

Unit 01: The Number System

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **7 Weeks**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

MA.7.NS	The Number System
MA.7.NS.A	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
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.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.7.NS.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.
MA.7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
MA.7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
MA.7.NS.A.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
MA.7.NS.A.2c	Apply properties of operations as strategies to multiply and divide rational numbers.
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.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

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.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.5	Understand appropriate uses for social media and the negative consequences of misuse.

Interdisciplinary Connections: NJSL for ELA, Social Studies, Science and/or Math Section

Capacities of the Literate Individual

Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.
They come to understand other perspectives and cultures.

MATH.K-12.1	Make sense of problems and persevere in solving them
LA.K-12.NJLSA.R	Reading
	Key Ideas and Details
LA.RL.7.1	Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.K-12.NJLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
MATH.K-12.2	Reason abstractly and quantitatively
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning
LA.K-12.NJLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.7.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.7.1.A	Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.
LA.W.7.1.B	Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
LA.W.7.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.
LA.W.7.1.D	Establish and maintain a formal style/academic style, approach, and form.
	Comprehension and Collaboration
LA.K-12.NJLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.W.7.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.7.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and

reflect on ideas under discussion.

LA.SL.7.1.B

Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

LA.SL.7.1.C

Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

LA.SL.7.1.D

Acknowledge new information expressed by others and, when warranted, modify their own views.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

The purpose of teaching The Number System Unit is to extend upon the previous knowledge of operations with rational numbers. Students will then be able apply mathematical properties to add, subtract, multiply, and divide a greater variety of numbers including integers and all positive and negative rational numbers in order to solve real-world problems.

Meaning

Essential Questions

Essential Questions

- How are positive, negative, and absolute values found in real-world situations?
- How can you determine the sign and value of a sum, difference, product, or quotient?
- How are adding and subtracting rational numbers related?
- How are multiplying and dividing rational numbers related?
- What strategies can you use to order positive and negative rational numbers?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Positive, negative, and absolute values can be used to solve real-world problems.
- Properties of numbers such as additive inverses and combining opposite signs to develop and apply algorithms for addition and subtraction of integers.
- Multiplying is repetitive addition and division is repetitive subtraction. Therefore, positive and negative multiplication and division follow particular patterns.
- Rational numbers are any numbers that can be written as the ratio of two integers and can be compared by creating common denominators, comparing decimals, and using tools such as number lines.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

- absolute value
- how to compare a variety of rational numbers, including absolute value expressions, by use of converting to the same type of number or by use of a number line
- methods for converting decimals to fractions and vice versa
- properties of addition and subtraction including opposites and additive inverses
- properties of multiplication and division
- algorithms for addition, subtraction, multiplication, and division of all types of rational numbers
- the sign of a sum, difference, product, or quotient before evaluating
- the definition of rational numbers
- how to apply the GIWAR method or other problem solving strategies to investigate real-world problems
- order of operations when solving an expression

Skills

Skills

Student will be skilled at ...

- Explain and apply the definition of absolute value related to real-world problems.
- Convert rational numbers to common types of numbers (all decimals, all fractions, etc.) or organize numbers on a number line in order to compare and order including absolute value expressions.
- Describe the method for converting fractions to decimals and vice versa.
- Develop the algorithms for addition, subtraction, multiplication of rational numbers by analyzing number patterns.
- Evaluate expressions with positive and negative rational numbers using the four basic operations: addition, subtraction, multiplication, and division.
- Determine the sign of a solution based on a variety of number properties.
- Determine whether a number is a rational number.
- Interpret the question and solution of a real-world problem by applying strategies such as GIWAR or other problem solving methods.
- Apply order of operations to solve an expression.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Any activity above with an * indicates a link below.

[Unit 1-Cycle 1-Number line activity.docx](#)
[Unit 1-Cycle 1- Discover Jar STEaM.docx](#)
[Unit 1-Cycle 2- Counter Activity.docx](#)
[Unit 1-Cycle 4- Create a story.docx](#)
[Unit 1-Cycle 4 scavenger hunt teacher instructions.docx](#)
[Unit 1-Cycle 4 scavenger hunt.docx](#)
[Unit 1-Cycle 5 Fraction War.docx](#)
[Unit 1-Cycle 5 Number Lines.docx](#)
[Unit 1-PARCC.docx](#)
[Unit 1-Cycle 6-decimal and fraction computation.docx](#)
[Unit 1-Cycle 6-STEM frozen treat.docx](#)
[Unit 1 activities.docx](#)

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

* See attached resource

Cycle 1: Topics Covered

- Absolute Value
- Integers
- Number Lines
- Comparison/Ordering Integers and Absolute Values

- Activities/Centers
 - IXL.com centers
 - B.4 Absolute value and opposite integers
 - B.6 Integer inequalities with absolute values
 - B.1 Understanding integers
 - B.2 Integers on number lines
 - B.3 Graph integers on horizontal and vertical number lines
 - Tenmarks centers
 - 7.NS.1a Understanding and Identifying Opposite Quantities
 - Hands-On/ Creative Centers
 - Number line Activity *
 - Football Integers (group activity)
http://www.glencoe.com/sec/math/t_resources/gamezone/pdfs/mac2_04/mac2_classgame_chap03.pdf
 - Online games
 - Ordering integers with and without absolute value:
<http://www.sheppardsoftware.com/mathgames/numberballs/numberballsAS2.htm>
 - Absolute Value: partner game <http://www.math-play.com/absolutevalue-millionaire.html>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 36—page 287-288
 - Bellringers: Week 36—page 285-286
 - Ordering problems on white boards
- STEM activity
 - Create a discovery jar. Have students brainstorm all of the questions or ideas he/she is curious about related to science, technology, engineering, art, or math . Maybe it is why grass is green or how space travel started. Or how many varieties of leaves exist on the trees in the yard. Then put all of the questions into a mason jar. Each group chooses out of the jar at a center and will research and explore the topic. (This activity can be repeated throughout the year and questions can be added as well).*

Cycle 2: Topics Covered

- Adding integers (2 or more)
- Subtracting integers (2 or more)

- Activities/Centers
 - IXL.com centers
 - C.2 Add and subtract integers using counters
 - C.3 Add and subtract integers
 - C.5 Add and subtract integers: word problems

- C.1 Integer addition and subtraction rules
 - Tenmarks centers
 - 7.NS.1d Adding and Subtracting Integers
 - Hands-On/ Creative Centers
 - Using counters to add integers activity *
 - Football Integers (group activity)
 - http://www.glencoe.com/sec/math/t_resources/gamezone/pdfs/mac2_04/mac2_classgame_chap03.pdf
 - Create a poster either explaining how to add integers or subtract integers providing several examples. Explain your poster to a partner who had the opposite operation.
 - Online games
 - Adding Integers http://www.mathplayground.com/ASB_OrbitIntegers.html
 - Subtracting Integers http://www.sheppardsoftware.com/mathgames/integers/FS_Integer_subtraction.htm
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 36—page 283-284
 - Bellringers: Week 36—page 281-282
 - Adding and subtracting problems (more than 2) created by teacher on white boards
- STEM activity:
 - Tidal Integers http://superm.math.hawaii.edu/pdfs/lessons/sixth_eighth/tidalInt.pdf

Cycle 3: Topics Covered

- Multiplying integers (2 or more)
- Dividing integers (2 or more)

- Activities/Centers
 - IXL.com centers
 - C.7 Multiply and divide integers
 - C.9 Evaluate numerical expressions involving integers
 - C.6 Integer multiplication and division rules
 - C.9 Evaluate numerical expressions involving integers
 - Tenmarks centers
 - 7.NS.2b Understanding Division of Integers
 - 7.NS.2a Understanding Multiplication of Rational Numbers
- Hands-On/ Creative Centers
 - Create a poster showing the pattern that proves either that a negative $x \div$ positive is negative or that a negative $x \div$ negative is positive. Explain in words the rule.
- Online games
 - Multiplying integers http://www.mathplayground.com/ASB_IntegerWarp.html
 - Jeopardy review for all operations of integers (work in a group) <http://www.math-play.com/Integers-Jeopardy/Integers-Jeopardy.html>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 35—page 279-280
 - Bellringers: Week 35—page 277-278
 - Multiplying and dividing (more than 2) created by teacher on white boards

- STEM activity:

- Order of operations <https://mathprojectsjournal.files.wordpress.com/2013/02/4-digit.pdf>

- **Cycle 4: Topics Covered**

(Review)

- Adding fractions and mixed numbers
- Subtracting fractions and mixed numbers
- Multiplying fractions and mixed numbers
- Dividing fractions and mixed numbers

- **Activities/Centers**

- IXL.com centers
 - 6th grade J.3 Add and subtract fractions with unlike denominators
 - G.9 Multiply fractions
 - G.11 Multiply fractions and mixed numbers: word problems
 - G.12 Divide fractions
 - N.4 Divide fractions by whole numbers
- Tenmarks centers
 - 7.NS.2a Understanding Multiplication of Fractions
 - 7.NS.2b Understanding Division of Fractions
- Hands-On/ Creative Centers
 - Write a short story where the characters must add, subtract, multiply, and divide fractions to solve their problem. Show how each problem is solved.*
 - Scavenger hunt mixed review. *
- Online games
 - <http://www.learn-with-math-games.com/fraction-games.html> variety of fraction links
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 35—page 275-276
 - Bellringers: Week 35—page 273-274
 - Add, subtract, multiply, divide fractions created by teacher on white boards
- STEM activity:
 - http://tidewaterteam.wm.edu/files/2012/05/fifth_grade_stem.pdf

- **Cycle 5: Topics Covered**

- Rational numbers
- Ordering rational numbers
- Converting decimals to fractions
- Converting fractions to decimals

- **Activities/Centers**

- IXL.com centers
 - H.1 Identify rational numbers
 - H.3 Absolute value of rational numbers
 - H.4 Compare rational numbers
 - H.5 Put rational numbers in order
 - H.2 Convert between decimals and fractions or mixed numbers
- Tenmarks centers
 - 7.NS.2d Converting Rational Numbers to Decimals
- Hands-On/ Creative Centers

- Fraction “War”—comparing fractions *
- Use number lines* or fraction tiles to complete the following worksheet http://www.math-aids.com/cgi/pdf_viewer_3.cgi?script_name=greater_fractions_decimals.pl&denom_5=1&denom_6=1&denom_7=1&denom_8=1&denom_9=1&denom_10=1&denom_11=1&denom_12=1&negative=1&language=0&memo=&answer=1&x=149&y=24
- Online games
 - Fraction to decimal memory game <http://www.fractions4kids.com/convert-fractions-to-decimals-memory-game/>
 - Ordering decimals <http://www.sheppardsoftware.com/mathgames/decimals/BalloonPopDecimals1.htm>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 34—page 271-272
 - Bellringers: Week 34—page 269-270
 - Ordering decimals and fractions created by teacher on white boards
- STEM activity:
 - <https://www.mangahigh.com/en-us/games/flowerpowerlite>

Cycle 6: Topics Covered

- All operations with rational numbers (positive and negative)à Choose areas of weakness as shown by previous cycle’s work.

Activities/Centers

- IXL.com centers
 - H.6 Add and subtract rational numbers
 - H.8 Multiply and divide rational numbers
 - E.4 Multiply decimals and whole numbers: word problems
 - E.6 Divide decimals by whole numbers: word problems
 - G.3 Add and subtract mixed numbers
 - G.4 Add and subtract mixed numbers: word problems
 - G.7 Multiply fractions and whole numbers
 - G.10 Multiply mixed numbers
 - G.11 Multiply fractions and mixed numbers: word problems
 - G.13 Divide mixed numbers
 - G.14 Divide fractions and mixed numbers: word problems
 - G.15 Estimate products and quotients of fractions and mixed numbers
 - G.16 Add, subtract, multiply, and divide fractions and mixed numbers: word problems
- Tenmarks centers
 - 7.NS.1b Understanding Addition of Rational Numbers
 - 7.NS.1c Understanding Subtraction of Rational Numbers
 - 7.NS.1d Applying Addition and Subtraction to Rational Numbers
 - 7.NS.2a Understanding Multiplication of Rational Numbers
 - 7.NS.2a Applying Multiplication to Integers and Rational Numbers
 - 7.NS.2b Applying Division to Integers and Rational Numbers
 - 7.NS.3 Number Sentences with Rational Numbers
- Hands-On/ Creative Centers
 - Use number lines* or fraction tiles to complete the following worksheet (mixed review)
file:///C:/Users/KKemeny/Downloads/Assignment%203%20-%20Add,%20Subtract,%20Multiply,%20and%20Divide%20Rational%20Numbers%20Review.pdf
 - Challenge order of operations with a partner*
- Online games
 - Variety of rational number games http://www.mathplayground.com/index_fractions.html
 - Jeopardy game with group <http://www.math-play.com/7th-Grade-Numbers-and-Operations-Jeopardy/7th-Grade-Numbers-and-Operations-Jeopardy.html>
- Xtramath: review flashcards

- PARCC practice for Unit 1*—work together in group
- Teacher Directed Stations
 - Bellringers: Week 34—page 267-268
 - Bellringers: Week 34—page 265-266
 - A variety of mixed review created by teacher on white boards
- STEM activity:
 - Frozen treat in a bag - practice fractions while learning about the scientific method *

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how

much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just

may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.