

# MATHEMATICS COMMON CORE CURRICULUM UNIT #1 Grade 6\*

## North Smithfield School Department

**TITLE OF UNIT:** Operations and Statistical Variability **COURSE OR GRADE :** 6  
**DATE PRESENTED:** \_\_\_\_\_ **DATE DUE:** \_\_\_\_\_ **LENGTH OF TIME:** Several weeks, quarter, semester

### OVERVIEW OF UNIT:

In this unit, students will compute, apply, and extend their previous understandings of numbers and operations. They will explore statistical questions, collect and display data, and summarize that information using measures of center.

### ESSENTIAL QUESTIONS

*How do the standard algorithms improve fluency?*

*How is statistical data used in the real world?*

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

| Ratios and Proportional Relationships <b>RP</b> | The Number System <b>NS</b>               | Expressions and Equations <b>EE</b> | Functions (grade 8) <b>F</b> | Geometry <b>G</b>        | Statistics and Probability <b>SP</b>         |
|---|---|-------------------------------------|------------------------------|--------------------------|--|
| <input type="checkbox"/>                        | <input type="checkbox"/> <b>6.NS.1</b>    | <input type="checkbox"/>            | <input type="checkbox"/>     | <input type="checkbox"/> | <input type="checkbox"/> <b>6.SP.1, 2, 3</b> |
| <input type="checkbox"/>                        | <input type="checkbox"/> <b>6.NS.2, 3</b> | <input type="checkbox"/>            | <input type="checkbox"/>     | <input type="checkbox"/> | <input type="checkbox"/> <b>6.SP.5</b>       |
| <input type="checkbox"/>                        | <input type="checkbox"/> <b>6.NS.3</b>    |                                     |                              |                          |  |
| <input type="checkbox"/>                        | <input type="checkbox"/>                  |                                     |                              |                          |  |

### STANDARDS: 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 | 8. Look for and express regularity in repeated reasoning |
| 2. Reason abstractly and quantitatively                 | 4. Model with mathematics ★  | 6. Attend to precision                 |                                       |  |

### FOCUS MATHEMATICS STANDARDS: [see curriculum](#) for specific standards, e.g.

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions. **6.NS.1**
- Compute fluently with multi-digit numbers and find common factors and multiples. **6.NS.2, 3**
- Apply and extend previous understandings of numbers to the system of rational numbers. **6.NS.5**
- Develop understanding of statistical variability. **6.SP.1, 2, 3**
- Summarize and describe distributions **6.SP.5**

#### Applied Learning Standards:

problem solving
communication
critical thinking
research
reflection/ evaluation

### ENDURING UNDERSTANDING:

- Students will accurately and fluently perform the basic operations on whole numbers, decimals, and fractions using standard algorithms.
- Students will interpret and analyze statistical data to make sense of the real world.

### PRIOR KNOWLEDGE:

- Students will know how to add, subtract, multiply, and divide whole numbers, decimals (to hundredths), and fractions.
- Students will know how to plot positive numbers on horizontal and vertical number lines.

### STUDENT OBJECTIVES, SKILLS and/or NEW KNOWLEDGE:

- **6.NS.1** Operations perform the same function on fractions and decimals as they do on whole numbers.
- **6.NS.1** Context and visual models help make the connection between dividing by a fraction and multiplying by the reciprocal of that fraction.
- **6.NS.2** Standard algorithms improve fluency of addition, subtraction, multiplication and division with multi-digit numbers and decimals.
- **6.NS.3** Properties of operations are used to simplify and fluently compute problems with multi-digit numbers and decimals.
- **6.NS.3** Positive and negative numbers are used to represent quantities in real-world contexts in relationship to the zero value for that context.
- **6.NS.5** A negative symbol represents the opposite value of a quantity (or the opposite direction on a number line from zero.)
- **6.NS.5** A number line extends infinitely to the left of zero to incorporate negative numbers.(TUSD)
- **6.SP.1** Statistical questions that anticipate variability are questions in which students are expecting a range of values for answers.
- **6.SP.2** A set of data can be described by its center, spread and overall shape.
- **6.SP.3** Measures of center (mean, median, and mode) and range, give one number that represents the data in different ways.
- **6.SP.5** One way to display data sets is to use number lines to create dot plots, histograms and box plots.

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### SUGGESTED PROBLEMS:

#### 6.NS.1 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/050/original/illustrative\\_mathematics\\_50.pdf?1364320802](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/050/original/illustrative_mathematics_50.pdf?1364320802)
- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/410/original/illustrative\\_mathematics\\_410.pdf?1343856991](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/410/original/illustrative_mathematics_410.pdf?1343856991)
- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/267/original/illustrative\\_mathematics\\_267.pdf?1343856995](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/267/original/illustrative_mathematics_267.pdf?1343856995)

#### 6.NS.1 Advanced

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/413/original/illustrative\\_mathematics\\_413.pdf?1343856995](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/413/original/illustrative_mathematics_413.pdf?1343856995)

#### 6.NS.2 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/270/original/illustrative\\_mathematics\\_270.pdf?1343856975](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/270/original/illustrative_mathematics_270.pdf?1343856975)
- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/001/300/original/illustrative\\_mathematics\\_1300.pdf?1364569848](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/300/original/illustrative_mathematics_1300.pdf?1364569848)

#### 6.NS.3 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/274/original/illustrative\\_mathematics\\_274.pdf?1343856959](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/274/original/illustrative_mathematics_274.pdf?1343856959)
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#### 6.NS.3 Advanced

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- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/272/original/illustrative\\_mathematics\\_272.pdf?1343856988](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/272/original/illustrative_mathematics_272.pdf?1343856988)

#### 6.NS.5 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/277/original/illustrative\\_mathematics\\_277.pdf?1352436008](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/277/original/illustrative_mathematics_277.pdf?1352436008)
- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/000/278/original/illustrative\\_mathematics\\_278.pdf?1350276391](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/278/original/illustrative_mathematics_278.pdf?1350276391)

#### 6.SP.1 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/001/040/original/illustrative\\_mathematics\\_1040.pdf?1364609125](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/040/original/illustrative_mathematics_1040.pdf?1364609125)

#### 6.SP.2 Basic

- [http://s3.amazonaws.com/illustrativemathematics/illustration\\_pdfs/000/001/199/original/illustrative\\_mathematics\\_1199.pdf?1358652973](http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/199/original/illustrative_mathematics_1199.pdf?1358652973)

#### 6.SP.3 Basic/Advanced

- <http://www.opusmath.com/common-core-standards/6.sp.3-recognize-that-a-measure-of-center-for-a-numerical-data-set-summarizes-all?q=Understand%20measures%20of%20center%20and%20variability%20as%20summary%20statistics>

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

- **6.NS.1**
  - Create a visual model.
  - Design real-world problems to demonstrate dividing by a fraction.
- **6.NS.2**
  - Model mathematical algorithms to explain place value.

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- **6.NS.3**
  - Explain how using estimation strategies and knowledge of place value help determine if a decimal answer is reasonable.
- **6.NS.5**
  - Solve real-world problems involving positive and negative numbers such as: temperature, elevation, credit/debit, etc.
- **6.SP.1**
  - Design a statistical question that anticipates variability.
- **6.SP.2**
  - Using the statistical question from 6.SP.1, collect data, display data on line plot, and identify clusters, peaks, gaps, symmetry, center, spread, and overall shape.
- **6.SP.3**
  - Using displayed data from 6.SP.2, determine the measures of center and variation (mean, median, mode, maximum, minimum, and range)
- **6.SP.5**
  - Generate data set by counting numbers of letters in each student's first name (within small group) and represent this data using stacking cubes. Model mean by "leveling" cubes. Display original data on a dot plot. Compare small group data with another small group's data (then whole class) to determine mean measure of center and deviation. (See Teaching Example 6.SP.4 in curriculum guide.)

### UNIT 1 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*

#### VOCABULARY

##### 6.NS.1

- Fraction
- Numerator
- Denominator
- Reciprocal
- Operation(s)

##### 6.NS.2

- Algorithm
- Estimation
- Place value

##### 6.NS.3

- Decimals

##### 6.NS.5

- Absolute value
- Opposite value
- Negative number
- Positive number

##### 6.SP.1

- Data
- Statistics
- Statistical question
- Variability

##### 6.SP.2

- Center
- Clusters
- Distribution
- Gap
- Line plot
- Peak
- Spread
- Symmetry

##### 6.SP.3

- Measures of center
- Measures of variation
- Mean
- Median
- Mode
- Maximum
- Minimum
- Range

##### 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:

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OBJECTIVES for LESSON # \_\_\_\_\_

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