

Core Focus

- Decimal fractions: Multiplying and dividing

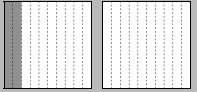
Decimal fractions: Multiplying

- In this module, students develop a broad and deep understanding of multiplication involving **decimal fractions**.
- The lessons purposefully avoid teaching rules and procedures. Students are encouraged to use and adapt what they already know about multiplying whole numbers to the new situation of multiplying decimal fractions.
- In later years, students will learn the **standard algorithm** for multiplying decimal fractions, connecting the written method to the strategies they are learning now.

10.1 Decimal fractions: Multiplying by a whole number

Step In Each square represents one whole.

The shaded part shows one group of 0.2.
How could you show 4 groups of 0.2?
What about 6×0.2 ?



In this lesson, students multiply whole numbers by decimal fractions (tenths).

- Students are already familiar with visualizing multiplication (using shaded rectangles or number lines) and with splitting numbers into parts to make them easier to multiply piece by piece.

10.4 Decimal fractions: Multiplying with whole numbers using partial products

Step In A leftover roll of carpet is 5 m long and 0.42 m wide. Marvin is thinking of using it to carpet his daughter's playhouse.

What floor area do you think the leftover carpet will cover?

The carpet would cover 5 square meters if it were 1 m wide. The carpet is a little less than $\frac{1}{2}$ that width, so it will cover half as much.

Lomasi draws this picture to calculate the area that it would cover.


How does she split the width of the carpet into parts that are easier to multiply?

Complete these equations to calculate each partial product.

$5 \times 0.4 = \square$ $5 \times 0.02 = \square$

I've used this strategy before to multiply whole numbers.

What area can the leftover carpet cover?
How would you use this strategy to calculate 6×0.36 ?



In this lesson, students split a decimal fraction into tenths and hundredths to multiply the parts.

Ideas for Home

- Write a basic multiplication fact such as $7 \times 3 = 21$. Then adjust one or more of the factors to write as many new equations as possible. E.g. your child could write $0.7 \times 3 = 2.1$, $0.3 \times 0.7 = 0.21$, and $70 \times 3 = 210$. Discuss how you know where to place the decimal point (e.g. 0.7 is one-tenth of 7, so the answer must be one-tenth of 21).
- Look at weekly supermarket circulars and choose some favorite food items. Ask your child to figure out the price of three, four, or five items. Be sure to ask what strategy they used.

Glossary

- **Decimal fractions** are fractions in which the denominator is 10, 100, or 1000, etc., but are always written using decimal points.
- An **algorithm** is a rule used for completing tasks or solving problems.

- The area model is the main representation used to provide meaning. The lessons rely on the work students have already completed to multiply *common fractions*. Students use the same steps to multiply 0.4 by 0.3 as they did for multiplying $\frac{4}{10}$ by $\frac{3}{10}$ in an earlier module.

10.3 Decimal fractions: Multiplying tenths by tenths

Step In Use the length of your hand to estimate the dimensions of this poster.

Do you think the area of the poster is more or less than one square meter? Explain your thinking.

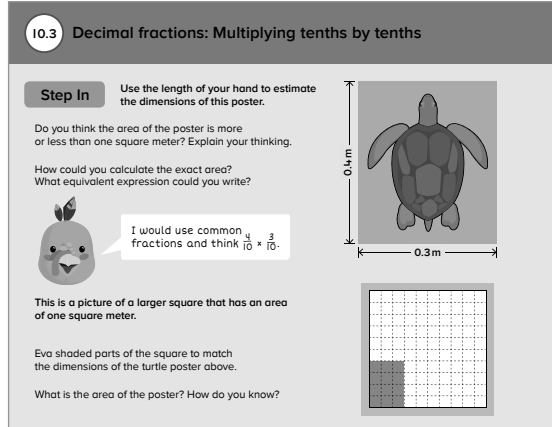
How could you calculate the exact area? What equivalent expression could you write?

I would use common fractions and think $\frac{4}{10} \times \frac{3}{10}$.

This is a picture of a larger square that has an area of one square meter.

Eva shaded parts of the square to match the dimensions of the turtle poster above.

What is the area of the poster? How do you know?



In this lesson, students split a decimal fraction into tenths and hundredths to multiply the parts.

Decimal fractions: Dividing

- Students begin to divide by decimal fractions. Students use real-world examples to solve problems involving sharing. They write equations to match the problems with the quotient or the divisor as a decimal fraction. Language such as “How many four tenths are there in 2 wholes?” is used to help interpret the latter sentence.
- The connection between division and multiplication is also used to provide meaning.

10.7 Decimal fractions: Dividing decimal fractions by whole numbers

Step In This pitcher holds 0.8 quarts of juice. Four people share the juice equally.

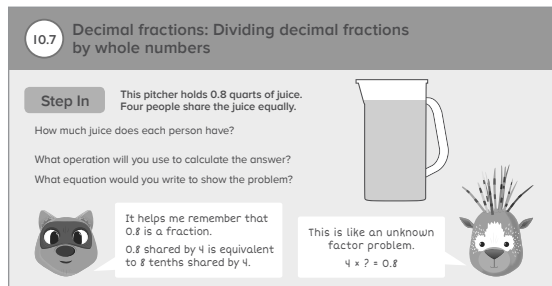
How much juice does each person have?

What operation will you use to calculate the answer?

What equation would you write to show the problem?

It helps me remember that 0.8 is a fraction. 0.8 shared by 4 is equivalent to 8 tenths shared by 4.

This is like an unknown factor problem. $4 \times ? = 0.8$



In this lesson, students consider different strategies to divide decimal fractions by whole numbers.

- Students rewrite a problem involving division by a decimal fraction as an equivalent problem where the divisor is a whole number to make the division easier. For example, $0.9 \div 0.3$ can be rewritten as $9 \div 3$, so the answer is 3. Language again plays an important role when exploring tenths divided by tenths.

Ideas for Home

- Restaurant menus provide a great opportunity for your child to practice with decimal fractions. Ask them to find the total price of two or three items, then find the cost per person if the items are shared by 2 or 3 people. There may be a few cents left over.
- Use everyday experiences such as cooking (mass or capacity) to create and solve situations involving division. E.g. if a dozen eggs weigh 0.72 kg, how much would one egg weigh?