{100}$	$(5 \times 100) + (1 \times 10) + (7 \times \frac{1}{100})$ $500 + 10 + \frac{7}{100}$	$(5 \times 100) + (1 \times 10) + (7 \times 0.01)$ $500 + 10 + 0.07$
$900\frac{9}{100}$	$(9 \times 100) + (9 \times \frac{1}{100})$ $900 + \frac{9}{100}$	$(9 \times 100) + (9 \times 0.01)$ $900 + 0.09$

Homework Sample

1. Write a decimal number sentence to identify the total value of the number disks.

   a. 10 10 10   0.1 0.1 0.1 0.1   0.01 0.01

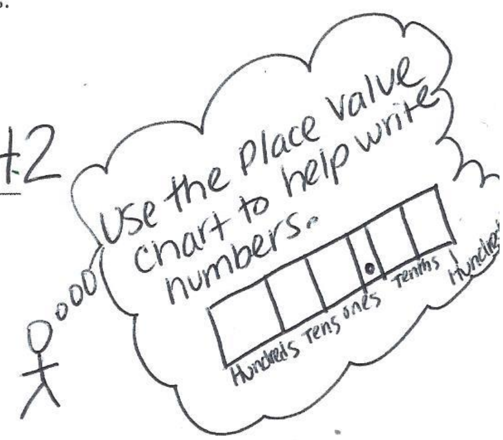
   3 tens   4 tenths   2 hundredths

   30 + 0.4 + 0.02 = 30.42

   b. 100 100 100 100   0.01 0.01 0.01

   4 hundreds   3 hundredths

   400 + 0.03 = 400.03



Lesson 8

Objective: Use understanding of fraction equivalence to investigate decimal numbers on the place value chart expressed in different units.

Homework Key

1. a. Area model accurately shaded;
   22, 2, 2, 2.2
   b. Explanations will vary.
2. 30; disks drawn to model number
   30; disks drawn to model number
   23; disks drawn to model number
   33; disks drawn to model number
3. a. 10
   b. 20
   c. 13
   d. 26
   e. 103
   f. 206
4. a. 100
   b. 200
   c. 130
   d. 260
   e. 1030
   f. 2060
5. $5\frac{3}{10}$, 53 tenths, $\frac{53}{10}$; 530 hundredths, $\frac{530}{100}$
   $9\frac{7}{10}$, 97 tenths, $\frac{97}{10}$; 970 hundredths, $\frac{970}{100}$
   $10\frac{9}{10}$, 109 tenths, $\frac{109}{10}$; 1090 hundredths, $\frac{1090}{100}$
   $68\frac{5}{10}$, 685 tenths, $\frac{685}{10}$; 6850 hundredths, $\frac{6850}{100}$

Homework Sample

1. Use the area model to represent $\frac{220}{100}$. Complete the number sentence.

   a. $\frac{220}{100}$ = 22 tenths = 2 ones 2 tenths = 2.2

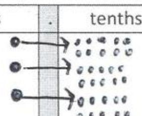
10 tenths + 10 tenths + 2 tenths

   b. In the space below, explain how you determined your answer to (a).

   I Shaded in 22 tenths which was 22 bars. 20 bars equals 2 ones and the 2 bars left equals 2 tenths so I got 2.2.

2. Draw number disks to represent the following decompositions:

3 ones = 30 tenths

ones	.	tenths	hundredths
			

3 tenths = ________ hundredths

ones	.	tenths	hundredths

Grade 4 Module 6 Topic C

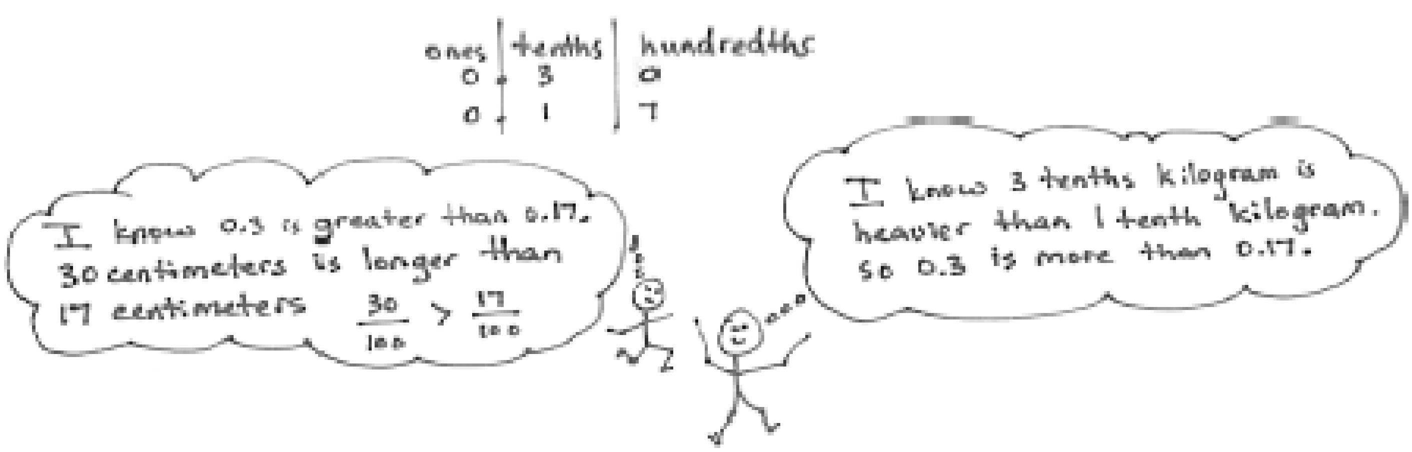
Decimal Comparison

Focus Standard:

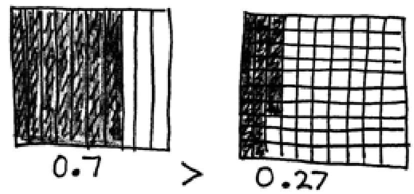
4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Recommended Instructional Days: 3

The focus of Topic C is comparison of decimal numbers. In Lesson 9, students compare pairs of decimal numbers representing lengths, masses, or volumes by recording them on the place value chart and reasoning about which measurement is longer than (shorter than, heavier than, lighter than, more than, or less than) the other. Comparing decimals in the context of measurement supports their justifications of their conclusions and begins their work with comparison at a more concrete level.



Students move on to more abstract representations in Lesson 10, using area models and the number line to justify their comparison of decimal numbers (**4.NF.7**). They record their observations with the <, >, and = symbols. In both Lessons 9 and 10, the intensive work at the concrete and pictorial levels eradicates the common misconception that occurs, for example, in the comparison of 7 tenths and 27 hundredths, where students believe that 0.7 is less than 0.27 simply because it resembles the comparison of 7 ones and 27 ones. This reinforces the idea that, in any comparison, one must consider the *size of the units.*



Finally, in Lesson 11, students use their understanding of different ways of expressing equivalent values to arrange a set of decimal fractions in unit, fraction, and decimal form from greatest to least or least to greatest.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 9

Objective: Use the place value chart and metric measurement to compare decimals and answer comparison questions.

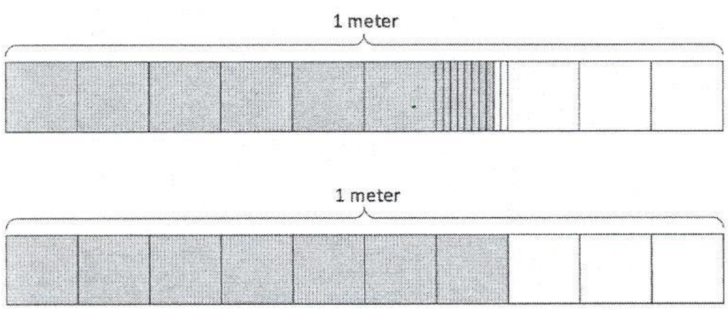
Homework Key

1. a. 0.68 m, 0.7 m; 0.7 meters is longer than 0.68 meters, or 0.68 meters is shorter than 0.7 meters
   b. 0.5 m, 0.44 m; 0.5 meters is longer than 0.44 meters, or 0.44 meters is shorter than 0.5 meters
   c. 0.44 m, 0.5 m, 0.68 m, 0.7 m
2. a. Basketball and soccer ball (0.62 kg and 0.43 kg) crossed off
   b. 0.15; 0.25; 0.62; 0.43
   c. Heavier than; lighter than
3. 0.7, 0.62, 0.28, 0.4, 0.85, 0.2
   a. >
   b. <
   c. <
   d. 0.2 L, 0.28 L, 0.4 L, 0.62 L, 0.7 L, 0.85 L

Homework Samples

1. Express the lengths of the shaded parts in decimal form. Write a sentence that compares the two lengths. Use the expression *shorter than* or *longer than* in your sentence.

   a.

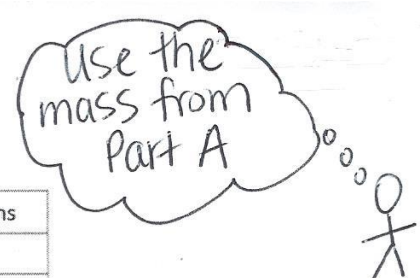


0.68m

0.70m

0.68 meters is Shorter than 0.70 meters.

b. Express the mass of each item on the place value chart.



	ones (kilograms)	•	tenths	hundredths
baseball	0	•	1	5
volleyball	0	•	2	5
basketball	0	•	6	2
soccer ball	0	•	4	3

Lesson 10

Objective: Use area models and the number line to compare decimal numbers, and record comparisons using <, >, and =.

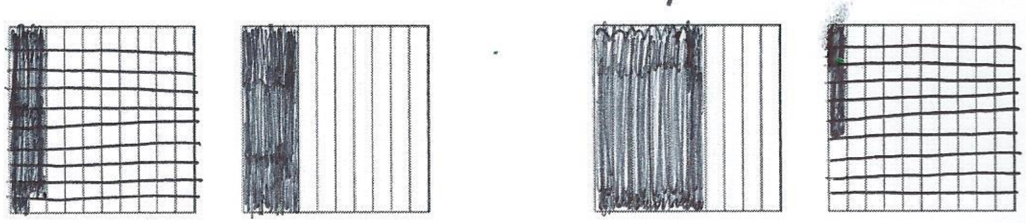
Homework Key

1. a. <, models shaded appropriately
   b. >, models shaded appropriately
   c. >, models shaded appropriately
   d. <, models shaded appropriately
2. a. >, points plotted and labeled accurately
   b. <, points plotted and labeled accurately
3. a. >
   b. <
   c. >
   d. <
   e. =
   f. <
4. a. =
   b. >
   c. >
   d. <
   e. =
   f. >

Homework Samples

1. Shade the parts of the area models below, decomposing tenths as needed, to represent the pairs of decimal numbers. Fill in the blank with <, >, or = to compare the decimal numbers.

   a. 0.19 __<__ 0.3   b. 0.6 __>__ 0.06



Lesson 10 (continued)

3. Use the symbols <, >, or = to compare.

   a. 2.68 > 2.54

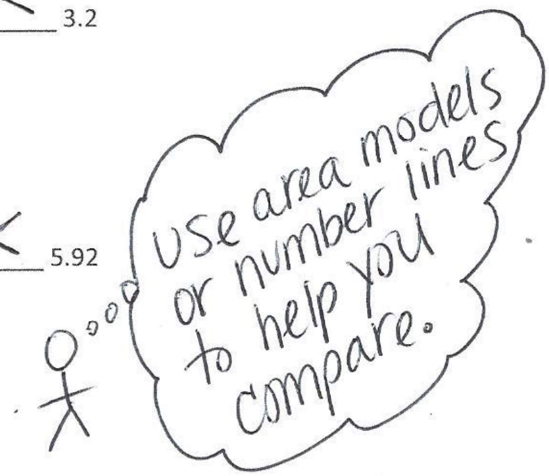
   b. 6.37 < 6.73

   c. 9.28 > 7.28

   d. 3.02 < 3.2

   e. 13.1 = 13.10

   f. 5.8 < 5.92



Lesson 11

Objective: Compare and order mixed numbers in various forms.

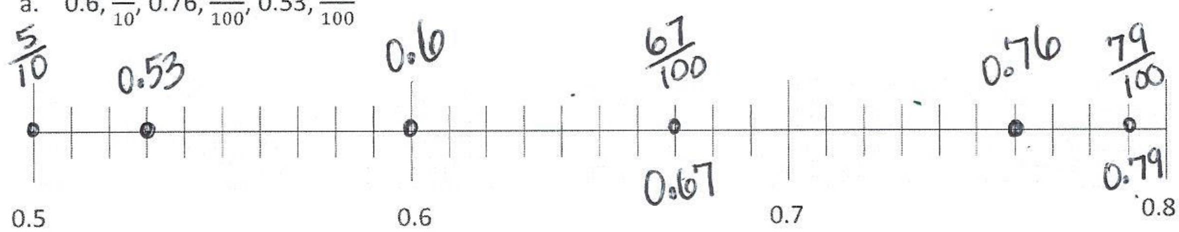
Homework Key

1. a. Points plotted accurately in following order: 0.5, 0.53, 0.6, 0.67, 0.76, 0.79
   b. Points plotted accurately in following order: 8.1, 8.15, 8.2, 8.27, 8.32
   c. Points plotted accurately in following order: 13, 13.03, 13.12, 13.21, 13.3
2. a. 4.43 > 4.33 > 4.31 > 4.30 > 4.03 > 0.34
   b. 17.55 > 17.5 > 17.05 > 15.75 > 15.71 > 15.7
   c. 81 > 9.8 > 8.9 > 8.19 > 8.1 > 8.09
3. Jenna
4. Monday; Wednesday

Homework Samples

1. Plot the following points on the number line using decimal form.

   a. 0.6, $\frac{5}{10}$, 0.76, $\frac{79}{100}$, 0.53, $\frac{67}{100}$



3. In a paper airplane contest, Matt's airplane flew 9.14 meters. Jenna's airplane flew $9\frac{4}{10}$ meters. Ben's airplane flew $\frac{904}{100}$ meters. Leah's airplane flew 9.1 meters. Whose airplane flew the farthest?

Put all numbers into the same form, then compare.

9.14 (Matt)
$9\frac{4}{10}$ = 9.4 (Jenna) ★
$\frac{904}{100}$ = 9.04 (Ben)
9.1 (Leah)

Jenna's airplane flew the farthest.

4. Becky drank $1\frac{41}{100}$ liters of water on Monday, 1.14 liters on Tuesday, 1.04 liters on Wednesday, $\frac{11}{10}$ liters on

Grade 4 Module 6 Topic D

Addition with Tenths and Hundredths

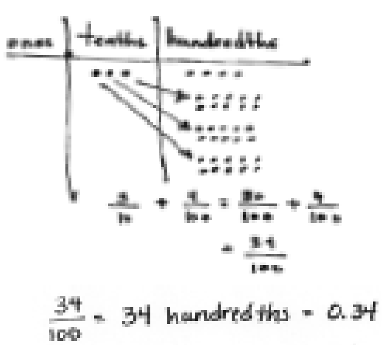
Focus Standards:

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* (Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.)

4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

Recommended Instructional Days: 3

Topic D brings together students' work with addition of fractions and their work with decimals. In Lesson 12, students begin at the pictorial level, decomposing tenths using the area model and place value chart to add tenths and hundredths. They progress to using multiplication to generate equivalent fractions and express the sum in fraction form as a decimal, as pictured below.



$$\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100}$$

$$\frac{3}{10} + \frac{4}{100} = \frac{30}{100} + \frac{4}{100} = \frac{34}{100} = 0.34$$

Students next apply what they know about fraction addition to use multiple strategies to solve sums of tenths and hundredths with totals greater than 1 (see the two examples pictured below), again expressing the solution in decimal form.

$$\frac{9}{10} + \frac{64}{100} = \frac{90}{100} + \underbrace{\frac{64}{100}}_{\frac{10}{100}\ \frac{54}{100}} = 1\frac{54}{100} = 1.54 \qquad \frac{9}{10} + \frac{64}{100} = \frac{90}{100} + \frac{64}{100} = \underbrace{\frac{154}{100}}_{\frac{100}{100}\ \frac{54}{100}} = 1\frac{54}{100} = 1.54$$

In Lesson 13, students add ones, tenths, and hundredths in decimal form by converting the addends to mixed numbers in fraction form, creating like denominators, and applying their understanding of the addition of mixed numbers. Once the decimal fractions are added (**4.NF.5**), the number sentence is written in decimal notation (**4.NF.6**).

$$\begin{aligned} 5.6 + 4.53 &= 5\frac{6}{10} + 4\frac{53}{100} \\ &= 5\frac{60}{100} + 4\frac{53}{100} \\ &= 9\frac{60}{100} + \frac{53}{100} \\ &= 9\underbrace{\frac{113}{100}}_{1\ \ \frac{13}{100}} \\ &= 10\frac{13}{100} \\ 5.6 + 4.53 &= 10.13 \end{aligned}$$

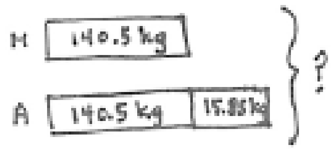
$$\begin{aligned} 5.6 + 4.53 &= 5\frac{6}{10} + 4\underbrace{\frac{53}{100}}_{\frac{4}{10}\ \frac{13}{100}} \\ &= 9 + 1 + \frac{13}{100} \\ &= 10\frac{13}{100} \\ 5.6 + 4.53 &= 10.13 \end{aligned}$$

$$\begin{aligned} 5.6 + 4.53 &= 5\frac{60}{100} + 4\underbrace{\frac{53}{100}}_{\frac{40}{100}\ \frac{13}{100}} \\ &= 10\frac{13}{100} \\ 5.6 + 4.53 &= 10.13 \end{aligned}$$

The addition of decimals is a Grade 5 standard. By converting addends in decimal form to fraction form, Grade 4 students strengthen their understanding both of fraction and decimal equivalence and of fraction addition.

In Lesson 14, students apply this work to solve measurement word problems involving addition. They convert decimals to fraction form, solve the problem, and write their statement using the decimal form of the solution as pictured below.

An apple orchard sold 140.5 kilograms of apples in the morning. The orchard sold 15.85 kilograms more apples in the afternoon than in the morning. How many total kilograms of apples were sold that day?



Solution A

$$140\tfrac{5}{10} + 15\tfrac{85}{100} = 155\tfrac{50}{100} + \tfrac{85}{100}$$
$$= 155\tfrac{135}{100}$$
$$= 156\tfrac{35}{100}$$
$$140\tfrac{5}{10} + 156\tfrac{35}{100} = 296\tfrac{50}{100} + \tfrac{35}{100}$$
$$= 296\tfrac{85}{100}$$

The apple orchard sold 296.85 kilograms of apples.

Solution B

$$\left(2 \times 140\tfrac{5}{10}\right) + 15.85 = 280\tfrac{10}{10} + 15\tfrac{85}{100}$$
$$= 296\tfrac{85}{100}$$

The apple orchard sold 296.85 kilograms that day.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 12

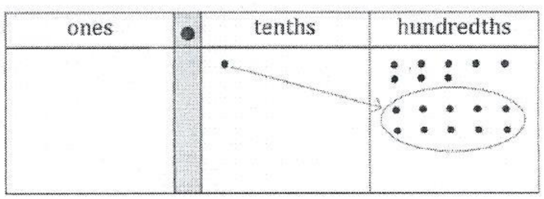
Objective: Apply understanding of fraction equivalence to add tenths and hundredths.

Homework Key

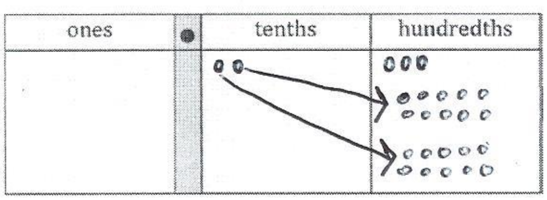
1. a. 18
   b. 23; disks modeled appropriately in chart
   c. 24; disks modeled appropriately in chart
2. a. 10, 12
   b. 40, 11, 51
   c. 80, 25, 105
   d. 43, 60, 103
3. a. 0.37
   b. 0.66
   c. 0.90 or 0.9
   d. 1.0 or 1
4. a. 1.03
   b. 1.07
   c. 1.18
   d. 1.68
5. 1.48 inches

Homework Samples

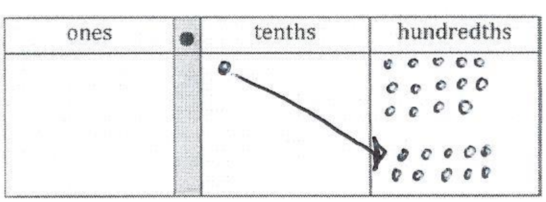
1. Complete the number sentence by expressing each part using hundredths. Model using the place value chart, as shown in Part (a).



a. 1 tenth + 8 hundredths = 18 hundredths



b. 2 tenths + 3 hundredths = 23 hundredths



c. 1 tenth + 14 hundredths = 24 hundredths

Lesson 12 (continued)

3. Find the sum. Convert tenths to hundredths as needed. Write your answer as a decimal.

a. $\frac{3}{10} + \frac{7}{100}$

$\frac{30}{100} + \frac{7}{100} = \frac{37}{100} = 0.37$

$\frac{3}{10} = \frac{30}{100}$

b. $\frac{16}{100} + \frac{5}{10}$

c. $\frac{5}{10} + \frac{40}{100}$

d. $\frac{20}{100} + \frac{8}{10}$

4. Solve. Write your answer as a decimal.

a. $\frac{5}{10} + \frac{53}{100}$

make sure the denominators are the same.

b. $\frac{27}{100} + \frac{8}{10}$

c. $\frac{4}{10} + \frac{78}{100}$

d. $\frac{98}{100} + \frac{7}{10}$

Lesson 13

Objective: Add decimal numbers by converting to fraction form.

Homework Key

1. a. $5\frac{27}{100}$; 5.27
   b. $8\frac{27}{100}$; 5.2 + 3.07 = 8.27
   c. $6\frac{50}{100} + \frac{1}{100} = 6\frac{51}{100}$; 6.5 + 0.01 = 6.51
   d. $6\frac{50}{100} + 7\frac{1}{100} = 13\frac{51}{100}$; 6.5 + 7.01 = 13.51
2. a. 10; 4.9 + 5.1 = 10.0 or 10
   b. $11\frac{35}{100}$; 8.7 + 2.65 = 11.35
   c. $14\frac{17}{100}$; 7.3 + 6.87 = 14.17
   d. $13\frac{28}{100}$; 5.48 + 7.8 = 13.28
3. a. $2\frac{97}{100}$; 2.1 + 0.87 = 2.97
   b. $7\frac{20}{100} + 2\frac{67}{100} = 9\frac{87}{100}$; 7.2 + 2.67 = 9.87
   c. $7\frac{3}{10} + 1\frac{8}{10} = 9\frac{1}{10}$; 7.3 + 1.8 = 9.1
   d. $7\frac{30}{100} + 1\frac{86}{100} = 9\frac{16}{100}$; 7.3 + 1.86 = 9.16
   e. $6\frac{7}{100} + 3\frac{93}{100} = 10$; 6.07 + 3.93 = 10.0 or 10
   f. $6\frac{87}{100} + 3\frac{90}{100} = 10\frac{77}{100}$; 6.87 + 3.9 = 10.77
   g. $8\frac{60}{100} + 4\frac{67}{100} = 13\frac{27}{100}$; 8.6 + 4.67 = 13.27
   h. $18\frac{62}{100} + 14\frac{70}{100} = 33\frac{32}{100}$; 18.62 + 14.7 = 33.32

Homework Samples

1. Solve. Convert tenths to hundredths before finding the sum. Rewrite the complete number sentence in decimal form. Problems 1(a) and 1(b) are partially completed for you.

a. $5\frac{2}{10} + \frac{7}{100} = 5\frac{20}{100} + \frac{7}{100} = 5\frac{27}{100}$ $5.2 + 0.07 = 5.27$	b. $5\frac{2}{10} + 3\frac{7}{100} = 8\frac{20}{100} + \frac{7}{100} = 8\frac{27}{100}$ comes from $5+3$ and $\frac{2}{10} = \frac{20}{100}$ $5.2 + 3.07 = 8.27$
c. $6\frac{5}{10} + \frac{1}{100} = 6\frac{50}{100} + \frac{1}{100} = 6\frac{51}{100}$ $6.5 + 0.01 = 6.51$	d. $6\frac{5}{10} + 7\frac{1}{100} = 6\frac{50}{100} + 7\frac{1}{100} = 13\frac{51}{100}$ $6.5 + 7.01 = 13.51$

Lesson 13 (continued)

3. Solve by rewriting the number sentence in fraction form. After solving, rewrite the complete number sentence in decimal form.

a. $2.1 + 0.87 = 2\frac{1}{10} + \frac{87}{100} = 2\frac{10}{100} + \frac{87}{100} = 2\frac{97}{100}$ $2.1 + 0.87 = 2.97$	b. $7.2 + 2.67$

Lesson 14

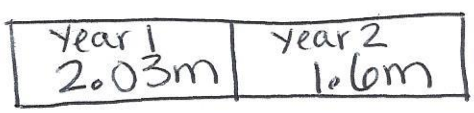
Objective: Solve word problems involving the addition of measurements in decimal form.

Homework Key

1. 3.63 meters
2. 36.14 kilograms
3. 256.54 liters
4. 54.8 seconds

Homework Sample

1. The snowfall in Year 1 was 2.03 meters. The snowfall in Year 2 was 1.6 meters. How many total meters of snow fell in Years 1 and 2?



$$\begin{array}{r} 2.03 \\ +1.6 \\ \hline 3.63\text{m} \end{array}$$

3.63 meters of snow fell in Years 1 and 2.

Grade 4 Module 6 Topic E

Money Amounts as Decimal Numbers

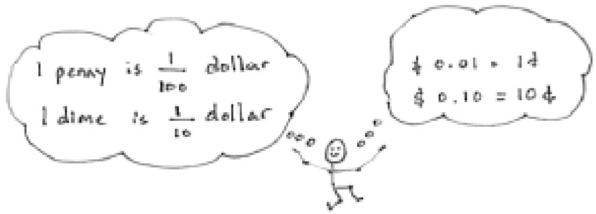
Focus Standard:

4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Recommended Instructional Days: 2

In Topic E, students work with money amounts as decimal numbers, applying what they have come to understand about decimals.

Students recognize 1 penny as 1100 dollar, 1 dime as 110 dollar, and 1 quarter as 25100 dollar in Lesson 15. They apply their understanding of tenths and hundredths to express money amounts in both fraction and decimal forms. Students use this understanding to decompose varying configurations and forms of dollars, quarters, dimes, and pennies and express each as a decimal fraction and decimal number. They then expand this skill to include money amounts greater than a dollar in decimal form.



In Lesson 16, students continue their work with money and apply their understanding that only like units can be added. They solve word problems involving money using all four operations (**4.MD.2**). Addition and subtraction word problems are computed using dollars and cents in unit form. Multiplication and division word problems are computed using cents in unit form. All answers are converted from unit form into decimal form, using the dollar symbol as the unit.

2 dollars, 1 quarter, 3 dimes, 7 pennies

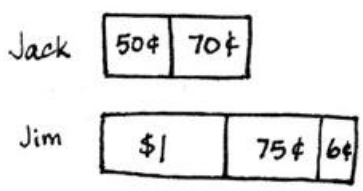
= 2 dollars 62 cents

= $2\frac{62}{100}$ dollars

= 2.62 dollars

= $2.62

Jack has 2 quarters and 7 dimes. Jim has 1 dollar, 3 quarters, and 6 pennies. How much money do they have together? Write your answer as a decimal.



They have $3.01 together.

Solution A

1 dollar 20 cents + 1 dollar 81 cents

= 2 dollars 101 cents

100 1

= 3 dollars 1 cent

= $3.01

Solution B

1 dollar 20 cents + 1 dollar 81 cents

80 1

= 3 dollars 1 cent

= $3.01

The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.

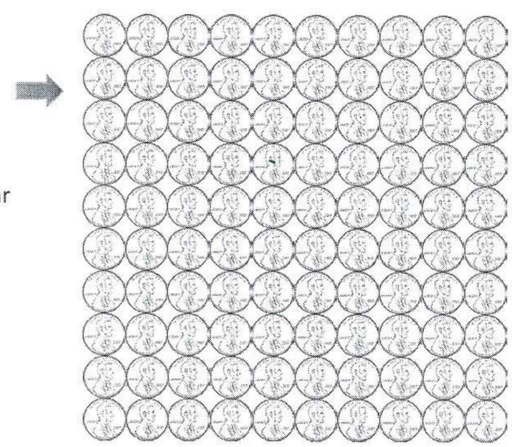
Lesson 15

Objective: Express money amounts given in various forms as decimal numbers.

Homework Key

1. \$1.00; 100
2. \$0.01; 1
3. \$0.03; 3
4. \$0.20; 20
5. \$0.37; 37
6. \$1.00; 10
7. \$0.20; 2
8. \$0.40; 4
9. \$0.60; 6
10. \$0.90; 9
11. \$0.75; 75
12. \$0.50; 50
13. \$1.00; 100
14. \$0.25; 25
15. $\frac{58}{100}$ dollar; \$0.58
16. $\frac{88}{100}$ dollar; \$0.88
17. $\frac{161}{100}$ or $1\frac{61}{100}$ dollar; \$1.61
18. $\frac{187}{100}$ or $1\frac{87}{100}$ dollar
19. \$4.08
20. \$5.26
21. \$16.85

Homework Samples



1. 100 pennies = \$ 1 . 00   100¢ = $\frac{100}{100}$ dollar
2. 1 penny = \$ 0 . 01   1¢ = $\frac{1}{100}$ dollar
3. 3 pennies = \$ 0 . 03   3¢ = $\frac{3}{100}$ dollar
4. 20 pennies = \$ 0 . 20   20¢ = $\frac{20}{100}$ dollar
5. 37 pennies = \$ 0 . 37   37¢ = $\frac{37}{100}$ dollar

Lesson 15 (continued)

Solve. Give the total amount of money in fraction and decimal form.

15. 5 dimes and 8 pennies

$\frac{58}{100}$ dollar $0.58

16. 3 quarters and 13 pennies

17. 3 quarters, 7 dimes, and 16 pennies

18. 187 cents is what fraction of a dollar?

Solve. Express the answer in decimal form.

19. 1 dollar 2 dimes 13 pennies + 2 dollars 3 quarters

$1.33 + $2.75

$$\begin{array}{r} 2.75 \\ +1.33 \\ \hline \$4.08 \end{array}$$

Lesson 16

Objective: Solve word problems involving money.

Homework Key

1. $4.59
2. $2.20
3. No; $0.61
4. $14.97
5. $2.17

Homework Sample

Use the RDW process to solve. Write your answer as a decimal.

1. Maria had 2 dollars, 3 dimes, and 4 pennies. Lisa had 1 dollar and 5 quarters. How much money did the two girls have in all?

Maria $2.34
Lisa $1.00 + $1.25 = $2.25

$$\begin{array}{r} \$2.34 \\ \$2.25 \\ \hline \$4.59 \end{array}$$

The girls have $4.59 in all.