01: Number Theory

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

The New Jersey Student Learning Standards (NJSLS) are rigorous and robust. The standards emphasize not only procedural skill but also conceptual understanding to ensure students are learning and absorbing the critical information needed to succeed mathematically now and in the future.

Due to the spiraling within and the articulation across grade levels and courses, students will learn concepts in a more organized and fluent structure. The standards encourage students to solve real-world problems and define what students should understand and be able to do in their study of mathematics. Mastery of the standards requires students to justify, in a way that is appropriate to the student's mathematical maturity, why a particular mathematical statement is true or where a mathematical rule comes from. Mathematical understanding and procedural skill are equally important, and both are assessable using mathematical tasks of sufficient richness.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Explore the relationship between factors, multiples, divisors and products.
- Find the LCM and GCF of two or more numbers.
- Identify if a word problem requires LCM or GCF and solve accordingly.
- List factors and multiples of a given number.
- Apply the Divisibility Rules to determine divisors of a number.
- Determine if a number is prime or composite.
- Simplify an expression with exponents to a single number.
- Apply the Order of Operations to simplify expressions.
- Use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers with no common factor.
- Apply the distributive property to write expressions in factored and expanded form.

Essential Questions:

- How can you decide when finding common factors or common multiples is useful in solving a problem?
- How is the Distributive Property used to create equivalent expressions?

Enduring Understandings:

- Numeric fluency includes both the understanding of and the ability to appropriately use numbers.

CONTENT AREA STANDARDS

6.NS -B. Apply and extend previous understandings of numbers to the system of rational numbers

6.EE - A. Apply and extend previous understandings of arithmetic to algebraic expressions

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.K-12.8	Look for and express regularity in repeated reasoning.
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.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
MA.6.EE.A.2a	Write expressions that record operations with numbers and with letters standing for numbers.
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).
MA.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
MA.6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.8.PB.1: Predict future expenses or opportunities that should be included in the budget planning process.

9.1.8.PB.2: Explain how different circumstances can affect one's personal budget.

LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
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.
CS.K-12.3	Recognizing and Defining Computational Problems
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- Content-specific vocabulary: Divisor, factor, composite number, prime number, multiple, square number, least common multiple (LCM), greatest common factor (GCF), exponent, prime factorization, relatively prime numbers, adjacent sides, equivalent expressions, even number, odd number, Distributive Property, expanded form, factored form, Order of Operations
- Whole numbers are categorized into primes and composites.
- Factors of a number occur in pairs.
- Whole numbers have factors and multiples.
- Multiplication and division distribute over addition and subtraction; meaning, the distributive property allows for an expression to be written equivalently with factors divided out or multiplied into an expression.
- Arithmetic operations are performed in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Procedural Knowledge

Students will be able to:

- Apply the divisibility rules.
- Find the greatest common factor of two whole numbers less than or equal to 100.
- Find the least common multiple of two whole numbers less than or equal to 12.
- Recognize situations that call for common factors, least common factor, common multiples, or least common multiple.
- Solve problems involving factors and multiples.
- 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.
- Evaluate numerical expressions involving whole-number exponents.

- Write numerical expressions involving whole-number exponents.
- Evaluate expressions by applying the Order of Operations.

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Alternate Assessments

- Portfolios

- Verbal Assessment (instead of written)

- Multiple choice

- Modified Rubrics

- Performance Based Assessments

Benchmark Assessments

- BOY Diagnostic Assessment
- MP1 Quarterly Assessment
- MP2 Quarterly Assessment
- MP3 Quarterly Assessment
- MP4 Quarterly Assessment

Summative Assessments

- Quizzes

- Unit Assessments

- Graded Assignments

- Projects

Formative Assessments

- Observations
- Classwork
- Homework Assignments
- Do Now Questions
- Exit Tickets
- Self Assessment Questions
- Proficiency Scale

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Resources

- *CMP3 Prime Time*
- Savvas Realize (teacher and student resources)

Supplemental Resources

- Additional Resources linked HERE
- Math 6 Enriched Prime Time folder linked HERE
- Khan Academy
- Delta Math
- Illustrative Math Performance Tasks:

  - 6.NS.B.4 Adding Multiples
  - 6.NS.B.4 Bake Sale
  - 6.NS.B.4 The Florist Shop
- IXL- Recommended Skills Practice
  - E.3 Prime or Composite
  - E.4 Identify factors
  - E.6 Prime Factorization
  - E.7 Prime Factorization with Exponents
  - E.8 Greatest Common Factor
  - E.10 Least Common Multiple
  - E.12 GCF and LCM: Word Problems
  - O.3 Evaluate Numerical Expressions Involving Whole-Numbers

INTERDISCIPLINARY CONNECTIONS

- Computations
- Financial/Economic/Business/Entrepenerial Literacy

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.