

Unit 7: Unit Rational Numbers

Content Area: **Mathematics**
Course(s): **Math - Grade 6**
Time Period: **March**
Length: **20 days**
Status: **Published**

Unit Overview

In this unit, students interpret signed numbers in contexts (e.g., temperature above or below zero, elevation above or below sea level). They understand and use the terms “positive number,” “negative number,” “rational number,” “opposite,” “sign,” “absolute value,” “a solution to an inequality,” “less than,” “greater than,” and the corresponding symbols.

Transfer

Students will be able to independently use their learning to solve real world situations including:

- finding the absolute value of a number.
- comparing and ordering integers and rational numbers
- graphing ordered pairs
- finding LCM and GCF of three or more numbers.

Meaning

Understandings

Students will understand that:

- quantities having more or less than zero are described using positive and negative numbers.
- an estimation can be used to see if an answer to a problem "makes sense."
- the absolute value of a number is that number's distance to zero on a number line.
- points can be plotted on a coordinate plane to solve real-world problems.
- a number line can be used to help compare and order integers and rational numbers.

Essential Questions

How can mathematical ideas be represented?

How can estimating be helpful?

How are integers and absolute value used in real-world situations?

Application of Knowledge and Skill

Students will know...

- the vocabulary that goes along with the unit.
- find the Greatest Common Factor of two or more numbers between 0 and 100.
- find the Least Common Multiple of two or more numbers less than or equal to 12.
- multiply and divide fractions, whole numbers and mixed numbers.
- add, subtract, multiply and divide multi-digit decimals using the standard algorithm.

Students will be skilled at...

- comparing and ordering fractions, decimals, and percents.

Learning Goal

Apply and extend previous understandings of numbers to the system of rational numbers.

MA.K-12.2

Reason abstractly and quantitatively.

Vocabulary

positive numbers, negative numbers, opposite numbers, rational numbers, sign, absolute value, solution to an inequality, quadrant, x-coordinate, y-coordinate, line segment, common factor, greatest common factor, common multiple, least common multiple

Daily Target- Lesson 1

- Comprehend the words “positive” and “negative” (in spoken and written language) and the symbol “-” (in written language). Say “negative” when reading numbers written with the “-” symbol.
- Interpret positive and negative numbers that represent temperature or elevation, and understand the convention of what “below zero” typically means in each of these contexts.
- Recognize that the number line can be extended to represent negative numbers.

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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.

Daily Target- Lesson 2

- Comprehend that two numbers are called “opposites” when they are the same distance from zero, but on different sides of the number line.
- Interpret a point on the number line that represents a positive or negative rational number.
- Plot a point on a number line to represent a positive or negative rational number.

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.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.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.

Daily Target- Lesson 3

- Compare rational numbers in the context of temperature or elevation, and express the comparisons (in writing) using the symbols $<$ and $>$.

- Comprehend the word “sign” (in spoken language) to refer to whether a number is positive or negative.
- Critique (orally and in writing) statements comparing rational numbers, including claims about relative position and claims about distance from zero.

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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.

Daily Target- Lesson 4

- Compare rational numbers without a context and express the comparisons using the terms “greater than,” “less than,” and “opposite” (orally and in writing).
- Comprehend that all negative numbers are less than all positive numbers.
- Order rational numbers from least to greatest, and explain (orally and through other representations) the reasoning.

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MA.6.NS.C	Apply and extend previous understandings of numbers to the system of rational numbers.
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.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.7	Understand ordering and absolute value of rational numbers.

Daily Target- Lesson 5

- Interpret a table of signed numbers that represent how a quantity changed.
- Recognize that signed numbers can be useful to represent changes in a quantity in opposite directions, e.g., money received and money paid, inventory bought and inventory sold, etc.

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.
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Daily Target- Lesson 6

- Compare rational numbers and their absolute values, and explain (orally and in writing) the reasoning.
- Comprehend the phrase “absolute value” and the symbol $|$ to refer to a number’s distance from zero on the number line.

- Interpret rational numbers and their absolute values in the context of elevation or temperature.

MA.6.NS.C.7	Understand ordering and absolute value of rational numbers.
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.

Daily Target- Lesson 7

- Critique comparisons (expressed using words or symbols) of rational numbers and their absolute values.
- Generate values that meet given conditions for their relative position and absolute value, and justify the comparisons (using words and symbols).
- Recognize that the value of a can be positive or negative, depending on the value of b .

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.7	Understand ordering and absolute value of rational numbers.
MA.6.NS.C.7d	Distinguish comparisons of absolute value from statements about order.

Daily Target- Lesson 8

- Coordinate verbal, algebraic, and number line representations of inequalities.
- Critique (orally and in writing) possible values given for a situation with a constraint, including determining whether the boundary value is included and making sense of situations with discrete quantities.
- Interpret phrases that describe a quantity constrained by a maximum or minimum acceptable value, e.g. “at least,” “at most,” “up to,” “more than,” “less than”, etc., and write an inequality statement to represent the constraint.

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Desmos graphing inequalities <https://teacher.desmos.com/activitybuilder/custom/56e837c6a8ab693f1a8f8c6b>

MA.6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.
MA.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MA.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Daily Target- Lesson 9

- Draw and label a number line diagram to represent the solutions to an inequality.
- Recognize and explain (orally and in writing) that an inequality may have infinitely many solutions.
- Use substitution to justify (orally) whether a given value is a “solution” to a given inequality.

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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.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MA.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real- world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Daily Target- Lesson 10

- Critique (orally and in writing) possible values given for a situation with more than one constraint, including whether fractional or negative values are reasonable.
- Interpret unbalanced hanger diagrams (orally and in writing) and write inequality statements to represent relationships between the weights on an unbalanced hanger diagram.
- Write and interpret inequality statements that include more than one variable.

MA.6.EE.A.2b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
MA.6.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MA.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MA.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real- world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Daily Target- Lesson 11

- Generalize about the signs of coordinates that represent locations in each “quadrant” of the coordinate plane.
- Plot a point given its coordinates or identify the coordinates of a given point on the coordinate plane.
- Recognize that the axes of the coordinate plane can be extended to represent negative numbers.

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<https://teacher.desmos.com/activitybuilder/custom/563d705f36a7843710aba2ce>

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.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.

Daily Target- Lesson 12

- Choose and label appropriate scales for the axes of the coordinate plane, based on the coordinates to be plotted, and explain (orally and in writing) the choice.
- Compare and contrast different scales for the axes of the coordinate plane.

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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.
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Daily Target- Lesson 13

- Compare points on a graph, including statements about relative position and the vertical distance between points.
- Describe (using words and inequality symbols) and interpret the range of coordinates on a graph, including the meaning of -values that are negative.
- Identify and interpret points on a graph to answer questions about situations involving temperature or money.

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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.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.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.

Daily Target- Lesson 14

- Compare and contrast (orally and in writing) the coordinates for points in different locations on the coordinate plane.
- Determine the vertical or horizontal distance between two points on the coordinate plane that share the same - or -coordinate.
- Generalize (orally) about the coordinates of points that are reflected across the - or -axis.

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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.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.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.

Daily Target- Lesson 15

- Determine the total length of multiple horizontal and vertical segments in the coordinate plane that are connected end-to-end.
- Draw a polygon in the coordinate plane given the coordinates for its vertices.
- Explain (orally) that coordinates can be a useful way of describing geometric figures or modeling real-world locations.

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<https://teacher.desmos.com/activitybuilder/custom/579a5b757ede16f5763ed937>

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.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.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Daily Target- Lesson 16

- Comprehend (orally and in writing) the terms “factor,” “common factor,” and “greatest common factor.”
- Explain (orally and in writing) how to determine the greatest common factor of two whole numbers

less than 100.

- List the factors of a number and identify common factors for two numbers in a real-world situation.

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<https://teacher.desmos.com/activitybuilder/custom/5ea9b80439ca6a0c6d5bb828>

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.

Daily Target- Lesson 17

- Comprehend (orally and in writing) the terms “multiple,” “common multiple,” and “least common multiple.”
- Explain (orally and in writing) how to calculate the least common multiple of 2 whole numbers.
- List the multiples of a number and identify common multiples for two numbers in a real-world situation.

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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.

Daily Target- Lesson 18

- Choose to calculate the greatest common factor or least common multiple to solve a problem about a real-world situation, and justify (orally) the choice.
- Present (orally, in writing, and using other representations) the solution method for a problem involving greatest common factor or least common multiple.

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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.

Formative Assessment and Performance Opportunities

Use the Lists tab.

- Academic Game
- BrainPop

- Centers
- Class Discussions
- Clickers
- Do Now
- Exit Ticket
- Graphic Organizer
- LinkIT
- Project
- Quiz
- Self-Assessment
- Student Teacher
- Teacher Interview
- Teacher Observation
- Think, Pair, Share

Summative Assessment

Group Presentation

End of Unit Assessment (located in shared google drive)

Chapter Project

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are

excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP.K-12.CRP6

Demonstrate creativity and innovation.

CRP.K-12.CRP6.1

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP.K-12.CRP8

Utilize critical thinking to make sense of problems and persevere in solving them.

CRP.K-12.CRP8.1

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

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.

CAEP.9.2.8.B.6

Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.

TECH.8.1.8.B

Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

TECH.8.1.8.B.CS2

Create original works as a means of personal or group expression.

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.CS1

Advocate and practice safe, legal, and responsible use of information and technology.

Accommodations and Modifications

- *Conceptual Processing: Processing Time.* Provide the image to students who benefit from extra processing time to review prior to implementation of this activity.
- *Fine Motor Skills: Peer Tutors.* Pair students with their previously identified peer tutors and allow students who struggle with fine motor skills to dictate pencil measurements as needed.
- *Strengths-based Approach:*
 - This activity leverages many natural strengths of students with ADHD, LD, and other concrete learners in terms of its real world context and personal student interest.
 - This may be an opportunity for the teacher to highlight this strength in class and allow individuals with disabilities to lead peer interactions/discussions, increasing buy-in.
- Teacher provides notes for student(s)
- Teacher will modify test for student(s)
- Students may use graph paper to help organize data
- A word bank can be provided
- Leveled centers can be used
- Small group instruction can be utilized
- Calculators may be used

- Extra Practice Board can be utilized to review pre-requisite skills
- Interactive games/websites may be used to practice skills
- Teacher can conference with student(s) to "check-in"

- Calculators
- Extra Practice Board
- Interactive Games/Websites
- Leveled Centers
- Manipulatives
- Modify Assessments
- Provide Notes
- Teacher Conferences
- Word Bank

Unit Resources

Mr. Morgan's Math Help <https://sites.google.com/view/mrmorgansmathhelp/illustrative-mathematics/math-6/unit-1-area-and-surface-area>

Interdisciplinary Connections
