MATHEMATICS COMMON CORE CURRICULUM UNIT #4 Grade 6*
North Smithfield School Department

TITLE OF UNIT: Rational Numbers **GRADE: 6**

DATE PRESENTED: _____ **DATE DUE:** _____ **LENGTH OF TIME:** Several weeks, quarter, semester

OVERVIEW OF UNIT:

In this unit, students will recognize, understand, and position integers (positive and negative) on number lines and coordinate planes. They will use coordinates and absolute value to solve real-world and mathematical problems. Students will use coordinate planes to draw polygons and find distances between the points on the plane. They will display data in appropriate representations and summarize the distribution.

ESSENTIAL QUESTIONS

How does the coordinate plane incorporate positive and negative numbers?
How can a number line be used to solve real-world problems on a coordinate plane?
How can a coordinate plane help to solve problems with mapping?
What type of representation best matches a set of data?
How can the measures of center be used to explain data?

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
	6.NS.6,7			6.G.3	6.SP.4, 5
	6.NS.8				

STANDARDS: Mathematical Practices grades K-12

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

FOCUS MATHEMATICS STANDARDS:

- Apply and extend previous understandings of numbers to the system of rational numbers. 6.NS.6,7
- Apply and extend previous understandings of numbers to the system of rational numbers. 6.NS.8
- Solve real-world and mathematical problems involving area, surface area and volume. 6.G.3
- Summarize and describe distributions. 6.SP.4, 5

Applied Learning Standards:

problem solving communication critical thinking research reflection/ evaluation

Expectations for Student Learning (High School only):

ENDURING UNDERSTANDING:

- Students will be able to read and plot positive and negative integers on a number line.
- Students will be able to use a coordinate plane to solve real-world problems, including those that involve mapping.
- Students will choose appropriate representations to display data.
- Students will summarize data through the use of measures of center.

PRIOR KNOWLEDGE:

- Students will know how to plot positive numbers on number lines and ordered pairs in the first quadrant of coordinate planes.
- Students will know how to create a line plot.

STUDENT OBJECTIVES, SKILLS and/or NEW KNOWLEDGE:

6.NS.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.

*Referenced templates from *Common Core Curriculum Maps, English Language Arts* and *The Understanding By Design Guide to Creating High Quality Units*

a. 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. 6.NS.6a

b. 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. 6.NS.6b

c. 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. 6.NS.6c

6.NS.7 Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
   - *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 ona number line oriented from left to right.* 6.NS.7a

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
   - *For example, write –3 ^{o}C > –7 ^{o}C to express the fact that –3 ^{o}C is warmer than –7 ^{o}C.* 6.NS.7b

c. 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.
   - *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* 6.NS.7c

d. Distinguish comparisons of absolute value from statements about order.
   - *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* 6.NS.7d

6.NS.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.

6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.5 Summarize numerical data sets in relation to their context, such as by:

a. Reporting the number of observations. 6.SP.5a

b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. 6.SP.5b

c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. 6.SP.5c

d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. 6.SP.5d

SUGGESTED PROBLEMS:

6.NS.6 Basic

- http://www.opusmath.com/common-core-standards/6.ns.6c-find-and-position-integers-and-other-rational-numbers-on-a-horizontal-or?q=Plot%20ordered%20pairs%20on%20the%20coordinate%20plane
- http://www.opusmath.com/common-core-standards/6.ns.6a-recognize-opposite-signs-of-numbers-as-indicating-locations-on-opposite

6.NS.7 Basic

- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/288/original/illustrative_mathematics_288.pdf?1343856954
- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/286/original/illustrative_mathematics_286.pdf?1343856978
- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/283/original/illustrative_mathematics_283.pdf?1343856974
- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/285/original/illustrative_mathematics_285.pdf?1343856960

6.NS.7 Advanced

- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/284/original/illustrative_mathematics_284.pdf?1344476804

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6.NS.8 Basic
- http://www.opusmath.com/common-core-standards/6.ns.8-solve-real-world-and-mathematical-problems-by-graphing-points-in-all-four?q=Find%20vertical%20and%20horizontal%20distances%20on%20the%20coordinate%20plane

6.G.3 Basic
- http://www.opusmath.com/common-core-standards/6.g.3-draw-polygons-in-the-coordinate-plane-given-coordinates-for-the-vertices

6.SP.4 Basic
- http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/026/original/illustrative_mathematics_1026.pdf?1354664528

6.SP.5 Basic/Advanced
- http://www.opusmath.com/common-core-standards/6.sp.5d-relating-the-choice-of-measures-of-center-and-variability-to-the-shape-of?q=Select%20an%20appropriate%20measure%20of%20center

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

- 6.NS.6
  - Plot integers (positive and negative)on number lines and coordinate planes. (See Teaching Examples for 6.NS.6 in Curriculum Guide.)
- 6.NS.7
  - Draw, interpret, and explain number line models for rational numbers in real-world problems.
- 6.NS.8
  - Solve real-world and mathematical problems using a coordinate plane. (See Teaching Examples for 6.NS.8 in Curriculum Guide.)
- 6.G.3
  - Apply knowledge of the coordinate plane in real-world situations. (See Teaching Example for 6.G.3 in Curriculum Guide.)
- 6.SP.4
  - Display data sets on dot plots, histograms, box plots, etc. and summarize statistics including quantitative measures of center, variability, and spread. (See Teaching Examples for 6.SP.4 in Curriculum Guide.)
- 6.SP.5
  - Display data sets on dot plots, histograms, box plots, etc. and summarize statistics including interquartile range, mean absolute deviation, mean measure of center, and measures of spread. (See Teaching Example for 6.SP.5 in Curriculum Guide.)

UNIT 4 ASSESSMENT

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

Web's Depth of Knowledge
- skill/conceptual understanding
- strategic reasoning
- extended reasoning

Bloom's Taxonomy
- apply
- analyze
- synthesize/create
- evaluate

ADDITIONAL RESOURCES: see curriculum for specifics
- *Exploration in Core Math , Holt Mc Dougal*
- *Holt Grade 6 Mathematics*

*Referenced templates from *Common Core Curriculum Maps, English Language Arts* and *The Understanding By Design Guide to Creating High Quality Units*

VOCABULARY

6.NS.6

- Axis (x,y)
- Coordinate plane
- Horizontal
- Vertical
- Ordered pairs
- Origin
- Point
- Quadrants
- Reflections

6.NS.7

- Inequality
- Integers
- Quantity
- Rational numbers
- Magnitude

6.NS.8

- Inequality
- integers
- Quantity
- Rational numbers
- Magnitude

6.G.3

- Coordinate plane
- Vertices/vertex
- Point
- Coordinate (ordered) pair

6.SP.4

- Box And Whisker Plot
- Dot Plot
- Frequency Table
- Histogram
- Outliers
- Skew

6.SP.5

- Interquartile range
- Mean absolute deviation
- Mean measure of center
- Measures of spread

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LESSON PLAN for UNIT _____

LESSONS

- **Lesson # 1 Summary:**
- **Lesson #2 Summary:**
- **Lesson #3 Summary:**

OBJECTIVES for LESSON # _____

- **Materials/Resources:**
- **Procedures:**
  - **Lead –in**
  - **Step by step**
  - **Closure**
- **Instructional strategies:** see curriculum introduction
- **Assessments:** see curriculum introduction
  - **Formative**

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- **Summative**

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