

MATH UNIT

One amount, many names: fractions, decimals and percents

Grade 4

8 lessons

8 × 30 minutes

3 source books

240 minutes in all

THE QUESTION THIS UNIT FOLLOWS

Is that the same amount, or a different one?

ABOUT THIS UNIT

This unit joins the two halves of Grade 4 fraction work that are usually taught apart. Children first add and subtract amounts that share a bottom number, and rename a measured amount without changing it, using strips and real measuring spoons. Then they meet the same idea in money, where a hundredths amount already carries three names and nothing has to be calculated at all.

It ends on the one procedure the book states and never carries out. Divide the numerator by the denominator names which number goes inside, and reversing the two nouns gives quotients above one — which the book's own answers rule out, because a fraction of a dollar is less than a dollar.

THE MATHEMATICAL ARC

Each lesson does one job the lesson before it made possible.

- 1 Add fractions that share a bottom number
- 2 Take one away, with the bottom number unchanged
- 3 Two quarter pounds is one half pound
- 4 What a dot adds: half of the value, added back on

- 5 Choose parts that add to a required total
- 6 One amount written three ways
- 7 Ninety cents or nine cents: the place decides
- 8 Which number goes inside?

SOURCE BOOKS

Every lesson in this unit is already published under Math lessons. Nothing here asks you to teach anything you cannot open today.



Civil War Recipes

3 lessons in this unit



Music Math

2 lessons in this unit



Fractions, Decimals, and Percents

3 lessons in this unit

HOW TO USE THIS GUIDE

Open the source lesson before you teach.

Each day names one lesson that already exists under Math lessons, with its book, its number and its title. This guide says what that lesson is doing in the sequence and what to collect from it; the lesson itself carries the steps, the printables and the answers.

Thirty minutes a day.

Five minutes to connect to yesterday, the twenty-minute source lesson, five minutes to close on something you can see. A day that runs long should lose the close, never the core.

Teach a lesson on its own if you need to.

Every day carries a one-sentence opening for a teacher who is using that lesson outside the sequence.

Stop after a checkpoint.

The unit holds together if you stop after either checkpoint and come back to it. Stopping between a checkpoint and the next one leaves a lesson without the evidence it was built on.

WHERE THIS FITS IN YOUR YEAR

When to teach it

Late in the year, after equivalence has been met informally. It needs fraction strips, measuring spoons and coins.

What students need first

Children can name unit fractions, can divide a two-digit number by a one-digit one, and can read money in dollars and cents.

What this unit develops

Adding and subtracting like fractions; renaming an amount without changing it; a value increased by half of itself; composing parts to a required total; the three equivalent forms of a hundredths amount; decimal place value; converting a fraction to a decimal by division.

What it prepares them for

Operations with decimals, percentage change, and any later work where one quantity is written in more than one notation.

CURRICULUM CONNECTIONS

None claimed. The lessons in this unit carry their own standards classifications on their own pages, checked lesson by lesson. A unit-level expectation is a different claim, and none has been verified for this unit, so none is printed here. Use the placement guide above to site the unit in your year, and the individual lesson pages for the codes.

UNIT AT A GLANCE

#	MATHEMATICAL MOVE	SOURCE LESSON	COLLECT
1	Add fractions that share a bottom number, built with strips on a cup mat	Civil War Recipes lesson 1, Double the Batch: One Third Plus One Third	A recording sheet with four lines, each written as amount plus the same amount again equals the answer.
2	Take one away: half the pot, with the bottom number unchanged	Civil War Recipes lesson 2, Half the Pot: Taking One Third from Two Thirds	Three written differences, each carrying the starting amount, what was slid away, and what is left.
3	Two quarter pounds is one half pound — the same measured amount under two names <i>Checkpoint after this lesson</i>	Civil War Recipes lesson 3, Two Quarter Pounds Is One Half Pound	A sheet carrying each amount with its second name on the line underneath, each built before it was written.
4	What a dot adds: halve a stated value and add the half back on	Music Math lesson 2, What a Dot Adds	Three joined lengths with the starting length, the half and the finished length said for each.
5	Choose parts that add to a required total	Music Math lesson 3, Filling a Measure That Must Come to Four	Two measures built with different sets of cards, each counted aloud to four.
6	One amount written three ways, on the box the book never answers <i>Checkpoint after this lesson</i>	Fractions, Decimals, and Percents lesson 1, The Box the Book Never Answers	A three-blank recording strip for the third box, completed with nothing printed to copy.
7	Ninety cents or nine cents: the place decides what a digit is worth	Fractions, Decimals, and Percents lesson 3, Ninety Cents or Nine Cents	Two labelled piles with a spoken position sentence for each.
8	Which number goes inside? Divide both ways and let the book's own answers rule one out	Fractions, Decimals, and Percents lesson 6, Which Number Goes Inside?	Two full columns of quotients with the procedure sentence marked above them.

UNIT VOCABULARY

Words students say, not words they are taught to define.

the same amount as	Used for a renaming, where the name changes and the quantity does not.
equivalent place	The three forms of a hundredths amount.
	Lesson 7: what decides whether a nine is worth ninety cents or nine.
numerator, denominator	Lesson 8: the two nouns whose order the procedure sentence fixes.

MATERIALS

From the source lessons

Each day's materials are listed on that day's page below and on the source lesson itself. Nothing is duplicated here.

New for this unit

- Checkpoint 1 page, one per child
- Checkpoint 2 page, one per child
- Performance task set: fraction strips, a coin set to ninety-nine cents, a dollar mat of one hundred squares and a three-column record sheet, per pair
- Performance task page, one per child

ASSESSMENT PLAN

Daily evidence

Keep the recording sheet from lesson 1, the two-naming lines from lesson 3, and the three-column sheet from lesson 6.

Checkpoint 1, after lesson 3: Add, take away, rename

Two eighths plus three eighths. Then five eighths minus two eighths. Then write four eighths a second way.

Book-free. Fraction strips and a blank sheet.

Look for. Five eighths, three eighths, and one half. A child who changes the bottom number when adding has not met the like-denominator condition.

Checkpoint 2, after lesson 6: Three names

Sixty-three cents. The child writes it as a fraction of a dollar, as a decimal and as a percent, and builds it in coins to prove all three describe one pile.

Book-free. Coins and a blank three-column sheet.

Look for. $63/100$, 0.63 and 63%. The coin pile is what makes it a proof rather than a rule.

Culminating task: Same amount, three names, one check

Each pair takes an amount of cents under a dollar, builds it in coins, and writes it in all three forms. They then take a fraction whose bottom number is not one hundred, predict what it will come to as a decimal, carry out the division as the procedure sentence reads, and carry it out reversed as well. They use their coin pile to say which of the two columns can possibly be an amount of a dollar, and mark the ruled-out column. They finish by writing one sentence naming the word that decided it.

Collect. The three-column record with its coin proof, the two columns of quotients, and the closing sentence naming the deciding word.

What it assesses. Renaming, the three forms, and the conversion procedure with the direction settled — the whole of what the unit built.

DAILY LESSON PAGES

Lesson 1

Add fractions that share a bottom number, built with strips on a cup mat**SKILL LESSON****Civil War Recipes** (</math-library/442.html>) · lesson 1, Double the Batch: One Third

Plus One Third · Grade 4 · 20 minutes

Adding fractions with like denominators

I CAN

I can add amounts that share a bottom number.

BIG IDEA

When the parts are the same size they can simply be counted together, and the bottom number stays put on both sides of the plus sign.

SUCCESS

The bottom number is unchanged in every line the child writes.

CONNECT | 5 MIN

First lesson. Lay two one-third strips together and ask what they make. Take the answers and write none of them down yet.

TAUGHT ON ITS OWN

The book doubles four recipes and writes every doubled amount as a full sentence, so the arithmetic arrives spelled out in words.

SOURCE CORE | 20 MIN

Pairs lay one half strip on the cup mat and push a second beside it, then do the same with two thirds and with two quarters, saying what the pieces cover each time before writing anything.

COLLECT

A recording sheet with four lines, each written as amount plus the same amount again equals the answer.

CLOSE | 5 MIN

Pairs trade sheets, read each other's four lines aloud, and rebuild with strips wherever the two answers differ, marking the line they fixed.

From the source lesson: Sentence strips carrying the book's two doubling rules; Fraction strips in halves, thirds, and quarters; A one cup mat for laying strips; Recording sheet ruled in ingredient lines; Word cards: double, equal, total

Watch for: A child adds the bottom numbers as well. Lay the strips back down and ask how big one piece is in the answer.

Lesson 2 Take one away: half the pot, with the bottom number unchanged

SKILL LESSON **Civil War Recipes** (/math-library/442.html) · lesson 2, Half the Pot: Taking One Third

from Two Thirds · Grade 4 · 20 minutes

Subtracting fractions with like denominators

I CAN	I can take one part away.
BIG IDEA	Taking a like part away leaves parts of the same size, so the bottom number is the same in all three places on the line.
SUCCESS	Every difference the child writes keeps the bottom number.
CONNECT 5 MIN	Yesterday you doubled a pot. Today you halve one, and the pieces come off rather than going on.
TAUGHT ON ITS OWN	Halving a pot is where this book does its clearest subtraction, and it spells every difference out in words.
SOURCE CORE 20 MIN	Pairs lay two one-third strips for the peanut paste, slide one away out of reach and say what is left while touching it, then do the same with quarters and with eighths.
COLLECT	Three written differences, each carrying the starting amount, what was slid away, and what is left.
CLOSE 5 MIN	Pairs read their three lines aloud to each other and rebuild whichever line they disagree on, sliding the piece away again while the partner watches.

From the source lesson: Sentence strip of the book's halving rule; Fraction strips in thirds, quarters, and eighths; Recording sheet ruled in ingredient lines; Word cards: half, minus, third

Watch for: A child subtracts the bottom numbers. Slide the strip away and ask what size the remaining pieces are.

Lesson 3

Two quarter pounds is one half pound — the same measured amount under two names

SKILL LESSON

Civil War Recipes (/math-library/442.html) · lesson 3, Two Quarter Pounds Is One Half

Pound · Grade 4 · 20 minutes

Recognizing equivalent fractions in a measured amount

I CAN	I can rename an amount without changing it.
BIG IDEA	Renaming changes what an amount is called and leaves how much is there alone.
SUCCESS	The child builds each amount before writing its second name, never after.
CONNECT 5 MIN	You can add and take away like parts. Today one amount is going to get a second name and stay exactly the same size.
TAUGHT ON ITS OWN	One line in this book carries three names for the same butter, and it renames two further amounts elsewhere.
SOURCE CORE 20 MIN	Pairs read the butter line and say its three names in order, then cover one half strip exactly with quarter strips adding one at a time until nothing sticks out, and cover a quarter strip with eighths the same way.
COLLECT	A sheet carrying each amount with its second name on the line underneath, each built before it was written.
CLOSE 5 MIN	Pairs fill the eighth spoon twice into the quarter spoon and say whether the amount of red pepper changed, then say which name they would use if the only spoon left were the small one.

From the source lesson: Sentence strip of the book's butter line; Fraction strips in halves, quarters, and eighths; Recording sheet with two naming lines per amount; A quarter teaspoon and an eighth teaspoon measuring spoon; Word cards: eighth, equal, quarter

Watch for: A child writes the second name from memory of a rule. The covering comes first; the writing follows it.

Checkpoint after this lesson: Add, take away, rename. The page is at the end of this guide.

Lesson 4**What a dot adds: halve a stated value and add the half back on****SKILL LESSON****Music Math** (/math-library/445.html) · lesson 2, What a Dot Adds · Grade 4 ·

20 minutes

Halving a stated value and adding the half back on

I CAN

I can say what a dot adds.

BIG IDEA

How much a dot adds depends on what it sits beside, which is why the rule names the original value rather than a number.

SUCCESS

The child refuses to answer with a single number and says why.

CONNECT | 5 MIN

You can rename an amount. Today an amount is increased by half of itself, and the half is different every time.

TAUGHT ON ITS OWN

The book states one rule and then works it three times with different starting values.

SOURCE CORE | 20 MIN

Pairs fold the two-beat strip end to end, crease and cut it to make the half, lay the half against the end of the whole strip and count the beat marks along the joined length; then run the same fold, cut and join for the four-beat and the one-beat strips.

COLLECT

Three joined lengths with the starting length, the half and the finished length said for each.

CLOSE | 5 MIN

Pairs tell another pair one sentence naming a starting length, the half cut from it and the finished length, then answer the question how much does a dot add — and a single number is the wrong answer.

From the source lesson: The dot rule and its first worked example on a card, one per pair; An envelope per pair holding a 4-beat strip, a 2-beat strip and a 1-beat strip, each marked in equal beats; Scissors; The strips and cut halves from the previous step; A report line, one per student; Strips pre-creased at the halfway mark, for the Support tier; A 6-beat strip marked in equal beats, for the Extension tier; Word cards: dot, half of, original, value

Watch for: A child rounds the half beat up to a whole. Say what that piece is worth instead; it is a real amount.

Lesson 5

Choose parts that add to a required total

SKILL LESSON

Music Math (/math-library/445.html) · lesson 3, Filling a Measure That Must Come to Four · Grade 4 · 20 minutes

Choosing parts that add to a required total

I CAN	I can choose parts that add to a required total.
BIG IDEA	The total is fixed and the parts are chosen, so two different sets of cards can reach the same four beats.
SUCCESS	Two measures both come to four using different cards, and the child names the cards rather than pointing.
CONNECT 5 MIN	Yesterday one amount grew by half of itself. Today a total is fixed in advance and you choose what fills it.
TAUGHT ON ITS OWN	The book adds up two measures from the same song, uses a different number of notes in each, and reaches four both times.
SOURCE CORE 20 MIN	Pairs check the book's two adding-up lines by laying cards for one of them and counting the total, then fill an empty measure box with cards so the beats come to exactly four, taking a card out and recounting if they land past.
COLLECT	Two measures built with different sets of cards, each counted aloud to four.
CLOSE 5 MIN	Pairs swap one measure with another pair, count theirs from left to right saying a number word only when a whole beat finishes, and write the sentence naming their own cards in order ending with four beats.

From the source lesson: The two adding-up lines printed on one card, one card per pair; Beat cards for each pair: eight cards reading one beat, four reading one half beat, four reading one and a half beats; A strip of paper ruled into four equal boxes, one measure per strip, four strips per pair; An empty measure strip, one per student; A second empty measure strip, one per student; A report line, one per student; A measure box with two cards already placed and a total of three written above it, for the Support tier; A third empty measure strip, for the Extension tier; Word cards: total, add up to, measure, beat

Watch for: A pair starts over every time they overshoot. Take one card out and recount; the adjustment is part of the skill.

Lesson 6**One amount written three ways, on the box the book never answers**

SKILL LESSON **Fractions, Decimals, and Percents** (</math-library/559.html>) · lesson 1, The Box the Book Never Answers · Grade 4 · 20 minutes

Writing an amount of cents as a fraction of a dollar, a decimal, and a percent

I CAN

I can write one amount three ways.

BIG IDEA

An amount of cents is a fraction of a dollar, a decimal and a percent at the same time, and the coins prove all three describe one pile.

SUCCESS

The child writes all three forms for a box the book never answers, with nothing to copy.

CONNECT | 5 MIN

You can rename a fraction. Today an amount of money gets three names at once, and two of them look like different kinds of number.

TAUGHT ON ITS OWN

The book counts two boxes of coins for the reader and answers both, then sets out a third and walks away.

SOURCE CORE | 20 MIN

Pairs lay out eighty-nine cents and write it in all three forms, build the book's first two boxes and write each three ways before reading the book's answer, then meet the third box and write all three forms themselves.

COLLECT

A three-blank recording strip for the third box, completed with nothing printed to copy.

CLOSE | 5 MIN

Pairs hunt the next page for the sentence that settles the third box, find that two of the three fractions are already known, and write the sentence beside their answer as the reason they were right.

From the source lesson: Coin set with at least 99 cents in mixed coins, one per pair; Recording strip with three blanks headed fraction, decimal, percent, one per student; Pencil per student; Third box coin card, seventeen cents in mixed coins, one per pair; Printed source passage in this step; Dollar mat of one hundred squares, one per student; Word cards: fraction, decimal, percent, cents, dollar

Watch for: A child writes the percent by copying the digits without counting the coins. Build the pile first; the coins are the referent.

Checkpoint after this lesson: Three names. The page is at the end of this guide.

Lesson 7**Ninety cents or nine cents: the place decides what a digit is worth****SKILL LESSON****Fractions, Decimals, and Percents** (</math-library/559.html>) · lesson 3, Ninety Cents

or Nine Cents · Grade 4 · 20 minutes

Deciding the value of a digit by its place relative to the decimal point

I CAN

I can say what a digit is worth from where it sits.

BIG IDEA

The same digit written in two places names two different amounts, and the piles settle it.

SUCCESS

The child's sentence names a position, not only a size.

CONNECT | 5 MIN

Yesterday one amount had three names. Today one digit has two values and only its place says which.

TAUGHT ON ITS OWN

The book makes a flat assertion and leaves it standing: ninety cents and nine cents are not the same.

SOURCE CORE | 20 MIN

Pairs read the assertion, build ninety cents and nine cents as two separate piles, and take turns finishing a spoken sentence about the two piles that names the pile and the position.

COLLECT

Two labelled piles with a spoken position sentence for each.

CLOSE | 5 MIN

Students lay out what each of the three nines in the lamb's price is worth, order the three from largest to smallest, and write one sentence that would convince somebody who thinks the two piles are the same amount.

From the source lesson: Coin set with at least 99 cents in mixed coins, one per pair; Two labelled pile mats reading \$0.90 and \$0.09, one pair per pair of students; Printed source passage in this step; Place cards for the three nines in the lamb price, one set per pair; Lined answer strip, one per student; Pencil per student; Printed position sentence frame with two blanks, one per student; Word cards: decimal point, place, value, digit

Watch for: A sentence that says one is bigger without saying why. The reason has to name the place.

Lesson 8

Which number goes inside? Divide both ways and let the book's own answers rule one out

MATH THROUGH THE READING

Fractions, Decimals, and Percents (/math-library/559.html) · lesson

6, Which Number Goes Inside? · Grade 4 · 20 minutes

Students divide both ways around the book's procedure sentence and use the book's own printed answers to decide which reading the sentence must have meant.

I CAN	I can say which number goes inside.
BIG IDEA	The whole instruction lives in one small word, and the book's own answers rule out the reading that gives quotients above one.
SUCCESS	Both columns are worked in full before either is judged.
CONNECT 5 MIN	You know the three names of a hundredths amount. Today the bottom number is not a hundred, and the procedure sentence has to be read very carefully.
TAUGHT ON ITS OWN	The book states how to turn a fraction into a decimal in one sentence, and reversing the two nouns produces 2, 1.33 and 1.25 instead of 0.5, 0.75 and 0.8.
SOURCE CORE 20 MIN	Pairs read the procedure sentence aloud twice, circle the word by and draw an arrow to the noun it attaches to, then work each of the three divisions as the sentence reads and again reversed, filling both columns.
COLLECT	Two full columns of quotients with the procedure sentence marked above them.
CLOSE 5 MIN	Students build half a dollar in coins, read the book's sentence about the coins being a fraction of a dollar, and say which column can possibly be an amount of a dollar, marking the ruled-out column and writing what the word decided.

From the source lesson: Procedure strip printed with the book's division sentence, one per student; Two-column division sheet headed as the sentence reads and reversed, one per student; Coin set with at least 99 cents in mixed coins, one per pair; Dollar mat of one hundred squares, one per pair;

Pencil per student; The two readings of the sentence written one above the other where the class can see both; One enlarged pair of columns showing 0.5 against 2

Watch for: A pair works only the column they think is right. Both columns are completed before anything is judged; the comparison is the lesson.

CULMINATING PERFORMANCE TASK

Same amount, three names, one check

Each pair takes an amount of cents under a dollar, builds it in coins, and writes it in all three forms. They then take a fraction whose bottom number is not one hundred, predict what it will come to as a decimal, carry out the division as the procedure sentence reads, and carry it out reversed as well. They use their coin pile to say which of the two columns can possibly be an amount of a dollar, and mark the ruled-out column. They finish by writing one sentence naming the word that decided it.

Collect. The three-column record with its coin proof, the two columns of quotients, and the closing sentence naming the deciding word.

What it assesses. Renaming, the three forms, and the conversion procedure with the direction settled — the whole of what the unit built.

TEACHER KEY AND RUBRIC

Key

- Checkpoint 1: five eighths, three eighths, one half.
- Checkpoint 2: $63/100$, 0.63, 63%.
- Task: for a half, three quarters and four fifths the correct column is 0.5, 0.75 and 0.8; the reversed column is 2, 1.33 and 1.25, and every entry in it is more than a dollar, which is what rules it out.

Rubric

STRAND	SECURE LOOKS LIKE	DEVELOPING	NOT YET
Representation	Every renaming is shown with strips or coins before it is written.	Does it with the arrangement in front of them.	Produces an answer without the arrangement or the reason.
Calculation	The three forms match the coin pile and both columns of quotients are worked in full.	Does it with the arrangement in front of them.	Produces an answer without the arrangement or the reason.
Meaning	A renamed amount is described as the same amount under a different name.	Does it with the arrangement in front of them.	Produces an answer without the arrangement or the reason.
Explanation	The child names the word that decides which number goes inside, and says what ruled the other column out.	Does it with the arrangement in front of them.	Produces an answer without the arrangement or the reason.

PRINT-READY STUDENT PAGES

CHECKPOINT 1 · GRADE 4

Add, take away, rename

Name

Date

Two eighths plus three eighths. Then five eighths minus two eighths. Then write four eighths a second way. Use the strips before you write.

CHECKPOINT 2 · GRADE 4

Three names

Name

Date

Sixty-three cents. Write it as a fraction of a dollar, as a decimal, and as a percent. Then build it in coins to prove all three describe one pile.

CULMINATING TASK • GRADE 4**Same amount, three names, one check**

Name _____

Date _____

Build your amount of cents in coins and write it in all three forms. Now take the fraction on your card, whose bottom number is not a hundred. Predict what it will come to. Divide it as the procedure sentence reads, and divide it the other way round as well, filling both columns. Use your coins to say which column could possibly be an amount of a dollar, and mark the other one out. Last, write one sentence naming the word that decided it.

TEACHER PLANNING AND HANDOFF

- Children who changed the bottom number while adding at checkpoint 1 need lesson 1 again before any decimal work.
- Lesson 8 is the reading lesson and it is the one that generalises; the same trap appears wherever a procedure is stated in prose.
- Fractions, Decimals, and Percents has a speed lesson on the three forms that is not used here; run it after this unit, not before.

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