BLUEBONNET LEARNING K–5 MATH

**5 GRADE** **Math Instructional Materials** ÷

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# GRADE 5 • MODULE 4

Multiplication and Division of Fractions

*Simple*

*Complex*

*MMA*

*EOMA*

*Instructional Days 30*
*MMA: A-C  2 Days*
*EOMA: A-F  2 Days*
*(26 Lessons)*

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# Grade 5 • Module 4

# Multiplication and Division of Fractions

## OVERVIEW

In Module 4, students learn to multiply fractions and begin working with fraction division. Students begin Topic A by decomposing non-unit fractions and representing these decompositions as repeated addition sentences. They build on this concept by representing addition sentences as multiplication, just as they did in Grade 4: $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 3 \times \frac{1}{4}$. They will apply this understanding of decomposition and multiplication and use the associative property in order to multiply a whole number by a fraction (**5.3I**). In using the associative property, students multiply and then consider the unit.

$$4 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = 4 \times 2 \text{ thirds} = (4 \times 2) \text{ thirds} = 8 \text{ thirds} = \frac{8}{3}$$

Topic A continues with solving multiplicative comparison word problems involving fractions and interpretation of data presented in dot plots (**5.9C**).

In Topic B, students interpret finding a fraction of a set as multiplication of a whole number by a fraction ($\frac{3}{4} \times 24$) and use strip diagrams to support their understandings (**5.3I**). This, in turn, leads students to see division by a whole number as being equivalent to multiplication by its reciprocal. That is, 1 divided by 2, for example, is the same as multiplication by $\frac{1}{2}$. Students also use the commutative property to relate a fraction of a set to the Topic A repeated addition interpretation of multiplication by a fraction. This offers opportunities for students to reason about various strategies for multiplying fractions and whole numbers. Students apply their knowledge of a fraction of a set and previous conversion experiences (with scaffolding from a conversion chart, if necessary) to find a fraction of a measurement, thus converting a larger unit to an equivalent smaller unit (e.g., $\frac{1}{3}$ minutes = 20 seconds and $2\frac{1}{4}$ feet = 27 inches) (**5.7A**).

Interpreting numerical expressions opens Topic C as students evaluate expressions with parentheses, such as $3 \times (\frac{2}{3} - \frac{1}{5})$ or $\frac{2}{3} \times (7 + 9)$ (**5.4F**). They then learn to interpret numerical expressions, such as *3 times the difference between* $\frac{2}{3}$ *and* $\frac{1}{5}$ or *two-thirds the sum of 7 and 9* (**5.4E**). Students generate word problems that lead to the same calculation (**5.3I**), such as "Kelly combined 7 ounces of carrot juice and 5 ounces of orange juice in a glass. Jack drank $\frac{2}{3}$ of the mixture. How much did Jack drink?" Solving word problems (**5.3I**) allows students to apply new knowledge of fraction multiplication in context, and strip diagrams are used to model multi-step problems requiring the use of addition, subtraction, and multiplication of fractions.

Topic D begins the work of division with fractions. Students use strip diagrams and number lines to reason about the division of a whole number by a unit fraction and a unit fraction by a whole number (**5.3J, 5.3L**). Using the same thinking developed in Module 2 to divide whole numbers, students reason about how many *fourths* are in 5 when considering such cases as $5 \div \frac{1}{4}$. They also reason about the size of the unit when $\frac{1}{4}$ is partitioned into 5 equal parts: $\frac{1}{4} \div 5$.

*Handwritten margin notes (left):*
Topic A
· represent
· decomposition
· repeated addition
· use associative property to ×
· solve word probs
· dot plots

Topic C
· evaluate expressions
· parenthesis
· make word probs.
· Strip diagrams
· multi step props
· w/ +, –, × of fractions

*Handwritten margin notes (right):*
Topic B:
· Find a fraction of a set
· Commutative prop
· use conversion experience

Topic D
· division of fractions
· strip diagram
· number lines
· Reason about size

In Topic E, students engage in activities designed to bring the Personal Financial Literacy standards for Grade 5 to life. Through the use of a consistent real-life scenario, students understand how to balance a simple budget. Then they differentiate between gross income and net income while defining income tax and payroll tax. This gives students an opportunity to use what they know about fraction of a set to do simple tax calculations (**5.10A**). Students understand the difference between sales tax and property tax and discuss the advantages and disadvantages of various forms of payment (**5.10C, 5.10E**).

The module concludes with Topic F, in which numerical expressions involving fraction-by-fraction multiplication are interpreted and evaluated (**5.4E, 5.4F**). Students create and solve word problems involving both multiplication and division of fractions and decimals.

The Mid-Module Assessment is administered after Topic C, and the End-of-Module Assessment follows Topic F.

Note that 5.3K is assessed in Modules 1 and 3. 5.4E is assessed in Module 2. 5.7A is assessed in Modules 1 and 2. 5.9A is assessed in Module 6. These standards are not addressed in this module.

Throughout Module 4 students engage with the TEKS mathematical process standards by applying the familiar concept of representing repeated addition as multiplication to multiply a whole number by a fraction at the start of the module, as well as applying their knowledge of fraction and decimal multiplication to understand concepts of financial literacy at the end of the module (**5.1F**). Students are encouraged to select from a variety of models to represent multiplication expressions and to solve problems (**5.1C**), later transitioning to using unit form and then to an abstract approach for solving problems. When dividing a whole number by a unit fraction and dividing a unit fraction by a whole number, students communicate their thinking by using precise mathematical language and diagrams such as strip diagrams and number lines (**5.1D**).

# Collaboratively Troubleshooting Student Misconceptions

It is common for students to make mistakes as they build their understanding of new or difficult concepts. As noted in the Program and Implementation Guide, *collaborative troubleshooting* is a routine to help teachers address students' misconceptions. The three steps to collaborative troubleshooting are

(1)  surface student thinking;

(2)  validate what the student did right; and

(3)  bridge to a better understanding.

The following table presents teachers with guidance on how to collaboratively troubleshoot misconceptions with students. The first three columns of the table outline misconceptions that commonly arise in this module, reasons why students may have the misconceptions, and associated TEKS. Teachers can use this information to help them decide which questions to ask students to surface thinking and to validate what the students understood or did correctly.

The last column of the table provides instructional strategies and sample guided questions that can support students as they build on what they already know and bridge to a better understanding.

*Note: Teachers can also refer to the sample teacher–student dialogue in the "Collaboratively Troubleshooting Student Misconceptions" section of the Grade 5 Course Guide for additional guidance on implementing the three-step routine.*
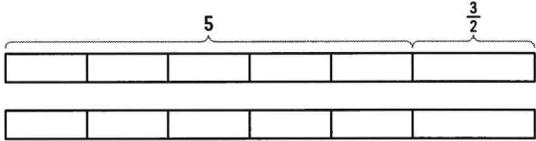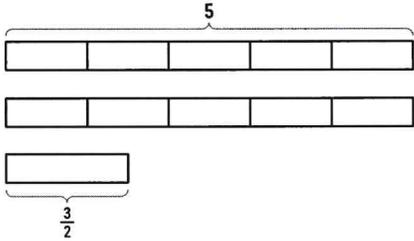
| Topic | TEKS | Student Misconception | How to Bridge to a Better Understanding |
|-------|------|-----------------------|------------------------------------------|
| Topic A | 5.3I | Students multiply only the whole number part or the fraction part of a mixed number by the other factor (e.g., $2 \times 3\frac{1}{5} = 6\frac{1}{5}$). | Notice how strip diagrams are used to model mixed number multiplication before transitioning to writing an expression with or without parentheses. By drawing the strip diagram with separate parts for the whole number part and the fraction part of the mixed number, we can model that there are multiple copies of the whole number part and multiple copies of the fraction part.

Draw a strip diagram with the parts representing the mixed number connected. Then redraw the strip diagram by grouping the parts that represent whole numbers and the parts that represent fractions. Grouping the parts of the strip diagram reinforces that both the whole number part of the mixed number and the fraction part of the mixed number are multiplied by the other factor.

| 3 | $\frac{1}{5}$ | 3 | $\frac{1}{5}$ |

| 3 | 3 | $\frac{1}{5}$ | $\frac{1}{5}$ |
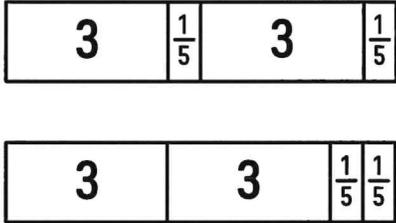
Continue to have students draw strip diagrams before writing an expression, such as in the Multiply Mixed Numbers fluency in Lessons 5–7. |

**Module 4:**    Multiplication and Division of Fractions

| Topic | TEKS | Student Misconception | How to Bridge to a Better Understanding |
|-------|------|----------------------|------------------------------------------|
| Topic B | 5.3I | Students overlook common factors when simplifying fractions (e.g., "$\frac{12}{16}$ simplifies to $\frac{6}{8}$ because 2 is the factor that 12 and 16 have in common"). | Remind students that we simplify fractions because fractions with larger units have smaller numbers in the numerator and denominator which can make them simpler to work with than fractions with smaller units. To name a fraction by using the largest units possible, we need to divide the numerator and denominator by common factors until they have no common factors other than 1. |
| | | | Have students list the factors of the numerator and the factors of the denominator of the fraction they think is simplified. Ask students to determine if there are any factors the numerator and denominator have in common and explain what this tells them about whether the fraction is simplified. Then have students rename the fraction by dividing the numerator and denominator by the largest factor they have in common. |
| | | | For example, analyze the fraction $\frac{6}{8}$. The factors of 6 are 1, 2, 3, and 6. The factors of 8 are 1, 2, 4, and 8. Since 6 and 8 have a common factor of 2, the fraction $\frac{6}{8}$ is not named with the largest units possible. $\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$. |
| | | | Facilitate a discussion about efficiency. Name a fraction such as $\frac{12}{16}$ that has more than one common factor. First, have students divide by a common factor that is not the largest factor the numerator and denominator have in common. Then, have students divide by the largest factor the numerator and denominator have in common. Have students compare the processes. |
| | | | ▪ To simplify $\frac{12}{16}$, we can divide 12 and 16 by the common factor 2, which renames the fraction as $\frac{6}{8}$. Since 6 and 8 have a common factor 2, we can divide again and rename $\frac{6}{8}$ as $\frac{3}{4}$. We cannot rename again because 3 and 4 have no common factors other than 1. |

| Topic | TEKS | Student Misconception | How to Bridge to a Better Understanding |
|---|---|---|---|
| | | | • To simplify $\frac{12}{16}$, we can divide 12 and 16 by the largest factor they have in common, which is 4. Dividing the numerator and denominator by 4 renames $\frac{12}{16}$ as $\frac{3}{4}$. We cannot rename again because 3 and 4 have no common factors other than 1.<br><br>• It is more efficient to simplify a fraction by dividing the numerator and denominator by the largest factor they have in common than to divide by any other common factor. |
| Topics C and F | 5.4F | Students do not recognize how grouping symbols change the meaning of an expression (e.g., $2(5 + \frac{3}{2}) = 2 \times 5 + \frac{3}{2}$). | Draw models to represent a pair of related expressions with and without grouping symbols. Then ask students to compare the story told by each model.<br><br>For example, compare $2(5 + \frac{3}{2})$ and $2 \times 5 + \frac{3}{2}$. Ensure students notice that there are 2 copies of $\frac{3}{2}$ in the first expression and 1 copy of $\frac{3}{2}$ in the second expression due to the placement of the parentheses.<br><br> |

| Topic | TEKS | Student Misconception | How to Bridge to a Better Understanding |
|-------|------|----------------------|------------------------------------------|
| Topic D | 5.3J<br><br>5.3L | Students think that dividing two numbers always yields a smaller quotient (e.g., "$5 \div \frac{3}{4}$ is less than 5 because the quotient is always smaller than the dividend"). | Notice how division of a whole number by a unit fraction is introduced with a series of related problems. The divisors in the problems within the series build from whole numbers to unit fractions. By analyzing the problems in the series, students notice that as the divisor gets smaller the quotient gets larger, and they reason about why this is true. Emphasize that as the same total is divided into smaller parts, there are more parts.<br><br>Similarly, division of a unit fraction by a whole number is introduced with a series of problems building from whole number dividends to fraction dividends. By analyzing the problems in the series, students notice that as the dividend gets smaller the quotient gets smaller, and they reason about why this is true.<br><br>For both division situations, ask students what they notice about the size of the quotient compared to the size of the dividend. Then ask if it makes sense that the quotient is less or more than the dividend and why. For non-contextual problems, use a familiar context as needed to support students in making sense of the division.<br><br>Students can apply this reasoning to estimating the quotient before they divide (i.e., Will the quotient be more or less than the dividend?) and use their estimates to determine the reasonableness of the actual quotient. |

| Topic | TEKS | Student Misconception | How to Bridge to a Better Understanding |
|---|---|---|---|
| Topic E | 5.10A<br>5.10B<br>5.10C<br>5.10E<br>5.10F | Students confuse the types of taxes, income, deductions, or forms of payment (e.g., "I pay sales tax on the money I earn from a job"). | Create classroom charts for each concept. On each chart, note the terms and their significant similarities and differences. Charts may take the form of a table, T-chart, Venn diagram, or other graphic organizer.<br><br>For example, use<br><br>  ▪  a table for the types of taxes,<br>  ▪  a T-chart for gross income and net income, including deductions,<br>  ▪  a Venn diagram for payment methods, and<br>  ▪  a T-chart for income and expenses. |

# Focus Grade Level Standards

## Number and Operations

The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. The student is expected to:

**5.3I**      represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models;

**5.3J**      represent division of a unit fraction by a whole number and the division of a whole number by a unit fraction such as $\frac{1}{3} \div 7$ and $7 \div \frac{1}{3}$ using objects and pictorial models, including area models;

**5.3K**      add and subtract positive rational numbers fluently;

**5.3L**      divide whole numbers by unit fractions and unit fractions by whole numbers.

## Algebraic Reasoning

The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:

**5.4E**      describe the meaning of parentheses and brackets in a numeric expression;

**5.4F**      simplify numerical expressions that do not involve exponents, including up to two levels of grouping.

## Geometry and Measurement

The student applies mathematical process standards to select appropriate units, strategies, and tools to solve problems involving measurement. The student is expected to:

**5.7A**      solve problems by calculating conversions within a measurement system, customary or metric.

## Data Analysis

**The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:**

| | |
|---|---|
| 5.9A | represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots; |
| 5.9C | solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot. |

## Personal Financial Literacy

**The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. The student is expected to:**

| | |
|---|---|
| 5.10A | define income tax, payroll tax, sales tax, and property tax; |
| 5.10B | explain the difference between gross income and net income; |
| 5.10C | identify the advantages and disadvantages of different methods of payment, including check, credit card, debit card, and electronic payments; |
| 5.10D | develop a system for keeping and using financial records; |
| 5.10E | describe actions that might be taken to balance a budget when expenses exceed income; |
| 5.10F | balance a simple budget. |

## Foundational Standards   *Prior Knowledge*

**The student is expected to:**

*5th →*

| | |
|---|---|
| 5.3A | estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division; |
| 4.2E | represent decimals, including tenths and hundredths, using concrete and visual models and money; |
| 4.2G | relate decimals to fractions that name tenths and hundredths; |
| 4.2H | determine the corresponding decimal to the tenths or hundredths place of a specified point on a number line; |
| 4.3A | represent a fraction $\frac{a}{b}$ as a sum of fractions $\frac{1}{b}$, where $a$ and $b$ are whole numbers and $b > 0$, including when $a > b$; |
| 4.3B | decompose a fraction in more than one way into a sum of fractions with the same denominator using concrete and pictorial models and recording results with symbolic representations; |
| 4.3C | determine if two given fractions are equivalent using a variety of methods; |

*4th grade*

*4th grade*

**4.3D**    compare two fractions with different numerators and different denominators and represent the comparison using the symbols >, =, or <;

**4.3E**    represent and solve addition and subtraction of fractions with equal denominators using objects and pictorial models that build to the number line and properties of operations;

**4.3F**    evaluate the reasonableness of sums and differences of fractions using benchmark fractions 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1, referring to the same whole;

**4.3G**    represent fractions and decimals to the tenths or hundredths as distances from zero on a number line;

**4.8B**    convert measurements within the same measurement system, customary or metric, from a smaller unit into a larger unit or a larger unit into a smaller unit when given other equivalent measures represented in a table.

## TEKS Mathematical Process Standards     *Problem Solving*

**The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:**

**5.1C**    select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;

**5.1D**    communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;

**5.1F**    analyze mathematical relationships to connect and communicate mathematical ideas.

# Overview of Module Topics and Lesson Objectives

| TEKS | ELPS | | Topics and Objectives | Days |
|---|---|---|---|---|
| **5.3I** **5.4E** **5.4F** **5.9A** **5.9C** 5.3K | 1.E 2.E 3.E 3.G 3.H 4.E 4.G 5.G | A | **Repeated Addition of Fractions as Multiplication** | 7 |
| | | | Lesson 1: Decompose non-unit fractions and represent them as a whole number times a unit fraction using strip diagrams. | |
| | | | Lessons 2–3: Represent and solve multiplication of a whole number and a fraction that refers to the same whole. | |
| | | | Lesson 4: Represent the multiplication of a whole number times a non-unit fraction using the associative property and visual models. | |
| | | | Lesson 5: Find the product of a whole number and a mixed number using the distributive property. | |
| | | | Lesson 6: Solve multiplicative comparison word problems involving fractions. | |
| | | | Lesson 7: Solve word problems involving the multiplication of a whole number and a fraction including those involving dot plots. | |
| **5.3I** **5.7A** 5.3K | 2.E 3.C 3.E 3.H 4.G 5.G | B | **Multiplication of a Whole Number by a Fraction** | 4 |
| | | | Lesson 8: Find a fraction of a set concretely and pictorially. | |
| | | | Lesson 9: Multiply any whole number by a fraction using strip diagrams. | |
| | | | Lesson 10: Relate a fraction of a set to the repeated addition interpretation of fraction multiplication. | |
| | | | Lesson 11: Find a fraction of a measurement, and solve word problems. | |
| **5.3I** **5.4E** **5.4F** **5.7A** 5.3K | 2.E 3.D 3.E 3.H 4.F 5.G | C | **Fraction Expressions and Word Problems** | 6 |
| | | | Lessons 12–13: Compare and evaluate expressions with parentheses and brackets. | |
| | | | Lessons 14–15: Solve and create fraction word problems involving addition, subtraction, and multiplication. | |
| | | | Lesson 16: Convert measures involving whole numbers, and solve multi-step word problems. | |
| | | | Lesson 17: Convert mixed unit measurements, and solve multi-step word problems. | |
| | | | **Mid-Module Assessment Task: Topics A–C** | 2 |

| TEKS | ELPS | | Topics and Objectives | | Days |
|---|---|---|---|---|---|
| **5.3J** **5.3L** 5.3A | 1.E 2.E 3.E 3.H 4.G 5.G | D | **Division of Fractions** | | 4 |
| | | | Lesson 18: | Divide a whole number by a unit fraction. | |
| | | | Lesson 19: | Divide a unit fraction by a whole number. | |
| | | | Lesson 20: | Solve problems involving fraction division. | |
| | | | Lesson 21: | Write equations and word problems corresponding to strip and number line diagrams. | |
| **5.10A** **5.10B** **5.10C** **5.10D** **5.10E** **5.10F** 5.3E 5.3K | 2.C 2.E 3.B 3.E 3.G 5.G | E | **Applying Fraction and Decimal Multiplication to Personal Financial Literacy** | | 4 |
| | | | Lesson 22: | Balance a simple budget. | |
| | | | Lesson 23: | Explain the difference between gross income and net income. Define income tax and payroll tax. | |
| | | | Lesson 24: | Define property tax and sales tax. | |
| | | | Lesson 25: | Identify the advantages and disadvantages of different methods of payment. | |
| **5.4E** **5.4F** | 2.E 3.E 5.G | F | **Interpretation of Numerical Expressions** | | 1 |
| | | | Lesson 26: | Interpret and evaluate numerical expressions. | |
| | | | **End-of-Module Assessment Task: Topics A–F** | | 2 |
| **Total Number of Instructional Days** | | | | | 30 |

# Terminology

A Spanish cognate is included when the term has a similar meaning and spelling in English. Not every term in this module has a Spanish cognate.

## New or Recently Introduced Terms　　PFL VOCab.

- **Budget**: a plan for saving and spending money

| Ben's Budget | |
|---|---|
| **Description** | **Amount** |
| House payment (future) | $1,950 |
| Groceries | $400 |
| Medical and dental expenses | $200 |
| Gas for car | $150 |
| Internet | $100 |
| Phone | $100 |
| Utilities (water, gas and electric) | $350 |
| Insurance | $450 |
| Car payment | $300 |
| Savings | $500 |
| Restaurants and entertainment | $150 |
| | |

- **Balanced budget**: a budget with expenses that are exactly equal to income

   Terry receives $100 per month for dog walking and $150 per month for babysitting. The table shows Terry's budget.

| Terry's Budget | |
|---|---|
| **Description** | **Amount** |
| Food | $50 |
| Clothes | $125 |
| Activities | $25 |
| Charitable donation | $50 |
| | |

Terry's total monthly income is $250. Terry's total monthly expenses are $250. Terry has a balanced budget because the amount of his expenses are equal to the amount of his income.

- **Expense**: items we spend money on; cost or charge

| Terry's Budget | | |
|---|---|---|
| **Description** | **Amount** | |
| Food | $50 | ⎫ |
| Clothes | $125 | ⎬ Expenses |
| Activities | $25 | ⎭ |
| Charitable donation | $50 | |
| | | |

- **Income**: money received

- **Wages**: money that is paid or received for work or services

- **Gross income**: total amount of money received before taxes and other deductions are subtracted

- **Net income**: the amount of money left after taxes and other deductions are subtracted

- **Income tax**: money the government collects based on a person's income

- **Payroll tax**: money collected to help fund programs that help people when they retire

**ABC Software, Inc**
123 4th Ave
Waco, TX 76706

Earnings Statement
Period Ending: 9/1/20
Pay Date: 9/30/20

Employee: Ben Jones

| GROSS INCOME AND WAGES: | | DEDUCTIONS | AMOUNT |
|---|---|---|---|
| This period: | $ 3,200 | Income and Wages Tax $ | |
| TOTAL DEDUCTED: | $ _____ | Payroll Tax | $ _____ |
| NET INCOME AND WAGES: | | Health Insurance | $ _____ |
| This period: | $ 2,500 | | |

- **Property tax**: an extra cost on something owned, such as a house or land

**Property Tax Bill**

Payable to:  McLennan County Tax Office
John Smith, Tax Assessor Collector
PO Box 605
Waco, TX 76703

| Parcel ID | Bill Date | Tax Year |
|---|---|---|
| 1234-567 | 10/15/24 | 2023 |

Housesite Tax Information
Housesite value $300,000
Property tax rate 0.01

Property tax due by January 31, 2024:   $ _____

- **Retail cost**: the price a store charges for an item

Clothes Receipt
XYZ Clothing Store

| Quantity | Description | Amount |
|---|---|---|
| 1 | Shirt | $20.00 |
| 1 | Jeans | $40.00 |
| 1 | Sweater | $40.00 |
| | | |
| Subtotal | | $100.00 |
| Sales tax | | $10.00 |
| Total | | $110.00 |
| Payment | | $110.00 |
| Change | | $0.00 |

This is the retail cost for each of these items.

## Familiar Terms and Symbols[1]

- **Commutative property** (*Propiedad conmutativa*): Changing the order of the factors in a multiplication expression does not change its product. Changing the order of the addends in an addition expression does not change its sum.

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

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

- **Conversion factor** (*Factor de conversión*): the factor in a multiplication sentence that renames one measurement unit as another equivalent unit

$$3 \text{ weeks} = 3 \times (1 \text{ week})$$
$$= 3 \times (7 \text{ days})$$
$$= 21 \text{ days}$$

1 week and 7 days are the conversion factors.

- **Denominator** (*Denominador*): the part of a fraction written below the fraction bar that identifies the total number of fractional units in a whole or set

$$\frac{5}{6}$$
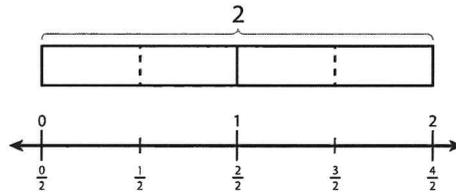
The denominator of this fraction is 6.

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[1] These are terms and symbols students have seen previously.

- **Distribute** (*Distribuir*): decompose an unknown product in terms of two known products to solve

$$1\frac{2}{5} \times 15 = (1 \times 15) + \left(\frac{2}{5} \times 15\right)$$
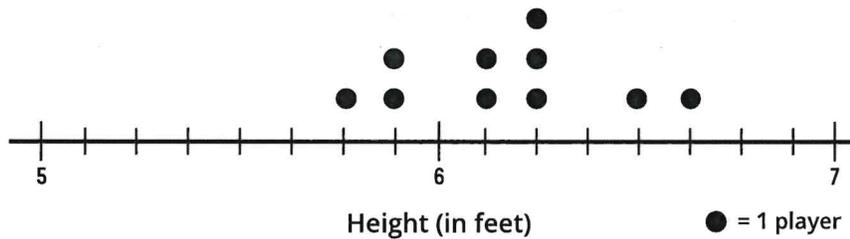
- **Divide, division** (*Dividir, división*): partitioning a total into equal groups to show how many units are in a whole



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

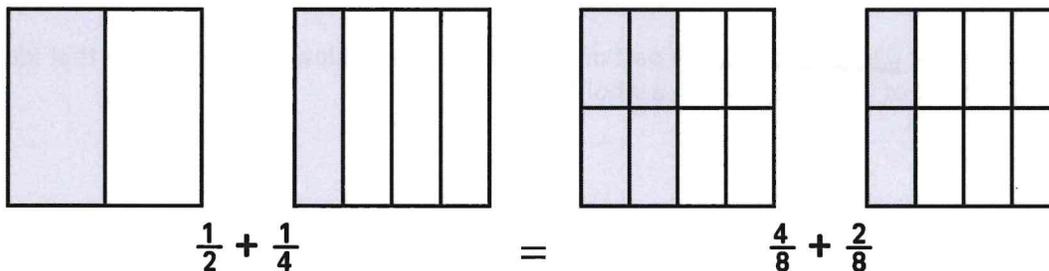- **Dot plot**: a plot of numerical data along a number line

### Football Players' Heights



Height (in feet)     ● = 1 player

- **Equation** (*Ecuación*): a statement that two expressions are equal

$$4 \times \frac{2}{3} = \frac{8}{3} + 0$$

- **Equivalent fractions** (*Fracción equivalente*): fractions that name the same size or amount



$$\frac{1}{2} + \frac{1}{4} \qquad = \qquad \frac{4}{8} + \frac{2}{8}$$

- **Expression** (*Expresión*): a number, or any combination of sums, differences, products, or divisions of numbers that evaluates to a number

$$\frac{1}{4} \div 3$$

- **Factors** (*Factores*): numbers that are multiplied to obtain a product

$$\frac{2}{3} \times 12 = \frac{24}{3}$$

**Factors**

- **Mile** (*Milla*): a customary unit for measuring distance or length
- **Yard** (*Yarda*): a customary unit for measuring distance or length
- **Foot**: a customary unit for measuring distance or length
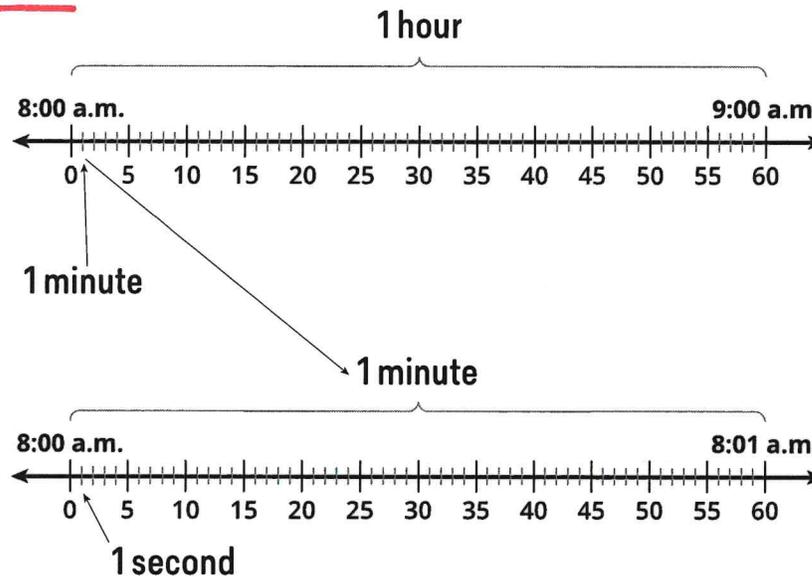- **Inch**: a customary unit for measuring distance or length

**1 foot** ⟵ (3 feet is 1 yard. 1,760 yards is 1 mile.)

**1 inch**
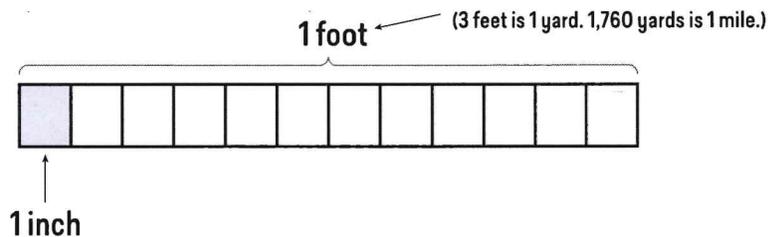
- **Gallon** (*Galón*): a customary unit of measure for liquid volume
- **Quart** (*Cuarto*): a customary unit of measure for liquid volume
- **Pint**: a customary unit of measure for liquid volume
- **Cup**: a customary unit of measure for liquid volume

**1 gallon**

**1 quart**

**1 pint**

**1 cup**
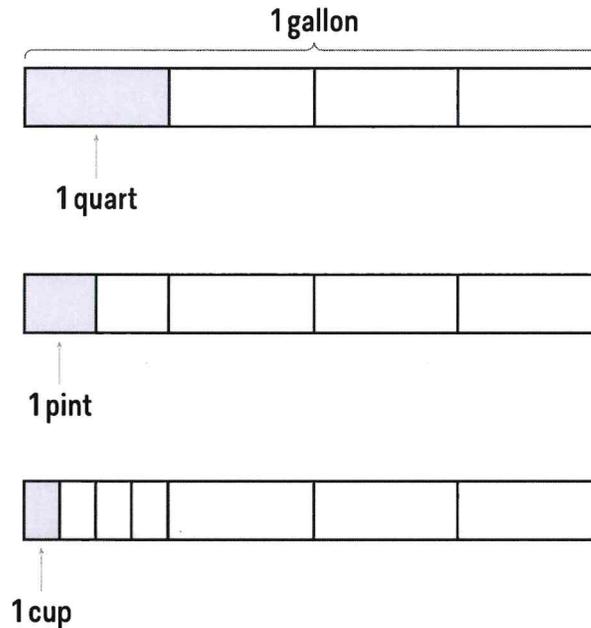
- **Pound**: a customary unit of measure for weight
- **Ounce** (*Onza*): a customary unit of measure for weight

**1 pound**

**1 ounce**
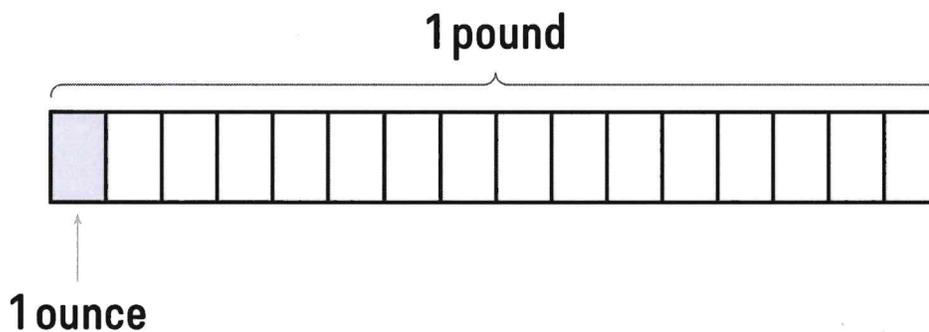
- **Hour** (*Hora*): a unit of measure for time

- **Minute** (*Minuto*): a unit of measure for time

- **Second** (*Segundo*): a unit of measure for time

**1 hour**

8:00 a.m.                                                      9:00 a.m.

0   5   10   15   20   25   30   35   40   45   50   55   60

**1 minute**

**1 minute**

8:00 a.m.                                                      8:01 a.m.

0   5   10   15   20   25   30   35   40   45   50   55   60

**1 second**

- **Fraction greater than or equal to 1**: a fraction with a numerator that is greater than or equal to the denominator

$\frac{8}{5}$   The numerator is 8. The denominator is 5. 8 is greater than 5, so $\frac{8}{5}$ is a fraction greater than or equal to 1.

- **Fraction written in the largest possible unit**: an equivalent fraction with the smallest possible denominator

$$\frac{3}{6} = \frac{(1 \times 3)}{(2 \times 3)} = \frac{1}{2}$$   A fraction written in the largest possible unit. Halves are larger than sixths.

- **Fractional unit** (*Unidad fraccionaria*): the unit created by partitioning a whole into a number of equal parts

1

The fractional unit is fourths. The whole is divided into four equal parts.

$\frac{1}{4}$
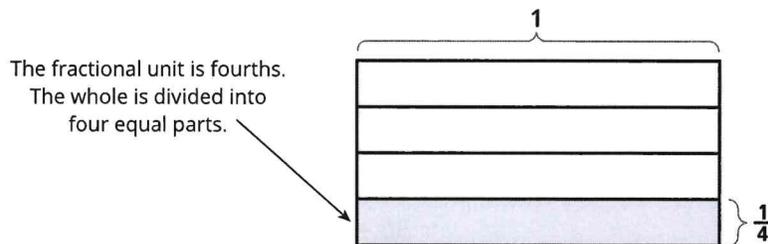
- **Tenth**: one part when a whole is partitioned into 10 equal parts
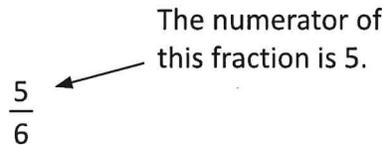
$$\frac{1}{10} \text{ or } 0.1$$

- **Hundredth**: one part when a whole is partitioned into 100 equal parts

$$\frac{1}{100} \text{ or } 0.01$$

- **Mixed number** (*Números mixtos*): a number composed of a whole number and a fraction

$$3\,\frac{1}{2}$$

- **Numerator** (*Numerador*): the part of a fraction written above the fraction bar that identifies the number of fractional units specified or being considered

The numerator of this fraction is 5.

$$\frac{5}{6}$$

- **Parentheses** (*Paréntesis*): symbols used to relate order of operations
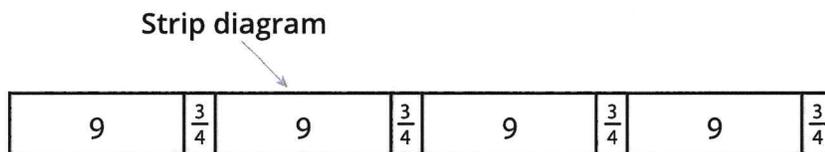
$$(4 + 1) \div 3$$

parentheses

- **Quotient** (*Cociente*): the answer when one number is divided by another

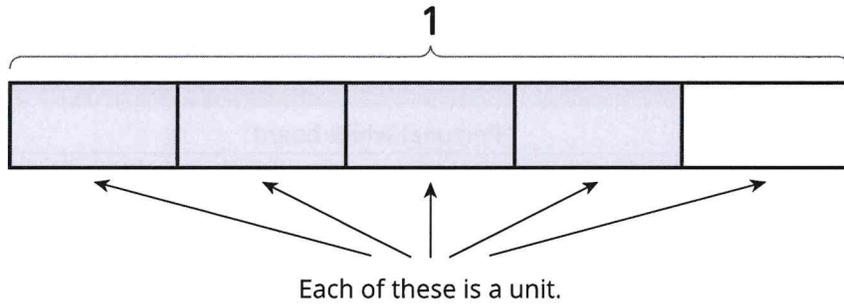$$\frac{1}{3} \div 2 = \frac{1}{6}$$

Quotient

- **Strip diagram**: a rectangular diagram used to model and solve numerical problems

Strip diagram

| 9 | $\frac{3}{4}$ | 9 | $\frac{3}{4}$ | 9 | $\frac{3}{4}$ | 9 | $\frac{3}{4}$ |
|---|---|---|---|---|---|---|---|

$$4 \times 9\frac{3}{4} = 36 + \frac{12}{4}$$
$$= 36 + 3$$
$$= 39$$

- **Unit** (*Unidad*): one segment of a partitioned strip diagram

1



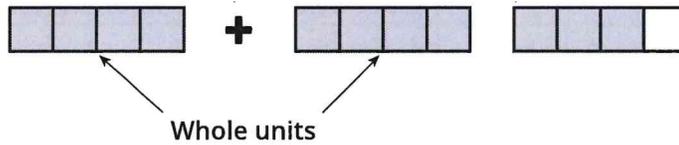Each of these is a unit.

- **Unknown**: a number that needs to be figured out

$$5 \times 8\frac{1}{5} = (\underline{\phantom{x}} \times 8) + (\underline{\phantom{x}} \times \frac{1}{5})$$

Unknowns

- **Whole unit**: any unit partitioned into smaller, equally sized fractional units



Whole units

# Suggested Tools and Representations

- Area models
- Number lines
- Strip diagrams

# Module 4 Lesson Overview Materials List

| Lesson | Teacher Materials | Student Materials<br>*All counts are per student unless otherwise indicated.* |
|---|---|---|
| 1 | | Personal white board |
| 2 | | Personal white board |
| 3 | | Personal white board |
| 4 | | Personal white board |
| 5 | | Personal white board |
| 6 | | Personal white board |
| 7 | | Personal white board |
| 8 | | Personal white board<br>Two-sided counters<br>Drinking straws |
| 9 | | Personal white board |
| 10 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T)* |
| 11 | Grade 5 Mathematics Reference Sheet (T) | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 12 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 13 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 14 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 15 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 16 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 17 | | Personal white board<br>Grade 5 Mathematics Reference Sheet (T) |
| 18 | | Personal white board<br>Several 4" × 2" rectangular pieces of paper<br>Scissors |
| 19 | 4" × 2" rectangular piece of paper | Personal white board<br>4" × 2" rectangular piece of paper |

| Lesson | Teacher Materials | Student Materials<br>*All counts are per student unless otherwise indicated.* |
|--------|-------------------|------------------------------------------------------------------------------|
| 20 | | Personal white board |
| 21 | | Personal white board |
| 22 | Lily's Monthly Business Budget (T)<br>Ben's Budget (T) | Personal white board<br>Lily's Monthly Business Budget (T)<br>Ben's Budget (T) |
| 23 | Ben's Pay Stub (T) | Personal white board<br>Ben's Pay Stub (T) |
| 24 | Property Tax Bill (T)<br>Clothes Receipt (T) | Personal white board |
| 25 | Forms of Payment (T)<br>Ben's Budget (T)<br>2 real world examples of various<br>forms of payment (optional) | Personal white board |
| 26 | | Personal white board |

*(T) Template provided in TE, Practice, and/or Learn