



Core Focus

- Multiplication involving common fractions, mixed numbers, and improper fractions
- Multiplication as comparison, and the effects of multiplying by fractions less than 1, equal to 1, and greater than 1
- Solving word problems involving fractions and mixed numbers
- Measurement conversions and problem solving involving customary measures of mass (ounces and pounds)

Multiplication with Common Fractions

- **Area models** and **number lines** help students visualize the idea of multiplying fractions.
- Students know they can decompose (break apart) numbers to make multiplication easier (for example, 5×23 is 5×20 plus 5×3). Using this idea, students make sense of decomposing mixed numbers for multiplying ($5 \times 4\frac{1}{3}$ is 5×4 plus $5 \times \frac{1}{3}$).

Step In **Multiplying Whole Numbers, Common Fractions, and Mixed Numbers**

This recipe makes one batch of granola. Norton wants to make 4 batches. How would you figure out the new amount for each ingredient? Which ingredient matches each of these sentences?

$4 \times \frac{2}{3} = \square$ $4 \times 1\frac{1}{3} = \square$ $4 \times 1\frac{2}{3} = \square$

Granola Mix

- $1\frac{2}{3}$ cups oats
- $\frac{2}{3}$ cup crushed almonds
- $1\frac{1}{3}$ cups mixed dried fruit
- $\frac{1}{2}$ cup of toasted coconut
- $\frac{1}{2}$ cup buckwheat

Felipe used a number line and made 4 jumps of $\frac{2}{3}$ to figure out the amount of crushed almonds. Draw jumps on this number line to show his thinking.

In this lesson, students review how to multiply common fractions and mixed numbers by whole numbers.

- Students use the familiar area model to visualize what is involved to do fraction multiplication. Instead of whole numbers for the dimensions, students use unit fractions (fractions with a numerator of 1).

Step In **Multiplying Proper Fractions (Area Model)**

Chloe needed a pane of glass that measured $\frac{2}{3}$ yard by $\frac{3}{4}$ yard. How could you use this diagram to calculate the area of the pane of glass?

To find the area of a rectangle, I need to multiply the dimensions.

$\frac{2}{3}$ yard by $\frac{3}{4}$ yard is the same as $\frac{2}{3} \times \frac{3}{4} = \square$ yd²

Chloe shaded $\frac{2}{3}$ of the diagram with stripes and $\frac{3}{4}$ of the diagram with stripes. How does the diagram match the number sentence above?

How many equal parts are in the whole square? How many of these parts show both and stripes? What is the area of the pane of glass?

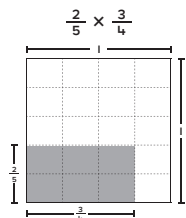
In this lesson, students use an area model (grid) to multiply two fractions that are less than one.

Ideas for Home

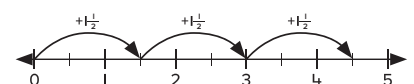
- Help your child make sense of multiplying with fractions by connecting the numbers to something they know. For example, $\frac{1}{2} \times \frac{1}{3}$ might represent $\frac{1}{2}$ of a sandwich and your child eats $\frac{1}{3}$ of that. Ask, "How much of the whole sandwich did you eat?" They can see that $\frac{1}{6}$ makes sense because they ate a part of a part of the whole, so the answer will be less than either factor.
- Talk with your child about times when you multiply fractions or mixed numbers. E.g. to double a recipe that uses $1\frac{1}{4}$ cups of flour, you multiply $1\frac{1}{4}$ by 2.

Glossary

- ▶ Students use an **area model** (grid) to multiply fractions.



- ▶ The **number line** below shows three jumps of $1\frac{1}{2}$ to solve $3 \times \frac{1}{2}$.



- Students use the familiar area model to illustrate what it means to divide a fraction by a whole number.

9.5

Step In Relating Division of a Unit Fraction to Multiplication

These diagrams were used to figure out $\frac{1}{3}$ divided by 4.

There is a way to figure out the answers without drawing all the diagrams.

The last diagram is like multiplying fractions. It is the same as $\frac{1}{3} \times \frac{1}{4}$.

Use these diagrams to help you complete the equations.

$\frac{1}{5} \div 4 =$

$\frac{1}{5} \times \frac{1}{4} =$

In this lesson, students consider how dividing a unit fraction by a whole number yields the same result as multiplying by the related unit fraction.

Customary 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.
- Students convert back and forth between ounces and pounds whether they are presented in whole number, fraction, or decimal format (e.g. 20 ounces is 1.25 pounds, and $1\frac{1}{2}$ pounds is 24 ounces).

9.10

Step In Converting between Ounces and Pounds

What is the weight of each package?
How could you figure out the difference in weight between these two packages?

I would convert the pounds into ounces. I know there are 16 oz in 1 pound.

How could you figure out the number of ounces in one-half of a pound?

Complete these statements.

<input type="text"/> ounces	is the same as	<input type="text"/> 1 pound.
<input type="text"/> ounces	is the same as	$\frac{1}{2}$ pound or <input type="text"/> 0.5 pound.
<input type="text"/> ounces	is the same as	$\frac{1}{4}$ pound or <input type="text"/> 0.25 pound.
<input type="text"/> ounces	is the same as	$\frac{3}{4}$ pound or <input type="text"/> 0.75 pound.

What are some other statements you could write?

I wonder how many ounces are in $\frac{1}{8}$ of a pound?

In this lesson, students convert pounds to ounces (heavy to light) and ounces to pounds (light to heavy).

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 one gram, and a roll of new US nickels has a mass of 200 grams.
- Shopping for fruits and vegetables is a great opportunity for comparing ounces and pounds. Have your child use the scale to weigh different items and tell you the mass in both pounds and ounces (e.g. “the apples weigh 36 ounces, which is $2\frac{1}{4}$ pounds”).
- Take turns naming different objects in your home and saying which unit of measurement is most appropriate (e.g. pounds is appropriate for the mass of a television, while ounces would be appropriate for the mass of a cell phone), and why.

Glossary

- 1 pound = 16 ounces
The abbreviation for pound is **lb**. The abbreviation for ounce is **oz**.