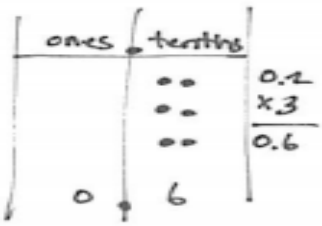
Eureka Math™ Tips for Parents

Grade 5 Module 1

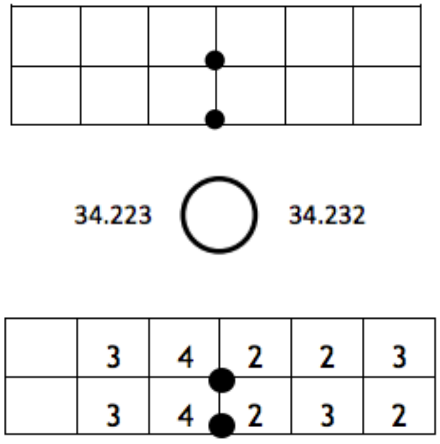
Place Value and Decimal Fractions

In this first module of Grade 5, we will extend 4th grade place value work to multi-digit numbers with decimals to the thousandths place. Students will learn the pattern that one-tenth times any digit on the place value chart moves it one place value to the right. They will also perform decimal operations to the hundredths place.



0.2 x 3 on the place value chart.

Notice how the dots for two tenths are simply repeated three times for a total of 0.6, or six tenths.



Place value chart for comparing decimals using <, >, =

What Comes After this Module:

In Module 2, we will continue to work with place value, moving to multiplication and division of decimal numbers. We move from concrete models to more abstract algorithms, always anchoring our work in our knowledge of place value patterns.

Terms, Phrases, and Strategies in this Module:

Thousandths: related to place value (we have already studied tenths and hundredths)

Exponents: how many times a number is to be used in a multiplication sentence

Millimeter: a metric unit of length equal to one thousandth of a meter

Equation: statement that two mathematical expressions have the same value, indicated by use of the symbol =; e.g., 12 = 4 x 2 + 4

Place value: the numerical value that a digit has by virtue of its position in a number

Standard form: a number written in the format: 135

Expanded form: e.g., 100 + 30 + 5 = 135

Unit form: e.g., 3.21 = 3 ones 2 tenths 1 hundredth

Word form: e.g., one hundred thirty-five

+ How you can help at home:

- When given a multi-digit number with decimal digits, ask your student what each digit represents (e.g., "What is the value of the 4 in the number 37.346?")
- Help practice writing numbers correctly by saying multi-digit decimal numbers and having your student write them down. Students can create their own place value charts to help

Key Common Core Standards:

- ***Understand the place value system***
  - Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left
  - Explain patterns in the number of zeros of the product when multiplying whole numbers by powers of 10
  - Read, write, and compare decimals to thousandths
  - Use place value understanding to round decimals to any place
- ***Perform operations with multi-digit whole numbers and with decimals to hundredths***
  - Add, subtract, multiply, and divide decimals to hundredths
- ***Convert like measurement units within a given measurement system***
  - Convert among different-sized standard measurement units within a given measurement system

Prepared by Erin Schweng, Math Coach

Welcome to *A Story of Units*!

Each module's parent tip sheet will highlight a new strategy or math model your student will be working on.

Place Value Chart – In Module 1, students will make extensive use of place value tools, as they have done in earlier grade levels. Now, however, students work with the extended place value chart, which includes place values to the thousandths.

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
1 ÷ 10									
	1								

(Above) Place Value Chart, with the thousandths place

(Below) 27.346 on the chart

tens	ones		tenths	hundredths	thousandths
2	7		3	4	6

Read on to learn a little bit about *Eureka Math*, the creators of *A Story of Units:*

Eureka Math is a complete, PreK–12 curriculum and professional development platform. It follows the focus and coherence of the Common Core State Standards (CCSS) and carefully sequences the progression of mathematical ideas into expertly crafted instructional modules.

This curriculum is distinguished not only by its adherence to the CCSS; it is also based on a theory of teaching math that is proven to work. That theory posits that mathematical knowledge is conveyed most effectively when it is taught in a sequence that follows the "story" of mathematics itself. This is why we call the elementary portion of *Eureka Math* "*A Story of Units*." The sequencing has been joined with methods of instruction that have been proven to work, in this nation and abroad. These methods drive student understanding beyond process, to deep mastery of mathematical concepts.

The goal of *Eureka Math* is to produce students who are not merely literate, but fluent, in mathematics. Your student has an exciting year of discovering the story of mathematics ahead!

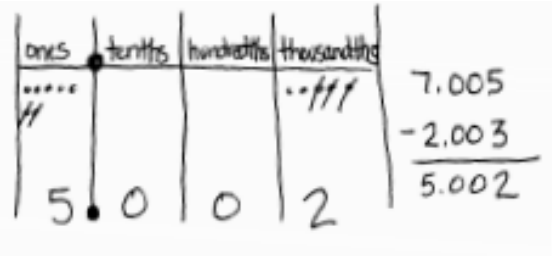
Sample Problem from Module 1:

(Example taken from Module 1, Lesson 10)

Teacher says:

"Subtract 2 ones 3 thousandths from 7 ones 5 thousandths."

Students use place value chart to solve.



Eureka Math™ Tips for Parents

Grade 5 Module 2

Multiplying and Dividing Whole Numbers and Decimals

In this module, we will be building up our knowledge of first multiplication and then division. We will start with whole numbers and then move to decimals as we practice different ways to model these operations.

Thinking mathematically is hard but important work!

Sample area model of multiplication for 64 x 73:

	70	+ 3
4	280	12
+ 60	4200	180

What Came Before this Module: We worked very hard to understand the values of numbers on the place value chart.

What Comes After this Module: We will begin work with the base-10 place value system

Key Words to Know

Decimal: A fraction whose denominator is a power of ten

Decimal Fraction: A proper fraction whose denominator is a power of ten

Equation: A statement that the values of two expressions are equal

Estimate: Approximation of the value of a quantity or number

Product: The result of a multiplication

Quotient: The result of dividing one quantity by another

Remainder: The number left over when one integer is divided by another

Unit Form: Place value counting, e.g., 34 is stated as 3 tens 4 ones

How you can help at home:

- Become familiar with the area model, a different method of multiplying than you may have learned
- Continue to review the place value system with your student
- Discuss mathematical patterns, such as 5 x 9, 5 x 90, 50 x 90, 50 x 900, etc.

Key Common Core Standards:

- ***Write and interpret numerical expressions, e.g., "Add 8 and 7, then multiply by 2" is represented as 2 x (8 + 7)***
- ***Perform operations with multi-digit whole numbers and with decimals to the hundredths, e.g., 46 x 72, 3.1***
- ***Convert like measurement units within a given measurement system, e.g., 5 cm is 0.05 m***

Prepared by Erin Schweng, Math Coach

Spotlight on Math Models:

Tape Diagrams

You will often see this mathematical representation in *A Story of Units*.

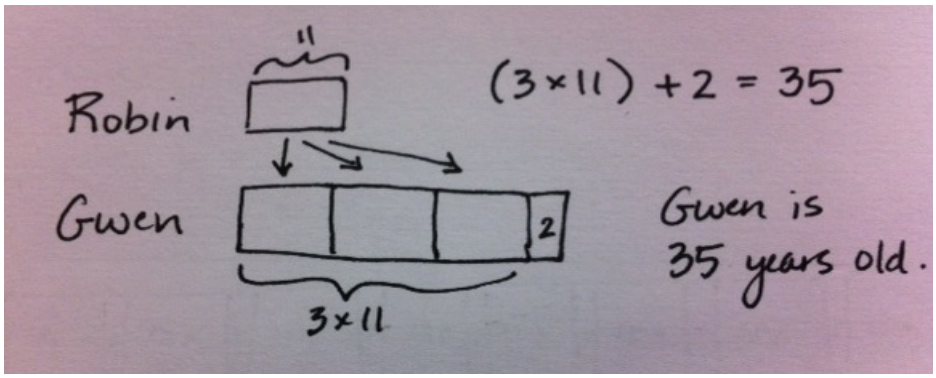
A *Story of Units* has several key mathematical "models" that will be used throughout a student's elementary years.

The tape diagram is a powerful model that students can use to solve various kinds of problems. In second grade, you will often see this model as an aid to addition and subtraction problems. Tape diagrams are also called "bar models" and consist of a simple bar drawing that students make and adjust to fit a word problem. They then use the drawing to discuss and solve the problem.

As students move through the grades, tape diagrams provide an essential bridge to algebra. Below is a sample word problem from Module 2 solved using a tape diagram to show the parts of the problem.

Sample Problem from Module 2:
(Example taken from Lesson 3, Module 2)

Robin is 11 years old. Her mother, Gwen, is 2 years more than 3 times Robin's age. How old is Gwen?

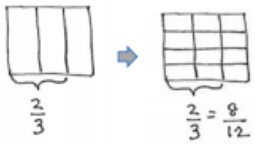


Eureka Math™ Tips for Parents

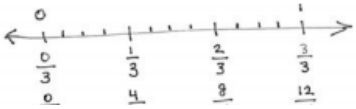
Grade 5 Module 3

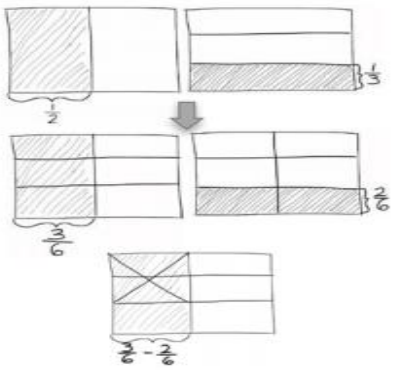
Addition and Subtraction of Fractions

In this 16-lesson unit, students build on earlier work with equivalent fractions and decimals to add and subtract fractions with unlike denominators. They will move from concrete examples (paper strips and number lines) to abstract skills (writing their own math sentences). By the end of the module, students will fluently work through multi-step word problems that contextualize their learning.



Both the area model and number line show the equivalent fractions of – and —.





Subtraction with unlike denominators:

– – – – –

What Came Before this Module: We worked to build our knowledge of multiplication and division of whole numbers and decimals.

What Comes After this Module: In Module 4, we will extend our understanding of fraction operations to multiplication and division of both fractions and decimal fractions.

Key Words:

Denominator - shows the fractional unit, e.g. the fifths in 3 fifths

Numerator - shows how many fractional units there are, e.g. the 3 in 3 fifths

Benchmark Fraction - a very familiar fraction that can be referred to in comparison questions, e.g. – is a benchmark fraction used when comparing – and –

Like Denominators - fractions with the same denominator, e.g. – and –

Unlike Denominators - fractions with different denominators, e.g. – and –

Equivalent Fraction - fractions that have the same value, though they may look different, e.g. – and —

Fraction Greater than or equal to 1 - e.g. – or 2 –

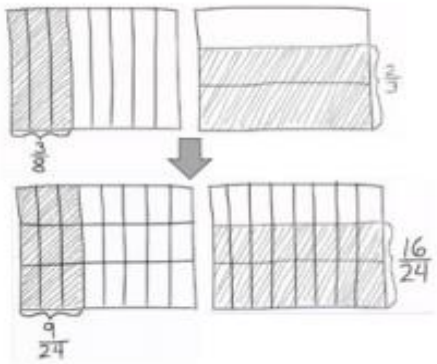
How you can help at home:

- 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 Common Core Standards:

- **Use equivalent fractions as a strategy to add and subtract fractions**
  - Add and subtract fractions with unlike denominators
  - Solve word problems involving addition and subtraction of fractions

Prepared by Erin Schweng, Math Coach

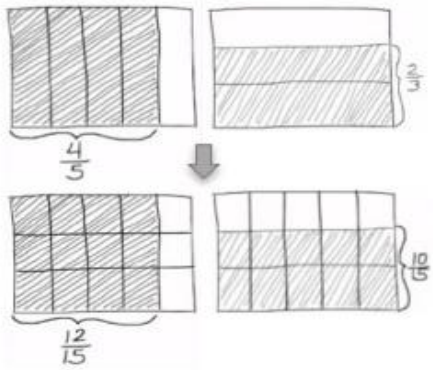


Above is an area model drawing of – + –. Note that the final answer would be found by doing the simple addition problem:

— — — —

Below is an area model drawing of – – –. Note that the final answer would be found by doing the simple subtraction problem:

— — —.



Spotlight on Math Models:

Area Models

You will often see this mathematical representation in *A Story of Units*.

A Story of Units has several key mathematical "models" that will be used throughout a student's elementary years.

Students began in earlier grades to build arrays for various purposes, first showing simple multiplication. In 5th 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.

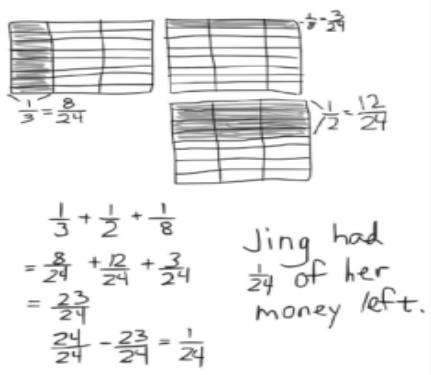
One of the goals in *A Story of Units* is to first give students concrete experiences with mathematical concepts, and then to build slowly toward more abstract representations of those concepts. The area model is a tool that helps students to make that important leap, and will support students' learning through algebra and beyond.

Sample Problem from Module 3:

(Example taken from Lesson 7)

Jing spent – of her money on a pack of pens, – of her money on a pack of markers, and – of her money on a pack of pencils.

What fraction of her money is left?



The student here has illustrated the equivalent fractions to –, –, and –, using the like denominator of twenty-fourths.

Then, in two steps, she adds those equivalent fractions, and subtracts that total from — to find the solution.

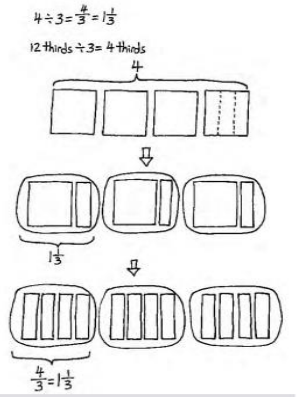
Eureka Math™ Tips for Parents

Grade 5 Module 4

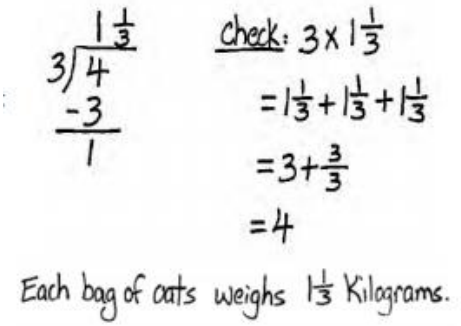
Multiplication and Division of Fractions and Decimal Fractions

In this 38-day module, students learn to multiply fractions and decimal fractions and start work with fraction division. Students will begin by measuring fractional parts on a number line as a concrete way of understanding fractional parts of a whole, and eventually move to more abstract fraction operations.

A diagram of 4 ÷ 3 showing fractional division:



4 ÷ 3, shown as a traditional algorithm division problem:



What Came Before this Module: We learned to add and subtract fractions with unlike denominators, moving from concrete to abstract examples.

What Comes After this Module: In Module 5, we will work with the area and volume of two- and three-dimensional figures.

New Terms in this Module:

Decimal divisor- the number that divides the whole and that has units of tenths, hundredths, thousandths, *e.g. 1/100*

Simplify - using the largest fractional unit possible to express an equivalent fraction, *e.g. 4/6 simplifies to 2/3, with the denominator 3 being a larger fractional unit than 6*

Familiar Terms with Some Definitions:

- *Denominator*
- *Decimal Fraction*
- *Equation*
- *Equivalent Fraction*
- *Factors* - numbers that are multiplied to obtain a product
- *Line Plot*
- *Mixed Number*
- *Numerator*
- *Tape Diagram*
- *Unit* - one segment of a partitioned tape diagram
- *Unknown* - the missing factor or quantity in multiplication or division
- *Whole Unit* - any unit that is partitioned into smaller, equally sized fractional units

+ How you can help at home:

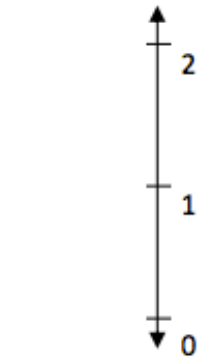
- Continue to practice and review multiplication and division math facts – this greatly supports work with fractions!
- Look for opportunities in daily life to discuss both fractional parts of a whole and of other fractions, e.g. What is ¼ of 20? ¼ of ½?

Key Common Core Standards:

- *Write and interpret numerical expressions.*
- *Perform operations with multi-digit whole numbers and with decimals to hundredths.*
- *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*
- *Convert like measurement units within a given measurement system.*
- *Represent and interpret data.*

Prepared by Erin Schweng, Math Coach

Various types of number lines:



Vertical number line

The clock – a circular number line!

A ruler number line

Spotlight on Math Models:

Number Lines

You will often see this mathematical representation in *A Story of Units*.

A Story of Units has several key mathematical "models" that will be used throughout a student's elementary years.

The number line is a powerful, flexible model that students can use in many ways. In this particular module, students begin to understand the idea of fractions as division by marking a ruler or line plot with $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ increments.

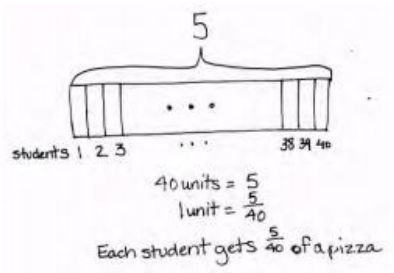
The number line is used beginning in Kindergarten in *A Story of Units*, and will continue to appear in various forms through 5th grade. It is used to develop a deeper understanding of whole number units, fraction units, measurement units, decimals, and negative numbers. Often, the mathematical concepts in an *ASOU* module move from concrete to more abstract, and the number line is an important concrete conceptual step for students of all ages.

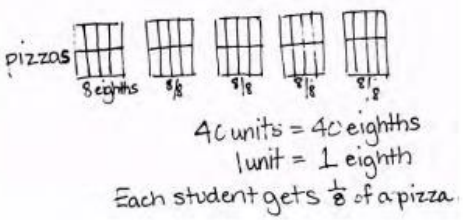
Sample Problem from Module 4:
(Example taken from Lesson 5)

Forty students shared 5 pizzas equally. How much pizza did each student receive?

What fraction of the pizza did each student receive?

Note the use of a tape diagram as well as the drawing showing division of a whole number into fractional parts:



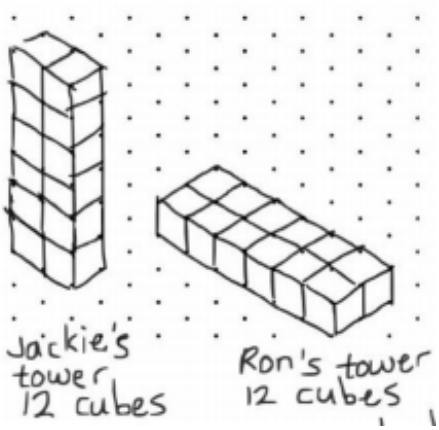


Eureka Math™ Tips for Parents

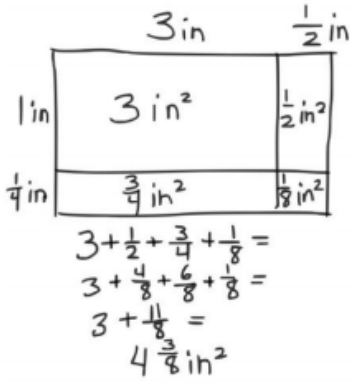
Grade 5
Module 5

Addition and Multiplication with Volume and Area

In Module 6, students begin by reasoning about and working with three-dimensional shapes. They explore cubic units and move toward calculations of volumes of rectangular prisms. Students also extend their two-dimensional work with area to figures with fractional side lengths. This module bridges the Grade 4 work on area with the Grade 6 work on volume and area to come.



Two orientations of 12 unit cubes



An area calculation for 3½ × 1¼

What Came Before this Module:

Students learned to multiply fractions and decimal fractions and began work on fraction division, working from concrete to abstract representations.

What Comes After this Module:

In Module 6, students begin to explore the coordinate plane, working from the familiar number line toward plotting points and creating lines and patterns.

New Terms in this Module:

Base: one face of a three-dimensional solid—often thought of as the surface upon which the solid rests

Bisect: divide into two equal parts

Cubic units: cubes of the same size used for measuring

Height: adjacent layers of the base that form a rectangular prism

Hierarchy: series of ordered groupings of shapes

Unit cube: cube whose sides all measure 1 unit

Volume of a solid: measurement of space or capacity

Unit Cubes

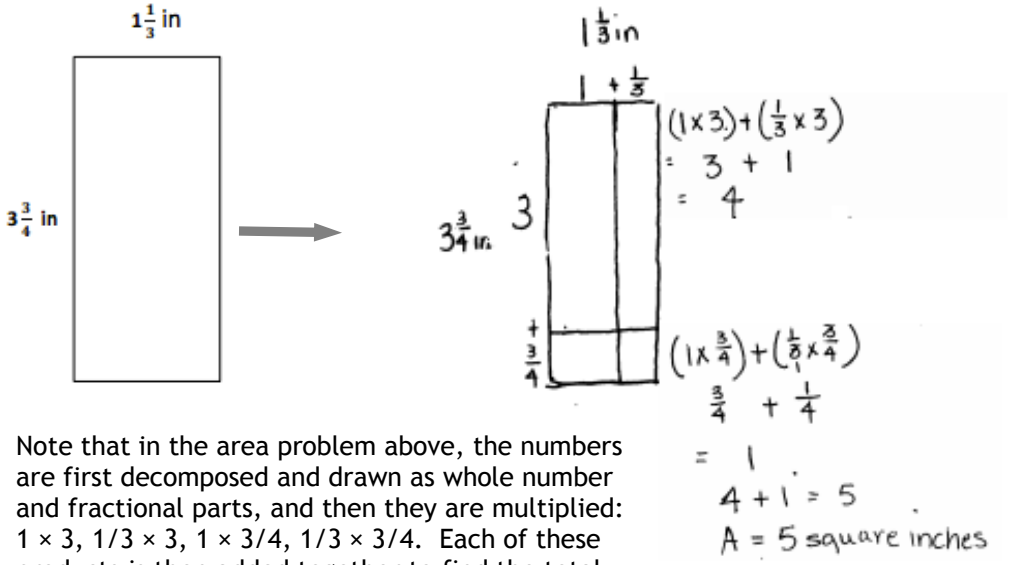
+ How You Can Help at Home:

- Begin to discuss and notice the volume of various household containers—this is also a good opportunity to talk about what units are often used to measure volume.
- Keep practicing those multiplication and division facts, especially as problems become more complex.

Key Common Core Standards:

- ***Apply and extend previous understanding of multiplication and division to multiply and divide fractions.***
  - Multiply a fraction or whole number by a fraction.
  - Solve real world problems involving multiplication of fractions and mixed numbers.
- ***Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.***
  - Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
  - Measure volumes by counting unit cubes of various units.
  - Relate volume to the operations of multiplication and addition.
- ***Classify two-dimensional figures into categories based on their properties.***
  - Understand that attributes belonging to a category of figures also belong to all subcategories of that category.

Prepared by Erin Schweng, Math Coach



Note that in the area problem above, the numbers are first decomposed and drawn as whole number and fractional parts, and then they are multiplied: 1 × 3, 1/3 × 3, 1 × 3/4, 1/3 × 3/4. Each of these products is then added together to find the total area of the rectangle.

Spotlight on Math Models:

Area Model with Fractional Parts

We will revisit this mathematical representation in Module 5 of *A Story of Units*.

A Story of Units has several key mathematical "models" that will be used throughout a student's elementary years.

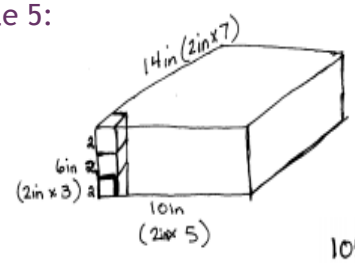
Earlier in Grade 5, we moved beyond using the area model for multiplication of whole numbers and begin to use this powerful model to illustrate mathematical operations on fractions. Now, we move a step further and use the area model in various real world problems, e.g., finding the area of a wall minus the space for two windows, or finding the area of a mat surrounding a picture in a frame.

The numbers we use in our area models now are often mixed whole numbers and fractions, giving students a chance to demonstrate their understanding in diagrams in which they show the multiplication of both the whole number and fractional parts of the problem.

Sample Volume Problem from Module 5:

(Example taken from Module 5, Lesson 18)

How many 2-inch cubes are needed to build a rectangular prism that measures 10 inches by 6 inches by 14 inches?



$3 \times 5 \times 7 = 105$

OR

Volume: $10in \times 6in \times 14in = 840in^3$

Volume of cube: $2in \times 2in \times 2in = 8in^3$

$\frac{840}{8} = 105$ cubes

105 cubes to build the prism.

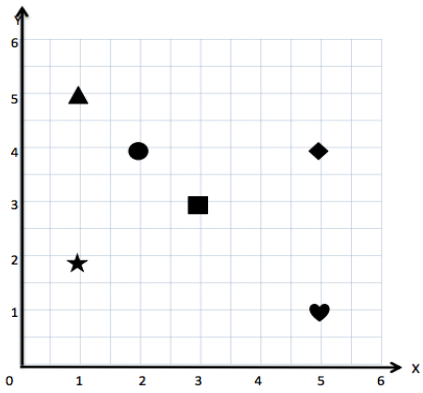
Note that the student here shows two ways to solve the problem!

Eureka Math™ Tips for Parents

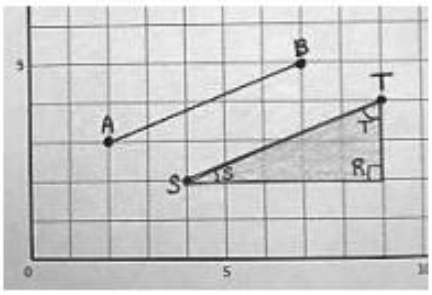
Grade 5
Module 6

Problem Solving with the Coordinate Plane

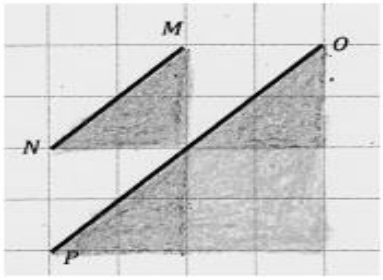
In Module 6, students develop a coordinate system for the first quadrant of the coordinate plane and use it to solve problems. They explore the relationship between points, ordered pairs, patterns, and lines. The module finishes with an exploration of the coordinate plane in real world applications.



The coordinate plane



Drawing figures on the coordinate plane



What Came Before this Module:

Students worked with three-dimensional shapes and explored cubic units and volumes of rectangular prisms. They also calculated area for figures with fractional side lengths.

New Terms in this Module:

Axis: fixed reference line for the measurement of coordinates

Coordinate: number that identifies a point on a plane

Coordinate pair: two numbers that are used to identify a point on a plane; written (*x*, *y*) where *x* represents a distance from 0 on the *x*-axis and *y* represents a distance from 0 on the *y*-axis

Coordinate plane: plane spanned by the *x*-axis and *y*-axis in which the coordinates of a point are distances from the two perpendicular axes

Ordered pair: two quantities written in a given fixed order, usually written as (*x*, *y*)

Origin: fixed point from which coordinates are measured; the point at which the *x*-axis and *y*-axis intersect

Quadrant: any of the four equal areas created by dividing a plane by an *x*-axis and *y*-axis

How You Can Help at Home:

- Play the game Battleship, if you have it! It gives good practice with locating points on a coordinate plane.
- Practice following rules to find ordered pairs, e.g. if the rule is *y* = double *x* plus 1, what is *y* if *x* is 3? 4? 5? (Answers are 7, 9, 11.)

Key Common Core Standards:

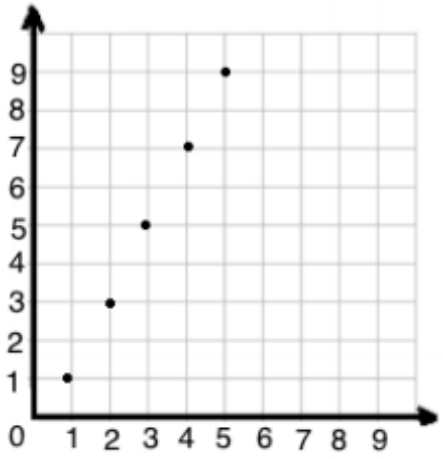
- ***Write and interpret numerical expressions.***
  - Write simple expressions that record calculations with numbers, and interpret numerical expressions.
- ***Analyze patterns and relationships.***
  - Generate two numerical patterns using two given rules, and identify apparent relationships between corresponding terms.
- ***Graph points on the coordinate plane to solve real-world and mathematical problems.***
  - Use a pair of perpendicular number lines, called axes, to define a coordinate system.
  - Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Prepared by Erin Schweng, Math Coach

Rule: Double x, then subtract 1.

x	y	(x, y)
1	1	(1,1)
2	3	(2,3)
3	5	(3,5)
4	7	(4,7)
5	9	(5,9)

The rule table and the plotted points for the rule "Double *x*, then subtract 1"



Spotlight on Math Skills:

Graphing Lines

Students learn this important skill in Module 6 of *A Story of Units*.

A Story of Units teaches students key mathematical skills that will be used throughout a student's elementary years and beyond.

Module 6, the final module of Grade 5, is a very important link to the algebraic skills students will need in later years. Students begin by investigating patterns, relating the *x*- and *y*-coordinates of the points on the line and reasoning about the patterns in the ordered pairs, which lays groundwork for Grade 6 work with proportional reasoning.

Students use given rules (e.g., "multiply by 2, then add 3") to generate coordinate pairs, plot points, and investigate relationships. Finally, students generate two number patterns from two given rules, plot the points, and analyze the relationships within the sequences of the ordered pairs and the graphs of the two lines.

Sample Problem from Module 6:

(Example taken from Module 6, Lesson 20)

Harry runs a hot dog stand at the county fair. When he arrived on Wednesday, he had 38 dozen hot dogs on his stand. The graph shows the number of hot dogs (in dozens) that remained unsold at the end of each day of sales.

1. How many dozen hot dogs did Harry sell on Wednesday? How do you know?
2. Between which two-day period did the number of hot dogs sold change the most? Explain how you determined your answer.