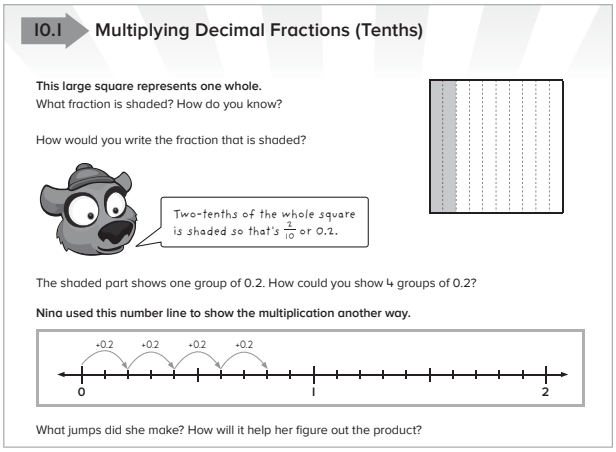
ORIGO STEPPING STONES

Core Focus

- Multiplication involving decimal fractions – tenths and hundredths (including using the distributive property)
- Measurement conversion and problem solving with metric measures of mass — grams and kilograms.

Multiplying Decimal Fractions

- In this module, students develop a broad and deep understanding of multiplication involving decimals.
- 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 decimals.
- 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 Multiplying Decimal Fractions (Tenths)

This large square represents one whole.
What fraction is shaded? How do you know?

How would you write the fraction that is shaded?

Two-tenths of the whole square is shaded so that's $\frac{2}{10}$ or 0.2.

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

Nina used this number line to show the multiplication another way.

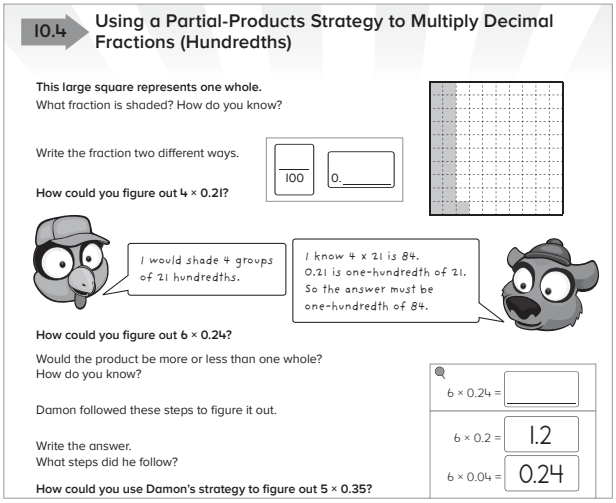
+0.2 +0.2 +0.2 +0.2

0 1 2

What jumps did she make? How will it help her figure out the product?

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

- Students are already familiar with visualizing multiplication and with splitting numbers into parts to make them easier to multiply piece by piece.



10.4 Using a Partial-Products Strategy to Multiply Decimal Fractions (Hundredths)

This large square represents one whole.
What fraction is shaded? How do you know?

Write the fraction two different ways.

$\frac{\quad}{100}$ 0._____

How could you figure out 4 × 0.21?

I would shade 4 groups of 21 hundredths.

I know 4 × 21 is 84. 0.21 is one-hundredth of 21. So the answer must be one-hundredth of 84.

How could you figure out 6 × 0.24?

Would the product be more or less than one whole?
How do you know?

Damon followed these steps to figure it out.

Write the answer.
What steps did he follow?

How could you use Damon's strategy to figure out 5 × 0.35?

6 × 0.24 = _____

6 × 0.2 = 1.2

6 × 0.04 = 0.24

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 × 3 = 21. Then adjust one or more of the factors to write as many new equations as possible. For example, your child could write 0.7 × 3 = 2.1, 0.3 × 0.7 = 0.21, and 70 × 3 = 210. Discuss how you know where to place the decimal point (e.g. 0.7 is ten times less than 7, so the answer must be ten times less, too).
- Look at weekly supermarket circulars and choose some favorite food items. Ask your child to figure out the price of 3, 4, or 5 of the items. Be sure to ask what strategy they used.
- Estimating the answer to a decimal multiplication problem helps determine where to place the decimal. Consider 2.3 × 1.2. Your child might think 2.3 is a little more than 2 and 1.2 is a little more than 1, so 2.3 × 1.2 will be a little more than 2 × 1. Temporarily ignoring the decimal points, have your child determine the answer, in this case 23 × 12 = 276. Since the estimated answer was a little more than 2, your child can see that 2.76 is the correct product.

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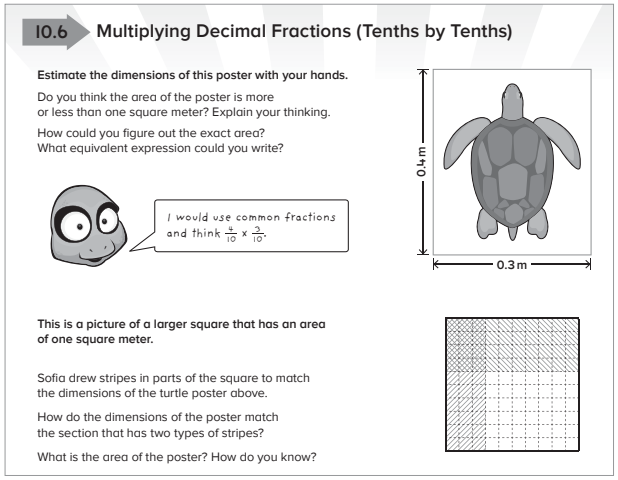
- The area model is the main representation used to provide meaning. The lessons rely on the work students have already completed to multiply common fractions. Students use the same steps to multiply 0.3 by 0.4 as they did for multiplying $\frac{3}{10}$ by $\frac{4}{10}$ in an earlier module.

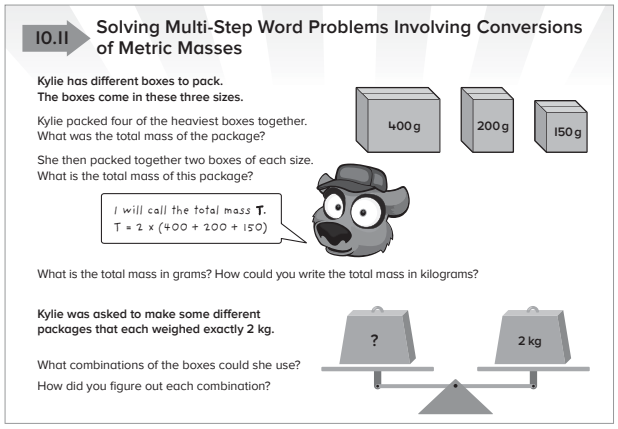


In this lesson, students use an area model to multiply tenths by tenths.

- With the connection to common fractions established, students use that thinking to determine where to place the decimal point. Multiplying tenths by tenths results in hundredths, while multiplying tenths by hundredths results in thousandths.

Metric Measurement: Mass

- Students review metric measurements of mass (kilograms, kg, and grams, g) and solve problems involving these measures. They know that 1 kilogram = 1,000 grams.
- Decimals can be used to express fractions of a kilogram because the metric system is based entirely on powers of 10 (10, 100, 1,000). For example, 1 ½ kilograms is 1.5 kg or 1,500 g.



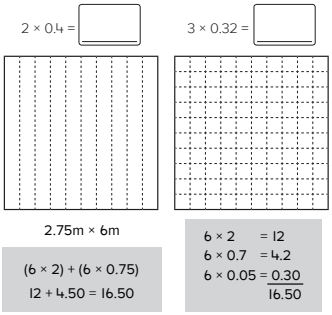
In this lesson, students solve multi-part word problems that involve converting metric units of mass.

Ideas for Home

- Your child probably has a sense of the mass of pounds and ounces. Establishing a personal benchmark for grams and kilograms is helpful. A large paper clip has a mass of about 1 gram and a roll of new US nickels has a mass of 200 grams.

Glossary

- Multiplying decimal fractions is easier to see when shown as **area models**.



- 1 kilogram = 1,000 grams
- 1 kilogram = about 2.2 pounds

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