*Unit 6-Mathematical Systems

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 3**
Length: **14 Blocks**
Status: **Published**

Enduring Understandings

A Mathematical System consists of a set of elements and at least one binary operation.

Different types of Mathematical Systems exist.

Computing in a variety of bases provides foundations for future use in mathematics.

Essential Questions

What is a Mathematical System?

What are the different types of Mathematical Systems?

What is a place-value system?

What is the purpose of computation in other bases?

Content

Groups

Additive Identity Element

Closure Property

Finite mathematical systems

Modulo system

Skills

- Determine if a mathematical system has the properties of a group.
- Determine if a mathematical system is a commutative group.
- Solve mathematical systems without numbers.
- Evaluate a modulo system for a given value.
- Find the replacement value for a modulo class that makes the situation true.
- Write a number using other systems of mathematics.
- Converting a number from one base to another.
- Use addition, subtraction, multiplication, and division to compute from one base to another.

Resources

Text: *A Survey of Mathematics with Applications, Pearson 2005*

Each skill is aligned to the text as a reference.

- Determine if a mathematical system has the properties of a group. (10.1)
- Determine if a mathematical system is a commutative group. (10.2)
- Solve mathematical systems without numbers. (10.2)
- Evaluate a modulo system for a given value.(10.3)
- Find the replacement value for a modulo class that makes the situation true. (10.3)
- Write a number using other systems of mathematics. (4.2)
- Converting a number from one base to another. (4.3)
- Use addition, subtraction, multiplication, and division to compute from one base to another.(4.4)

https://www.youtube.com/watch?v=lMEdBbl4e-M

https://www.youtube.com/watch?v=jrXNt6GvYoM

Standards

NJSLS 2016

Math Analysis

MA.N-RN	The Real Number System
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.N-RN.A	Extend the properties of exponents to rational exponents.
MA.N-RN.B	Use properties of rational and irrational numbers.
MA.K-12.6	Attend to precision.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

With each extension of number, the meanings of addition, subtraction, multiplication, and division are extended. In each new number system—integers, rational numbers, real numbers, and complex numbers—the four operations stay the same in two important ways: They have the commutative, associative, and distributive properties and their new meanings are consistent with their previous meanings.