ORIGO
STEPPING STONES
TEXAS

Core Focus

- Multiplication involving decimal fractions — tenths and hundredths (including using the distributive property)
- Solving word problems involving perimeter, area, and volume.

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.

8.1

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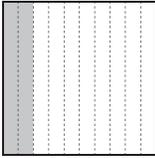
> Two-tenths of the whole square is shaded so that's $\frac{2}{10}$ or 0.2.

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

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.

8.4

Step In   **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.

$\frac{}{100}$ 0.___

How could you figure out 4 × 0.21?
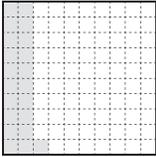
> I would shade 4 groups of 21 hundredths.

> I know 4 × 21 is 84. 0.21 is one-hundredth of 21. So the answer must be one-hundredth of 84.
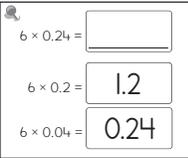
How could you figure out 6 × 0.24?

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

Emilio followed these steps to figure it out.

Write the answer.
What steps did he follow?

How could you use Emilio'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. E.g. 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).

- 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.

- Estimating the answer to a decimal multiplication problem helps determine where to place the decimal. E.g. 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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- 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.

- 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 $\frac{3}{10}$ by $\frac{4}{10}$ in an earlier module.

8.8

Step In ▶ **Multiplying Decimal Fractions (Tenths by Tenths)**

Estimate the dimensions of this poster with your hands.

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

How could you figure out the exact area? What equivalent expression could you write?

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

0.4 m

0.3 m

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

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

How do the dimensions of the poster match the dark grey section of the square?

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.

Measurement

- Problem-solving is vital for developing skills and concepts in all areas of mathematics. Students use what they have learned about measurement to solve a variety of problems. Students are introduced to steps and strategies that help organize their mathematical working and develop critical and creative thought to solve problems.

- The problems involve whole numbers and decimal fractions and reinforce the work with multiplication in the beginning lessons of this module.

8.10

Step In ▶ **Solving Word Problems Involving Perimeter**

The local parks department has decided to lay edging around the outside of a playground. The playground is rectangular and the length is four times the width. Each short side measures 7.4 m.

How can you figure out the perimeter of the playground?

Miles figured it out like this.

$P = (2 \times L) + (2 \times W)$
$P = 2(4 \times 7.4) + (2 \times 7.4)$
$P = 2 \times 59.2 + 14.8$
$P = 118.4 + 14.8$
$P = 133.2$ m

You could also add the length and width first, then multiply the total by 2.

The edging for the playground is sold in strips that are 30 cm long. How many strips will be needed for the playground project?

What steps will you follow to figure out the solution?

First I need to convert the perimeter to centimeters so that I am working with the same units.

In this lesson, students apply old and new strategies to solve problems involving perimeter.

Ideas for Home

- Language plays an important role in helping your child understand decimal fractions. When looking at problems, encourage your child to read 4.2 X 2 as "four and two-tenths multiplied by two" or "forty-two tenths multiplied by two" instead of reading it as "four point two multiplied by two."

- Encourage your child to use problem-solving strategies such as acting it out (using real-world objects or mathematical ones such as base ten blocks, cubes or number lines); drawing a picture or diagram; making a table or a graph; solving a simpler situation (e.g. instead of 345 + 99, do 45 + 9); or working backwards. Discuss these strategies when solving problems in the real world, such as measuring food for recipes, comparing prices while shopping, or playing puzzle games.

Glossary

▸ **Area** of a rectangle: A = L X W

▸ **Perimeter** of a rectangle: P = (2 X L) + (2 X W)

▸ **Volume** relates to area of the rectangular-base of the prism multiplied by its height

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