

Multiplying Fractions By a Whole Number

Key Content from This Unit:

Students apply their understanding of multiplication to multiply fractions by whole numbers. Through the use of visual fraction models, they represent a fraction as a multiple of a unit fraction (e.g., $7/6 = 7 \times 1/6$). Furthermore, students solve word problems involving multiplication of a fraction by a whole number. Activities should start at the developmental level of instruction and then move to reinforcement activities.

Vocabulary to Know:

Benchmark - standard or reference point by which something is measured)

Common denominator - when two or more fractions have the same denominator

Mixed number - number made up of a whole number and a fraction

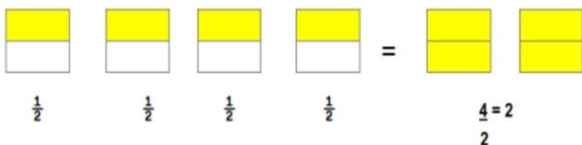
Compose - change a group of unit fractions with the same denominator to a single non-unit fraction or mixed number

Decompose - change a non-unit fraction or mixed number to the sum of its parts or unit fractions

How can I use models to multiply a fraction by a whole number?

Example: Multiply $4 \times \frac{1}{2} = ?$

1. Use models to show 4 groups of $\frac{1}{2}$.



2. Find the product.

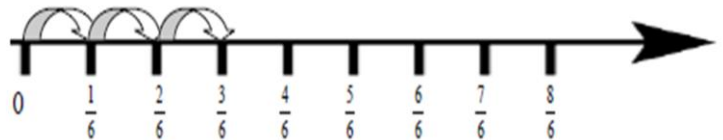
There are 4 halves, or 2 wholes, in all.

$$4 \times \frac{1}{2} = \frac{4}{2} = 2$$

Students use a number line as a model to show multiplication of fractions.

$$\frac{3}{6} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 3 \times (\frac{1}{6})$$

Number line:



What came before this:

In grade 3, students developed an understanding of the meaning and properties of multiplication of whole numbers in preparation for multiplication of fractions by a whole number. Also, they viewed fractions as being built out of unit fractions, or fractions where the numerator is one.

What comes after this:

In grade 5, students will apply their understanding of fractions and fraction models to add and subtract fractions with unlike denominators, including mixed numbers. Fifth graders will multiply fractions by whole numbers, whole numbers by fractions, and fractions by fractions.

Common Core Focus:

- Apply understanding of operations of whole numbers to develop conceptual understanding of multiplying a fraction by a whole number.
- Multiply a fraction by a whole number using repeated addition.
- Understand a fraction is a multiple of a unit fraction.
- Use understanding of fractions as a multiple of a unit fraction to multiply fractions by whole numbers.
- Solve word problems involving multiplying a fraction by a whole number.
- Use visual models and equations to represent word problems.

4.NF.4a, 4.NF.4b, 4.NF.4c

Spotlight on the Math Practices

Attend to Precision

Mathematically proficient students they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose.

In this unit, students **attend to precision** when they:

- Attend to the language of real-world situations to determine if answers are reasonable.
- Communicate clear explanation of number sequences

How Can You Help?

- Look for opportunities in daily life to discuss fractional parts of a whole, e.g. pieces of pizza, parts of an hour, distances to familiar places.
- Continue to practice and review multiplication and division math facts – this greatly supports work with fractions!

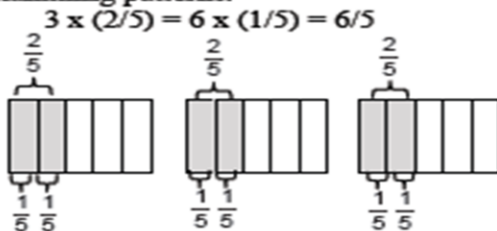
KEY MATHEMATICAL MODELS of the COMMON CORE AREA MODEL

Students began in earlier grades to build arrays for various purposes, first showing simple multiplication. In 4th grade, we move beyond using the area model for multiplication of whole numbers and begin to use this powerful model to illustrate mathematical operations on fractions. One of the goals is to first give students concrete experiences with mathematical concepts, and then to build slowly toward more abstract representations of those concepts. The area model is a tool that helps students to make that important leap, and will support students' learning through algebra and beyond.

Example:

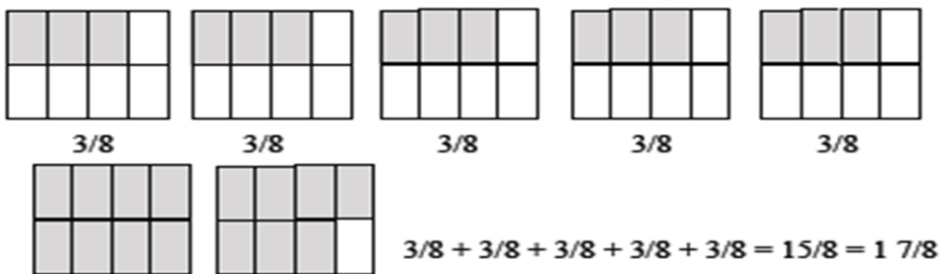
Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns.

Examples:



If each person at a party eats $3/8$ of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie?

A student may build a fraction model to represent this problem:



Some Resources to Help at Home

- <http://www.ixl.com/math/grade-4/multiply-fractions-by-whole-numbers> -multiplying fractions by whole numbers quiz
- <http://www.k-5mathteachingresources.com/support-files/models-for-fraction-multiplication-4nf4a.pdf> - use models to multiply fractions
- <http://www.k-5mathteachingresources.com/support-files/fullhouseaninvitationtofractions.pdf> - Fraction read aloud