

# Unit 2: Number Systems

Content Area: **Mathematics**  
Course(s): **Math 6**  
Time Period: **November**  
Length: **9 weeks**  
Status: **Published**

## Unit Summary

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The goal for this unit is to develop students' understanding of number systems and their applications to real life problem solving. Students will use their prior understanding of mathematical operations to determine the greatest common factor and least common multiple of the provided numbers. In addition, students will use the relationship between multiplication and division to understand division of fractions. Students will extend their understanding of the number system to negative integers and then negative rational numbers. Students can appropriately solve real world multi-decimal problems involving all four operations.

## Standards

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MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.6.NS	The Number System
MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
MA.7.NS.A.1a	Describe situations in which opposite quantities combine to make 0.
MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MA.6.NS.B	Compute fluently with multi-digit numbers and find common factors and multiples.
MA.7.NS.A.1b	Understand $p + q$ as the number located a distance $ q $ from $p$ , in the positive or negative direction depending on whether $q$ is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
MA.7.NS.A.1c	Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
MA.6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

MA.7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
MA.6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
MA.6.NS.C	Apply and extend previous understandings of numbers to the system of rational numbers.
MA.6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MA.6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
MA.7.NS.A.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
MA.6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$ , and that 0 is its own opposite.
MA.6.NS.C.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
MA.6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MA.6.NS.C.7	Understand ordering and absolute value of rational numbers.
MA.6.NS.C.7a	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
MA.6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.
MA.6.NS.C.7c	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
MA.6.NS.C.7d	Distinguish comparisons of absolute value from statements about order.
MA.6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
MA.6.4.5.6 F.1	Use technology to gather, analyze, and communicate mathematical information.
MA.6.4.5.6 F.2	Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.
MA.6.4.5.6 F.4	Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.8.D.CS2	Use and maintain technological products and systems.

## Student Learning Objectives

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- Students will learn how to determine greatest common factor and least common multiple to solve fraction problems.
- Students will learn how to extend previous understandings of multiplication and division to divide fractions by fractions and interpret the quotient.
- Students will learn how to construct visual fraction models for multiplication and division.
- Students will learn how to extend previous understandings of decimals to fluency in solving multi-digit decimal problems and real world problems using all four operations.
- Students will learn how to apply and extend previous understandings of numbers to the system of rational numbers.
- Students will learn how to compare and order rational numbers.
- Students will learn how to understanding of integers and their purpose in real world situations.
- Students will learn how to introduce and interpret absolute value.
- Students will learn how to distinguish comparisons of absolute value from statements of order in real life situations.
- Students will learn how to order and compare integers using inequality symbols and number lines.
- Students will learn how to add integers using number line, chip jar, and absolute value.
- Students will learn how to subtract integers using number line, chip jar, and additive inverse property.
- Students will learn how to graph ordered pairs in the coordinate plane.
- Students will learn how to determine the distance between ordered pairs using absolute value.

## Essential Questions

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- Where do you see rational numbers in your world?

- In what ways can rational numbers be used?
- How can rational numbers be expressed in multiple ways?
- How are integers and whole numbers alike and different?

## Enduring Understandings

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- Students understand that there are specific rules when adding, subtracting, multiplying, and dividing rational numbers.
- Students understand how to fluently solve addition, subtraction, multiplication, and division problems involving positive rational numbers.
- Students understand that numbers allow us to compare and establish relationships between quantities in the real world.

## Application

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- Students will be able to independently use their learning to solve fraction, decimal, and integer problems.

## Skills

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Students will be skilled at:

- Ordering and comparing rational numbers.
- Computing quotients for decimal and fraction problems.
- Creating visual models for fraction division problems.
- Interpreting and solving real world problems involving rational numbers.
- Interpreting and using absolute value to solve integer problems.
- Solving addition and subtraction integer problems.
- Graphing ordered pairs on the coordinate plane.
- Calculating distances between ordered pairs.