



Multiplication With Whole Numbers and Decimals

Key Content from This Unit:

Students will build on their previous work with multiplication models and written methods to understand and use the standard algorithm for multiplication with whole numbers. They will be asked to explain their reasoning as they compare different methods for multiplying numbers. The use of parenthesis in math to indicate the order that operations on numbers will be done will also be learned in this unit. They will also use models and written methods to multiply decimal numbers to hundredth place..

Vocabulary to Know:

Standard Algorithm: or long multiplication: a way of setting out a step-by-step mathematical procedure.

Product: the result when two numbers are multiplied

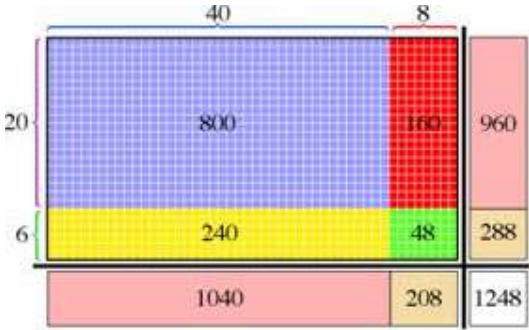
Parenthesis: in math help to determine an order to perform operations on numbers.

When students are asked to explain the standard algorithm for multiplication: They can use pictures or other written methods to explain their understanding.

Look at this diagram:

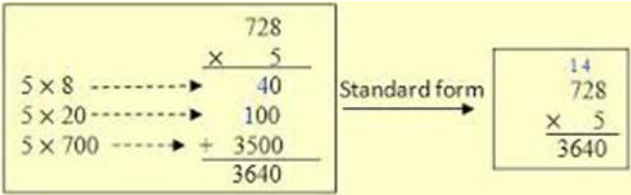
Each rectangle represents a portion of the product of $26 \times 48 = 1248$

$(20 + 6) \times (40 + 8) = 1248$



Partial Product –to-standard algorithm:

Find the Product of 728×5



Using a written method called partial products students can see how “carrying” the 4 tens and 1 hundred makes sense.

By comparing the standard algorithm steps to the partial product steps students make sense of each product. A diagram can also be used to see the connection.

What came before this?

In fourth grade In fourth grade students focused on developing various strategies for multiplying whole numbers and were exposed to the standard algorithm for multiplication. They found the produce of four digit by one digit and two digit by two digit numbers.

What comes after this?

In sixth grade students will apply and extend their previous understanding of multiplication to fractions and the system of rational numbers.

Common Core Focus:

- Multiply multi--digit whole numbers using the standard algorithm.
- Connect mathematical models to the standard algorithm.
- Multiply decimals to hundredths, using concrete models relate the strategy to the written methods, and explain the reasoning used
- Use and evaluate parentheses in numerical expressions (partial products and area model). 5.NBT.5 5.NBT 5.OA.1 5.OA.2

Spotlight on the Math Practices

Construct viable arguments and critique the reasoning of others

Mathematically proficient students:

- Make conjectures and build a logical progression of statements to explore the truth of their conjectures.
- Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions.
- Construct viable arguments and critique the reasoning of others.

How Can You Help?

- Have your child show you the models that they are using in school. Using these models will provide continuity
- Help by learning a new method of multiplication from your child. As they explain a different way of multiplying they are enforcing what they know.
- Try to use similar problems to your child's home work when practicing at home.

KEY MATHEMATICAL MODELS of the COMMON CORE

product

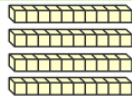
$$\square \times \square = \square ?$$

multiplicand multiplier product

a product is the result of multiplication



$$5 \times 3 = 15$$



$$10 \times 4 = 40$$

Early multiplication using counters and blocks.

$$153 \times 6 =$$

	H	T	O
	1	5	3
x			6
	9	1	8

$$1386 \times 7 =$$

	Th	H	T	O
	1	3	8	6
x				7
	9	7	0	2

Multiplying vertically with trading (carrying).

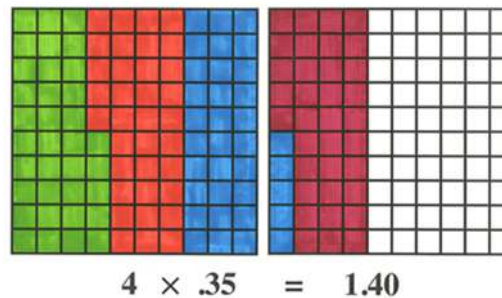
When a column is more than ten, the **tens** go into the next column left and are added to the answer, the ones stay in their own column.

© Jenny Eather 2014

A common mistake when multiplying decimals is misplacing the decimal point in the product.

$$\begin{array}{r} 2.34 \leftarrow 2 \text{ decimal places} \\ \times 1.6 \leftarrow + 1 \text{ decimal place} \\ \hline 1404 \\ 234 \\ \hline 3.744 \leftarrow 3 \text{ decimal places} \end{array}$$

Begin multiplying decimals with decimal grids. A whole number times a decimal uses a repeat addition diagram.



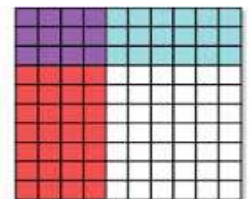
$$4 \times .35 = 1.40$$

A Decimal times a

decimal use a

shaded grid model.

$$0.3 \times 0.4 = 0.12$$



Some Resources to Help at Home

- <http://www.decimalsquares.com/videos/TeachingDecimalSquaresVideos.html> models
- <https://www.splashmath.com/skills/3-digit-x-2-digit/attempts/d511912f-c98d-4bdf-a35e-f61c942b5720> practice multiplying whole numbers with standard algorithm
- <https://www.splashmath.com/skills/multiply-decimals-by-a-whole/attempts/a16b16be-f44a-4d59-84f7-e52edf9a5fa1> multiply a whole number times a decimal using grids
- <https://www.splashmath.com/math-skills/fifth-grade/decimal-arithmetic/multiply-decimals> multiply a decimal times a decimal using hundreds grids
- http://www.mathopolis.com/questions/q.php?id=962&site=1&ref=/multiplying-decimals.html&q=962_1348_963_1349_964_1350_3463_3464_3465_3466 definitions and examples of decimal math. There is a question quiz on the bottom of the page