MATHEMATICS COMMON CORE CURRICULUM UNIT*
North Smithfield Public Schools

TITLE OF UNIT: Unit 1 The Number System   **COURSE OR GRADE : 7**

DATE PRESENTED: _____ DATE DUE: _____ LENGTH OF TIME: 22 Days

OVERVIEW OF UNIT:

Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.

> **ESSENTIAL QUESTION, PROMPT, PROBLEM/UNIT**
> **How can estimating skills and accuracy in calculations help solve real-life problems?**

STANDARDS: Common Core Math Standards – Grade level domains 6-8

Ratios and Proportional Relationships RP	The Number System NS	Expressions and Equations EE	Functions (grade 8) F	Geometry G	Statistics and Probability SP
☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐
☐	☐				
☐	☐				

:   Mathematical Practices grades K-12

1.	Make sense of problems and persevere in solving them	3.	Construct viable arguments and critique the reasoning of others	5.	Use appropriate tools strategically	7.	Look for and make use of structure
2.	Reason abstractly and quantitatively	4.	Model with mathematics ★	6.	Attend to precision	8.	Look for and express regularity in repeated reasoning

FOCUS MATHEMATICS STANDARDS: see curriculum _____ for specific standards, e.g. **(CUT AND PASTE FROM MAP)**

- Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 7.NS.1, 2, 3

Applied Learning Standards:

problem solving   communication   critical thinking   research   reflection/ evaluation

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ENDURING UNDERSTANDING: (CUT AND PASTE FROM CURRICULUM – ESSENTIAL KNOWLEDGE)

Students will be able to accurately perform operations on all forms of rational numbers.

PRIOR KNOWLEDGE:
- ☐ **Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**
- ☐ **Compute fluently with multi-digit numbers and find common factors and multiples.**
- ☐ **Apply and extend previous understandings of numbers to the system of rational numbers.**

STUDENT OBJECTIVES, SKILLS and/or NEW KNOWLEDGE: (CUT AND PASTE FROM CURRICULUM – ESSENTIAL KNOWLEDGE)

7.NS.1

- When opposites are combined the sum is always 0.
- A positive number is represented by moving right on a number line, a negative number is represented moving left on a number line.
- Absolute value is the distance that number is away from zero on a number line, also referred to as the magnitude of a number in real-world contexts.
- Addition of rational numbers $(p + q)$ is the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative.
- Subtraction of rational numbers is the same as adding the additive inverse, $p - q = p + (-q)$.
- Distance between two rational numbers on the number line is the absolute value of their difference.

7.NS.3

- Patterns and properties of operations are used to generate rules for multiplying and dividing positive and negative rational numbers.
- Any rational number can be written as a fraction, decimal, percent or quotient of integers with a non-0 divisor.
- Rational numbers can be converted to a decimal that either ends in 0 or repeat.

7.NS.3

- Properties of operations are used as strategies to compute real- world problems with rational numbers.

ACTIVITIES, PRODUCTS, PERFORMANCE, and ASSESSMENTS: see curriculum introduction

1. Application to real world problems
2. Creating charts/collecting data
3. Collaboration - interpersonal
4. Conferencing
5. Exhibits
6. Graphic organizers
7. Graphing
8. Interviews
9. Journals
10. KWL charts
11. Mathematical Practices
12. Modeling ★
13. Oral presentations
14. Problem/Performance based/common tasks
15. Real-life applications involving graphing
16. Represent numbers
17. Rubrics/checklists (mathematical practice, modeling)
18. Technology
19. Summarizing and note-taking
20. Tests and quizzes
21. Writing genres Arguments/ opinion Informative

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Lessons	Resources	Timeframe
Integers	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 2 Lesson 1	1
Properties of Operations **Using properties as strategies for mental math should be embedded throughout the unit.	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 1 Lesson 2	1
Integer Addition and Subtraction	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 2 Lessons 2 & 3	2
Rules for Addition and Subtraction of Signed Numbers, Additive Inverses	Teacher directed notes (can use Holt Course 3 Sections 1.3, 1.4, 1.5 as a resource)	1
Adding and Subtracting Decimals	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 3 Lesson 1	1
Adding and Subtracting Fractions and Mixed Numbers	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 3 Lesson 5	1
Application	Jossey-Bass CC Hands-On Activities Pg. 90	1
Real-World Examples		1
Quiz on Adding and Subtracting Rational Numbers		1
Rules for Multiplying and Dividing Signed Numbers and Multiplying and Dividing Integers **Emphasize division by zero is undefined.	Teacher directed notes – (McDougall Littell Pre-Algebra Section 1.7 or Holt Course 2 Section 2.4)	1
Multiplying and Dividing Decimals	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 3 Lessons 2 and 3	1
Multiplying and Dividing Fractions and Mixed Numbers	Holt McDougall Mathematics *Explorations in Core Math Grade 7* Chapter 3 Lessons 6 & 7	1
Application	Jossey-Bass CC Hands-On Activities Pg. 92	1
Real World Examples		1
Quiz on Multiplying and Dividing Rational Numbers		1
Application	Jossey-Bass CC Hands-On Activities Pg. 98	2
Additional Review/Practice		3
Unit Assessment		1

HIGHER ORDER THINKING SKILLS: Web's Depth of Knowledge 2 – 4 or Bloom's Taxonomy

Web's Depth of Knowledge	Bloom's Taxonomy
- skill/conceptual understanding - strategic reasoning - extended reasoning	- apply - analyze - synthesize/create - evaluate

ADDITIONAL RESOURCES: see curriculum for specifics

- ☐ Holt McDougall Mathematics *Explorations in Core Math Grade 7*
- ☐ Jossey-Bass <u>Teaching the Common Core Math Standards with Hands-On Activities</u>
- ☐ Holt Course 2
- ☐ Holt Course 3
- ☐ McDougall Littell Pre-Algebra

VOCABULARY   (CUT AND PASTE FROM CURRICULUM)

- Absolute value
- Additive inverse
- Associative property distributive property, integers
  - ☐
- Commutative property
- Magnitude
- Opposites
- Order of operations
- Rational numbers

OBJECTIVES:

Lessons	Objective
Number Lines, Absolute Value, Opposites, Directionality	**Students will use number lines to explore absolute value, opposites and directionality.**
Properties of Operations ****Using properties as strategies for mental math should be embedded throughout the unit.**	**Students will learn how to identify properties of rational numbers and use them to simplify numerical expressions.**
Integer Addition and Subtraction	**Students will accurately add and subtract integers.**
Rules for Addition and Subtraction of Signed Numbers, Additive Inverses	**Students will learn the rules for adding and subtracting signed rational numbers.** **Students will identify additive inverses and recognize that the sum of additive inverses is zero.**
Adding and Subtracting of Decimals	**Students will accurately add and subtract signed decimals.**
Additing and Subtracting of Signed Fractions and Mixed Numbers	**Students will accurately add and subtract signed fractions and mixed numbers.**
Application	**Students will be able to explain the procedures for adding and subtracting rational numbers.** **Students will provide real world examples requiring addition and subtraction of rational numbers.**
Real-World Examples	**Students will practice the skills of adding and subtracting rational numbers in problems involving real world examples.**
Quiz on Adding and Subtracting Rational Numbers	
Rules for Multiplying and Dividing Signed Numbers and Multiplying and Dividing Integers ****Emphasize division by zero is undefined.**	**Students will learn the rules for multiplying and dividing signed rational numbers.** **Students will accurately multiply and divide integers.**
Multiplying and Dividing Decimals	**Students will accurately multiply and divide signed decimals.**
Multiplying and Dividing Fractions and Mixed Numbers	**Students will accurately multiply and divide signed fractions and mixed numbers.**
Application	**Students will practice using the Distributive Property with numerical expressions.**
Real World Examples	**Students will practice the skills of multiplying and dividing rational numbers in problems involving real world examples.**
Quiz on Multiplying and Dividing Rational Numbers	
Application	**Students will recognize equivalent rational numbers in different forms.**
Additional Review/Practice	
Unit Assessment	

☐ **Assessments:** see curriculum introduction
  o **Formative**

  o **Summative**

Teaching Problems

7.NS.1

- A hydrogen atom has 0 charge because its two constituents are oppositely charged.

- You have $4 and you need to pay a friend $3. What will you have after paying your friend? $4 + (-3) = 1$ or $(-3) + 4 = 1$
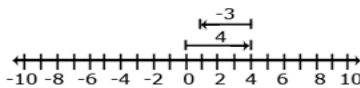
7.NS.2

- Examine the family of equations. What patterns do you see? Create a model and context for each of the products. Write and model the family of equations related to $3 \times 4 = 12$.

Equation	Number Line Model	Context
2 x 3 = 6	(0, 3, 6)	Selling two packages of apples at $3.00 per pack
2 x -3 = -6	(-6, -3, 0)	Spending 3 dollars each on 2 packages of apples
-2 x 3 = -6	(-6, -4, -2, 0)	Owing 2 dollars to each of your three friends
-2 x -3 = 6	(0, 2, 4, 6)	Forgiving 3 debts of $2.00 each

7.NS.3

- It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent?

$$\frac{-100\,\text{feet}}{20\,\text{seconds}} = \frac{-5\,\text{feet}}{1\,\text{second}} = -5\text{ft/sec}$$

Associative property of addition	$(a + b) + c = a + (b + c)$
Commutative property of addition	$a + b = b + a$
Additive identity property of 0	$a + 0 = 0 + a = a$
Existence of additive inverses	For every *a* there exists –*a* so that $a +$ $(-a) = (-a) + a = 0$
Associative property of multiplication	$(a \times b) \times c = a \times (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property of 1	$a \times 1 = 1 \times a = a$
Existence of multiplicative inverses	For every $a \neq 0$ there exists $1/a$ so that $a \times$ $1/a = 1/a \times a = 1$
Distributive property of multiplication over addition	$a \times (b + c) = a \times b + a \times c$

** For sample assessment problems, see curriculum document located on NSMS T: drive.