

Multiply & Divide Decimals

Unit 6 Overview: 9 lessons

Students multiply and divide decimals to hundredths with models first: tenths strips and hundred grids for a decimal times a whole number and for tenths times tenths, base-ten blocks and grids for sharing a decimal equally. Then they work as with whole numbers and place the point two ways, by estimating and by counting decimal places. They multiply in columns, money too, divide by 2-digit numbers to a quotient in hundredths, and divide by a decimal by asking how many tenths or hundredths fit. The unit ends with stories that use all four operations. In some states it also covers times and divided by 0.1 and 0.01 (lesson 6.5). Ask “about how big should the answer be?” before every problem.

THE UNIT, DAY BY DAY

Day 1	Pre-Check	What students already know, before the first lesson.
Day 2	6.1 Multiply a decimal by a whole number	I can multiply a decimal by a whole number with models.
Day 3	6.2 Estimate to place the decimal point	I can estimate to place the decimal point.
Day 4	6.3 Tenths times tenths	I can multiply tenths by tenths on a hundred grid.
Day 5	6.4 Multiply decimals in columns	I can multiply decimals and count the decimal places.
Day 6	6.5 Multiply and divide by 0.1 and 0.01 ★	I can multiply and divide by 0.1 and 0.01.
Day 7	6.6 Divide decimals with models	I can divide a decimal by a whole number with models.
Day 8	6.7 Divide by 2-digit numbers	I can divide decimals by 2-digit numbers.
Day 9	6.8 Divide by a decimal	I can divide by tenths and hundredths.
Day 10	6.9 Decimal stories	I can solve decimal stories with all four operations.
Day 11	Unit Review	The review, to go over together.
Day 12	Unit Test	Form A; Form B (other numbers) is for a retest.

★ Taught in 5th grade in some states. Skip these lessons if yours teaches them in another grade; 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 0.1, a small square as 0.01
- Grid paper (1 centimeter) for columns and long division
- Play money, dimes and price tags
- Whiteboards and dry erase markers, and a place value chart to thousandths

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	EXIT TICKET	Exit Tickets: one a lesson, two to a page
PRINTABLE	Unit Review: the day before the test	PRINTABLE	Unit Test: Forms A and B, with keys



Multiply & Divide Decimals

Lesson 6.1: Multiply a decimal by a whole number

GOAL Students multiply a decimal by a whole number with tenths strips and hundred grids, and by thinking in tenths or hundredths: 3×0.5 is 15 tenths, or 1.5, and 3×0.24 is 72 hundredths, or 0.72.

About 45 minutes

I can multiply a decimal by a whole number with models.

THE LESSON

- 1 Warm up** (5 min) Count by tenths together from 0.7 to 1.5, then by 0.2 from 0 to 2. Where does each count pass 1 whole?
- 2 Teach** (10 min) Shade 0.5 on each of 3 tenths strips: 3 groups of 5 tenths is 15 tenths. 10 tenths make 1 whole, so $3 \times 0.5 = 1.5$. Then hundredths: shade 0.24 of a hundred grid 3 times, a new color each time, starting where the last group stopped. That is 72 hundredths, so $3 \times 0.24 = 0.72$. Last, think in tenths with no picture: 4×0.9 is 36 tenths, or 3.6.
Say: "I say the product in tenths or hundredths first. Then I trade 10 tenths for 1 whole and write the decimal."
- 3 Try it together** (10 min) Pairs shade 2×0.45 on a hundred grid (90 hundredths, 0.9) and 5×0.6 on tenths strips (30 tenths, 3), saying each product in tenths or hundredths before writing the decimal. Why is 5×0.6 a whole number?
- 4 Practice** (15 min) Students do sheet 1 of Multiplying and Dividing Decimals: shade tenths strips, shade groups on hundred grids, then multiply by thinking in tenths or hundredths.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.1** and circle a face beside the "I can" line. On question 1, look for 2.4; 0.24 means the tenths were read as hundredths, so count the shaded tenths again: 24 tenths. On question 2, look for 4 groups of 17 squares and 0.68; 6.8 means the point is in the wrong place.

Need help? Say each product in units first: 3 groups of 5 tenths is 15 tenths. Then trade 10 tenths for 1 whole.

Ready for more? Find 6×0.25 and 6×2.5 . Why do the digits match when the products do not?

GET READY

- Tenths strips and hundred grids, several for each student
- Colored pencils in three or four colors
- Whiteboards and markers

WORDS TO USE

tenth: one of 10 equal parts of a whole, 0.1

hundredth: one of 100 equal parts of a whole, 0.01

product: the answer to a multiplication

ASK

- How many tenths (or hundredths) did you shade in all?
- How many tenths make 1 whole?
- Is the product more or less than the whole number? Why?

WATCH FOR

Writes $3 \times 0.5 = 0.15$. Count the shaded tenths: 15 tenths, and 10 tenths make 1 whole, so 1.5.

Shades the groups of hundredths on top of each other. Start each group where the last one stopped, in a new color.

ON ANIMAL MATH

PRINTABLE

Multiplying and Dividing Decimals: sheet 1

TOOL

Number Line: Start 0, End 2, Interval 0.1, Mode Jump, then jumps of the decimal

QUIZ

Decimal Operations Quiz: the Multiply Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.1

Multiply & Divide Decimals

Lesson 6.2: Estimate to place the decimal point

GOAL Students place the decimal point in a product or a quotient by estimating with whole numbers: 8.9×4.2 is about $9 \times 4 = 36$, so the digits 3738 make 37.38.

About 45 minutes

I can estimate to place the decimal point.

THE LESSON

- 1 Warm up** (5 min) Round each number to the nearest whole number: 6.7, 3.2, 9.48 and 0.8.
- 2 Teach** (10 min) Write 8.9×4.2 and give the digits of the product: 3738. Round to whole numbers: $9 \times 4 = 36$, so the product is in the 30s: 37.38, not 3.738 or 373.8. Quotients work the same way: $50.12 \div 7$ has the digits 716. 50.12 is close to 49, and $49 \div 7 = 7$, so the quotient is 7.16.
Say: "Before I place the point, I estimate. The answer has to be close to my estimate."
- 3 Try it together** (10 min) Give pairs problems with the digits of the answer and ask where the point goes: 6.9×7.2 (4968; about $7 \times 7 = 49$, so 49.68), 4.85×6 (2910; about $5 \times 6 = 30$, so 29.10) and $66.24 \div 8$ (828; about $64 \div 8 = 8$, so 8.28).
- 4 Practice** (15 min) Students place the point by estimating in problems 5 to 8 on sheet 2 and problems 1 to 5 on sheet 5 of Multiplying and Dividing Decimals, then problems 8 to 10 on sheet 2 of Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.2** and circle a face beside the "I can" line. On question 1, look for $8 \times 3 = 24$ and 21.58; 2.158 or 215.8 means the estimate was not used. On question 2, look for 5.88 circled: $36 \div 6 = 6$.

Need help? Write the three places the point could go and circle the one closest to the estimate.

Ready for more? Find two decimals with one decimal place each whose product has the digits 1872 and is close to 20.

GET READY

- Cards with a problem and the digits of its answer
- Whiteboards and markers

WORDS TO USE

estimate: a close answer from rounded numbers

decimal point: the dot between the ones and the tenths

reasonable: close to the estimate, so it makes sense

ASK

- What whole numbers are the factors close to?
- Which place for the point gives a number close to your estimate?
- Why is 373.8 not reasonable for 8.9×4.2 ?

WATCH FOR

Puts the point after the first digit:

$8.9 \times 4.2 = 3.738$. Estimate first: about $9 \times 4 = 36$, so the product is in the 30s.

Rounds 4.85 down to 4. Look at the tenths: 4.85 is closer to 5.

ON ANIMAL MATH

PRINTABLE

Multiplying and Dividing Decimals: sheet 2, problems 5 to 8, and sheet 5, problems 1 to 5

PRINTABLE

Dividing Decimals: sheet 2, problems 8 to 10

QUIZ

Decimal Operations Quiz: the Multiply Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.2

Multiply & Divide Decimals

Lesson 6.3: Tenths times tenths

GOAL Students multiply tenths by tenths on a hundred grid: one factor shaded as columns, the other as rows, and the overlap is the product. A tenth of a tenth is a hundredth, so $0.6 \times 0.8 = 0.48$.

About 45 minutes

I can multiply tenths by tenths on a hundred grid.

THE LESSON

- 1 Warm up** (5 min) Shade 0.6 of a hundred grid in yellow. How many columns is that? How many small squares? Write $0.6 = 0.60$.
- 2 Teach** (10 min) Keep the 6 yellow columns: 0.6. Shade 8 rows in blue: 0.8. The overlap is 0.6 of 0.8. Count the squares shaded twice, 6 by 8: 48 squares, so $0.6 \times 0.8 = 0.48$. Tenths times tenths makes hundredths, because a tenth of a tenth is one small square. Then 0.2×0.9 : 2 columns, 9 rows, 18 squares in the overlap, so 0.18.
Say: "The first factor is the columns, the second is the rows, and the overlap is the product. A tenth of a tenth is a hundredth."
- 3 Try it together** (10 min) Pairs shade 0.3×0.5 (0.15) and 0.8×0.8 (0.64) on hundred grids, then explain why each product is less than both of its factors.
- 4 Practice** (15 min) Students shade hundred grids and read the overlaps in problems 1 to 4 on sheet 2 of Multiplying and Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.3** and circle a face beside the "I can" line. On question 1, look for 0.32; 3.2 means the overlap was read as tenths, and 1.2 means the columns and rows were added. On question 2, look for 7 columns and 6 rows shaded and 0.42.

Need help? Shade the columns on a paper grid and the rows on a clear sheet laid on top, so the overlap shows.

Ready for more? Find two different pairs of tenths whose product is 0.36.

GET READY

- Hundred grids, several for each student
- Two colors of pencil (or a grid on clear plastic for the rows)
- Whiteboards and markers

WORDS TO USE

overlap: the squares shaded twice, once for each factor

hundredth: one small square of a hundred grid

factor: a number being multiplied

ASK

- Which squares are shaded twice?
- Why is a tenth of a tenth a hundredth?
- Is the product more or less than each factor? Why?

WATCH FOR

Writes $0.6 \times 0.8 = 4.8$. Count the overlap: 48 small squares are 48 hundredths of the grid.

Counts every shaded square, not just the overlap. Use two colors and count only the squares with both.

ON ANIMAL MATH

PRINTABLE

Multiplying and Dividing Decimals: sheet 2, problems 1 to 4

QUIZ

Decimal Operations Quiz: the Multiply Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.3

Multiply & Divide Decimals

Lesson 6.4: Multiply decimals in columns

GOAL Students multiply decimals in columns as if they were whole numbers, then count the decimal places in the factors to place the point in the product, money included, and check with an estimate.

About 45 minutes

I can multiply decimals and count the decimal places.

THE LESSON

- 1 Warm up** (5 min) Multiply 74×23 the standard way on whiteboards.
- 2 Teach** (10 min) Now 7.4×2.3 . Multiply as whole numbers, as in the warm up: $74 \times 23 = 222 + 1,480 = 1,702$. Count the decimal places: one in 7.4 and one in 2.3, so two in the product: 17.02. The 0 holds the tenths place. Check: about $7 \times 2 = 14$. Money works the same way: $\$1.95 \times 9$ is $195 \times 9 = 1,755$ with two places, so \$17.55, about $2 \times 9 = 18$.
Say: "I multiply as if there were no points. Then I count the decimal places in both factors, and the product gets that many."
- 3 Try it together** (10 min) Pairs estimate, then multiply 3.8×2.5 and $\$3.15 \times 12$ in columns (\$37.80). Why does $3.8 \times 2.5 = 9.50$ end in a 0, and why is 9.5 the same number?
- 4 Practice** (15 min) Students do sheet 3 of Multiplying and Dividing Decimals: tenths times tenths, hundredths times a whole number, then money. Early finishers make a maker sheet and estimate before each problem.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.4** and circle a face beside the "I can" line. On question 1, look for 3.22 and \$26.28; 32.2 means only one decimal place was counted. On question 2, look for 122.2 and 12.22 from the digits of 1,222; 1,222 for either means the places were not counted.

Need help? Write the whole-number problem beside the decimal one (74×23 beside 7.4×2.3) and circle each decimal place in the factors.

Ready for more? Find the cost of 3.5 pounds of apples at \$1.80 a pound and of 12 pounds of grapes at \$2.45 a pound.

GET READY

- Grid paper (1 centimeter) to keep the columns straight
- Price tags for the money problems
- Whiteboards and markers

WORDS TO USE

decimal places: the digits after the decimal point

partial product: one row of the multiplication, before the rows are added

estimate: a close answer from rounded numbers

ASK

- How many decimal places are in the factors?
- What is your estimate?
- Why can you multiply as if there were no points?

WATCH FOR

Lines the factors up on the point and writes a point in every row. Multiply as whole numbers; place the point only in the product.

Drops the zero: $7.4 \times 2.3 = 1.72$. Count two places from the right in 1,702: 17.02. The 0 holds the tenths.

ON ANIMAL MATH

PRINTABLE

Multiplying and Dividing Decimals: sheet 3

MAKER

Column Multiplication: Numbers Decimals, Decimal Places Tenths or Hundredths, Range Within 100

QUIZ

Decimal Operations Quiz: the Multiply Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.4

Multiply & Divide Decimals

Lesson 6.5: Multiply and divide by 0.1 and 0.01

GOAL Students multiply and divide by 0.1 and 0.01: times 0.1 is a tenth of the number, the same as dividing by 10, and divided by 0.1 asks how many tenths fit, the same as multiplying by 10.

About 45 minutes

★ Taught in 5th grade in some states

I can multiply and divide by 0.1 and 0.01.

THE LESSON

- 1 Warm up** (5 min) Find 5.2×10 , 5.2×100 and $5.2 \div 10$ on a place value chart. Which way do the digits move each time?
- 2 Teach** (10 min) Write 26×0.1 . A tenth of 26 is 2.6, the same as $26 \div 10$: every digit moves one place to the right. 82×0.01 is a hundredth of 82, so 0.82, like $82 \div 100$: two places. Dividing goes the other way. $3.7 \div 0.1$ asks how many tenths are in 3.7: 37, the same as 3.7×10 . And $0.19 \div 0.01 = 19$, like 0.19×100 .
Say: "Times 0.1 is the same as divided by 10. Divided by 0.1 is the same as times 10. Then I move the digits."
- 3 Try it together** (10 min) Pairs sort cards into matching pairs: 38×0.1 and $38 \div 10$, $6.5 \div 0.1$ and 6.5×10 , $0.27 \div 0.01$ and 0.27×100 , 140×0.01 and $140 \div 100$. They find each value and say which way the digits moved.
- 4 Practice** (15 min) Students start with sheets 2 and 3 of Multiplying and Dividing by Powers of Ten (times and divided by 10, 100 and 1,000 on a place value chart), then do problems 6 to 11 on sheet 4 of Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.5** and circle a face beside the "I can" line. On question 1, look for 5.7, 24, 0.48 and 43; 570 or 0.24 means times and divided by 0.1 were swapped, so ask whether a tenth of 57 is more or less than 57. On question 2, look for 7.4×100 circled.

Need help? Lay digit cards in a place value chart and slide each card one place for each 0.1 and two places for each 0.01.

Ready for more? Is 0.5×0.1 the same as $0.5 \div 10$? Find both and explain.

GET READY

- A place value chart from hundreds to thousandths
- Digit cards
- Whiteboards and markers

WORDS TO USE

a tenth of: one of 10 equal parts of a number, the same as times 0.1

a hundredth of: one of 100 equal parts of a number, the same as times 0.01

place value chart: columns that show what each digit is worth

ASK

- Is the answer bigger or smaller than the number you started with? Why?
- How many places do the digits move?
- Which problem with 10 or 100 gives the same answer?

WATCH FOR

Moves the digits the wrong way: $26 \times 0.1 = 260$.

Ask: is a tenth of 26 more or less than 26? Times 0.1 makes it smaller.

Thinks dividing always makes a number smaller. Count how many tenths fit in 3.7: there are 37 of them.

ON ANIMAL MATH

PRINTABLE

Multiplying and Dividing by Powers of Ten: sheets 2–3, a first step

PRINTABLE

Dividing Decimals: sheet 4, problems 6 to 11

QUIZ

Decimal Place Value Quiz: the Powers of Ten level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.5

Multiply & Divide Decimals

Lesson 6.6: Divide decimals with models

GOAL Students divide a decimal by a whole number by sharing base-ten blocks (a flat is 1 whole) and by splitting a shaded hundred grid, trading a flat for 10 rods or a rod for 10 small squares when a piece will not share, then record it with long division.

About 45 minutes

I can divide a decimal by a whole number with models.

THE LESSON

- 1 Warm up** (5 min) Show 2 flats, 3 rods and 6 small squares. If a flat is 1 whole, what number is it? (2.36)
- 2 Teach** (10 min) Share 4.5 among 3 plates: 4 flats and 5 rods. Each plate gets 1 flat, and 1 flat is left: trade it for 10 rods, so there are 15 rods, 5 for each plate. Each plate has 1 flat and 5 rods, so $4.5 \div 3 = 1.5$. Then shade 0.96 of a hundred grid and split it into 4 equal groups of 24 squares: $0.96 \div 4 = 0.24$. Record $7.35 \div 5$ in long division with the point straight up: 1.47.
Say: "I share the biggest pieces first. If one is left, I trade it for 10 of the next smaller piece and keep sharing."
- 3 Try it together** (10 min) Pairs share 5.4 among 3 with blocks (trade 2 flats for 20 rods: 1.8 each), then split a shaded 0.75 into 5 equal groups (0.15 each), and write each equation.
- 4 Practice** (15 min) Students do sheet 1 of Dividing Decimals (share blocks, split shaded grids), problems 1 to 7 on sheet 2 (long division by a 1-digit number, an estimate first) and problems 1 and 2 on sheet 4 of Multiplying and Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.6** and circle a face beside the "I can" line. On question 1, look for 0.7, with 2 flats traded for 20 rods (28 rods, 7 in each group); 7 means the rods were counted as wholes. On question 2, look for 0.28; 2.8 means the squares were counted as tenths.

Ready for more? Share 1.2 among 5 with blocks. Which trades do you need?

GET READY

- Base-ten blocks and paper plates for each pair (a flat is 1 whole)
- Hundred grids and colored pencils
- Whiteboards and markers

WORDS TO USE

share: put the same amount in each group

trade: swap 1 flat for 10 rods, or 1 rod for 10 small squares

quotient: the answer to a division

ASK

- What do you do with a flat that cannot be shared?
- How many rods (or small squares) are in each group?
- Where does the point go in the quotient?

WATCH FOR

Writes $4.5 \div 3 = 15$. Each plate has 1 flat and 5 rods: 1 whole and 5 tenths, so 1.5.

Stops when a flat is left over. Trade it for 10 rods and keep sharing.

Need help? Share real blocks on paper plates and say each trade out loud.

ON ANIMAL MATH

PRINTABLE

Dividing Decimals: sheet 1, and sheet 2, problems 1 to 7

PRINTABLE

Multiplying and Dividing Decimals: sheet 4, problems 1 and 2

MAKER

Long Division: Numbers Decimals, Decimal Places Tenths, Divisor 1 Digit, Range Within 10 (long division only)

TOOL

Base Ten Blocks: call a flat 1 whole and a rod 0.1

QUIZ

Decimal Operations Quiz: the Divide Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.6

Multiply & Divide Decimals

Lesson 6.7: Divide by 2-digit numbers

GOAL Students divide decimals by 2-digit whole numbers with long division to a quotient in hundredths: they estimate first, put the point in the quotient straight above the point in the dividend, write zeros after the dividend to keep dividing, and check by multiplying.

About 45 minutes

I can divide decimals by 2-digit numbers.

THE LESSON

- 1 Warm up** (5 min) Estimate with compatible numbers: $41.6 \div 13$ and $77.5 \div 25$. (About $39 \div 13 = 3$ and $75 \div 25 = 3$.)
- 2 Teach** (10 min) Divide $33.12 \div 18$. Estimate: $36 \div 18 = 2$. Put the point in the quotient above the point in 33.12. 18 goes into 33 once, $33 - 18 = 15$. Bring down 1: 151, and $18 \times 8 = 144$, so 8 with 7 left. Bring down 2: 72, and $18 \times 4 = 72$. The quotient is 1.84, close to 2. Then $57 \div 12$: after 4 with 9 left, write 57.00 and keep dividing to 4.75.
Say: "I estimate, put the point straight up, and divide as with whole numbers. If something is left, I write a 0 and keep going."
- 3 Try it together** (10 min) Pairs estimate, then divide $18.72 \div 24$ (0.78) and $40.25 \div 23$ (1.75), and check by multiplying back: $23 \times 1.75 = 40.25$.
- 4 Practice** (15 min) Students do sheet 3 of Dividing Decimals (2-digit divisors, zeros written after the dividend, is the point in the right place?) and problems 3 and 4 on sheet 4 of Multiplying and Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.7** and circle a face beside the "I can" line. On question 1, look for 0.58 with a 0 in the ones place; 5.8 means the point did not go straight up. On question 2, look for No and 4.2: about $48 \div 12 = 4$.

Need help? Write the multiples of the divisor (18, 36, 54, 72 and so on) down the side before dividing.

Ready for more? Divide 9 by 12 and 9 by 15. Which one needs more zeros written after the 9?

GET READY

- Grid paper for the long division
- A list of multiples of the divisor
- Whiteboards and markers

WORDS TO USE

divisor: the number you divide by

compatible numbers: numbers close to the real ones that divide easily

check: multiply the quotient by the divisor to get the dividend back

ASK

- What is your estimate?
- Where does the point go in the quotient?
- How can you check by multiplying?

WATCH FOR

Stops with something left over. Write a 0 after the last digit of the dividend and keep dividing.

Puts the point in the wrong place in the quotient. Write the point in the quotient straight above the point in the dividend before dividing.

Tries a quotient digit that is too big. Multiply the digit by the divisor first; if it is more than the part, try one less.

ON ANIMAL MATH

PRINTABLE

Dividing Decimals: sheet 3

PRINTABLE

Multiplying and Dividing Decimals: sheet 4, problems 3 and 4

MAKER

Long Division: Numbers Decimals, Decimal Places Hundredths, Divisor 2 Digits, Range Within 100

QUIZ

Decimal Operations Quiz: the Divide Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.7

Multiply & Divide Decimals

Lesson 6.8: Divide by a decimal

GOAL Students divide by a decimal by asking how many of the divisor fit: with jumps on a tenths number line, and by counting both numbers in tenths or both in hundredths ($1.4 \div 0.2$ is 14 tenths $\div$ 2 tenths, so 7).

About 45 minutes

I can divide by tenths and hundredths.

THE LESSON

- 1 Warm up** (5 min) How many dimes make \$1.50? How many quarters make \$3? Each one is a division by a decimal.
- 2 Teach** (10 min) How many jumps of 0.2 make 1.4? Draw them on a tenths number line: 7 jumps, so $1.4 \div 0.2 = 7$. Say it in tenths: 14 tenths $\div$ 2 tenths = 7. Hundredths work the same way: $0.64 \div 0.08$ is 64 hundredths $\div$ 8 hundredths, so 8. When the places are different, count both in the smaller unit: $0.9 \div 0.03$ is 90 hundredths $\div$ 3 hundredths = 30.
Say: "Dividing by 0.2 asks how many 0.2s fit. I count both numbers in the same unit and divide the counts."
- 3 Try it together** (10 min) Pairs show $1.5 \div 0.3$ with jumps on a number line (5), then write $4.9 \div 0.7$ and $0.81 \div 0.09$ in tenths or hundredths before dividing (7 and 9). Why is each quotient bigger than the number they started with?
- 4 Practice** (15 min) Students do problems 1 to 5 on sheet 4 of Dividing Decimals (jumps on tenths strips, then both numbers in tenths or hundredths) and problems 5 to 7 on sheet 4 of Multiplying and Dividing Decimals.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.8** and circle a face beside the "I can" line. On question 1, look for 7 equal jumps of 0.3 from 0 to 2.1. On question 2, look for $72 \div 8 = 9$; 0.9 means the two numbers were not counted in the same unit.

Need help? Use dimes for tenths: how many groups of 2 dimes make \$1.40?

Ready for more? Find $3 \div 0.5$ and $3 \div 0.05$. What pattern do you see?

GET READY

- Tenths strips or number lines marked in tenths
- Dimes and quarters
- Whiteboards and markers

WORDS TO USE

divisor: the number you divide by

how many fit: dividing by 0.2 asks how many 0.2s make the number

same unit: count both numbers in tenths, or both in hundredths

ASK

- How many jumps of the divisor make the number?
- What unit can you count both numbers in?
- Why is the quotient bigger than the number you started with?

WATCH FOR

Writes $1.4 \div 0.2 = 0.7$. Count the jumps: 7 jumps of 0.2 make 1.4. Check: $7 \times 0.2 = 1.4$.

Counts one number in tenths and the other in hundredths. Write both in the smaller unit first: 0.9 is 90 hundredths.

ON ANIMAL MATH

PRINTABLE

Dividing Decimals: sheet 4, problems 1 to 5

PRINTABLE

Multiplying and Dividing Decimals: sheet 4, problems 5 to 7

TOOL

Number Line: Start 0, End 3, Interval 0.1, Mode Jump, then jumps of the divisor from 0

QUIZ

Decimal Operations Quiz: the Divide Decimals level

EXIT TICKET

5th Grade Multiplying and Dividing Decimals Exit Tickets: Exit Ticket 6.8

Multiply & Divide Decimals

Lesson 6.9: Decimal stories

GOAL Students solve decimal stories with all four operations, money and measurements included: they choose the operation for each step, estimate first, and check that the answer makes sense.

About 45 minutes

I can solve decimal stories with all four operations.

THE LESSON

- 1 Warm up** (5 min) Read four short stories aloud: sharing a bill, buying 5 of one thing, how much more, and the total of two prices. Students hold up $\times$, $\div$, $-$ or $+$ for each.
- 2 Teach** (10 min) Read: Sam buys 3 notebooks at \$2.35 each and a pen for \$1.60. He pays with a \$20 bill. What is his change? Estimate: about $\$7 + \$2 = \$9$, so about \$11 back. Step 1: $3 \times \$2.35 = \$7.05$. Step 2: $\$7.05 + \$1.60 = \$8.65$. Step 3: $\$20 - \$8.65 = \$11.35$, close to the estimate.
Say: "I read the question, plan the steps and estimate. Each step gets a label, and money gets two decimal places."
- 3 Try it together** (10 min) Pairs plan and solve: Lena runs 2.4 kilometers a day for 5 days, and Max runs 9.75 kilometers in all. Who runs farther, and by how much? ($2.4 \times 5 = 12$, and $12 - 9.75 = 2.25$ kilometers.) Then 4 friends share a \$27.80 bill equally: how much does each pay? (\$6.95)
- 4 Practice** (15 min) Students do the stories on sheet 5 of Multiplying and Dividing Decimals (problems 6 to 8) and sheet 5 of Dividing Decimals (estimate, then solve). For more money stories: Stocks, Bonds and Funds sheet 2 and the bake sale on Recipe Math sheet 5.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 6.9** and circle a face beside the "I can" line. On question 1, look for \$7.40, then \$2.60; \$7.40 as the answer means the second step was left out. On question 2, look for 0.7 meters; 7 means the point was dropped.

Ready for more? Write a two-step decimal story that uses $\times$ and $-$, and trade with a partner.

ON ANIMAL MATH

PRINTABLE **Multiplying and Dividing Decimals:** sheet 5, problems 6 to 8

PRINTABLE **Dividing Decimals:** sheet 5

PRINTABLE **Stocks, Bonds and Funds:** sheet 2

PRINTABLE **Recipe Math:** sheet 5, problems 6 to 9

QUIZ **Decimal Operations Quiz:** the Word Problems level

EXIT TICKET **5th Grade Multiplying and Dividing Decimals Exit Tickets:** Exit Ticket 6.9

GET READY

- Story cards
- Play money and price tags
- Whiteboards and markers

WORDS TO USE

total: the amount in all

change: the money you get back after paying

each: a clue that the groups are equal: multiply or divide

ASK

- What does the question ask for?
- Which operation does each step need? How do you know?
- Is your answer close to your estimate?

WATCH FOR

Stops after the first step. Read the question again and label what each step's answer means.

Lines up money on the right when adding or subtracting. Line up the points: write \$20 as \$20.00.

Need help? Act the story out with play money before choosing the operations.