Unit 1: The Number System

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 1**
Length: **5 weeks**
Status: **Published**

Unit Overview

In this unit, students will gain an understanding of the number system. Students will begin this unit by reviewing integer operations. Students will then learn how to add, subtract, multiply, and divide all types of rational numbers. Students will also be able to order all types of rational numbers from least to greatest (fractions, decimals, and integers in a single question). Students will then learn the meaning of absolute value, and how this effects the value of rational numbers. Finally, students will then take this knowledge and apply it to real world problems. This unit will serve as the foundation for all remaining units for the remainder of the school year.

Standards

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.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.

Essential Questions

- Why is it imperative to have a strong foundation in mathematical operations?
- How does explaining the process of solving a problem help better understand a problem's solution?
- How can the additive inverse help cut down the amount of time it takes to solve a problem?

Application of Knowledge: Students will know that...

- Order of operations must be used when evaluating expressions involving one or more operation.
- The absolute value of a number is the distance the number is from "0". It's always positive.
- There must be a plan in place in order to solve a real world problem.
- When adding numbers with different signs, you subtract and choose the sign of the number with the greatest absolute value.
- When adding numbers with the same sign, you simply add like normal and choose the common sign.
- When adding/subtracting fractions you need to have a common denominator.
- When dividing fractions, complete "Same, Change, Reciprocal" by keeping the first fraction the same, change division to multiplication, take the reciprocal of the second fraction, and follow the rules for multiplication.
- When multiplying fractions, look to cross simplify first followed by multiplying straight across
- When multiplying/dividing numbers with different signs you get a negative solution.
- When multiplying/dividing numbers with the same sign you get a positive answer.

Application of Skills: Students will be able to...

- Add, subtract, multiply, or divide all types of rational numbers
- Determine the absolute value of a given number
- Evaluate an expression by following the order of operations
- Order a set of rational numbers from least to greatest
- State the opposite of a number
- Use and identify problem solving strategies to solve real world problems

Assessments

- Do Now's: Will be used to check for prior knowledge and to determine mastery of particular topics. If needed the teacher will remediate the previous lesson before continuing.
- Tickets to leave: Will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Communicator Practice: Will be used as a quick whole-class assessment tool to check for complete comprehension.
- Unit Quiz: focusing on adding/subtracting of rational numbers.
- Unit test: focusing on all concepts covered within the "Number Systems" unit.

- Integer Alphabet Project: Project in which each letter of the alphabet is assigned a particular integer and students take the letters of their name and add all of the associated interers together to come up with their integer number.
- IXL practice: used to provide remediation/extra practice for skills learned within the unit.
- Pizzazz practice worksheets
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment. From this unit, students will be asked to apply their knowledge of rational numbers (used within other contexts such as equations, proportions, proportional relationships, etc).

Suggested Activities

- Digits launch activities (Topics 4 - 5).
- Review games using communicators.
- Student centered SMART Board lessons: drag and reveal/challenge express questions for all rational number presentations.
- Human Number Line: will be used to order all types of rational numbers.
- Integer alphabet project (from assessments).
- Clue "walk-around" activity to review the concepts from the unit: focus of this review will be on integer/decimal/fraction operations, real world problem solving for rational operations, and ordering rational numbers. Students will complete review problems that are posted around the room on topics from this unit. The theme of the gallery walk is based off of the board game "Clue". Each problem will rule out possibilities for the suspect, weapon, and location. Once all of the problems are completed correctly, students will be left with the suspect, weapon, and location for the fictional crime.
- "4 Square" communicator activity. Students are given a square with a problem to complete. Once all 4 "squares" from the group are completed, the group adds all 4 answers together and writes it in the center of the page.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task
    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery
    - Increase one-to-one time
    - Working contract between you and student at risk
    - Position student near helping peer or have quick access to teacher
    - Break tests down in smaller increments

- **Content specific modifications may include:**
    - Personal handout for remembering integer rules (can be taped to desk).
    - Graphic organizer for remembering integer rules.

- Provide completed examples for practice work and homework.

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan

- **Content specific vocabulary important for ELL students to understand include:**
  - Fraction, numerator/denominator, greatest/least, absolute value, signs, negative, opposite, improper fraction, mixed number, inverse

Differentiation to extend learning for gifted students may include:

- Fraction/Decimal problems involving order of operations.
- Evaluating expressions containing more rational numbers.
- Allow order of operation problems to contain multiple sets of parenthesis (including parenthesis inside of parenthesis).

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

Science: when subtracting rational numbers explain to students the idea of the change in elevation between two different locations.

Economics: explain what it means to have a surplus or be in debt.

Resources

Digits teacher materials and support: www.pearsonrealize.com

Digits student access and support: www.mymathuniverse.com

IXL practice: www.ixl.com

SMART Board lessons

Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP11	Use technology to enhance productivity.