

# Decimals

## Unit 10 Overview: 10 lessons

Students meet decimals as a new way to write tenths and hundredths. They shade tenths strips and hundred grids and write each amount as a fraction, a decimal and in words, rename tenths as hundredths ( $4/10 = 40/100$ ) so they can add tenths and hundredths, and place decimals in a place value chart and on number lines. Money ties it together: a dime is a tenth of a dollar and a penny a hundredth. Then they compare and order decimals by place value, checking with grids. In some states the unit goes on to halves, fourths and fifths as decimals with benchmarks, thousandths, and adding and subtracting decimals with money. Decimals come right after the fraction units, as fractions with denominators 10 and 100.

### THE UNIT, DAY BY DAY

|        |                                                      |                                                      |
|--------|------------------------------------------------------|------------------------------------------------------|
| Day 1  | <b>Pre-Check</b>                                     | What students already know, before the first lesson. |
| Day 2  | <b>10.1</b> Tenths as fractions and decimals         | I can write tenths as fractions and as decimals.     |
| Day 3  | <b>10.2</b> Hundredths and tenths as hundredths      | I can write hundredths as decimals.                  |
| Day 4  | <b>10.3</b> Add tenths and hundredths                | I can add tenths and hundredths.                     |
| Day 5  | <b>10.4</b> Decimal place value                      | I can use place value to read and write decimals.    |
| Day 6  | <b>10.5</b> Decimals on a number line                | I can read and mark decimals on a number line.       |
| Day 7  | <b>10.6</b> Money as decimals                        | I can write money as a decimal of a dollar.          |
| Day 8  | <b>10.7</b> Compare and order decimals               | I can compare and order decimals.                    |
| Day 9  | <b>10.8</b> Halves, fourths and fifths as decimals ★ | I can write halves, fourths and fifths as decimals.  |
| Day 10 | <b>10.9</b> Thousandths ★                            | I can read, write and compare thousandths.           |
| Day 11 | <b>10.10</b> Add and subtract decimals ★             | I can add and subtract decimals.                     |
| Day 12 | <b>Unit Review</b>                                   | The review, to go over together.                     |
| Day 13 | <b>Unit Test</b>                                     | Form A; Form B (other numbers) is for a retest.      |

★ Taught in 4th grade in some states. Skip these lessons if yours teaches them in another grade; [animalmath.com/standards](http://animalmath.com/standards) shows your state's list.

### GET READY FOR THE UNIT

- Tenths strips and hundred grids, plenty of each, and colored pencils
- Base-ten blocks: a flat as 1 whole, a rod as a tenth, a small cube as a hundredth
- Play money: dollar bills, dimes and pennies, and price tags
- A place value chart from tens to hundredths on chart paper (to thousandths for lesson 10.9)
- A meter stick, blank number lines (the Graph Paper maker prints them) and whiteboards

### HOW EACH LESSON GOES

- 1. Warm up** (5 min)
- 2. Teach** (10 min)
- 3. Try it together** (10 min)
- 4. Practice** (15 min)
- 5. Exit ticket** (5 min): a quick check on the lesson.

Each lesson page ends with the Animal Math sheets, makers, tools and quizzes for it. "Sheet 3" is the third worksheet of a pack; a color pack prints each sheet again in black and white.

### CHECKING AS YOU GO

PRINTABLE

**Pre-Check:** Day 1, with a key

PRINTABLE

**Unit Review:** the day before the test

EXIT TICKET

**Exit Tickets:** one a lesson, four to a page

PRINTABLE

**Unit Test:** Forms A and B, with keys



# Decimals

## Lesson 10.1: Tenths as fractions and decimals

**GOAL** Students see a whole cut into 10 equal parts, name each part a tenth, and write tenths as a fraction, as a decimal and in words ( $2/10 = 0.2$ , two tenths). With wholes, 3 and 9 tenths is the mixed number  $3 \frac{9}{10}$  and the decimal 3.9.

About 45 minutes

**I can write tenths as fractions and as decimals.**

### THE LESSON

- 1 Warm up** (5 min) Show a strip cut into 10 equal parts. Ask what one part is called and how many parts make the whole. Students write  $10/10 = 1$  on whiteboards.
- 2 Teach** (10 min) Shade 2 parts of a tenths strip:  $2/10$ , two tenths. Write it a new way, 0.2: the 0 says no whole, the point ends the whole numbers, and the 2 is in the tenths place. Then lay out 3 whole strips and 9 tenths of another:  $3 \frac{9}{10}$ , which is 3.9, read “3 and 9 tenths”. Show 10 centimeters on the meter stick: a tenth of a meter.  
**Say:** “A tenth is one of 10 equal parts. In a decimal, the first place after the point is the tenths place. I read the point as “and”.”
- 3 Try it together** (10 min) Pairs shade tenths strips for numbers the teacher calls (4 tenths, 1 whole and 2 tenths, 2 wholes and 9 tenths) and write each as a fraction and as a decimal. Then the teacher writes decimals (0.4, 2.8) and pairs read them aloud and shade them.
- 4 Practice** (15 min) Students write the shaded tenths as fractions and decimals in problems 1 to 3 of sheet 1 of Tenths and Hundredths (the grids are for the next lesson), then shade strips of their own for a partner. Early finishers show 1 and 3 tenths two ways.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.1** and circle a face beside the “I can” line. On question 1, look for  $1 \frac{4}{10}$  and 1.4; 0.4 means the whole strip was left out, and 1.04 means the tenths place is not yet clear. On question 2, look for  $7/10$  and 0.7; 0.07 means tenths and hundredths are mixed up, so have them say “seven tenths” while they shade a strip.

**Need help?** Shade a paper strip for each number, then write the fraction under the strip and the decimal under the fraction.

**Ready for more?** Write 17 tenths as a mixed number and as a decimal.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 1, problems 1-3

QUIZ

**Decimals Quiz:** the Tenths and Hundredths level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.1

### GET READY

- Paper strips cut into 10 equal parts, a few for each pair
- A meter stick (each 10 centimeters is a tenth of it)
- Colored pencils and whiteboards

### WORDS TO USE

**tenth:** one of 10 equal parts of a whole

**decimal:** a number written with a decimal point, like 0.2

**decimal point:** the dot after the whole numbers; tenths come right after it

### ASK

- How many equal parts is the whole cut into?
- Which digit is in the tenths place?
- How do you read 3.9 out loud?

### WATCH FOR

**Writes  $2/10$  as 2.10 or 0.02.** Say it: two tenths. The first place after the point is tenths, so 0.2.

**Leaves out the whole number in a mixed number.** Count the whole strips first and write that number before the point.

**Reads 3.9 as “three point nine” only.** Both are heard, but “3 and 9 tenths” says what it means. Use it while learning.

# Decimals

## Lesson 10.2: Hundredths and tenths as hundredths

**GOAL** Students cut a whole into 100 equal parts, write hundredths as a fraction and a decimal ( $42/100 = 0.42$ ), and see that each tenth is 10 hundredths, so  $4/10 = 40/100$  and  $0.4 = 0.40$ .

About 45 minutes

**I can write hundredths as decimals.**

### THE LESSON

- 1 Warm up** (5 min) Show a hundred grid. Ask how many small squares make the whole and how many squares are in one column.
- 2 Teach** (10 min) Shade 42 squares: 4 full columns and 2 more. Write  $42/100$  and  $0.42$ , read “42 hundredths”. The 4 is in the tenths place (4 columns) and the 2 in the hundredths place (2 squares). Then shade 4 columns: that is  $4/10$ , but also 40 squares,  $40/100$ . So  $4/10 = 40/100$  and  $0.4 = 0.40$ . Last, 5 hundredths is  $0.05$ : a zero holds the tenths place.  
**Say:** “Each tenth is 10 hundredths. To write tenths as hundredths, I multiply the top and the bottom by 10.”
- 3 Try it together** (10 min) Pairs shade hundred grids for numbers the teacher calls (38 hundredths, 9 hundredths, 3 tenths), write each as a fraction and a decimal, and check with a partner. Then they rename  $5 \frac{4}{10}$  as  $5 \frac{40}{100}$  and say why it is the same amount.
- 4 Practice** (15 min) Students write the shaded hundredths on sheet 1 of Tenths and Hundredths (problems 4 to 11), then the missing numbers at the top of sheet 3 (problems 1 to 5). Early finishers shade a grid for  $0.5$  and one for  $0.50$  and write why they match.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.2** and circle a face beside the “I can” line. On question 1, look for  $85/100$  and  $0.85$ ;  $15/100$  means the white squares were counted, and  $8.5$  means the point is in the wrong place. On question 2, look for  $160/100$ ;  $16/100$  means the tenths were not changed to hundredths, so shade 6 columns of a grid and count the squares.

**Need help?** Lay a tenths strip on a hundred grid so each tenth covers a column of 10 squares.

**Ready for more?** How many hundredths are in 2 wholes? Write 2 as a fraction with 100 at the bottom.

### GET READY

- Hundred grids (10 by 10), several for each student
- A tenths strip the size of a hundred grid, to lay on top
- Colored pencils

### WORDS TO USE

**hundredth:** one of 100 equal parts of a whole

**hundredths place:** the second place after the decimal point

**equivalent:** the same amount written another way:  $4/10 = 40/100$

### ASK

- How many hundredths are in one tenth?
- Which digit tells the tenths? The hundredths?
- Why is  $0.4$  the same as  $0.40$ ?

### WATCH FOR

**Writes 5 hundredths as 0.5.** Shade 5 small squares, then 5 columns. Which is  $0.5$ ? A zero holds the tenths place:  $0.05$ .

**Counts the white squares instead of the shaded ones.** Count the shaded columns by 10s, then the extra squares by 1s.

**Thinks 0.40 is more than 0.4 because 40 is more than 4.** Shade both on hundred grids. They cover the same part.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 1, problems 4-11, and sheet 3, problems 1-5

QUIZ

**Decimals Quiz:** the Tenths and Hundredths level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.2

# Decimals

## Lesson 10.3: Add tenths and hundredths

**GOAL** Students add tenths and hundredths by writing the tenths as hundredths first:  
 $9/10 + 4/100 = 90/100 + 4/100 = 94/100 = 0.94$ . A hundred grid shows why the parts must be the same size before they are added.

About 45 minutes

**I can add tenths and hundredths.**

### THE LESSON

- 1 Warm up** (5 min) Quick rename: students write  $3/10$ ,  $6/10$  and  $9/10$  as hundredths on whiteboards.
- 2 Teach** (10 min) Write  $9/10 + 4/100$  and ask: can we add the 9 and the 4? Shade 9 columns of a grid in one color and 4 squares in another: 94 squares are shaded, not 13. Rename  $9/10$  as  $90/100$ , then add:  $90/100 + 4/100 = 94/100 = 0.94$ . Then  $62/100 + 1/10$ : the tenths come second, but rename them the same way,  $62/100 + 10/100 = 72/100$ .  
**Say:** "Before I add, the parts must be the same size. I write the tenths as hundredths, then add the hundredths."
- 3 Try it together** (10 min) Pairs shade and add on hundred grids:  $3/10 + 45/100$  and  $18/100 + 7/10$ . They write each sum as a fraction and as a decimal, and check by counting the shaded squares.
- 4 Practice** (15 min) Students add on sheet 3 of Tenths and Hundredths (problems 6 to 8), then add on the grids in problems 1 and 2 of sheet 1 of Adding and Subtracting Decimals and write the addition the grid shows in problem 6. Early finishers find three ways to make 0.65 from tenths plus hundredths.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.3** and circle a face beside the "I can" line. On question 1, look for  $48/100$ ;  $12/100$  or  $12/110$  means the tenths were not renamed, so shade both on one grid. On question 2, look for  $77/100$  and  $0.77$ ;  $32/100$  means the 5 tenths were added as 5 hundredths.

**Need help?** Shade every problem on a hundred grid first, then count the squares to find the sum.

**Ready for more?** Add three parts:  $1/10 + 4/100 + 7/10$ . Write the sum as a decimal.

### GET READY

- Hundred grids and two colors of pencils
- Whiteboards and markers

### WORDS TO USE

**rename:** write a fraction another way with the same value

**same denominator:** the same bottom number, so the parts are the same size

**sum:** the answer to an adding problem

### ASK

- Why can we not add the 9 and the 4 here?
- How many hundredths is 9 tenths?
- How can the grid show your sum is right?

### WATCH FOR

**Adds the tops and the bottoms:**

**$9/10 + 4/100 = 13/110$ .** Shade it: is 13 of 110 parts the 94 squares we shaded? Rename first.

**Renames the hundredths instead of the tenths.**

Tenths can be written as hundredths (times 10); 4 hundredths are not a whole number of tenths.

**Writes  $94/100$  as  $9.4$ .** Read it: 94 hundredths. Two places after the point: 0.94.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 3, problems 6–8

PRINTABLE

**Adding and Subtracting Decimals:** sheet 1, problems 1, 2 and 6

QUIZ

**Decimals Quiz:** the Tenths and Hundredths level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.3

# Decimals

## Lesson 10.4: Decimal place value

**GOAL** Students place decimals in a place value chart (tens, ones, tenths, hundredths), write them in expanded form and as mixed numbers ( $46.18 = 40 + 6 + 0.1 + 0.08 = 46 \frac{18}{100}$ ), and find 0.1 and 0.01 more or less.

About 45 minutes

**I can use place value to read and write decimals.**

### THE LESSON

- 1 Warm up** (5 min) Write 3,725 on the board. Students say what each digit is worth. Then ask: what place could come to the right of the ones?
- 2 Teach** (10 min) Write 46.18 in the chart. The places right of the point are tenths and hundredths; each place is still 10 times the place to its right. Read it “46 and 18 hundredths”, write  $46 \frac{18}{100}$ , then  $40 + 6 + 0.1 + 0.08$ . Now 0.1 more changes the tenths digit: 46.28. 0.01 less changes the hundredths: 46.17. Last, 8.04 minus 0.01 is 8.03, but 8.04 minus 0.1 needs a trade: 7.94.  
**Say:** “The tenths place is right after the point and the hundredths place is next. 0.1 more adds 1 to the tenths; 0.01 more adds 1 to the hundredths.”
- 3 Try it together** (10 min) Pairs build 52.67, 9.3 and 0.72 with digit cards in their charts and write each in expanded form. Then they fill in a table together: 0.1 more, 0.1 less, 0.01 more and 0.01 less than 2.59 and than 6.90.
- 4 Practice** (15 min) Students fill in the place value chart, the expanded forms and the 0.1 and 0.01 more or less table on sheet 4 of Tenths and Hundredths (the number lines at the top are for the next lesson). Early finishers find 0.1 more and 0.01 more than 9.95.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.4** and circle a face beside the “I can” line. On question 1, look for 5 in the ones, 8 in the tenths and 2 in the hundredths. On question 2, look for 7.19, 6.99, 7.10 and 7.08; 6.09 or 7.99 for 0.1 less means only half of the trade (1 one for 10 tenths) was made, and 7.010 means 9 + 1 was written in one place.

**Need help?** Build each number with base-ten blocks, a flat as 1 whole, a rod as a tenth and a small cube as a hundredth.

**Ready for more?** Write a number that has a 6 in the tenths place and is between 12 and 13. How many can you find?

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 4, the chart and the table

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.4

### GET READY

- A place value chart from tens to hundredths on chart paper
- A place value chart for each student, in a sheet protector
- Digit cards 0 to 9

### WORDS TO USE

**place value:** what a digit is worth because of its place

**expanded form:** a number written as the sum of what each digit is worth

**mixed number:** a whole number and a fraction:  $46 \frac{18}{100}$

### ASK

- What is the 8 worth in 46.18? The 1?
- Which digit changes when you add 0.1?
- What happens when the tenths digit is 0 and you take away 0.1?

### WATCH FOR

**Writes 46.18 as  $40 + 6 + 1 + 8$ .** Ask what the 1 is worth: 1 tenth, 0.1. Read each place name from the chart.

**Adds 0.1 to the hundredths digit.** Point to the chart: tenths come first after the point.

**Finds 8.04 minus 0.1 as 8.03.** That takes away 1 hundredth. With 0 tenths, trade 1 one for 10 tenths: 7.94.

# Decimals

## Lesson 10.5: Decimals on a number line

**GOAL** Students read and mark tenths on a number line between two whole numbers, and hundredths on a line between two tenths, by finding what each small jump is worth first.

About 45 minutes

**I can read and mark decimals on a number line.**

### THE LESSON

- 1 Warm up** (5 min) Show a number line from 0 to 10 with 10 jumps, then one from 0 to 100 with 10 jumps. Ask what each jump is worth on each line.
- 2 Teach** (10 min) Open the Number Line tool with Start 6, End 7 and Interval 0.1. There are 10 jumps from 6 to 7, so each jump is 0.1. Count: 6.1, 6.2, 6.3. Mark 6.7. Then draw a line from 0.7 to 0.8 on the board and cut it into 10 jumps: each jump is now a hundredth. Count 0.71, 0.72 and mark 0.78. The middle mark is 0.75.  
**Say:** "First I find what one jump is worth: the space between the end numbers, cut into 10 equal jumps. Then I count the jumps."
- 3 Try it together** (10 min) Partners label blank 10-space lines: 2 to 3 by tenths (mark 2.1 and 2.8) and 0.3 to 0.4 by hundredths (mark 0.33 and 0.38). Then they say which end each point is closer to.
- 4 Practice** (15 min) Students name and mark the points on the three number lines at the top of sheet 4 of Tenths and Hundredths, then label two blank lines of their own for a partner. Early finishers draw a line from 4 to 5 and mark 4.09 and 4.9.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.5** and circle a face beside the "I can" line. On question 1, look for  $A = 7.4$  and  $B = 7.9$ ; 7.04 or 7.09 means each jump was read as a hundredth. On question 2, look for the dot on the third tick after 0.5; if it is anywhere else, ask what one jump is worth on that line.

**Need help?** Lay a meter stick under the line: from 0 to 1 meter, each 10 centimeters is a tenth and each centimeter a hundredth.

**Ready for more?** On a line from 0 to 1 by tenths, where would 0.45 go? Explain how you know without drawing hundredths.

### GET READY

- A meter stick
- Blank 10-space number lines (the Graph Paper maker prints them)
- The Number Line tool on the board

### WORDS TO USE

**interval:** the jump from one tick mark to the next

**tick mark:** a small line that marks a number on a number line

### ASK

- What are the numbers at the ends? How many jumps are between them?
- What is one jump worth?
- Is 0.78 closer to 0.7 or to 0.8?

### WATCH FOR

**Counts the tick marks instead of the jumps, and is one off.** Put a finger on the first number and count each jump as it moves.

**Reads every line as going by tenths.** Read the end numbers first. From 0.7 to 0.8 the jumps are hundredths.

**Writes 6.7 as 6.07.** Say it: 6 and 7 tenths. Tenths go in the first place after the point.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 4, the number lines

MAKER

**Graph Paper:** Paper Type Number Lines, Number Lines Blank, 10 Spaces

TOOL

**Number Line:** Start 6, End 7, Interval 0.1 (tenths; it rounds hundredths)

QUIZ

**Decimals Quiz:** the Number Lines level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.5

# Decimals

## Lesson 10.6: Money as decimals

**GOAL** Students see a dollar as 1 whole: a dime is a tenth of a dollar (\$0.10) and a penny a hundredth (\$0.01). They write dimes and pennies as a fraction of a dollar and as a decimal, and trade 10 dimes for a dollar.

About 45 minutes

**I can write money as a decimal of a dollar.**

### THE LESSON

- 1 Warm up** (5 min) Ask how many dimes make a dollar and how many pennies. Lay a dime on one column of a hundred grid: 10 squares.
- 2 Teach** (10 min) Lay out 2 dimes and 4 pennies. Each dime is  $\frac{1}{10}$  of a dollar, so 2 dimes is  $\frac{2}{10}$ , or  $\frac{20}{100}$ ; the pennies add  $\frac{4}{100}$ . In all,  $\frac{24}{100}$  of a dollar, written \$0.24: 2 tenths and 4 hundredths. Then show 12 dimes: 10 dimes make \$1, and 2 more make \$1.20. Last, 9 pennies is \$0.09: the 0 holds the dimes place.  
**Say:** "A dollar is the whole. Dimes are tenths and pennies are hundredths, so the dimes go right after the point and the pennies after them."
- 3 Try it together** (10 min) Pairs build \$0.65, \$1.03 and \$2.40 with the fewest dollars, dimes and pennies, and write each as a fraction of a dollar and as a decimal. Then they show \$0.65 on a hundred grid.
- 4 Practice** (15 min) Students write dimes and pennies as a fraction of a dollar and as a decimal, then make amounts with the fewest coins, on sheet 2 of Tenths and Hundredths. Early finishers find the fewest dollars, dimes and pennies for \$3.07.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.6** and circle a face beside the "I can" line. On question 1, look for \$0.61; \$6.10 or \$0.16 means the dimes and pennies went in the wrong places. On question 2, look for 31 dimes and \$0.08; 1 dime means the dollars were left out, and \$0.80 means the pennies were written as tenths.

**Need help?** Lay dimes on the columns and pennies on the squares of a hundred grid before writing the decimal.

**Ready for more?** How many different ways can you make \$0.30 with dimes and pennies?

### GET READY

- Play money: dollar bills, dimes and pennies for each pair
- Hundred grids
- The Money tool on the board

### WORDS TO USE

**dime:** 10 cents; 10 make a dollar, so a dime is a tenth

**penny:** 1 cent; 100 make a dollar, so a penny is a hundredth

**cent:** a hundredth of a dollar; \$0.24 is 24 cents

### ASK

- What part of a dollar is a dime? A penny?
- Why does \$0.09 need a zero?
- How many dimes are in \$1.20?

### WATCH FOR

**Writes 9 pennies as \$0.9.** Nine pennies are 9 hundredths, not 9 tenths. Show 9 squares and 9 columns of a grid.

**Counts 12 dimes as 12 cents.** Trade 10 dimes for a dollar first: \$1 and 2 dimes, \$1.20.

**Writes the dollar sign and the cent sign together: \$0.24¢.** One or the other: \$0.24 or 24¢.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 2

MAKER

**Counting Money:** Coin Types Pennies, Nickels & Dimes, Max Total Value \$1.00, Answer Format Dollar (\$0.35)

TOOL

**Money:** Line Up and Count

QUIZ

**Decimals Quiz:** the Money level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.6

# Decimals

## Lesson 10.7: Compare and order decimals

**GOAL** Students compare decimals to hundredths by place value, starting from the left, and check with hundred grids or a number line. They write the same number of places ( $0.8 = 0.80$ ) to compare, and put three or four decimals in order.

About 45 minutes

**I can compare and order decimals.**

### THE LESSON

- 1 Warm up** (5 min) Ask which is greater, 4,100 or 4,099, and how they know. We compare from the greatest place, and decimals work the same way.
- 2 Teach** (10 min) Write 0.8 and 0.79. Some say 0.79 is greater because 79 is more than 8. Shade both on hundred grids: 0.8 is 80 squares, 0.79 is 79. In a place value chart, the tenths differ first, 8 tenths and 7 tenths, so  $0.8 > 0.79$ . Writing 0.8 as 0.80 helps: 80 hundredths and 79 hundredths. Then order 4.2, 0.42, 4.02 and 0.24: compare the ones first, then the tenths, then the hundredths.  
**Say:** "I line up the decimal points and compare from the left. The first place where the digits differ tells which is greater."
- 3 Try it together** (10 min) Pairs compare 0.05 and 0.5, 2.4 and 2.40, and 1.36 and 1.7 on whiteboards and prove one with a grid. Then they order four decimal cards and explain the order to another pair.
- 4 Practice** (15 min) Students compare shaded grids and decimals, choose the closest benchmark, and order decimals on sheet 5 of Tenths and Hundredths. Early finishers write three decimals between 0.5 and 0.6, in order.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.7** and circle a face beside the "I can" line. On question 1, look for  $0.29 < 0.3$  and  $5.1 = 5.10$ ;  $0.29 > 0.3$  means the longer decimal was read as the greater one. On question 2, look for 0.07, 0.17, 0.7; if the order is mixed up, ask what each 7 is worth.

**Need help?** Shade each decimal on a hundred grid and compare the shaded parts.

**Ready for more?** Order these prices from least to greatest: \$4.09, \$4.90, \$0.49, \$9.04 and \$4.19.

### GET READY

- Hundred grids, two for each pair
- A place value chart
- Decimal cards for ordering

### WORDS TO USE

**greater than ( $>$ ):** more; the open side faces the greater number

**less than ( $<$ ):** less; the point faces the smaller number

**equivalent decimals:** decimals that name the same amount:  $2.4 = 2.40$

### ASK

- Where do the digits first differ?
- Why can we write a zero at the end of 0.8?
- Which is closer to 1? How do you know?

### WATCH FOR

**Thinks the decimal with more digits is greater.** Write both to hundredths (0.80 and 0.79) and compare.

**Lines up the numbers on the right, as with whole numbers.** Line up the decimal points: tenths under tenths.

**Calls 0.05 and 0.5 equal.** Shade both: 5 squares and 5 columns.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 5

QUIZ

**Decimals Quiz:** the Compare Decimals level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.7



# Decimals

## Lesson 10.8: Halves, fourths and fifths as decimals

**GOAL** Students write halves, fourths and fifths as decimals by making tenths or hundredths ( $2/5 = 4/10 = 0.4$ ,  $1/4 = 25/100 = 0.25$ ), learn the ones used most by heart, and tell whether a decimal is closest to 0,  $1/2$  or 1.

**About 45 minutes**

★ Taught in 4th grade in some states

**I can write halves, fourths and fifths as decimals.**

### THE LESSON

- 1 Warm up** (5 min) Show a hundred grid with half of it shaded. Students name it as many ways as they can:  $1/2$ ,  $5/10$ ,  $50/100$ , 0.5, 0.50.
- 2 Teach** (10 min) Fifths: fold a tenths strip into 5 equal parts. Each fifth covers 2 tenths, so  $2/5 = 4/10 = 0.4$ . Fourths do not make whole tenths, so use a hundred grid:  $1/4$  of it is 25 squares, so  $1/4 = 25/100 = 0.25$ . With a whole,  $4 \frac{1}{4} = 4.25$ . Then mark 0, 0.5 and 1 on a number line. 0.09 is near 0, 0.66 is nearest  $1/2$ , and 0.96 is nearest 1.  
**Say:** "To write a fraction as a decimal, I make tenths or hundredths: I multiply the top and the bottom by the same number."
- 3 Try it together** (10 min) Pairs match fraction cards ( $1/5$ ,  $4/5$ ,  $1/4$ ,  $6/5$ ) to decimal cards and write each as tenths or hundredths. Then they sort 0.06, 0.41, 0.57 and 0.97 by the closest benchmark.
- 4 Practice** (15 min) Students write halves, fourths and fifths as decimals on sheet 3 of Tenths and Hundredths (problems 9 to 14) and choose benchmarks on sheet 5 (problems 11 to 16). Early finishers try sheets 1 and 4 of Fractions, Decimals and Percents, a 5th grade pack with twentieths, eighths and thirds too.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.8** and circle a face beside the "I can" line. On question 1, look for 3.75 and 2.6; 3.34 or 2.35 means the numerator and denominator were written as digits, so ask how many hundredths make  $3/4$ . On question 2, look for 1 circled for 0.89.

**Need help?** Use the hundred grid for every fraction: shade it, count the squares, then write the decimal.

**Ready for more?** Write  $7/4$  and  $11/5$  as decimals. Which benchmark whole number is each closest to?

### GET READY

- Hundred grids and tenths strips
- A number line from 0 to 1 in tenths
- Fraction cards and decimal cards to match

### WORDS TO USE

**benchmark:** a number we know well and compare to: 0,  $1/2$  and 1

**fifth:** one of 5 equal parts;  $1/5$  is  $2/10$ , or 0.2

**fourth:** one of 4 equal parts;  $1/4$  is  $25/100$ , or 0.25

### ASK

- How many tenths make  $1/5$ ?
- Why does  $1/4$  need hundredths, not tenths?
- Is 0.66 closer to  $1/2$  or to 1? How far is it from each?

### WATCH FOR

**Writes  $1/4$  as 0.14 or 0.4.** A fraction is not its digits with a point. Shade  $1/4$  of a hundred grid and count the squares.

**Writes  $2/5$  as 0.25.** Fold the tenths strip into fifths: each fifth is 2 tenths.

**Calls 0.66 closest to 1 because it is more than half.** Measure both distances on the number line:  $1/2$  is much closer.

### ON ANIMAL MATH

PRINTABLE

**Decimals: Tenths and Hundredths:** sheet 3, problems 9–14, and sheet 5, problems 11–16

PRINTABLE

**Fractions, Decimals and Percents:** sheets 1 and 4, 5th grade, for early finishers

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.8

# Decimals

## Lesson 10.9: Thousandths

**GOAL** Students extend the place value chart to thousandths (a thousandth is a tenth of a hundredth), read and write decimals to thousandths in standard form, word form and expanded form, give the value of a digit, and compare thousandths.

About 45 minutes

★ Taught in 4th grade in some states

**I can read, write and compare thousandths.**

### THE LESSON

- 1 Warm up** (5 min) Students write 0.1 and 0.01 as fractions. Then ask: what would a tenth of a hundredth be?
- 2 Teach** (10 min) Cut one small square of a hundred grid into 10 strips: each strip is a thousandth,  $1/1,000$  of the whole, 0.001. Add a thousandths place to the chart. Write 6.254, read "6 and 254 thousandths", and its expanded form  $6 + 0.2 + 0.05 + 0.004$ . The 5 is worth 0.05. Then compare 0.5 and 0.497: write 0.5 as 0.500 and line up the points. The tenths differ first, so  $0.5 > 0.497$ .  
**Say:** "Each place is 10 times the place to its right. The third place after the point is the thousandths place."
- 3 Try it together** (10 min) Pairs build 9.162 and 0.708 with digit cards, write each in expanded form and in words, and name the value of the 6 and the 7. Then they compare 1.07 and 1.065 and explain to another pair.
- 4 Practice** (15 min) Students do sheet 1 (the chart and the values of digits) and sheet 2 (standard, word and expanded form) of Decimal Place Value to Thousandths, a 5th grade pack. Sheets 3 and 4 (number lines, comparing and ordering) are for a second day or early finishers.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.9** and circle a face beside the "I can" line. On question 1, look for 3.276 and 0.04; 3.2706 means the parts were written one after another, so put them in a place value chart. On question 2, look for  $0.8 > 0.798$ ;  $0.8 < 0.798$  means the longer decimal was read as the greater one.

**Need help?** Write each number in the place value chart before giving a value or comparing.

**Ready for more?** Order 0.4, 0.404, 0.044 and 0.44 from least to greatest.

### GET READY

- A place value chart from ones to thousandths
- A hundred grid with one square cut into 10 thin strips
- Digit cards

### WORDS TO USE

**thousandth:** one of 1,000 equal parts; 0.001

**thousandths place:** the third place after the decimal point

**value:** what a digit is worth in its place: the 4 in 6.254 is worth 0.004

### ASK

- What is a tenth of a hundredth?
- What is the 5 worth in 6.254?
- How can zeros at the end help you compare?

### WATCH FOR

**Thinks 6.254 is greater than 6.3 because 254 is more than 3.** Line up the points and compare the tenths first.

**Gives the value of the 4 in 6.254 as 4.** Name its place first: thousandths, so 0.004.

**Writes  $6 + 0.2 + 0.05 + 0.004$  as 6.2054.** Use the chart: one digit a place.

### ON ANIMAL MATH

PRINTABLE

**Decimal Place Value to Thousandths:** sheets 1-2, then 3-4; 5th grade

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.9



# Decimals

## Lesson 10.10: Add and subtract decimals

**GOAL** Students add and subtract decimals to hundredths by lining up the decimal points, writing zeros in empty places and regrouping as with whole numbers. They estimate first, and solve money stories with totals and change.

**I can add and subtract decimals.**

**About 45 minutes**

★ Taught in 4th grade in some states

### THE LESSON

- 1 Warm up** (5 min) Students round 4.7 and 2.58 to the nearest whole number and add. The estimate will check today's first sum.
- 2 Teach** (10 min) Write  $4.7 + 2.58$  in columns. Line up the points, then write 4.7 as 4.70 so every place has a digit. Add the hundredths, then the tenths (12 tenths is 1 one and 2 tenths), then the ones: 7.28. Bring the point straight down. The estimate was 8, so 7.28 makes sense. Then  $\$10.00 - \$6.37$ : regroup across the zeros as with whole numbers,  $\$3.63$ . Check:  $\$3.63 + \$6.37 = \$10.00$ .  
**Say:** "I line up the decimal points, fill empty places with zeros, and add or subtract each place as with whole numbers."
- 3 Try it together** (10 min) Pairs estimate, then solve  $5.06 + 3.9$  and  $8.2 - 4.56$  in columns and check the subtraction by adding. Then a store story: a notebook for  $\$2.79$  and markers for  $\$4.25$ , paid with a  $\$10$  bill. Find the total and the change.
- 4 Practice** (15 min) Students line up and solve on sheet 2, then find totals and change on sheet 3 of Adding and Subtracting Decimals. Sheet 5 (stories) and sheet 4 (estimate first, with some thousandths) are for a second day or early finishers.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 10.10** and circle a face beside the "I can" line. On question 1, look for 7.35 and  $\$2.52$ ; 3.21 means 4.6 was lined up on the right, under the hundredths. On question 2, look for  $\$1.75$ ;  $\$2.25$  means the smaller digit was taken from the larger in each place.

**Need help?** Shade the numbers on hundred grids, or use dimes and pennies for money, before writing them in columns.

**Ready for more?** Find two prices that add to exactly  $\$10.00$ , neither of them a whole number of dollars.

### GET READY

- Hundred grids
- Grid paper or place value columns for lining up
- Play money and price tags

### WORDS TO USE

**line up:** put the decimal points one above the other, so tenths are under tenths

**placeholder zero:** a zero written in an empty place:  $4.7 = 4.70$

**change:** the money you get back when you pay more than the price

### ASK

- Where do the decimal points go?
- Why can we write a zero after 4.7?
- Is your answer close to your estimate?

### WATCH FOR

**Lines up the last digits, as with whole numbers.**

Line up the points. Write zeros so every number has the same places.

**Forgets to regroup tenths into a one.** Twelve tenths is 1 one and 2 tenths, just as 12 ones is 1 ten and 2 ones.

**Takes the smaller digit from the larger in each place.** Check by adding back: the sum must be the first number.

### ON ANIMAL MATH

PRINTABLE

**Adding and Subtracting Decimals:** sheets 2–3, then 4–5

QUIZ

**Decimals Quiz:** the Money level

EXIT TICKET

**4th Grade Decimals Exit Tickets:** Exit Ticket 10.10

