Unit 01: The Number System

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

Standards Alignment

New Jersey Student Learning Standards

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.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.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.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.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.EE	Expressions and Equations
MA.6.EE.A	Apply and extend previous understandings of arithmetic to algebraic expressions.
MA.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
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.A.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
AAAA.K-12.1.1	Skills
AAAA.K-12.1.3	Responsibilities
AAAA.K-12.1.3.5	Use information technology responsibly.
AAAA.K-12.2.1	Skills
AAAA.K-12.2.1.4	Use technology and other information tools to analyze and organize information.
AAAA.K-12.3	Share knowledge and participate ethically and productively as members of our democratic society.
AAAA.K-12.3.1	Skills
AAAA.K-12.3.1.6	Use information and technology ethically and responsibly.

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: NJSLS 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.

LA.K-12.NJSLSA.R	Reading
MATH.K-12.1	Make sense of problems and persevere in solving them
	Key Ideas and Details
MATH.K-12.2	Reason abstractly and quantitatively
LA.K-12.NJSLSA.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.
LA.RL.6.1	Cite textual evidence and make relevant connections to support analysis of what the text

	says explicitly as well as inferences drawn from the text.
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.NJSLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.6.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.6.1.A	Introduce claim(s) and organize the reasons and evidence clearly.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
LA.W.6.1.C	Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.
LA.K-12.NJSLSA.SL	Speaking and Listening
LA.W.6.1.D	Establish and maintain a formal/academic style, approach, and form.
	Comprehension and Collaboration
LA.W.6.1.E	Provide a concluding statement or section that follows from the argument presented.
LA.K-12.NJSLSA.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.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.6.1.A	Come to discussions prepared, having read or studied required material; 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.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
LA.SL.6.1.C	Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
LA.SL.6.1.D	Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

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

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit… In order to understand the concepts of basic Algebra, students must master the number system.

Meaning

Essential Questions

Essential Questions

- Why do we use different types of numbers to model different situations?

- How do we know which operation to choose when solving a real-life problem?

- Why do we follow an order of operations when evaluating expressions?

- How can we use common factors and multiples to solve problems involving grouping of two or three different quantities?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Real world situations use a variety of numbers to display information. (fractions,decimals,percents)

- Real world problems can be solved using various operations

- Following the order of operations allows us to better understand Algebra

- Breaking numbers down into comparable pieces helps to efficiently sort information

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- How to analyze, interpret, apply, sort information to solve a specific problem

- Understand and apply the Order of Operations to a variety of situations

- Understand and apply Prime Factorization to efficiently find GCF/LCM in a variety of situations

- Given a situation add, subtract, multiply, divide fractions, mixed numbers and decimals to solve real-world problems

Skills

Skills

Student will be skilled at …

- Given a word problem, choose an appropriate mathematical operation(s).

- Compute sums, differences, products, and quotients of whole numbers, decimals, and fractions.

- Solve a variety of problems by analyzing and using diagrams to identify number patterns using prime factorization, least common multiple, and greatest common factor.

- Use models and algorithms to add, subtract, multiply, and divide whole numbers, fractions, mixed numbers and decimals.

- Apply the order of operations including parentheses and exponents.

- Choose appropriate operations to solve problems including common factors and multiples.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Unit 1 activities.docx
Unit 1-Cycle 1- Discover Jar STEaM.docx

Unit 1-Cycle 1 scavenger hunt answer page.docx
Unit 1-Cycle 1 scavenger hunt teacher instructions.docx
Unit 1 - PARCC practice.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

The Number System: Approximately 7 Cycles

Cycle 1: Topics Covered

- Whole number operations
- Word problems with one operations using whole numbers

- Activities/Centers
    - IXL.com centers
        - A.4 Add and subtract whole numbers
        - A.5 Add and subtract whole numbers: word problems
        - B.1 Multiply whole numbers
        - B.2 Multiply whole numbers: word problems
        - B.3 Multiply whole numbers with four or more digits
        - B.4 Multiply numbers ending in zeroes
        - B.5 Multiply numbers ending in zeroes: word problems
        - B.6 Multiply three or more numbers
        - B.7 Multiply three or more numbers: word problems
        - B.8 Estimate products
        - C.3 Divide numbers ending in zeroes: word problems
        - C.4 Estimate quotients

        - C.5 Divide whole numbers - 2-digit divisors
        - C.6 Divide whole numbers - 3-digit divisors
        - O.1 Add, subtract, multiply, or divide two whole numbers
        - O.2 Add, subtract, multiply, or divide two whole numbers: word problems
    - Tenmarks centers
        - 6.NS.2 Dividing Multi-Digit Numbers
    - Hands-On/Creative Centers
        - Activity 2-EGG-O http://mathcentral.uregina.ca/RR/database/RR.09.99/sawatzky1/task-no2.html
    - Online games
        - Variety of multiplication games http://www.math-play.com/multiplication-games.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 36—page 251-252
        - Bellringers: Week 36—page 249-250
        - Teacher created problems on white boards: multiply and divide multi-digit numbers
    - 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

- Powers and positive exponents
- Review adding and subtracting fractions

- Activities/Centers
    - IXL.com centers
        - D.1 Write multiplication expressions using exponents
        - D.2 Evaluate exponents
        - D.3 Find the missing exponent or base
        - J.3 Add and subtract fractions with unlike denominators
        - J.4 Add and subtract fractions with unlike denominators: word problems
    - Tenmarks centers
        - 6.NS.7A Ordering Rational Numbers
    - Hands-On/Creative Centers
        - Scavenger hunt*
    - Online games
        - Exponent games online http://www.learn-with-math-games.com/math-exponents-games-middle-school.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 36—page 247-248
        - Bellringers: Week 36—page 246
        - Teacher created problems on white boards: add or subtract fractions

Cycle 3: Topics Covered

- Order of operations

- Activities/Centers

    - IXL.com centers
        - O.8 Add, subtract, multiply, or divide two fractions: word problems
        - O.9 Perform multiple operations with fractions
        - O.3 Evaluate numerical expressions involving whole numbers
    - Tenmarks centers
        - 6.NS.7d Absolute Value and Statements about Order
    - Hands-On/Creative Centers
        - Group activity order of operations http://www.learnnc.org/lp/pages/3151?ref=search
        - hands-on activity http://www.uen.org/Lessonplan/preview?LPid=21529
    - Online games
        - http://cemc2.math.uwaterloo.ca/mathfrog/english/kidz/order.shtml
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 35—page 244-245
        - Bellringers: Week 35—page 242-243
        - Teacher created problems on white boards: follow the order of operations to solve
    - STEM activity: order of operations activity http://www.mathsolutions.com/documents/order_of_operations_i33.pdf

Cycle 4: Topics Covered

- Prime factorization
- Divisibility rules

- Activities/Centers
    - XL.com centers
        - C.1 Divisibility rules
        - E.3 Prime or composite
        - E.4 Identify factors
        - E.5 Prime factorization
        - E.6 Prime factorization with exponents
    - Hands-On/Creative Centers
        - Prime numbers game: http://mathcentral.uregina.ca/RR/database/RR.09.99/sawatzky1/task-no6.html

Game board: http://mathcentral.uregina.ca/RR/database/RR.09.99/sawatzky1/primeboard.html

- Create a divisibility poster with a partner
- Online games
    - http://www.mathplayground.com/factortrees.html
    - http://mrnussbaum.com/factorization_forest/
- Xtramath: review flashcards
- Teacher Directed Stations

- Bellringers: Week 35—page 240-241
- Bellringers: Week 35—page 239
- Teacher created problems on white boards: Is the number divisible by…?

Cycle 5: Topics Covered

- Greatest Common Factor
- Least Common Multiple

- Activities/Centers
  - IXL.com centers
    - E.7 Greatest common factor
    - E.8 Least common multiple
    - E.9 GCF and LCM: word problems
  - Tenmarks centers
    - 6.NS.4 Identifying the Least Common Multiple
    - 6.NS.4 Identifying the Greatest Common Factor
  - Hands-On/Creative Centers
    - Partner game: http://www.mathblaster.com/parents/math-activities/view-all-math-activities/factors-with-friends-view
    - Using Venn Diagrams: http://www.mathblaster.com/parents/math-activities/view-all-math-activities/gcf-and-lcm-with-venn-diagrams-view
  - Online games
    - GCF http://www.sheppardsoftware.com/mathgames/fractions/GreatestCommonFactor.htm
    - LCM http://www.sheppardsoftware.com/mathgames/fractions/LeastCommonMultiple.htm
  - Xtramath: review flashcards
  - Teacher Directed Stations
    - Bellringers: Week 34—page 237-238
    - Bellringers: Week 34—page 235-236
    - Teacher created problems on white boards: Find the GCF and LCM of two or three numbers
  - STEM activity: GCF fun

http://teachingcommons.cdl.edu/mec/teacher_resources/TeachingGrades6-7NumberSense.htm#GCF
http://lessonplanspage.com/mathgcfpostertalkshowreviewidea69.htm/

Cycle 6: Topics Covered

- Multiply fractions and mixed numbers
- Divide fractions and mixed numbers

- Activities/Centers
  - IXL.com centers

        - O.7 Add, subtract, multiply, or divide two fractions
        - O.8 Add, subtract, multiply, or divide two fractions: word problems
        - K.6 Multiply two fractions
        - K.7 Multiply fractions: word problems
        - K.8 Multiply three or more fractions and whole numbers
        - K.9 Estimate products of fractions, whole numbers, and mixed numbers
        - K.10 Multiply mixed numbers and whole numbers
        - K.11 Multiply mixed numbers
        - K.12 Multiply mixed numbers: word problems
        - K.13 Multiply three or more mixed numbers, fractions, and/or whole numbers
    - Tenmarks centers
        - 6.NS.1 Solving Problems Involving the Division of Fractions
        - 6.NS.1 Dividing Two Fractions
        - 6.NS.1 Dividing Fractions and Mixed Numbers
        - 6.NS.1 Dividing Fractions and Whole Numbers
    - Hands-On/Creative Centers
        - partner game file:///C:/Users/KKemeny/Downloads/4DiceFractionGamesAddingSubtractingMultiplyingDividing Fractions.pdf
    - Online games
        - http://www.math-play.com/Fractions-Jeopardy/fractions-jeopardy.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 34—page 233-234
        - Bellringers: Week 34—page 232
        - Teacher created problems on white boards: Division practice
    - STEM activity: Fraction Code https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/36199-FractionCode.pdf

Cycle 7: Topics Covered

- Add and subtract decimals
- Multiply decimals
- Divide decimals

- Activities/Centers
    - IXL.com centers
        - G.1 Add and subtract decimal numbers
        - G.2 Add and subtract decimals: word problems
        - G.3 Estimate sums and differences of decimals
        - G.4 Maps with decimal distances
    - Tenmarks centers
        - 6.NS.3 Estimating with All Operations: Multi-Digit Decimals
        - 6.NS.3 Add/Subtract/Multiply/Divide: Multi-Digit Decimals
    - Hands-On/Creative Centers
        - Out to Lunch http://www.cpalms.org/Public/PreviewResourceLesson/Preview/33126
    - Online games
        - Variety of decimal games http://www.math-play.com/decimal-math-games.html
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 33—page 230-231
        - Bellringers: Week 33—page 228-229
        - PARCC practice*
        - Teacher created problems on white boards: decimal division

STEM activity https://illuminations.nctm.org/TooBigTooSmall/

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.