## **Mathematics Curriculum Map**

### Sussex Montessori School

The mathematics curriculum is built around several research-based curriculum and standards documents including:

First State Montessori Academy Curriculum Montessori Mathematics Curriculum Albums The National Common Core Standards National Council of Teachers of Mathematics Investigations 3/ Connections Mathematics

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#### Introduction to the Mathematics Curriculum Framework

In the Mathematics Curriculum, the teacher must be knowledgeable about the "Processes and Proficiencies" and have tools to assess when students demonstrate these proficiencies as they work within the various mathematical strands. Teachers also need a clear understanding of the knowledge goals for mathematical thinking within each of strands. The Montessori Mathematics Curriculum Framework provides teachers with the goals for mathematics at each multi-age stage of development (5-7, 7-9, and 9-12-year-old). Early in the school year, teachers use a variety of assessments to determine where children are on the learning continuum in each area. The Curriculum Framework provides the teacher with instructional strategies that are used in small group and individual lessons/units using hands-on Montessori materials, TERC Investigations 3 Mathematics, and other resources to meet the individual instructional needs of the child. These lessons provide opportunities for teachers to observe children and to evaluate their progress towards the goals for learning across each strand of the mathematics curriculum as well as their understanding and demonstration of the processes and proficiencies. The Framework provides various formative and summative assessment tools for teachers to confirm their observations, and to make adjustments to instruction as a result of those observations. These tools include daily

observations, teacher designed assessments, and summative assessments. DIBELS Math assessments are used to identify children who may need to be more closely followed and monitored in the RTI model of assessment/instruction.

The development of the child in Mathematics is embedded within the context of a classroom that supports the best educational practices. It is generally accepted that the workforce of the future will require skills such as creative and innovative thinking, comfort with ideas and abstraction, along with a global worldview and vibrant imagination. Research (Adams, 2005) shows that children develop these skills in classrooms designed to promote intrinsic motivation; to provide choice, time for focus and deep study in areas of interest; to allow opportunities to experiment and discover, and to develop a focus on "What did you learn?" rather than "How well did you do?" The overall Montessori Program is designed to support the following:

 A focus on big ideas and essential questions with extended work periods to allow for depth of understanding and habits of mind.

- Child-centered inclusive learning environments that utilize differentiated instruction and flexible grouping to meet individual children's learning needs.
- Classroom-based assessment and observation that informs instructional decision making as the basis for RTI.
- Hands-on interactive curricular materials and classroom environment supporting children developing from concrete to abstract thinking.

- Academic development supported by an emphasis on the social/emotional development of the child within a multi-age community of learners.
- **Collaborative learning** and **community service** leading to mutual respect of others and the development of the child's **global perspective.**

#### References

Adams, K. (2005). "Sources of innovation and creativity". A paper commissioned by the National Center on Education and the Economy. Accessed 10/26/2011 at <a href="http://www.fpspi.org/Pdf/InnovCreaitivy.pdf">http://www.fpspi.org/Pdf/InnovCreaitivy.pdf</a>.

Montessori, Maria. (1991). *The Advanced Montessori Method: Scientific pedagogy as applied to the education of children from seven to eleven years*. Oxford, England: Clio Press.

Montessori, Maria. (1973). The Advanced Montessori Method: Volume 2. New York: Schocken Books.

|                                     | Mathematics Proces                         | ses and Proficiencies                 |  |
|-------------------------------------|--|---------------------------------------|--|
| This table presents the overall set | t of 'habits of mind" that contribute t    | to the development of mathematical    | processes and proficiencies. This                    |
| table provides an over-arching      | g guide to these processes and profic      | iencies that will be focused on by SN | 1S teachers through the use of                       |
| Μ                                   | ontessori Math materials and the Inv       | vestigations 3/ Connections Math uni  | its.   |
| Mathematically proficient student   | ts:  |                                       |  |
| Make sense of problems and          | Reason abstractly and                      | Construct viable arguments and        | Model with mathematics.                              |
| persevere in solving them.          | quantitatively.                            | critique the reasoning of             |  |
| Explain to themselves the           | Make sense of quantities and               | others.                               | Apply the mathematics they<br>know to solve problems |
| meaning of a problem.               | their relationships in problem             | Understand and use stated             | ·  |
| Look for entry points to its        | situations.                                | assumptions, definitions, and         | arising in everyday life,                            |
| solution.                           |  | previously established results        | society, and the workplace.                          |
|                                     | Bring two complementary                    |                                       | In early grades, this might be as                    |
| Analyze givens, constraints,        | abilities to bear on problems              | in constructing arguments.            | simple as writing an addition                        |
| relationships, and goals.           | involving quantitative                     | Make conjectures and build a          | equation to describe a                               |
| Make conjectures about the form     | relationships:                             | logical progression of                | situation.   |
| and meaning of the solution.        | The ability to <i>decontextualize</i> , to | statements to explore the             | Apply what they know.                                |
| Plan a solution pathway rather      | abstract a given situation and             | truth of their conjectures.           | Make assumptions and                                 |
| than simply jumping into a          | represent it symbolically and              | Analyze situations by breaking        | approximations to simplify a                         |
| solution attempt.                   | manipulate the representing                | them into cases.                      | complicated situation,                               |
| Consider analogous problems,        | symbols as if they have a life             | Recognize and use                     | realizing that these may need                        |
| and try special cases and           | of their own, without                      | counterexamples.                      | revision later.                                      |
| simpler forms of the original       | necessarily attending to their             | Justify their conclusions,            | Identify important quantities in a                   |
| problem in order to gain            | referents                                  | communicate them to                   | practical situation.                                 |
| insight into its solution.          | The ability to <i>contextualize</i> , to   | others, and respond to the            | Map relationships using such                         |
| Monitor and evaluate their          | pause as needed during the                 | arguments of others.                  | tools as diagrams, two-way                           |
| progress and change course          | manipulation process in                    | Make plausible arguments that         | tables, graphs, flowcharts                           |
| if necessary.                       | order to probe into the                    | take into account the context         | and formulas.  |
| Explain correspondences             | referents for the symbols                  | from which the data arose,            | Analyze relationships                                |
| between equations, verbal           | involved.                                  | reasoning inductively.                | mathematically to draw                               |
| descriptions, tables, and           | Create a coherent representation           | Compare the effectiveness of two      | conclusions.   |
| graphs or draw diagrams of          | of the problem at hand,                    | plausible arguments.                  | Interpret their mathematical                         |

|                                       | 1                                   | 1                                  |                                 |
|---------------------------------------|-------------------------------------|------------------------------------|---------------------------------|
| important features and                | considering the units               | Distinguish correct logic or       | results in the context of the   |
| relationships, graph data.            | involved.                           | reasoning from that which is       | situation.                      |
| Search for regularity or trends.      | Attend to the meaning of            | flawed, and, if there is a flaw    | Reflect on whether the results  |
| Check their answers to problems       | quantities, not just how to         | in an argument, explain what       | make sense, possibly            |
| using a different method.             | compute them.                       | it is.                             | improving the model if it has   |
| Ask themselves, "Does this make       | Know and flexibly use different     | Listen to or read the arguments    | not served its purpose.         |
| sense?"                               | properties of operations and        | of others, decide whether          |                                 |
| Understand the approaches of          | objects.                            | they make sense.                   |                                 |
| others to solving complex             |                                     | Ask useful questions to clarify or |                                 |
| problems.                             |                                     | improve arguments.                 |                                 |
| Identify correspondences              |                                     | Construct arguments using          |                                 |
| between different                     |                                     | concrete referents such as         |                                 |
| approaches.                           |                                     | objects, drawings, diagrams,       |                                 |
| Use concrete objects or pictures      |                                     | and actions. Such arguments        |                                 |
| to help conceptualize and             |                                     | can make sense and be              |                                 |
| solve a problem. (younger             |                                     | correct, even though they are      |                                 |
| students)                             |                                     | not generalized or made            |                                 |
| Transform algebraic expressions       |                                     | formal until later grades.         |                                 |
| or change the viewing                 |                                     | (younger students)                 |                                 |
| window on their graphing              |                                     | Determine domains to which an      |                                 |
| calculator to get the                 |                                     | argument applies. (older           |                                 |
| information they need,                |                                     | students)                          |                                 |
| depending on the context of           |                                     |                                    |                                 |
| the problem. (older students)         |                                     |                                    |                                 |
| Mathematically proficient student     | ts:                                 |                                    | •                               |
| · · · · · · · · · · · · · · · · · · · |                                     |                                    |                                 |
| Use Appropriate Tools                 | Attend to precision.                | ok for and make use of structure.  | Look for and express regularity |
| Strategically.                        | Communicate precisely to            | Look closely to discern a pattern  | in repeated reasoning.          |
| Consider the available tools when     | others.                             | or structure.                      | Notice if calculations are      |
| solving a mathematical                | Use clear definitions in discussion | Young students might notice that   | repeated, and look both for     |
| problem. These tools might            | with others and in their own        | three and seven more is the        | general methods and for         |
|                                       |                                     |                                    |                                 |

| include pencil and paper,       | reasoning.                          | same amount as seven and                     | shortcuts.                     |
|---------------------------------|-------------------------------------|--|--------------------------------|
| concrete models, a ruler, a     | State the meaning of the symbols    | three more, or they may sort                 | Upper elementary students      |
| protractor, a calculator, a     | they choose, including using        | a collection of shapes                       | might notice when dividing     |
| spreadsheet, a computer         | the equal sign consistently         | according to how many sides                  | 25 by 11 that they are         |
| algebra system, a statistical   | and appropriately.                  | the shapes have.                             | repeating the same             |
| package, or dynamic             | Use care to correctly specify units | Later, students will see 7 × 8               | calculations over and over     |
| geometry software.              | of measure, and label axes to       | equals the well-remembered                   | again, and conclude they       |
| Develop familiarity with tools  | clarify the correspondence          | $7 \times 5 + 7 \times 3$ , in preparation   | have a repeating decimal.      |
| appropriate for their grade or  | with quantities in a problem.       | for learning about the                       | Apply what they know.          |
| course to make sound            | Calculate accurately and            | distributive property.                       | Maintain oversight of the      |
| decisions about when each of    | efficiently.                        | Older students can look at the               | problem-solving process,       |
| these tools might be helpful,   | Express numerical answers with a    | expression 2x + 9x + 14 and                  | while attending to the         |
| recognizing both the insight    | degree of precision                 | see the 14 as 2 × 7 and the 9                | details.                       |
| to be gained and their          | appropriate for the problem         | as 2 + 7.                                    | Evaluate the reasonableness of |
| limitations. For example,       | context.                            | Recognize the significance of an             | their intermediate results.    |
| mathematically proficient       | Give carefully formulated           | existing line in a geometric                 |                                |
| high school students analyze    | explanations to each other.         | figure and can use the                       |                                |
| graphs of functions and         | (elementary school)                 | strategy of drawing an                       |                                |
| solutions generated using a     | Examine claims and make explicit    | auxiliary line for solving                   |                                |
| graphing calculator.            | use of definitions. (high           | problems.                                    |                                |
| Detect possible errors by       | school)                             | Consider an overview and be able             |                                |
| strategically using estimation  |                                     | to shift perspective.                        |                                |
| and other mathematical          |                                     | See complicated things as single             |                                |
| knowledge.                      |                                     | objects or as being composed                 |                                |
| Know that technology can enable |                                     | of several objects.                          |                                |
| them to visualize the results   |                                     | For example, they can see $5 - 3(x)$         |                                |
| of varying assumptions,         |                                     | $(-y)^2$ as 5 minus a positive               |                                |
| explore consequences, and       |                                     | number times a square and                    |                                |
| compare predictions with        |                                     | use that to realize that its                 |                                |
| data.                           |                                     | value cannot be more than 5                  |                                |
| Identify relevant external      |                                     | for any real numbers <i>x</i> and <i>y</i> . |                                |

#### Attachment 4D - Math Maps

| mathematical resources,<br>such as digital content<br>located on a website, and use<br>them to pose or solve<br>problems.<br>Use technological tools to |  |  |
|---|--|--|
| explore and deepen their  |  |  |
| understanding of concepts.  |  |  |

#### **Curriculum Resources and Materials**

There are three resources that will be the foundation for the math curriculum at FSMA.

- Montessori Math Lessons
- TERC Investigations 3 (Grades K-5)
- Connected Mathematics (Grade 6)

Montessori Math Lessons are part of a larger integrated curriculum. This integrated curriculum is founded on the teaching of five "Great Lessons." Relevant to the Math Curriculum articulated in this document is the fifth Great lesson, "The History of Mathematics," also called "The Story of Numbers," which focuses on learning about the numeric system of early civilizations and continuing by looking at the different number systems that have been used and culminates with a study of the decimal system used today. The Fifth Great Lesson: The Story of Numbers leads to the study of:

- Mathematics: operations, fractions, decimals, multiples, squares, cubes, percentages, ration, probability, intro to algebra
- Numbers: origins of numbers and systems, bases, types of numbers, scientific notation, mathematicians
- Geometry: congruency, similarity, nomenclature of lines, angels, shapes, solids, measurement and theorems
- Application: story problems, measurement, estimation, graphs, patterning, rounding, money concepts.

*Montessori Math in the Lower Elementary Classrooms:* The lower elementary Montessori classroom is full of ongoing discoveries. Spurred on by the telling of the fifth Great Lesson, "the Story of Numbers," children are motivated to

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learn about their own number system and uncover the mysteries as did those who came before. The absorbent mind of the early childhood has given way to a reasoning mind which enjoys learning about natural truths and laws of nature. The mathematical facts learned in the younger grades are now tested to see if there are rules and laws to be discovered and manipulated. Patterns are sought as the child seeks to discover the empirical truths of the universe through the use of concrete Montessori math materials. It is now that children are able to use their imaginations to see beyond the immediate. They are able to see beyond the concrete reputations and imagine higher place values in the decimal system.

Montessori math in the upper Elementary Classroom: The inquisitiveness of the upper elementary Montessori student is astounding. The beauty of the advanced squaring and cubing materials beckons like beacons, inviting the students to come explore and learn with them. They dive into the study of fractions and decimals, eager to move beyond to more complex mathematics, geometry, and, algebra. While the concrete materials are still in place, the need for repetition is gone. "Show me. Then, show me more" is the litany of the upper elementary Montessori math students. Upper elementary students move quickly form the concrete experience abstract thought. They are eager to test their knowledge with pencil and paper and need, at times, a gentle reminder to return to the materials as a way of building neurological pathways.

<u>TERC Investigations 3 (k-5<sup>th</sup> grade</u>) helps students develop a strong conceptual foundation and skills based on that foundation. Each curriculum unit focuses on an area of content and provides opportunities for student to develop and practice e ideas across a variety of activities and contexts that build on each other. The units also address the learning needs of real students in a wide range of classrooms and communities. there are six major goals of the curriculum:

- Support student to make sense of mathematics and learn that they can be mathematical thinking
- Focus on computational fluency with whole numbers as a major goal of elementary grades
- Provide substantive work in important areas of mathematics – rational numbers, geometry, measurement, data, and earl algebra – and connections among them.
- Emphasize reasoning about mathematical ideas
- Communicate mathematics content and pedagogy to teachers
- Engage the range of learners in understanding mathematics

Underlying these goals are three guiding principles that are closely connected to the Montessori philosophy:

- 1. Students have mathematical ideas. The curriculum must support all students in developing and expanding those ideas.
- 2. Teachers are engaged in ongoing earning about mathematics content and how students learn mathematics.
- 3. Teachers collaborate with the students and curriculum materials to create the curriculum as enacted in the classroom. The curriculum must support teachers in implementing it in a way that accommodates the needs of their particular students.

<u>Connected Math (6<sup>th</sup> grade)</u> is a math curriculum designed for students in grades 6-8. It is a natural extension of the TERC Investigations. Each grade level of the curriculum is a fullyear program and covers numbers, algebra, geometry/measurement, probability, and statistics. The curriculum uses an investigative approach, and students utilize interactive problems and everyday situation to learn math concepts.

#### **SMS Mathematics Assessments**

The following tables outline the mathematics assessments that will allow the Sussex Montessori School teacher to collect both formative (F) and summative data (S) on students' progress in mathematics in each age grouping.

| Common Core Domain                         | Smarter<br>Balance | Third Period of<br>Lesson: Ob |          | TERC Investigations3/ Connections (6 <sup>th</sup> grade) |            |                                      | DIBELS Math<br>3 time a year |
|--|--------------------|-------------------------------|----------|---|------------|--------------------------------------|------------------------------|
|  |                    | Anecdotal<br>Records          | Journals | Assessment<br>Checklists                                  | Portfolios | Embedded<br>Benchmark<br>Assessments |                              |
| Mathematics Processes<br>and Proficiencies | N/A                | x                             | X        | X   | Х          | x                                    |                              |
| Counting and<br>Cardinality                | N/A                | x                             | X        | X   | Х          | x                                    | Х                            |
| Numbers and<br>Operations in Base 10       | N/A                | X                             | x        | X   | Х          | Х                                    | X                            |
| Numbers and<br>Operations Fractions        | N/A                | X                             | X        | X   | Х          | Х                                    |                              |
| Operations/Algebraic<br>Thinking           | N/A                | x                             | Х        | X   | Х          | x                                    | Х                            |
| Geometry                                   | N/A                | Х                             | Х        | X   | Х          | Х                                    | Х                            |
| Measurement and Data                       | N/A                | Х                             | х        | X   | Х          | Х                                    | Х                            |

#### K/1 Mathematics Assessments

| Common Core Domain                         | Smarter<br>Balance   | Third Period o<br>Lesson: Ob |                          | TERC Investigations3/ Connections (6 <sup>th</sup> grade) |                                      |   | DIBELS Math<br>3 time a year |
|--|----------------------|------------------------------|--------------------------|---|--------------------------------------|---|------------------------------|
|  | Anecdotal<br>Records | Journals                     | Assessment<br>Checklists | Portfolios  | Embedded<br>Benchmark<br>Assessments |   |                              |
| Mathematics Processes<br>and Proficiencies | Х                    | X                            | Х                        | X   | Х                                    | x |                              |
| Numbers and<br>Operations in Base 10       | Х                    | X                            | X                        | X   | Х                                    | x | Х                            |
| Numbers and<br>Operations Fractions        | X                    | x                            | Х                        | X   | Х                                    | X |                              |
| Operations/Algebraic<br>Thinking           | Х                    | x                            | Х                        | X   | Х                                    | X | Х                            |
| Geometry                                   | х                    | Х                            | X                        | X   | Х                                    | X | Х                            |
| Measurement and Data                       | х                    | Х                            | Х                        | X   | Х                                    | Х | Х                            |

#### 2/3 Mathematics Assessments

#### 4/5/6 Mathematics Assessments

| Common Core Domain  | SmarterThird Period of MontessoriBalanceLesson: Observation |                      |          | TERC Investig            | DIBELS Math<br>3 time a year |                                      |   |
|---|---|----------------------|----------|--------------------------|------------------------------|--------------------------------------|---|
|   |   | Anecdotal<br>Records | Journals | Assessment<br>Checklists | Portfolios                   | Embedded<br>Benchmark<br>Assessments |   |
| Mathematics Processes<br>and Proficiencies                  | Х   | х                    | X        | X                        | Х                            | X                                    |   |
| Numbers and<br>Operations in Base 10                        | Х   | X                    | x        | x                        | Х                            | X                                    | Х |
| Numbers and<br>Operations Fractions                         | Х   | Х                    | X        | X                        | Х                            | X                                    | Х |
| Operations/Algebraic<br>Thinking                            | Х   | x                    | X        | X                        | Х                            | X                                    | Х |
| Geometry  | Х   | Х                    | Х        | X                        | Х                            | х                                    | Х |
| Ratios and Proportional<br>Relationships (6 <sup>th</sup> ) |   | Х                    | X        | X                        | Х                            | X                                    | Х |
| Measurement and Data  | х   | Х                    | Х        | Х                        | Х                            | Х                                    | Х |
| Statistics and<br>Probability (6 <sup>th</sup> )            | Х   | x                    | X        | X                        | Х                            | X                                    | Х |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum Kindergarten

#### **Curriculum Framework for Mathematics**

School: <u>Sussex Montessori School</u> Curricular Resources: <u>Montessori Materials and Lessons / Investigations 3</u> Grade: <u>K</u>

Unit One: Counting Timeline: 16 Sessions

**Unit Description:** In this unit children will explore counting objects, connect number names to the written number, and use numbers to organize and label sets.

| Standards Alignment                             | Unit Concept/Big Ideas    | Essential Questions/           | Instructional Materials/             |
|---|---------------------------|--------------------------------|--------------------------------------|
|   |                           | Learning Targets               | Assessments                          |
| K.CC.A.1 Count to 100 by ones and by tens.      | Count objects and         | Essential Questions:           | Montessori Materials                 |
|   | represent quantities with | How can numbers be counted,    | Cards and Counters                   |
| K.CC.A.3 Write numbers from 0 to 20.            | numbers, names, and       | read, and written?             | Spindle Box (for review)             |
| Represent a number of objects with a written    | numerals.                 | How does counting tell how     | Number Rods                          |
| numeral 0-20 (with 0 representing a count of    |                           | many?                          | Golden Bead Material                 |
| no objects).                                    | Compare and order         | How can numbers be             | Bead Cabinet                         |
|   | quantities.               | represented?                   | Teens Board                          |
| K.CC.B.4 Understand the relationship between    |                           | What are strategies that we    | Tens Board                           |
| numbers and quantities; connect counting to     | Counting is cumulative.   | can use to keep track of       | Hundred Board                        |
| cardinality.                                    |                           | quantities when we count?      |                                      |
|   | Counting tells how many   | What is the unique vocabulary  | Investigations Unit 1 –              |
| K.CC.B.4a When counting objects, say the        | are in a set.             | related to quantity?           | Counting People, Sorting             |
| number names in the standard order, pairing     |                           |                                | Buttons                              |
| each object with one and only one number        | There is a unique         | Learning Targets:              |                                      |
| name and each number name with one and          | vocabulary that helps     | Students will:                 | Assessments:                         |
| only one object.                                | describe quantities.      | • use strategies to accurately | <u>Formative</u>                     |
|   |                           | count and keep track of        | Student Exercises                    |
| K.CC.B.4b Understand that the last number       | Represent quantities with | quantities up to 10.           | <ul> <li>Peer questioning</li> </ul> |
| name said tells the number of objects counted.  | pictures, numbers,        |                                | Classroom Discussion                 |
| The number of objects is the same regardless    | objects, and/or words.    | • count and compare            | Problem Solving                      |
| of their arrangement or the order in which they |                           | quantities up to 10.           | Challenges                           |
| were counted.                                   | Use attributes of objects |                                | Exit Tickets                         |
|   | to sort them according to |                                | Vocabulary checks                    |
| K.CC.B.4c Understand that each successive       |                           |                                |                                      |

| number name refers to a quantity that is one larger.  | how they are alike or different. | • | represent quantities with pictures, numbers, objects, | <u>Su</u><br>• | <u>mmative</u><br>Montessori Three-   |
|---|----------------------------------|---|---|----------------|---|
| K.CC.B.5 Count to answer "how many?"<br>questions about as many as 20 things arranged<br>in a line, a rectangular array, or a circle, or as<br>many as 10 things in a scattered configuration;<br>given a number from 1–20, count out that<br>many objects. |                                  |   | or words.   | •              | Period Lesson including<br>introduction, practice,<br>and assessment of the %<br>of concept mastery.<br>Problem-based<br>interactive Learning<br>activities |
| K.CC.C.6 Identify whether the number of<br>objects in one group is greater than, less than,<br>or equal to the number of objects in another<br>group, e.g., by using matching and counting<br>strategies.   |                                  |   |   | •              | Performance<br>assessment   |
| K.MD.B.3 Classify objects into given categories;<br>count the numbers of objects in each category<br>and sort the categories by count.  |                                  |   |   |                |   |

Unit Two: Counting and Measurement **Timeline: 22 Sessions** Unit Description: In this unit, students will further develop counting skills, connect number names and numerals, and develop visual images of quantities up to 10. They will compare and order two or more amounts and describe and measure the length of objects by direct comparison. **Essential Questions/** Instructional Materials/ **Standards Alignment** Unit Concept/Big Ideas Learning Targets Assessments Understanding length Essential Questions: K.CC.A.1 Count to 100 by ones and by tens. Montessori Materials How can we make equivalent Cards and Counters K.CC.A.2 Count forward beginning from a given Number Rods Understanding weight sets? number within the known sequence (instead of How can we use numbers to Golden Bead Material Bead Cabinet having to begin at 1). Counting and representing represent quantities? quantities How can we determine what **Teens Board** K.CC.A.3 Write numbers from 0 to 20. has more? Tens Board Represent a number of objects with a written What is length? Hundred Board numeral 0-20 (with 0 representing a count of What is weight? Investigations Unit 2 no objects). **Counting Quantities**, Learning Targets: K.CC.B.4 Understand the relationship between Students will: **Comparing Lengths** numbers and quantities; connect counting to count and count out a set cardinality. of objects up to 10 objects. Assessments: Formative K.CC.B.4a When counting objects, say the Students will compare two Student Exercises number names in the standard order, pairing quantities up to 10 to Peer questioning ٠ each object with one and only one number determine which is greater. Classroom Discussion ٠ name and each number name with one and Problem Solving • only one object. Describe length and decide Challenges ٠ which of two objects is Exit Tickets • K.CC.B.4b Understand that the last number longer. Vocabulary checks • name said tells the number of objects counted. The number of objects is the same regardless Summative of their arrangement or the order in which they

| <ul> <li>were counted.</li> <li>K.CC.B.4c Understand that each successive<br/>number name refers to a quantity that is one<br/>larger.</li> <li>K.CC.B.5 Count to answer "how many?"<br/>questions about as many as 20 things arranged<br/>in a line, a rectangular array, or a circle, or as<br/>many as 10 things in a scattered configuration;<br/>given a number from 1–20, count out that<br/>many objects.</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson including<br/>introduction, practice,<br/>and assessment of the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|
| K.CC.C.6 Identify whether the number of<br>objects in one group is greater than, less than,<br>or equal to the number of objects in another<br>group, e.g., by using matching and counting<br>strategies.   |  |
| K.CC.C.7 Compare two numbers between 1 and 10 presented as written numerals.  |  |
| K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.  |  |
| K.MD.B.3 Classify objects into given categories;<br>count the numbers of objects in each category   |  |

| and sort the categories by count. |  |  |
|-----------------------------------|--|--|
|                                   |  |  |

| Standards Alignment  | Unit Concept/Big Ideas               | Essential Questions/<br>Learning Targets  | Instructional Materials/<br>Assessments  |
|--|--------------------------------------|---|--|
| K.G.A.1 Describe objects in the environment  | Describing, identifying,             | Essential Questions:  | Montessori Materials   |
| using names of shapes, and describe the relative positions of these objects using terms  | and comparing 2-D shapes             | What are 2-D shapes?<br>What are attributes?  | Geometry Cabinet<br>Constructive Triangle Boxes  |
| such as above, below, beside, in front of,<br>behind, and<br>next to.  | Composing and decomposing 2-D shapes | What are the attributes of<br>curved shapes?<br>What are the attributes of<br>rectangles, squares, triangles,                   | Insets<br>3-Part Cards<br>Investigations Unit 3 –  |
| K.G.A.2 Correctly name shapes regardless of their orientations or overall size.  |                                      | What shapes can I make with other shapes?   | Make a Shape, Fill a<br>Hexagon  |
| K.G.A.3 Identify shapes as two-dimensional<br>(lying in a plane, "flat") or three-dimensional<br>("solid").  |                                      | What shapes do I see around me?   | Assessments:<br>Formative<br>• Student Exercises   |
| K.G.B.4 Analyze and compare two- and three<br>dimensional shapes, in different sizes and<br>orientations, using informal language to<br>describe their similarities, differences, parts<br>(e.g., number of sides and vertices/"corners")<br>and other |                                      | <ul> <li>Students will:</li> <li>Identify and describe the overall size, shape, and features of familiar 2-D shapes.</li> </ul> | <ul> <li>Peer questioning</li> <li>Classroom Discussion</li> <li>Problem Solving</li> <li>Challenges</li> <li>Exit Tickets</li> <li>Vocabulary checks</li> </ul> |
| attributes (e.g., having sides of equal length).   |                                      | Make 2-D shapes.  | <u>Summative</u>   |
| K.G.B.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.   |                                      | Combine smaller shapes to make larger shapes.   | <ul> <li>Montessori Three-<br/>Period Lesson including<br/>introduction, practice,<br/>and assessment of the<br/>of concept mastery.</li> </ul>                  |

| K.G.B.6 Compose simple shapes to form larger<br>shapes. For example, "Can you join these two<br>triangles with full sides touching to make a<br>rectangle?" | <ul> <li>Find combinations of<br/>shapes that fill a region.</li> <li>Describe 2-D shapes by</li> <li>Performance</li> </ul> |
|---|--|
|   | <ul> <li>their attributes. assessment</li> <li>Identify 2-D shapes in their environments.</li> </ul>                         |

# Unit Four: Counting and Measurement 2Timeline: 23 SessionsUnit Description: In this unit, students will focus on counting and representing sets of up to 15 objects, using counting skills, decomposing<br/>numbers in many ways, and beginning to make sense of the operations of addition and subtraction.

| Unit Concept/Big Ideas    | Essential Questions/<br>Learning Targets  | Instructional Materials/<br>Assessments   |
|---------------------------|---|---|
| Counting and representing | Essential Questions:  | Montessori Materials  |
| quantities                | How do we represent   | Golden Bead Material  |
|                           | quantities over 10?   | Bead Cabinet  |
| Comparing and ordering    | How do we make an equivalent  | Teens Board   |
| quantities                | set and represent the quantity  | Tens Board  |
|                           | for a given number?   | Hundred Board   |
| Collecting, representing, | How can we keep track of  | A variety of counters   |
| describing, and           | growing sets of objects?  |   |
| interpreting data         |   | Investigations Unit 4 –   |
|                           | Learning Targets:   | Collect, Count, and   |
|                           | Students will:  | Measure   |
|                           | • Count and count out a set   |   |
|                           | of up to 15 objects.  | Assessments:  |
|                           |   | <u>Formative</u>  |
|                           | • Make a set of a given size.   | Student Exercises   |
|                           |   | Peer questioning  |
|                           | • Use numbers to represent  | Classroom Discussion  |
|                           | measurements and  | Problem Solving   |
|                           | quantities.   | Challenges  |
|                           | •   | Exit Tickets  |
|                           | • Record an arrangement of  | Vocabulary checks   |
|                           | e e   |   |
|                           | , ,   | Summative   |
|                           |   | Montessori Three-   |
|                           |   | Period Lesson including   |
|                           | Counting and representing<br>quantities<br>Comparing and ordering<br>quantities<br>Collecting, representing,<br>describing, and | Learning TargetsCounting and representing<br>quantitiesEssential Questions:<br>How do we represent<br>quantities over 10?Comparing and ordering<br>quantitiesHow do we make an equivalent<br>set and represent the quantity<br>for a given number?Collecting, representing,<br>describing, and<br>interpreting dataHow can we keep track of<br>growing sets of objects?Learning Targets:<br>Students will:Learning Targets:<br>Students will:•Make a set of a given size.•Use numbers to represent<br>measurements and<br>quantities. |

| The number of objects is the same regardless<br>of their arrangement or the order in which they<br>were counted. | <ul> <li>Establish one-to-one<br/>correspondence between<br/>equal groups.</li> </ul> | <ul> <li>introduction, practice,</li> <li>and assessment of the %</li> <li>of concept mastery.</li> <li>Problem-based</li> </ul> |
|--|---|--|
| K.CC.B.4c Understand that each successive  |   | interactive Learning   |
| number name refers to a quantity that is one   |   | activities   |
| larger.  |   | <ul> <li>Performance<br/>assessment</li> </ul>   |
| K.CC.B.5 Count to answer "how many?"   |   |  |
| questions about as many as 20 things arranged  |   |  |
| in a line, a rectangular array, or a circle, or as   |   |  |
| many as 10 things in a scattered configuration;  |   |  |
| given a number from 1–20, count out that   |   |  |
| many objects.  |   |  |
| K.CC.C.6 Identify whether the number of  |   |  |
| objects in one group is greater than, less than,   |   |  |
| or equal to the number of objects in another   |   |  |
| group, e.g., by using matching and counting  |   |  |
| strategies.  |   |  |
| K.OA.A.1 Represent addition and subtraction  |   |  |
| with objects, fingers, mental images, drawings,  |   |  |
| sounds (e.g., claps), acting out situations,   |   |  |
| verbal   |   |  |
| explanations, expressions, or equations.   |   |  |
| K.OA.A.2 Solve addition and subtraction word   |   |  |
| problems, and add and subtract within 10, e.g.,  |   |  |
| by using objects or drawings to represent the  |   |  |
| problem.   |   |  |

| K.OA.A.3 Decompose numbers less than or<br>equal to 10 into pairs in more than one way,<br>e.g., by using objects or drawings, and record<br>each decomposition by a drawing or equation<br>(e.g., $5 = 2 + 3$ and $5 = 4 + 1$ ). |  |  |
|---|--|--|
| K.OA.A.5 Fluently add and subtract within 5.  |  |  |
| K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.  |  |  |
| K.MD.B.3 Classify objects into given categories;<br>count the numbers of objects in each category<br>and sort the categories by count.  |  |  |

| Standards Alignment  | Unit Concept/Big Ideas  | Essential Questions/   | Instructional Materials/  |
|--|---|--|---|
| K.G.A.1 Describe objects in the environment  | Describing, identifying,  | Learning Targets<br>Essential Questions:   | Assessments<br>Montessori Materials   |
| using names of shapes, and describe the<br>relative positions of these objects using terms<br>such as <i>above</i> , <i>below</i> , <i>beside</i> , <i>in front of</i> ,<br><i>behind</i> , and<br><i>next to</i> .  | and comparing 3-D shapes<br>Composing and<br>decomposing 3-D shapes | What are the attributes of<br>cones, cylinders, spheres,<br>prisms, cubes, ellipsoids, and<br>ovoids?<br>How do 3-D shapes relate to   | Golden bead material<br>Geometry Cabinet<br>Insets<br>Geometric Solids<br>3-Part Cards  |
| K.G.A.2 Correctly name shapes regardless of their orientations or overall size.  | Comparing and<br>contrasting 2-D and 3-D<br>shapes                  | real-world objects?<br>How are 2-D and 3-D shapes<br>alike and different?<br>How can 3-D shapes be used to   | Investigations Unit 5 – Build<br>a Block, Build a Wall  |
| <ul> <li>K.G.A.3 Identify shapes as two-dimensional<br/>(lying in a plane, "flat") or three-dimensional<br/>("solid").</li> <li>K.G.B.4 Analyze and compare two- and three<br/>dimensional shapes, in different sizes and<br/>orientations, using informal language to<br/>describe their similarities, differences, parts<br/>(e.g., number of sides and vertices/"corners")<br/>and other attributes (e.g., having sides of equal<br/>language to</li> </ul> |   | <ul> <li>make different 3-D shapes?</li> <li><u>Learning Targets:</u><br/>Students will:</li> <li>Identify and describe the<br/>overall size, shape, and<br/>features of familiar 3-D<br/>shapes.</li> <li>Make 3-D shapes.</li> </ul> | Assessments:FormativeStudent ExercisesPeer questioningClassroom DiscussionProblem SolvingChallengesExit TicketsVocabulary checks                    |
| length).<br>K.G.B.5 Model shapes in the world by building<br>shapes from components (e.g., sticks and clay<br>balls) and drawing shapes.   |   | <ul> <li>Combine shapes to make 3-<br/>D shapes.</li> <li>Understand words that<br/>describe relative position.</li> </ul>   | <ul> <li><u>Summative</u></li> <li>Montessori Three-<br/>Period Lesson including<br/>introduction, practice,<br/>and assessment of the %</li> </ul> |

| K.G.B.6 Compose simple shapes to form larger | • | Problem-based        |
|--|---|----------------------|
| shapes. For example, "Can you join these two |   | interactive Learning |
| triangles with full sides touching to make a |   | activities           |
| rectangle?"                                  | • | Performance          |
|  |   | assessment           |

Unit Six: Addition, Subtraction, and the Number System 1Timeline: 20 SessionsUnit Description: In this unit, students have repeated opportunities and experiences with join two or more amounts, remove and amountfrom the whole, and think of a number as being composed of two parts.

| Standards Alignment                             | Unit Concept/Big Ideas     | Essential Questions/                        | Instructional Materials/              |
|---|----------------------------|---|---------------------------------------|
|   |                            | Learning Targets                            | Assessments                           |
| K.CC.A.1 Count to 100 by ones and by tens.      | Understanding,             | Essential Questions:                        | Montessori Materials                  |
|   | representing, and solving  | How do we accurately count                  | 100 Board                             |
| K.CC.A.3 Write numbers from 0 to 20.            | addition and subtraction   | and keep track of quantities up             | Bead bars                             |
| Represent a number of objects with a written    | problems.                  | to 20?                                      | Addition strip board                  |
| numeral 0-20 (with 0 representing a count of    |                            | How can we use numbers,                     | Addition finger charts                |
| no objects).                                    | Combining two numbers      | pictures, words, and/or                     | Subtraction strip board               |
|   | (0-10), with totals to 20. | addition notation to represent              | Subtraction finger charts             |
| K.CC.B.4 Understand the relationship between    |                            | a quantity?                                 | Bead Cabinet                          |
| numbers and quantities; connect counting to     | Representing and solving   | How can we compare                          | A variety of counting objects         |
| cardinality.                                    | addition and subtraction   | quantities to 20 to determine               |                                       |
|   | story problems with result | which is greater?                           | Investigations Unit 6 – How           |
| K.CC.B.4a When counting objects, say the        | unknown.                   |   | Many Now?                             |
| number names in the standard order, pairing     |                            | Learning Targets                            | -                                     |
| each object with one and only one number        | Decomposing numbers to     | Students will:                              | Assessments:                          |
| name and each number name with one and          | 6 into two or more         | Students will write                         | <u>Formative</u>                      |
| only one  | addends.                   | numbers to 10.                              | Student Exercises                     |
| object.   |                            | • Figure out what is one                    | <ul> <li>Peer questioning</li> </ul>  |
|   | Using numbers, pictures,   | more or lone less than a                    | Classroom Discussion                  |
| K.CC.B.4b Understand that the last number       | words, and/or              | number.                                     | <ul> <li>Problem Solving</li> </ul>   |
| name said tells the number of objects counted.  | addition/subtraction       | Represent and solve                         | Challenges                            |
| The number of objects is the same regardless    | notation to represent a    | addition story problems                     | Exit Tickets                          |
| of their arrangement or the order in which they | solution to a problem      | within 10.                                  | <ul> <li>Vocabulary checks</li> </ul> |
| were counted.                                   | -                          | <ul> <li>Decompose a number into</li> </ul> |                                       |
|   |                            | two addends in more than                    | Summative                             |
| K.CC.B.4c Understand that each successive       |                            | one way.                                    | Summative                             |

| number name refers to a quantity that is one<br>larger.<br>K.CC.B.5 Count to answer "how many?"<br>questions about as many as 20 things arranged<br>in a line, a rectangular array, or a circle, or as<br>many as 10 things in a scattered configuration;<br>given a number from 1–20, count out that<br>many objects.<br>K.CC.C.6 Identify whether the number of<br>objects in one group is greater than, less than, | <ul> <li>Montessori Three-<br/>Period Lesson including<br/>introduction, practice,<br/>and assessment of the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|
| or equal to the number of objects in another<br>group, e.g., by using matching and counting<br>strategies.  |  |
| K.OA.A.1 Represent addition and subtraction<br>with objects, fingers, mental images, drawings,<br>sounds (e.g., claps), acting out situations,<br>verbal explanations, expressions, or equations.   |  |
| K.OA.A.2 Solve addition and subtraction word<br>problems, and add and subtract within 10, e.g.,<br>by using objects or drawings to represent the<br>problem.  |  |
| K.OA.A.3 Decompose numbers less than or<br>equal to 10 into pairs in more than one way,<br>e.g., by using objects or drawings, and record<br>each decomposition by a drawing or equation<br>(e.g., $5 = 2 + 3$ and $5 = 4 + 1$ ).   |  |

| K.OA.A.5 Fluently add and subtract within 5. |  |  |
|--|--|--|

| Unit Seven: Modeling with Data Timelin  | ne: 15 Sessions                |  |                                       |  |
|---|--------------------------------|--|---------------------------------------|--|
| Unit Description: In this unit, student will describ                                  | e attributes of objects and da | ata, use this information to sort, cla         | assify, count, order, compare,        |  |
| and represent dates, and use this date to model real-world problems with mathematics. |                                |  |                                       |  |
| Standards Alignment   | Unit Concept/Big Ideas         | Essential Questions/                           | Instructional Materials/              |  |
|   |                                | Learning Targets                               | Assessments                           |  |
| K.CC.A.1 Count to 100 by ones and by tens.  | Sorting and classifying        | Essential Questions                            | Montessori Materials                  |  |
|   |                                | How can we count and keep                      | Attribute blocks                      |  |
| K.CC.A.3 Write numbers from 0 to 20.  | Collecting, representing,      | track of quantities?                           | 100 board                             |  |
| Represent a number of objects with a written  | describing, and                | Can we find a total of up to 6                 | Golden bead material                  |  |
| numeral 0-20 (with 0 representing a count of  | interpreting data              | small quantities?                              |                                       |  |
| no objects).  |                                | Can we count by groups of 2?                   | Investigations Unit 7 – How           |  |
|   | Comparing and ordering         | Can we count by groups of 10?                  | Many Noses? How Many                  |  |
| K.CC.B.4 Understand the relationship between  | quantities                     | Can we establish the one-to-                   | Eyes?                                 |  |
| numbers and quantities; connect counting to   |                                | one correspondence between a                   |                                       |  |
| cardinality.  | Counting and representing      | set of data and a                              | Assessments:                          |  |
|   | quantities                     | representation of this data set?               | <u>Formative</u>                      |  |
| K.CC.B.4a When counting objects, say the  |                                |  | <ul> <li>Student Exercises</li> </ul> |  |
| number names in the standard order, pairing   | There are various ways to      | Learning Targets                               | <ul> <li>Peer questioning</li> </ul>  |  |
| each object with one and only one number  | collect, represent,            | Students will:                                 | Classroom Discussion                  |  |
| name and each number name with one and  | describe and interpret         | <ul> <li>Sort a set of objects by a</li> </ul> | <ul> <li>Problem Solving</li> </ul>   |  |
| only one object.  | data.                          | given attribute and order                      | <ul> <li>Challenges</li> </ul>        |  |
|   |                                | the groups based on the                        | Exit Tickets                          |  |
| K.CC.B.4b Understand that the last number   |                                | number in each.                                | Vocabulary checks                     |  |
| name said tells the number of objects counted.  |                                |  |                                       |  |
| The number of objects is the same regardless  |                                | Use data to represent and                      | Summative                             |  |
| of their arrangement or the order in which they                                       |                                | solve a real-world problem.                    | Montessori Three-                     |  |
| were counted.   |                                |  | Period Lesson including               |  |
|   |                                |  | introduction, practice,               |  |
| K.CC.B.4c Understand that each successive   |                                |  | and assessment of the %               |  |
| number name refers to a quantity that is one larger.                                  |                                |  | of concept mastery.                   |  |

| K.CC.B.5 Count to answer "how many?"<br>questions about as many as 20 things arranged<br>in a line, a rectangular array, or a circle, or as<br>many as 10 things in a scattered configuration;<br>given a number from 1–20, count out that<br>many objects. |  | <ul> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|---|
| K.CC.C.6 Identify whether the number of<br>objects in one group is greater than, less than,<br>or equal to the number of objects in another<br>group, e.g., by using matching and counting<br>strategies.   |  |   |
| K.OA.A.1 Represent addition and subtraction<br>with objects, fingers, mental images, drawings,<br>sounds (e.g., claps), acting out situations,<br>verbal explanations, expressions, or equations.   |  |   |
| K.OA.A.2 Solve addition and subtraction word<br>problems, and add and subtract within 10, e.g.,<br>by using objects or drawings to represent the<br>problem.  |  |   |
| K.MD.B.3 Classify objects into given categories;<br>count the numbers of objects in each category<br>and sort the categories by count.  |  |   |

| Standards Alignment   | Unit Concept/Big Ideas  | Essential Questions/<br>Learning Targets   | Instructional Materials/<br>Assessments   |
|---|---|--|---|
| K.CC.A.1 Count to 100 by ones and by tens.  | Understanding, representing, and solving  | Essential Questions<br>Can we make a set and   | <u>Montessori Materials</u><br>Golden bead material   |
| <ul><li>K.CC.A.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).</li><li>K.CC.A.3 Write numbers from 0 to 20.</li><li>Represent a number of objects with a written</li></ul> | addition and<br>subtraction problems<br>Understanding that the<br>value of a number is<br>dependent on its position | represent the quantity<br>equivalent to a given<br>expression?<br>Can we recognize, identify, and<br>write the teen numbers?<br>How can use a group of ten | Stamp Game<br>Hundred Board<br>Million Cube<br>Teens board<br>Tens board<br>Addition strip board              |
| numeral 0-20 (with 0 representing a count of no objects).   | in a number   | ones and some number of ones<br>to represent a teen number?<br>Can we count groups of 10?  | Addition finger charts<br>Teacher-made materials<br>including 10-frames                                       |
| K.CC.B.4 Understand the relationship between numbers and quantities; connect counting to cardinality.   |   | How can we use addition<br>notation to represent the teen<br>numbers as 10 plus some<br>number of ones?  | Investigations Unit 8 – Ten<br>Frames and Teen Numbers  |
| K.CC.B.4a When counting objects, say the<br>number names in the standard order, pairing<br>each object with one and only one number<br>name and each number name with one and<br>only one object.                                     |   | <ul> <li><u>Learning Targets:</u><br/>Students will:</li> <li>Write numbers to 20.</li> <li>Count by 1s and 10s to 100;</li> </ul>                         | Assessments:<br>Formative<br>Student Exercises<br>Peer questioning<br>Classroom Discussion<br>Problem Solving |
| K.CC.B.4b Understand that the last number<br>name said tells the number of objects counted.<br>The number of objects is the same regardless<br>of their arrangement or the order in which they<br>were counted.                       |   | when counting by 1s, start<br>from a number other than<br>1.   | <ul> <li>Challenges</li> <li>Exit Tickets</li> <li>Vocabulary checks</li> </ul>                               |

Unit Fight: Addition Subtraction and the Number System 2 Timeline: 22 Sessions

| <ul> <li>K.CC.B.5 Count to answer "how many?"<br/>questions about as many as 20 things arranged<br/>in a line, a rectangular array, or a circle, or as<br/>many as 10 things in a scattered configuration;<br/>given a number from 1–20, count out that<br/>many objects.</li> <li>K.CC.C.6 Identify whether the number of<br/>objects in one group is greater than, less than,<br/>or equal to the number of objects in another<br/>group, e.g., by using matching and counting<br/>strategies.</li> <li>K.OA.A.1 Represent addition and subtraction<br/>with objects, fingers, mental images, drawings,<br/>sounds (e.g., claps), acting out situations,<br/>verbal explanations, expressions, or equations.</li> <li>K.OA.A.2 Solve addition and subtraction word<br/>problems, and add and subtract within 10, e.g.,<br/>by using objects or drawings to represent the<br/>problem.</li> <li>K.OA.A.3 Decompose numbers less than or<br/>equal to 10 into pairs in more than one way,<br/>e.g., by using objects or drawings, and record<br/>each decomposition by a drawing or equation<br/>(e.g., 5 = 2 + 3 and 5 = 4 + 1).</li> <li>K.OA.A.4 For any number from 1 to 9, find the</li> </ul> |  | <ul> <li>Add and subtract fluently within 5.</li> <li>Figure out a missing addend when the sum is 10.</li> <li>Represent the teen numbers as ten 1s and some number of 1s.</li> <li>Represent and solve subtraction story problems within 10, with result unknown.</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson including<br/>introduction, practice,<br/>and assessment of the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|---|--|
|---|--|---|--|

| number that makes 10 when added to the<br>given number, e.g., by using objects or<br>drawings, and record the answer with a<br>drawing or equation.  |  |  |
|--|--|--|
| K.OA.A.5 Fluently add and subtract within 5.<br>K.NBT. A.1 Compose and decompose numbers<br>from 11 to 19 into ten ones and some further<br>ones, e.g., by using objects or drawings, and<br>record each composition or decomposition<br>by a drawing or equation (e.g., 18 = 10 + 8);<br>understand that these numbers are composed<br>of ten ones and one, two, three, four, five, six,<br>seven, eight, or nine ones. |  |  |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 1<sup>st</sup> Grade

#### Curriculum Framework for Mathematics

School: <u>Sussex Montessori School</u> Curricular Resources: <u>Montessori Materials and Lessons / Investigations</u> <u>3</u> Grade: <u>1</u>

Unit One: Number and Operations Timeline: 20 Sessions

**Unit Description:** In this unit students extend their understanding of counting and the number sequence, and build a strong foundation for their work

with place value and the operations of addition and subtraction.

| Standards Alignment  | Unit Concept/Big Ideas   | Essential Questions/   | Instructional Materials/   |
|--|--|--|--|
|  |  | Learning Targets   | Assessments  |
| 1.OA.A.1   | Counting forward and   | Essential Questions  | Montessori Materials   |
| Use addition and subtraction within  | backward can begin from  | How can numbers to 1,000 be                                  | 100 board  |
| 20 to solve word problems involving situations of adding to, taking from, putting together,  | any number.  | read and written?  | Colored bead bars  |
| taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings,   | Number lines can be used as a tool for counting.                             | What does each digit in a 2-<br>digit number designate?      | Addition and subtraction snake games                             |
| and equations with a symbol for the unknown<br>number to represent the problem.<br>1.OA.B.3  | Counting tells how many are in a set and numbers represent a set of objects. | How can we use symbols<br>compare two 2-digit<br>quantities? | Teacher-made materials for greater than, less than, and equal to |
| Apply properties of operations as<br>strategies to add and subtract.<br>Examples: If 8+3=11 is known, then 3+8=11 is<br>also known. (Commutative property of | A teen number is a group<br>of ten ones and some<br>number of ones           | How can we count by groups of 2, 5, or 10?                   | Teacher-made materials for<br>missing addends and<br>subtrahends |
| addition.) To add 2+6+4, the second two  | The first numeral in a 2-  | How can we use the 100 board                                 | Bead cabinet   |
| numbers can be added to make a ten, so<br>2+6+4=2+10=12. (Associative property of  | digit number designates  | to find patterns of numbers?                                 | Teens board  |
| addition.)   | given quantity.  | <u>Learning Targets</u><br>Students will:                    | Tens Board   |
| 1.OA.B.4   | The first digit of a 2-digit   | Understand ten ones as                                       | Number lines   |
| Understand subtraction as an unknown-addend  | number designates the  | one ten, and a teen  | Investigations Unit 1 –  |
| problem. For example, subtract 10-8 by finding   | number of groups of 10   | numbers as one ten   | Building Numbers and   |
| the number that makes 10 when added to 8.  | and the second digit   |  | Solving Story Problems   |

|   | designates the number of   | and some number of   |   |
|---|--|--|---|
| 1.0A.C.5  | ones   | ones.  | Assessments   |
| Relate counting to addition and subtraction   | ones   |  | Formative   |
| <ul><li>(e.g., by counting on 2 to add 2).</li><li>1.OA.C.6</li><li>Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.</li></ul>   | Two quantities can be<br>compared to see which is<br>greater.<br>A 100 chart is a<br>representation of the | <ul> <li>Rote count, read, and<br/>write numbers to<br/>1,000.</li> <li>Understand that the</li> </ul>   | <ul> <li>Student Exercises</li> <li>Peer questioning</li> <li>Classroom<br/>Discussion</li> <li>Problem Solving</li> </ul>            |
| Use strategies such as counting on; making ten<br>(e.g., 8+6=8+2+4=10+4=14); decomposing a<br>number leading to a ten (e.g., 13-4=13-3-1=10-<br>1=9); using the relationship between addition   | counting numbers 1 to 100.   | multiples of 10 through<br>90 refer to 1 – 9 tens<br>and 0 ones.   | <ul><li>Challenges</li><li>Exit Tickets</li><li>Vocabulary checks</li></ul>   |
| <ul> <li>and subtraction (e.g., knowing that 8+</li> <li>4=12, one knows 12-8=4); and creating</li> <li>equivalent but easier or known sums (e.g.,</li> <li>adding 6+7by creating the known equivalent</li> <li>6+6+1=12+1=13).</li> <li>1.OA.D.7</li> <li>Understand the meaning of the</li> </ul> |  | <ul> <li>Use a numeral to<br/>represent a number of<br/>objects organized into<br/>tens and ones and,<br/>given a numeral,<br/>represent it with tens<br/>and ones.</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %</li> </ul> |
| equal sign, and determine if equations<br>involving addition and subtraction are true or<br>false. For example, which of the following<br>equations are true and which are false? 6=6,<br>7=8-1,5+2=2+5, 4+1=5+2.   |  | <ul> <li>Use standard notation<br/>(&lt;, &gt;) to represent the<br/>comparison of two 2-<br/>digit numbers.</li> </ul>  | <ul> <li>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance</li> </ul>           |
| 1.OA.D.8<br>Determine the unknown whole number in an<br>addition or subtraction equation relating three<br>whole numbers. For example, determine the  |  | <ul> <li>Add or subtract 10<br/>to/from any 2-digit<br/>number.</li> </ul>   | • assessment  |

| unly any supplier that walks the sound is the         |  |  |
|---|--|--|
| unknown number that makes the equation true           |  |  |
| in each of the equations $8+?=11, 5=\Box-3, 6+6=\Box$ |  |  |
|   |  |  |
| 1.NBT.A.1   |  |  |
| Count to 120, starting at any number                  |  |  |
| less than 120. In this range, read and write          |  |  |
| numerals and represent a number of objects            |  |  |
| with a written numeral.                               |  |  |
|   |  |  |
| 1.NBT.B.2a  |  |  |
| 10 can be thought of as a bundle of ten ones—         |  |  |
| -   |  |  |
| called a "ten."                                       |  |  |
|   |  |  |
| 1.NBT.B.2b  |  |  |
| The numbers from 11 to 19 are composed of a           |  |  |
| ten and one, two, three, four, five, six, seven,      |  |  |
| eight, or nine ones.                                  |  |  |
|   |  |  |
| 1.NBT.B.2c  |  |  |
| The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90        |  |  |
| refer to one, two, three, four, five, six, seven,     |  |  |
| eight, or nine tens (and 0 ones).                     |  |  |
|   |  |  |
| 1.NBT.B.3   |  |  |
| Compare two two-digit numbers based on                |  |  |
|   |  |  |
| meanings of the tens and ones digits, recording       |  |  |
| the results of comparisons with the symbols           |  |  |
| 7, =, and 6.  |  |  |
|   |  |  |
| 1.NBT.C.4   |  |  |

|   | <br> |  |
|---|------|--|
| Add within 100, including adding a two-digit    |      |  |
| number and a one-digit number, and adding a     |      |  |
| two-digit number and a multiple of 10, using    |      |  |
| concrete models or drawings and strategies      |      |  |
| based on place value, properties of operations, |      |  |
| and/or the relationship between addition and    |      |  |
| subtraction; relate the strategy to a written   |      |  |
| method and explain the reasoning used.          |      |  |
| Understand that in adding two-digit numbers,    |      |  |
| one adds tens and tens, ones and ones; and      |      |  |
| sometimes it is necessary to compose a ten.     |      |  |
|   |      |  |
| 1.NBT.C.5                                       |      |  |
| Given a two-digit number, mentally find 10      |      |  |
| more or 10 less than the number, without        |      |  |
| having to count; explain the reasoning used.    |      |  |
|   |      |  |
| 1.NBT.C.6                                       |      |  |
| Subtract multiples of 10 in the range 10–90     |      |  |
| from multiples of 10 in the range 10–90         |      |  |
| (positive or zero differences), using concrete  |      |  |
| models or drawings and strategies based on      |      |  |
| place value, properties of operations, and/or   |      |  |
| the relationship between addition and           |      |  |
| subtraction; relate the strategy to a written   |      |  |
| method and explain the reasoning used.          |      |  |
|   | l    |  |

| dimensional geometric shapes.<br>Standards Alignment | Unit Concept/Big Ideas   | Essential Questions/           | Instructional Materials/              |
|--|--------------------------|--------------------------------|---------------------------------------|
| Ū.   |                          | Learning Targets               | Assessments                           |
| 1.MD.A.1   | 2- and 3-D shapes have   | Essential Questions            | Montessori Materials                  |
| Order three objects by length; compare the           | common attributes.       | What language can we use to    | Geometry cabinet                      |
| lengths of two objects indirectly by using a         |                          | describe 2- and 3-D shapes?    | Attribute blocks                      |
| third object.  | Geometric language helps |                                | Constructive Triangle boxes           |
|  | us describe geometric    | What are the attributes of 2-D | Solid geometric shapes                |
| 1.MD.A.2   | shapes.                  | shapes?                        | 3-part cards                          |
| Express the length of an object as a whole           |                          |                                | Insets                                |
| number of length units, by laying multiple           | Shapes can be composed   | What are the attributes of 3-D |                                       |
| copies of a shorter object (the length unit) end     | of or decomposed into    | shapes?                        | Investigations Unit 2 –               |
| to end; understand that the length                   | different shapes.        |                                | Comparing and Combining               |
| measurement of an object is the number of            |                          | How can we use 2-D shapes to   | Shapes                                |
| same-size length units that span it with no gaps     | There are many types of  | create other 2-D shapes?       |                                       |
| or overlaps. Limit to contexts where the object      | quadrilaterals.          |                                | <u>Assessments</u>                    |
| being measured is spanned by a whole number          |                          | What are the common            | <u>Formative</u>                      |
| of length units with no gaps or overlaps.            |                          | attributes of 2- and 3-D       | <ul> <li>Student Exercises</li> </ul> |
|  |                          | shapes?                        | <ul> <li>Peer questioning</li> </ul>  |
| 1.MD.B.3   |                          |                                | Classroom                             |
| Tell and write time in hours and half-hours          |                          | What is a quadrilateral?       | Discussion                            |
| using analog and digital clocks.                     |                          |                                | <ul> <li>Problem Solving</li> </ul>   |
|  |                          | Learning Targets               | Challenges                            |
| 1.MD.C.4   |                          | Students will:                 | Exit Tickets                          |
| Organize, represent, and interpret data with up      |                          | Compose and                    | Vocabulary checks                     |
| to three categories; ask and answer questions        |                          | decompose shapes in            | ,                                     |
| about the total number of data points, how           |                          | different ways.                | Summative                             |
| many in each category, and how many more             |                          |                                | Montessori Three-                     |
| or less are in one category than in another.         |                          |                                |                                       |

| <ul> <li>1.G.A.1</li> <li>Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.</li> <li>1.G.A.2</li> <li>Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.</li> </ul> | <ul> <li>Build and draw familiar<br/>2-D shapes.</li> <li>Use geometric<br/>language to describe<br/>and identify important<br/>attributes, and use<br/>those attributes to sort<br/>familiar 2-D shapes.</li> <li>Use geometric<br/>language to describe<br/>and identify defining<br/>attributes of familiar 3-<br/>D shapes</li> </ul> | <ul> <li>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|---|--|
| <ul> <li>1.G.A.2</li> <li>Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.</li> <li>1.NBT.B.3</li> <li>Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols 7, =, and 6.</li> </ul>   | <ul> <li>Compose 3-D shapes.</li> <li>Match a 2-D<br/>representation of a 3-D<br/>shape to the outline of<br/>one of its faces.</li> </ul>  |  |

| 1.NBT.C.5                                    |  |  |
|--|--|--|
| Given a two-digit number, mentally find 10   |  |  |
| more or 10 less than the number, without     |  |  |
| having to count; explain the reasoning used. |  |  |
| 1.MD.B.3                                     |  |  |
| Tell and write time in hours and half-hours  |  |  |
| using analog and digital clocks.             |  |  |

Unit Three: Addition, Subtraction, and the Number System 2 Timeline: 26 Sessions Unit Description: In this unit, student will focus on counting on and back as a strategy for adding/subtracting, on composing and decomposing numbers into two or more parts, on adding more than two numbers, on expanding understanding of addition and subtraction notation, and on counting and comparing larger quantities.

| Standards Alignment                              | Unit Concept/Big Ideas                          | Essential Questions/                     | Instructional Materials/              |
|--|---|--|---------------------------------------|
|  |   | Learning Targets                         | Assessments                           |
| 1.0A.A.1   | The equals sign represents                      | Essential Questions                      | Montessori Materials                  |
| Use addition and subtraction within 20 to solve  | equivalence and is used to                      | Does the order of addends                | Addition and subtraction              |
| word problems involving situations of adding     | show equivalent                                 | matter to the sum?                       | snake games                           |
| to, taking from, putting together, taking apart, | expressions.                                    |  | Colored bead bars                     |
| and comparing, with unknowns in all positions,   |   | How does counting on or                  | Golden bead material                  |
| e.g., by using objects, drawings, and equations  | Counting on or counting                         | counting back help in solving            | Teacher-made materials for            |
| with a symbol for the unknown number to          | back can be used as a                           | an addition or subtraction               | greater than/less than                |
| represent the problem.                           | strategy for adding or subtracting two numbers. | problem?                                 | Number lines                          |
| 1.0A.A.2   |   | How can we determine                     | Investigations Unit 3 – How           |
| Solve word problems that call for addition of    | The order of addends                            | equivalence?                             | Many of Each? How Many                |
| three whole numbers whose sum is less than or    | does not affect the total.                      |  | in All?                               |
| equal to 20, e.g., by using objects, drawings,   |   | How can number patterns help             |                                       |
| and equations with a symbol for the unknown      | A 100 chart is a                                | us?                                      | Assessments                           |
| number to represent the problem.                 | representation of the                           |  | <u>Formative</u>                      |
|  | counting numbers from 1                         | Learning Targets                         | <ul> <li>Student Exercises</li> </ul> |
| 1.OA.B.3   | to 100.   | Students will:                           | <ul> <li>Peer questioning</li> </ul>  |
| Apply properties of operations as strategies to  |   | Find at least 5 solutions                | Classroom                             |
| add and subtract. Examples: If 8+3=11is known,   | A teen number is a group                        | to put together/take                     | Discussion                            |
| then 3+8=11 is also known. (Commutative          | of ten and some number                          | apart problem with                       | <ul> <li>Problem Solving</li> </ul>   |
| property of addition.) To add 2+6+4, the         | of ones.  | both addends                             | Challenges                            |
| second two numbers can be added to make a        |   | unknown.                                 | Exit Tickets                          |
| ten, so 2+6+=2+10=12. (Associative property of   |   |  | Vocabulary checks                     |
| addition.)                                       |   | <ul> <li>Solve story problems</li> </ul> |                                       |
|  |   | with 3 addends.                          | <u>Summative</u>                      |

| 1.OA.B.4  |   | Montessori Three-                 |
|---|---|-----------------------------------|
| Understand subtraction as an unknown-addend     | Represent numbers                             | Period Lesson                     |
| problem. For example, subtract 10-8 by finding  | with equivalent                               | including                         |
| the number that makes 10 when added to 8.       | expressions.                                  | introduction,                     |
|   |   | practice,                         |
| 1.OA.C.5  | <ul> <li>Find at least 5 solutions</li> </ul> | and assessment of                 |
| Relate counting to addition and subtraction     | to a put together/take                        | the %                             |
| (e.g., by counting on 2 to add 2).              | apart problem with                            | of concept mastery.               |
|   | both addends                                  | <ul> <li>Problem-based</li> </ul> |
| 1.OA.C.6  | unknown.                                      | interactive Learning              |
| Add and subtract within 20, demonstrating       |   | activities                        |
| fluency for addition and subtraction within 10. | Solve story problems                          | <ul> <li>Performance</li> </ul>   |
| Use strategies such as counting on; making ten  | with 3 addends.                               | assessment                        |
| (e.g., 8+6=8+2+4=10+4=14); decomposing a        |   |                                   |
| number leading to a ten (e.g., 13-4=13-3-1=10-  | Represent numbers                             |                                   |
| 1=9); using the relationship between addition   | with equivalent                               |                                   |
| and subtraction (e.g., knowing that 8+4=12,     | expressions.                                  |                                   |
| one knows 12-8=4); and creating equivalent      | ·   |                                   |
| but easier or known sums (e.g., adding 6+7 by   | <ul> <li>Understand that you</li> </ul>       |                                   |
| creating the known equivalent 6+6+1=12+1=       | can count on/back to                          |                                   |
| 13).  | add/subtract.                                 |                                   |
|   |   |                                   |
| 1.OA.D.7  | Rote count, read, and                         |                                   |
| Understand the meaning of the equal sign, and   | write numbers to                              |                                   |
| determine if equations involving addition and   | 1,000.  |                                   |
| subtraction are true or false. For example,     | 1,000.  |                                   |
| which of the following equations are true and   |   |                                   |
| which are false? 6=6, 7=8-1,5+2=2+5, 4+1=5+2.   |   |                                   |
|   |   |                                   |
| 1.OA.D.8  |   |                                   |

| Determine the unknown whole number in an   |  |  |
|--|--|--|
| addition or subtraction equation relating three  |  |  |
| whole numbers. For example, determine the  |  |  |
| unknown number that makes the equation true  |  |  |
| in each of the equations $8+?=11, 5=\Box-3,$   |  |  |
| 6+6=□.   |  |  |
|  |  |  |
| 1.NBT.A.1  |  |  |
| Count to 120, starting at any number less than   |  |  |
| 120. In this range, read and write numerals and represent a number of objects with a written |  |  |
| numeral.   |  |  |
| numerai.   |  |  |
| 1.NBT.B.2.a  |  |  |
| 10 can be thought of as a bundle of ten ones—  |  |  |
| called a "ten."  |  |  |
|  |  |  |
| 1.NBT. B.2b  |  |  |
| The numbers from 11 to 19 are composed of a  |  |  |
| ten and one, two, three, four, five, six, seven,   |  |  |
| eight, or nine ones.   |  |  |
|  |  |  |
| 1.NBT. B.2c  |  |  |
| The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90   |  |  |
| refer to one, two, three, four, five, six, seven,  |  |  |
| eight, or nine tens (and 0 ones).  |  |  |
|  |  |  |
| 1.NBT.B.3  |  |  |
| Compare two two-digit numbers based on   |  |  |
| meanings of the tens and ones digits,  |  |  |
| recording the results of comparisons with the  |  |  |

| symbols 7, =, and 6.                        |  |  |
|---|--|--|
| 1.MD.B.3                                    |  |  |
| Tell and write time in hours and half-hours |  |  |
| using analog and digital clocks.            |  |  |

| Standards Alignment                              | Unit Concept/Big Ideas     | Essential Questions/          | Instructional Materials/     |
|--|----------------------------|-------------------------------|------------------------------|
|  |                            | Learning Targets              | Assessments                  |
| 1.OA.A.1   | A whole can be             | Essential Questions           | Montessori Materials         |
| Use addition and subtraction within 20 to solve  | partitioned into equal     | How can we solve comparison   | Fraction Insets              |
| word problems involving situations of adding     | parts.                     | story problems with the       | Fraction box                 |
| to, taking from, putting together, taking apart, |                            | difference unknown?           | Bead box                     |
| and comparing, with unknowns in all positions,   | Equal parts of a whole can |                               | Teacher-made materials for   |
| e.g., by using objects, drawings, equations with | be described as halves,    | How can we use numbers,       | missing addends and          |
| a symbol for the unknown number to represent     | fourths or quarters.       | pictures, words, and/or       | subtrahends                  |
| the problem.                                     |                            | notation to represent a       | Teacher-made materials for   |
|  | When a whole is cut into   | solution to a problem?        | greater than/less than       |
| 1.OA.B.3   | fractional pieces, the     |                               | Measurement materials        |
| Apply properties of operations as strategies to  | pieces are smaller.        | How can we describe equal     | Clock matching materials     |
| add and subtract. Examples: If 8+3=11 is         |                            | parts of a whole?             |                              |
| known, then 3+8=11 is also known                 | Length can be quantified   |                               | Investigations Unit 4 – Fish |
| (Commutative property of addition.) To add       | by repeating identical,    | How can we accurately         | Lengths and Fraction Rugs    |
| 2+6+4, the second two numbers can be added       | multiple units from one    | measure an object or length?  |                              |
| to make a ten, so 2+6+4=2+10=12. (Associative    | end of an object to the    |                               | <u>Assessments</u>           |
| property of addition.)                           | other with no gaps or      | Will two people measuring the | <u>Formative</u>             |
|  | overlaps.                  | same length or object get the | Student Exercises            |
| 1.OA.B.4   |                            | same measurement?             | Peer questioning             |
| Understand subtraction as an                     | Inch tiles can be used to  |                               | Classroom                    |
| unknown-addend problem.                          | measure objects.           | Learning Targets              | Discussion                   |
| For example, subtract 10-8 by finding the        |                            | Students will:                | Problem Solving              |
| number that makes 10 when added to 8.            | Measurements of the        | Solve comparison              | Challenges                   |
|  | same lengths are the       | problems                      | Exit Tickets                 |
| 1.OA.C.6   | same when they are         | with the difference           | Vocabulary checks            |
|  | measured twice or by       | unknown (how many             |                              |

| Add and subtract within 20, demonstrating        | different people using the | more, and how many       | Summative            |
|--|----------------------------|--------------------------|----------------------|
| fluency for addition and subtraction within 10.  | same unit of measure.      | fewer).                  | Montessori Three-    |
| Use strategies such as counting on; making ten   |                            | /                        | Period Lesson        |
| (e.g., 8+6=8+2+4=10+4=14); decomposing a         |                            | Solve comparison         | including            |
| number leading to a ten (e.g., 13-4=13-3-1=10-   |                            | problems with the        | introduction,        |
| 1=9); using the relationship between addition    |                            | difference unknown       | practice,            |
| and subtraction (e.g., knowing that 8+           |                            | (how many more, and      | and assessment of    |
| 4=12, one knows 12-8=4); and creating            |                            | how many fewer).         | the %                |
| equivalent but easier or known sums (e.g.,       |                            | , ,                      | of concept mastery.  |
| adding 6+7by creating the known equivalent       |                            | • Solve comparison       | Problem-based        |
| 6+6+1=12+1=13).                                  |                            | problems                 | interactive Learning |
|  |                            | with the difference      | activities           |
| 1.MD.A.1   |                            | unknown (how many        | Performance          |
| Order three objects by length; compare the       |                            | more, and how many       | assessment           |
| lengths of two objects indirectly by using a     |                            | fewer).                  |                      |
| third object.                                    |                            |                          |                      |
|  |                            | • Compare the lengths of |                      |
| 1.MD.A.2   |                            | two                      |                      |
| Express the length of an object as a             |                            | objects indirectly by    |                      |
| whole number of length units, by laying          |                            | using a third length.    |                      |
| multiple copies of a shorter object (the length  |                            |                          |                      |
| unit) end to end; understand that the length     |                            | Demonstrate accurate     |                      |
| measurement of an object is the number of        |                            | measuring techniques     |                      |
| same-size length units that span it with no gaps |                            | when measuring an        |                      |
| or overlaps. Limit to contexts where the object  |                            | object or distance with  |                      |
| being measured is spanned by a whole number      |                            | multiples units. These   |                      |
| of length units with no gaps or overlaps.        |                            | techniques include       |                      |
|  |                            | starting at the          |                      |
| 1.MD.B.3   |                            | beginning, ending at     |                      |
| Tell and write time in hours and half-hours      |                            | the end, leaving no      |                      |
| using analog and digital clocks.                 |                            | gaps or overlaps,        |                      |

| <ul> <li>1.G.A.2</li> <li>Compose two-dimensional shapes<br/>(rectangles, squares, trapezoids, triangles, half-<br/>circles, and quarter-circles) or three-<br/>dimensional<br/>shapes (cubes, right rectangular prisms, right<br/>circular cones, and right circular cylinders) to<br/>create a composite shape, and compose new<br/>shapes from the composite shape.</li> <li>1.G.A.3</li> <li>Partition circles and rectangles into two<br/>and four equal shares, describe the shares<br/>using the words halves, fourths, and<br/>quarters, and use the phrases half of, fourth of,<br/>and quarter of. Describe the whole as two of,<br/>or four of the shares. Understand for these<br/>examples that decomposing into more equal</li> </ul> | <ul> <li>measuring in a straight<br/>line, and keeping track<br/>of the number of units.</li> <li>Tell time to the hour<br/>and half hour.</li> <li>Understand that halves<br/>or fourths (quarters)<br/>apply to wholes divided<br/>into two (four) equal<br/>parts; partition circles<br/>and rectangles into two<br/>and four equal parts.</li> </ul> |
|---|--|
| examples that decomposing into more equal shares creates smaller shares.  |  |

| <b>Unit Description:</b> In this unit, student focus on developing fluency with addition and subtraction with 10, including the 2-addend combinations of 10, understanding the meaning of the equal sign as a symbol of equivalence, and finding an unknown addend or unknown change. |                           |                                |                                      |  |
|---|---------------------------|--------------------------------|--------------------------------------|--|
| Standards Alignment   | Unit Concept/Big Ideas    | Essential Questions/           | Instructional Materials/             |  |
|   |                           | Learning Targets               | Assessments                          |  |
| 1.OA.A.1  | The equal sign represents | Essential Questions            | Montessori Materials                 |  |
| Use addition and subtraction within   | equivalence.              | How can we determine           |                                      |  |
| 20 to solve word problems involving situations  |                           | equivalence?                   | Teacher-made materials for           |  |
| of adding to, taking from, putting together,  | A teen number is a group  |                                | missing addends and                  |  |
| taking apart, and comparing, with unknowns  | of ten plus some number   | How can we determine if        | subtrahends                          |  |
| in all positions, e.g., by using objects, drawings,   | of ones.                  | equations are true or false?   | Addition and subtraction             |  |
| and equations with a symbol for the unknown   |                           |                                | snake games                          |  |
| number to represent the problem.  | There are many strategies | How can we use 5 + 5 to reason | Bead bars                            |  |
|   | for solving put           | about other combinations of    |                                      |  |
| 1.OA.B.3  | together/take apart story | 10?                            | Investigations Unit 5 –              |  |
| Apply properties of operations as   | problems.                 |                                | Number Games and Crayon              |  |
| strategies to add and subtract.   |                           | Does order matter in addition? | Problems                             |  |
| Examples: If 8+3=11 is known, then 3+8=11 is  | Numbers, pictures, words, |                                |                                      |  |
| also known. (Commutative property of  | and/or notation may be    | How can we solve problems      | <u>Assessments</u>                   |  |
| addition.) To add 2+6+4, the second two   | used to represent a       | with one, tow, or more         | <u>Formative</u>                     |  |
| numbers can be added to make a ten, so  | solution to a problem.    | addends unknown?               | Student Exercises                    |  |
| 2+6+4=2+10=12. (Associative property of   |                           |                                | <ul> <li>Peer questioning</li> </ul> |  |
| addition.)  |                           | How can we show that all       | Classroom                            |  |
|   |                           | possible two-addend            | Discussion                           |  |
| 1.OA.B.4  |                           | combinations of a number have  | Problem Solving                      |  |
| Understand subtraction as an unknown-addend   |                           | been found?                    | Challenges                           |  |
| problem. For example, subtract 10-8 by finding  |                           |                                | Exit Tickets                         |  |
| the number that makes 10 when added to 8.   |                           | How can we use numbers,        | Vocabulary checks                    |  |
|   |                           | pictures, words, and/or        |                                      |  |
| 1.OA.C.5  |                           | notation to represent a        | Summative                            |  |
| Relate counting to addition and   |                           | solution to a problem?         | Montessori Three-                    |  |

| subtraction (e.g., by counting on 2 to add 2).  |   | Period Lesson                     |
|---|---|-----------------------------------|
|   | Learning Targets                          | including                         |
| 1.OA.C.6  | Students will:                            | introduction,                     |
| Add and subtract within 20, demonstrating       | <ul> <li>Fluency with addition</li> </ul> | practice,                         |
| fluency for addition and subtraction within 10. | and subtraction within                    | and assessment of                 |
| Use strategies such as counting on; making ten  | 10.                                       | the %                             |
| (e.g., 8+6=8+2+4=10+4=14); decomposing a        |   | of concept mastery.               |
| number leading to a ten (e.g., 13-4=13-3-1=10-  | Solve a put                               | <ul> <li>Problem-based</li> </ul> |
| 1=9); using the relationship between addition   | together/take                             | interactive Learning              |
| and subtraction (e.g., knowing that 8+4=12,     | apart problem with one                    | activities                        |
| one knows 12-8=4); and creating equivalent      | addend unknown.                           | <ul> <li>Performance</li> </ul>   |
| but easier or known sums (e.g., adding 6+7 by   |   | assessment                        |
| creating the known equivalent 6+6+1=12+1=       | <ul> <li>Solve add to and take</li> </ul> |                                   |
| 13).  | from                                      |                                   |
|   | problems with                             |                                   |
| 1.0A.D.7  | unknown change.                           |                                   |
| Understand the meaning of the equal sign, and   |   |                                   |
| determine if equations involving addition and   | Understand the                            |                                   |
| subtraction are true or false. For example,     | meaning of                                |                                   |
| which of the following equations are true and   | the equal sign.                           |                                   |
| which are false? 6=6, 7=8-1,5+2=2+5, 4+1=5+2.   |   |                                   |
|   | Determine the                             |                                   |
| 1.OA.D.8  | unknown                                   |                                   |
| Determine the unknown whole number in an        | in an addition or                         |                                   |
| addition or subtraction equation relating three | subtraction equation                      |                                   |
| whole numbers. For example, determine the       | relating 3 numbers                        |                                   |
| unknown number that makes the equation true     | (e.g., 5+? =8).                           |                                   |
| in each of the equations $8+?=11, 5=\Box-3,$    |   |                                   |
| 6+6=□.  |   |                                   |
| 1.NBT. B.2b                                     |   |                                   |
|   |   |                                   |

| The numbers from 11 to 19 are composed of a      |  |  |
|--|--|--|
| ten and one, two, three, four, five, six, seven, |  |  |
| eight, or nine ones.                             |  |  |

## Unit Six: Modeling with Data

Timeline: 12 Sessions

Montessori Materials:

#### Investigations Unit 6 – Would You Rather Be an Eagle or a Whale?

**Unit Description:** IN this unit, student focus on collecting, recording, representing, describing, and comparing date in two and three categories, and on conducting data investigations.

| Standards Alignment                              | Unit Concept/Big Ideas    | Essential Questions/          | Instructional Materials/             |
|--|---------------------------|-------------------------------|--------------------------------------|
|  |                           | Learning Targets              | Assessments                          |
| 1.0A.A.1   | Numbers, pictures, words, | Essential Questions           | Montessori Materials                 |
| Use addition and subtraction within 20 to solve  | and/or notation can be    | How can counting by 10s help  | Teacher-made materials               |
| word problems involving situations of adding     | used to represent a       | me?                           | Attribute blocks                     |
| to, taking from, putting together, taking apart, | solution to a problem.    |                               |                                      |
| and comparing, with unknowns in all positions,   |                           | How can we make sense of and  | Investigations Unit 6 –              |
| e.g., by using objects, drawings, and equations  | The sum of the responses  | compare different data        | Would You Rather Be an               |
| with a symbol for the unknown number to          | in each data category     | representations?              | Eagle or a Whale?                    |
| represent the problem.                           | must equal the total      |                               |                                      |
|  | responses collected.      | How can we keep track of data | Assessments                          |
| 1.OA.A.2   |                           | collected?                    | <u>Formative</u>                     |
| Solve word problems that call for addition of    |                           |                               | Student Exercises                    |
| three whole numbers whose sum is less than or    |                           | How can we represent and      | <ul> <li>Peer questioning</li> </ul> |
| equal to 20, e.g., by using objects, drawings,   |                           | compare data?                 | Classroom                            |
| and equations with a symbol for the unknown      |                           |                               | Discussion                           |
| number to represent the problem.                 |                           | How can we make a             | <ul> <li>Problem Solving</li> </ul>  |
|  |                           | comparative statement (more   | Challenges                           |
| 1.OA.C.6   |                           | than/fewer than/same as)      | Exit Tickets                         |
| Add and subtract within 20, demonstrating        |                           | about a data representation?  | Vocabulary checks                    |
| fluency for addition and subtraction within 10.  |                           |                               |                                      |
| Use strategies such as counting on; making ten   |                           | Learning Targets              | <u>Summative</u>                     |
| (e.g., 8+6=8+2+4=10+4=14); decomposing a         |                           | Students will:                | Montessori Three-                    |
| number leading to a ten (e.g., 13-4=13-3-1=10-   |                           | Represent and describe        | Period Lesson                        |
|  |                           | a set                         | including                            |

| 1=9); using the relationship between addition<br>and subtraction (e.g., knowing that 8+4=12,<br>one knows 12-8=4); and creating equivalent<br>but easier or known sums (e.g., adding 6+7 by<br>creating the known equivalent 6+6+1=12+1=<br>13). | three categories (e.g.,<br>how many are in each<br>group, which groupprhas more/how many<br>more, and how manyof | troduction,<br>ractice,<br>nd assessment of<br>le %<br>concept mastery.<br>roblem-based |
|--|--|---|
| 1.NBT. B.2a 10 can be thought of as a bundle of ten ones—called a "ten."   | the survey). ac  | teractive Learning<br>tivities<br>erformance  |
| 1.NBT. B.2c<br>The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90<br>refer to one, two, three, four, five, six, seven,<br>eight, or nine tens (and 0 ones).  | Solve comparison story as problems with bigger or smaller unknown.   | sessment  |

Unit Seven: Addition, Subtraction, and the Number System 4Timeline: 24 SessionsUnit Description: In this unit, students will focus on counting by numbers other than 1 with an emphasis on groups of 10, on adding and<br/>subtracting 10 from a 2-digit number, on subtracting a multiple of 10 from a multiple of 10, and on representing 2-digt number with tens and<br/>ones.

| Standards Alignment                             | Unit Concept/Big Ideas       | Essential Questions/                    | Instructional Materials/              |
|---|------------------------------|---|---------------------------------------|
|   |                              | Learning Targets                        | Assessments                           |
| 1.OA.A.2  | A quantity can be            | <b>Essential Questions</b>              | Montessori Materials                  |
| Solve word problems that call for addition of   | described by its number      | How can we tell the number on           | Tens board                            |
| three whole numbers whose sum is less than or   | on ones, tens, etc.          | tens in a 2-digit number?               | Tens board                            |
| equal to 20, e.g., by using objects, drawings,  |                              |   | 100 Board                             |
| and equations with a symbol for the             | The first digit of a 2-digit | How can I record what I have            | Gold bead material                    |
| unknown number to represent the problem.        | number changes when 10       | counted?                                |                                       |
|   | is added or subtracted and   |   | Investigations Unit 7 – How           |
| 1.OA.C.5  | the second digit remains     | How can groups of 2, 5, and/or          | Many Tens? How Many                   |
| Relate counting to addition and                 | the same.                    | 10 be easily counted?                   | Ones?                                 |
| subtraction (e.g., by counting on 2 to add 2).  |                              |   |                                       |
|   | The first digit in a 2-digit | Learning Targets                        | <u>Assessments</u>                    |
| 1.OA.C.6  | number determines the        | Students will:                          | <u>Formative</u>                      |
| Add and subtract within 20, demonstrating       | number of groups of 10       | <ul> <li>Understand that the</li> </ul> | <ul> <li>Student Exercises</li> </ul> |
| fluency for addition and subtraction within 10. | and the second number        | multiples of 10 through                 | <ul> <li>Peer questioning</li> </ul>  |
| Use strategies such as counting on; making ten  | determines the number        | 90 refer to 1–9                         | Classroom                             |
| (e.g., 8+6=8+2+4=10+4=14); decomposing a        | on ones.                     | tens and 0 ones.                        | Discussion                            |
| number leading to a ten (e.g., 13-4=13-3-1=10-  |                              |   | <ul> <li>Problem Solving</li> </ul>   |
| 1=9); using the relationship between addition   | Multiples of 10 (up to 90)   | <ul> <li>Use a numeral to</li> </ul>    | <ul> <li>Challenges</li> </ul>        |
| and subtraction (e.g., knowing that 8+4=12,     | can be represented as        | represent                               | <ul> <li>Exit Tickets</li> </ul>      |
| one knows 12-8=4); and creating equivalent      | groups of ten and no         | a number of objects                     | <ul> <li>Vocabulary checks</li> </ul> |
| but easier or known sums (e.g., adding 6+7 by   | ones.                        | organized into tens and                 |                                       |
| creating the known equivalent 6+6+1=12+1=       |                              | ones and, given a                       | <u>Summative</u>                      |
| 13).  |                              | numeral, represent it                   | Montessori Three-                     |
|   |                              | with tens and ones.                     | Period Lesson                         |
| 1.OA.D.8  |                              |   | including                             |

| <ul> <li>Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8+? =11, 5=□-3, 6+6=□.</li> <li>1.NBT.A.1</li> <li>Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.</li> <li>1.NBT.B.2a</li> <li>10 can be thought of as a bundle of ten ones—called a "ten."</li> <li>1.NBT.B.2c</li> <li>The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90</li> <li>refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).</li> </ul> | <ul> <li>Subtract multiples of<br/>10 from multiples of 10<br/>using concrete models<br/>that represent tens and<br/>ones.</li> <li>Use standard notation<br/>(&lt;, &gt;) to represent the<br/>comparison of two 2-<br/>digit numbers.</li> <li>Add or subtract 10<br/>to/from any 2-digit<br/>number.</li> <li>Add within 100 using<br/>concrete models that<br/>represent tens<br/>and ones.</li> </ul> |
|--|--|
| <ul> <li>1.NBT.B.3</li> <li>Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols 7, =, and 6.</li> <li>1.NBT.C.4</li> <li>Add within 100, including adding a two-digit number and a one-digit number, and adding a</li> </ul>  |  |

| two-digit number and a multiple of 10, using<br>concrete models or drawings and strategies<br>based on place value, properties of<br>operations, and/or the relationship between<br>addition and subtraction; relate the strategy to<br>a written method and explain the reasoning<br>used. Understand that in adding two-digit<br>numbers, one adds tens and tens, ones and<br>ones; and sometimes it is necessary to<br>compose a ten. |  |  |
|--|--|--|
| 1.NBT.C.5<br>Given a two-digit number, mentally find 10<br>more or 10 less than the number, without<br>having to count; explain the reasoning used.  |  |  |
| 1.NBT.C.6<br>Subtract multiples of 10 in the range 10–90<br>from multiples of 10 in the range 10–90<br>(positive or zero differences), using concrete<br>models or drawings and strategies based on<br>place value, properties of operations, and/or<br>the relationship between addition and<br>subtraction; relate the strategy to a written<br>method and explain the reasoning used.   |  |  |

| <b>Unit Description:</b> In this unit, students will focus for naming and describing defining attributes of 2   |  | nparing, and building 3-D shapes a   | nd on developing vocabulary  |
|---|--|--|--|
| Standards Alignment   | Unit Concept/Big Ideas                                       | Essential Questions/<br>Learning Targets   | Instructional Materials/<br>Assessments  |
| 1.MD.B.3  | Clocks allow us to tell                                      | Essential Questions  | Montessori Materials   |
| Tell and write time in hours and half-hours using analog and digital clocks.  | time.<br>3-D shapes can be                                   | How can we combine smaller<br>3-D shapes to compose a larger<br>3-D structure?   | Teacher-made clock<br>materials<br>Geometric cabinet   |
| 1.G.A.1 Distinguish between defining attributes<br>(e.g., triangles are closed and three-sided)<br>versus non-defining attributes (e.g., color,   | identified by their<br>attributes.                           | How can we describe 3-D shapes?  | Geometric solids<br>3-part geometry cards  |
| orientation, overall size); build and draw shapes<br>to possess defining attributes.  | 3-D shapes can be<br>combined to create other<br>3-D shapes. | How can a shapes attributes<br>help us identify 3-D shapes?  | Investigations Unit 8 –<br>Blocks and Buildings  |
| 1.G.A.2 Compose two-dimensional shapes<br>(rectangles, squares, trapezoids, triangles, half-<br>circles, and quarter-circles) or three-<br>dimensional shapes (cubes, right rectangular<br>prisms, right circular cones, and right circular<br>cylinders) to create a composite shape, and<br>compose new shapes from the composite<br>shape. |  | How can we tell time?<br>How can clocks help us tell<br>time?<br>How can we determine the<br>length of something?<br>How can attributes help us<br>identify a 3-D shape? | Assessments<br>Formative<br>Student Exercises<br>Peer questioning<br>Classroom<br>Discussion<br>Problem Solving<br>Challenges<br>Exit Tickets<br>Vocabulary checks |
|   |  | <u>Learning Targets</u><br>Students will:  | <ul> <li>Summative</li> <li>Montessori Three-<br/>Period Lesson<br/>including</li> </ul>   |

| Tell time to the hour.   |
|--|
| <ul> <li>Demonstrate accurate<br/>measuring techniques<br/>when measuring an<br/>object or distance with<br/>multiple units.</li> </ul>  |
| <ul> <li>Compose 3-D shapes.</li> <li>Compare the lengths of two objects indirectly by using a third length.</li> </ul>  |
| <ul> <li>Use geometric<br/>language to<br/>describe and identify<br/>defining attributes of<br/>familiar 3-D shapes.</li> <li>Match a 2-D<br/>representation<br/>of a 3-D shape to the<br/>outline of one of its<br/>faces.</li> <li>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 2<sup>nd</sup> Grade

#### **Curriculum Framework for Mathematics**

School: Sussex Montessori SchoolCurricular Resources: Montessori Materials and Lessons / Investigations3Grade: 2Unit One: Addition, Subtraction, and the Number System 1Timeline: 20 SessionsUnit Description: In this unit students focus on adding and subtracting single-digit numbers, especially on adding numbers in any order;<br/>shifting from counting by 1s to counting by groups, particularly groups of tens and ones, which lays the foundation for students' work with<br/>place value and the base-10 number system; and developing and refining strategies for solving a variety of addition and subtraction problems.

| Standards Alignment                             | Unit Concept/Big Ideas       | Essential Questions/           | Instructional Materials/    |
|---|------------------------------|--------------------------------|-----------------------------|
|   |                              | Learning Targets               | Assessments                 |
| 2.0A.A.1  | There is more than one       | Essential Questions            | Montessori Materials        |
| Use addition and subtraction within             | way to count a quantity.     | How can we count coins?        | 100 board                   |
| 100 to solve one- and two-step word problems    |                              |                                | 3-part coin quantity cards  |
| involving situations of adding to, taking from, | Numbers, symbols,            | How can we equivalent          | 3-part time cards           |
| putting together, taking apart, and comparing,  | pictures, and/or words       | expressions for a number?      | Stamp game                  |
| with unknowns in all positions, e.g., by using  | can be used to represent a   |                                | Place value cards           |
| drawings and equations with a symbol for the    | solution to a problem.       | How can we solve problems      | Bead frame                  |
| unknown number to represent the problem.        |                              | about 10s and 1s?              | Bead Cabinet                |
|   | Identifying and using        |                                |                             |
| 2.OA.B.2  | patterns can help us         | How can we count groups of 2,  | Investigations Unit 1 –     |
| Fluently add and subtract within 20 using       | count, read, and write       | 5, or 10?                      | <b>Building Numbers and</b> |
| mental strategies. By end of Grade 2, know      | numbers to 100 and           |                                | Solving Story Problems      |
| from memory all sums of two one-digit           | beyond.                      | Does order matter in addition? |                             |
| numbers.  |                              |                                | Assessments                 |
|   | The first digit of a 2-digit | Does order matter in           | Formative                   |
| 2.NBT.A.2                                       | number designates the        | subtraction?                   | Student Exercises           |
| Count within 1000; skip-count by 5s, 10s, and   | number of groups of 10       |                                | Peer Questioning            |
| 100s.   | and the second digit         | How can using known facts to   | Classroom                   |
|   | designates the number of     | add two or more numbers.       | Discussions                 |
| 2.NBT.A.3                                       | ones.                        |                                | Quick Check sheets          |
| Read and write numbers to 1000 using            |                              | How do clocks tell us time?    | Vocabulary checks           |
| base-ten numerals, number names, and            |                              |                                | Problem Solving             |
| expanded form.                                  |                              | Learning Targets               | Challenges                  |

| .NBT.A.3  | Students will:   | <ul> <li>Exit Tickets</li> </ul>   |
|---|--|--|
| Read and write numbers to 1000 using  | Solve a comparison   | 3-Period Lesson  |
| base-ten numerals, number names, and  | story problem with the   |  |
| expanded form.  | difference unknown.  | <u>Summative</u>   |
| Expanded form.<br>2.NBT.B.6<br>Add up to four two-digit numbers using<br>trategies based on place value and<br>properties of operations.<br>2.NBT.B.9<br>Explain why addition and subtraction<br>trategies work, using place value and the<br>properties of operations.<br>2.MD.B.6<br>Represent whole numbers as lengths from 0 on<br>a number line diagram with equally<br>spaced points corresponding to the<br>numbers 0, 1, 2,, and represent whole-<br>number sums and differences within 100 on a<br>number line diagram.<br>2.MD.C.8<br>Solve word problems involving dollar bills,<br>juarters, dimes, nickels, and pennies, using<br>a and ¢ symbols appropriately. Example: If you | <ul> <li>Solve put<br/>together/take<br/>apart story problems<br/>with the total<br/>unknown, and add to<br/>and take from story<br/>problems with the<br/>result unknown.</li> <li>Use known<br/>combinations to<br/>add several numbers in<br/>any order.</li> <li>Recognize and identify<br/>coins<br/>and their values.</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |

| Recognize and draw shapes having specified     |  |  |
|--|--|--|
| attributes, such as a given number of          |  |  |
| angles or a given number of equal faces.       |  |  |
| Identify triangles, quadrilaterals, pentagons, |  |  |
| hexagons, and cubes.                           |  |  |

## Unit Two: 2-D Geometry Timeline: 12 Sessions

**Unit Description:** In this unit students focus on observing and describing defining attributes of 2-D and 3-D shapes (e.g., number and shape of faces, number and length of sides, and number of angles and vertices), and using those attributes as they sort, construct, draw, and compare shapes.

| Standards Alignment                              | Unit Concept/Big Ideas                            | Essential Questions/<br>Learning Targets                 | Instructional Materials/<br>Assessments            |
|--|---|--|--|
| 2.OA.B.2   | Geometry has its own                              | Essential Questions                                      | Montessori Materials                               |
| Fluently add and subtract within 20 using        | vocabulary.                                       | How can we categorize shapes                             | Geometric cabinet                                  |
| mental strategies. By end of Grade 2, know       | vocabalary.                                       | based on their attributes?                               | Geometric solids                                   |
| from memory all sums of two one-digit            | A 3-D shapes attributes                           | based on their attributes:                               | Constructive triangle boxes                        |
| numbers.   | help us identify it.                              | How can we determine a half,                             | Fraction skittles                                  |
| numbers.   | help us identify it.                              | third, or fourth of a region?                            | Fraction insets                                    |
| 2.G.A.1  | Quadrilaterals have four                          |  | Fraction box                                       |
| Recognize and draw shapes having specified       | sides and four angles.                            | Can halves or fourths of the                             |  |
|  | sides and rour angles.                            | same shape look different?                               | Investigations Unit 2                              |
| attributes, such as a given number of            | Regular polygons can be                           | same shape look unrerent?                                | Investigations Unit 2 –<br>Comparing and Combining |
| angles or a given number of equal faces.         | Regular polygons can be named and sorted by their | How can we develop fluency                               |  |
| Identify triangles, quadrilaterals, pentagons,   | number of sides.                                  | How can we develop fluency with doubles facts within 20? | Shapes   |
| hexagons, and cubes.                             | number of sides.                                  | with doubles facts within 20?                            | A  |
| 2 C A 2  |   | ) A (hat is the valationship                             | Assessments  |
| 2.G.A.2  | Different rectangular                             | What is the relationship                                 | Formative  |
| Partition a rectangle into rows and columns of   | arrays can be made with                           | between doubles and near                                 | Student Exercises                                  |
| same-size squares and count to find the total    | the same number of tiles.                         | doubles?   | Peer Questioning                                   |
| number of them.                                  |   |  | Classroom  |
|  | Fractions are equal parts                         | What is the relationship                                 | Discussions  |
| 2.G.A.3  | of a whole.                                       | between quadrilaterals,                                  | Quick Check sheets                                 |
| Partition circles and rectangles into two,       |   | rectangles, and squares?                                 | <ul> <li>Vocabulary checks</li> </ul>              |
| three, or four equal shares, describe the shares |   |  | Problem Solving                                    |
| using the words halves, thirds, half of, a third |   | Learning Targets   | Challenges   |
| of, etc., and describe the whole as two halves,  |   | Students will:   | Exit Tickets                                       |
| three thirds, four fourths. Recognize that equal |   | <ul> <li>Identify defining</li> </ul>                    | 3-Period Lesson                                    |
|  |   | attributes   |  |

| shares of identical wholes need not have the | of 2-D and 3-D shapes Summative  |
|--|--|
| same shape.                                  | <ul> <li>(number and shape of faces, number and length of sides, number of angles and vertices) and draw shapes with those attributes.</li> <li>Make a rectangle out of same size squares and specify the number of squares in</li> <li>Make a rectangle out of rows and the number of squares in</li> </ul> |
|  | <ul> <li>each row.</li> <li>Recognize that [halves, thirds, fourths] of the same whole can look different.</li> <li>Partition 2-D shapes into halves, thirds and fourths and name the regions.</li> </ul>  |

| Unit Three: Addition, Subtraction, and the Number System 2 Timeline: 26 Sessions   |  |                                 |                                       |  |
|--|--|---------------------------------|---------------------------------------|--|
| Unit Description: In this unit students focus on the place value of 2-digit numbers, and operating on those numbers within 100. Students |  |                                 |                                       |  |
| come to see 100 as ten 10s and multiples of 100 as being made up of some number of hundreds.   |  |                                 |                                       |  |
| Standards Alignment  | Unit Concept/Big Ideas                           | Essential Questions/            | Instructional Materials/              |  |
|  |  | Learning Targets                | Assessments                           |  |
| 2.0A.A.1   | Different combinations of                        | Essential Questions             | Montessori Materials                  |  |
| Use addition and subtraction within  | a 2-digit number, using                          | How can 100 charts help us      | 100 Board                             |  |
| 100 to solve one- and two-step word problems   | only tens and ones, can                          | reason about the magnitude      | Teens Board                           |  |
| involving situations of adding to, taking from,  | represent the same                               | and relationship of numbers?    | Tens Board                            |  |
| putting together, taking apart, and comparing,   | number, (e.g. 4 tens and                         |                                 |                                       |  |
| with unknowns in all positions, e.g., by using   | 6 ones, 3 tens and 16                            | What is the relationship        | Investigations Unit 3 – How           |  |
| drawings and equations with a symbol for the   | ones, etc.).                                     | between 1, 10, and 100?         | Many of Each? How Many                |  |
| unknown number to represent the problem.   |  |                                 | in All?                               |  |
|  | An equation can                                  | How can we use standard         |                                       |  |
| 2.OA.B.2   | represent a 2-digit                              | notation (<, >) to express the  | <u>Assessments</u>                    |  |
| Fluently add and subtract within 20 using  | number as the sum of                             | relationship between two        | <u>Formative</u>                      |  |
| mental strategies. By end of Grade 2, know   | multiples of ten and                             | quantities?                     | Student Exercises                     |  |
| from memory all sums of two one-digit  | some number of ones                              |                                 | Peer Questioning                      |  |
| numbers.   | (e.g., 22-20+2,                                  | How can we identify a quantity  | Classroom                             |  |
|  | 22=10+10+2).                                     | given a number of tens and      | Discussions                           |  |
| 2.NBT.A.3  |  | ones?                           | Quick Check sheets                    |  |
| Read and write numbers to 1000 using   | Adding two-digit                                 |                                 | <ul> <li>Vocabulary checks</li> </ul> |  |
| base-ten numerals, number names, and   | numbers  | What happens to the tens place  | Problem Solving                       |  |
| expanded form.   |  | when a multiple of 10 is added  | Challenges                            |  |
|  | Sums can be represented                          | or subtracted?                  | Exit Tickets                          |  |
| 2.NBT.A.3  | as lengths on a number                           |                                 | 3-Period Lesson                       |  |
| Read and write numbers to 1000 using   | line   | Learning Targets                |                                       |  |
| base-ten numerals, number names, and   | Numbers can be grouped                           | Students will:                  | <u>Summative</u>                      |  |
| expanded form.   | Numbers can be grouped<br>and added in any order | <ul> <li>Solve a put</li> </ul> | Montessori Three-                     |  |
| 2.NBT.B.5  | and added in any order                           | together/take                   | Period Lesson                         |  |
| 2.1101.0.3   |  |                                 | including                             |  |

| <ul> <li>Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.</li> <li>2.NBT.B.6</li> <li>Add up to four two-digit numbers using strategies based on place value and properties of operations.</li> <li>2.NBT.B.8</li> <li>Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.</li> <li>2.NBT.B.9</li> <li>Explain why addition and subtraction strategies work, using place value and the properties of operations.</li> <li>2.MD.B.6</li> <li>Represent whole numbers as lengths from 0 on a number line diagram with equally Spaced points corresponding to the numbers 0, 1, 2,, and represent whole-number sums and differences within 100 on a number line diagram.</li> <li>2.MD.C.8</li> <li>Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using</li> </ul> | Regrouping<br>Subtracting two-digit<br>numbers<br>Differences can be<br>calculated using a<br>number line<br>Using addition to check<br>subtraction | <ul> <li>apart story problem<br/>with both addends<br/>unknown, and find all<br/>the possible<br/>combinations.</li> <li>Solve a put<br/>together/take<br/>apart story problem<br/>with one addend<br/>unknown.</li> <li>Solve two-step story<br/>problems about money.</li> <li>Solve story problems<br/>with<br/>an unknown change.</li> <li>Solve story problems<br/>with<br/>an unknown start.</li> <li>Solve a put<br/>together/take<br/>apart story problem<br/>with both addends<br/>unknown, and find all<br/>the possible<br/>combinations.</li> </ul> | introduction,<br>practice,<br>and assessment of<br>the %<br>of concept mastery.<br>Problem-based<br>interactive Learning<br>activities<br>Performance<br>assessment |
|--|---|---|---|
|--|---|---|---|

| \$ and ¢ symbols appropriately. Example: If you |  |  |
|---|--|--|
| have 2 dimes and 3 pennies, how many cents      |  |  |
| do you have?                                    |  |  |

 Unit Four: Measurement and Fractions
 Timeline: 14 Sessions

 Unit Description: In this unit students focus on sorting and classifying categorical data; ordering numerical data; and collecting and representing categorical and numerical data using a variety of representations: student-generated representations, picture graphs, bar graphs, Venn diagrams, cube towers, and line plots.

| Standards Alignment                             | Unit Concept/Big Ideas    | Essential Questions/                       | Instructional Materials/     |
|---|---------------------------|--|------------------------------|
|   |                           | Learning Targets                           | Assessments                  |
| 2.OA.A.1  | Data can be represented   | Essential Questions                        | <u>Montessori Materials</u>  |
| Use addition and subtraction within             | on a picture graph, bar   | How can we represent data on               | Stamp game                   |
| 100 to solve one- and two-step word problems    | graph, or line plot.      | a picture graph, bar graph, or             |                              |
| involving situations of adding to, taking from, |                           | line plot?                                 | Investigations Unit 4 – Fish |
| putting together, taking apart, and comparing,  | An equation can show      |  | Lengths and Fraction Rugs    |
| with unknowns in all positions, e.g., by using  | that the sum of the       | How can we gather data?                    |                              |
| drawings and equations with a symbol for the    | responses in each data    |  | <u>Assessments</u>           |
| unknown number to represent the problem.        | category equals the total | How can we record data?                    | <u>Formative</u>             |
|   | responses collected.      |  | Student Exercises            |
| 2.OA.B.2  |                           | How can we interpret data                  | Peer Questioning             |
| Fluently add and subtract within 20 using       |                           | from graphs?                               | Classroom                    |
| mental strategies. By end of Grade 2, know      |                           |  | Discussions                  |
| from memory all sums of two one-digit           |                           | Learning Targets                           | Quick Check sheets           |
| numbers.  |                           | Students will:                             | Vocabulary checks            |
|   |                           | <ul> <li>Organize a set of data</li> </ul> | Problem Solving              |
| 2.NBT.A.2                                       |                           | into up to four                            | Challenges                   |
| Count within 1000; skip-count by 5s, 10s, and   |                           | categories.                                | Exit Tickets                 |
| 100s.   |                           |  | 3-Period Lesson              |
|   |                           | • Create, describe, and                    |                              |
| 2.MD.D.9  |                           | interpret a variety of                     | Summative                    |
| Generate measurement data by measuring          |                           | data representations,                      | Montessori Three-            |
| lengths of several objects to the nearest       |                           | including picture                          | Period Lesson                |
| whole unit, or by making repeated               |                           | graphs and bar graphs.                     | including                    |
| measurements of the same object. Show the       |                           |  | introduction,                |
| measurements by making a line plot, where the   |                           | • Order, represent, and                    | practice,                    |
|   |                           |  | practice,                    |

| horizontal scale is marked off in whole-number<br>units.  | describe a set of<br>numerical data. | and assessment of<br>the %<br>of concept mastery.   |
|---|--------------------------------------|---|
| 2.MD.D.10<br>Draw a picture graph and a bar graph (with<br>single-unit scale) to represent a data set with<br>up to four categories. Solve simple put-<br>together, take apart, and compare problems<br>using information presented in a bar graph. |                                      | <ul> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |

Unit Five: Addition, Subtraction and the Number System 3Timeline: 10 SessionsUnit Description: In this unit students focus on the place value of 3-digit numbers and operating on numbers within 100. Students come to<br/>see 100 as 10 tens and multiples of 100 as being made up of some number of hundreds.

| Standards Alignment                             | Unit Concept/Big Ideas | Essential Questions/<br>Learning Targets | Instructional Materials/<br>Assessments |
|---|------------------------|--|---|
| 2.0A.A.1  | Three-digit numbers:   | Essential Questions                      | Montessori Materials                    |
| Use addition and subtraction within             | place value            | How can using cubes or a                 | Teacher-made materials                  |
| 100 to solve one- and two-step word problems    |                        | number line show the                     | Golden Beads                            |
| involving situations of adding to, taking from, | Finding missing parts  | relationship between adding              | Place value cards                       |
| putting together, taking apart, and comparing,  |                        | (or subtracting) 9 and addition          | Stamp Game                              |
| with unknowns in all positions, e.g., by using  | Using models to solve  | (or subtracting) 10 to/from a            |   |
| drawings and equations with a symbol for the    | problems               | number?                                  | Investigations Unit 5 –                 |
| unknown number to represent the problem.        |                        |  | Number Games and Crayon                 |
| 2.OA.B.2  |                        | How can we solve 2-step problems?        | Problems                                |
| Fluently add and subtract within 20 using       |                        | problems                                 | Assessments                             |
| mental strategies. By end of Grade 2, know      |                        | How can we solve story                   | Formative                               |
| from memory all sums of two one-digit           |                        | problems that involve                    | Student Exercises                       |
| numbers.  |                        | comparison and finding the               | Peer Questioning                        |
|   |                        | difference?                              | Classroom                               |
| 2.NBT.A.2                                       |                        |  | Discussions                             |
| Count within 1000; skip-count by 5s, 10s, and   |                        | What combinations of coins               | Quick Check sheets                      |
| 100s.   |                        | equal \$1.00?                            |   |
| 1005.   |                        |  | Vocabulary checks                       |
| 2.NBT.A.3                                       |                        | What strategies can we use to            | Problem Solving     Challenges          |
| Read and write numbers to 1000 using            |                        | add three-digit numbers?                 | Challenges                              |
| base-ten numerals, number names, and            |                        |  | Exit Tickets                            |
| expanded form.                                  |                        | What strategies can we use to            | 3-Period Lesson                         |
|   |                        | subtract three-digit numbers?            |   |
| 2.NBT.A.3                                       |                        |  | Summative                               |
| 2.1101.71.5                                     |                        |  | <ul> <li>Montessori Three-</li> </ul>   |

| Read and write numbers to 1000 using           | What strategies and techniques             | Period Lesson        |
|--|--|----------------------|
| base-ten numerals, number names, and           | are used to add mentally?                  | including            |
| expanded form.                                 |  | introduction,        |
|  | What strategies are used to                | practice,            |
| 2.NBT.B.5                                      | subtract mentally?                         | and assessment of    |
| Fluently add and subtract within 100 using     |  | the %                |
| strategies based on place value, properties    | What techniques are used to                | of concept mastery.  |
| of operations, and/or the relationship between | subtract three-digit numbers?              | Problem-based        |
| addition and subtraction.                      |  | interactive Learning |
|  | When is counting on a helpful              | activities           |
| 2.NBT.B.6                                      | Strategy?                                  | Performance          |
| Add up to four two-digit numbers using         |  | assessment           |
| strategies based on place value and            | When is counting back a                    |                      |
| properties of operations.                      | helpful strategy?                          |                      |
| 2.NBT.B.8                                      | Learning Targets                           |                      |
| Mentally add 10 or 100 to a given number 100–  | Students will:                             |                      |
| 900, and mentally subtract 10 or 100           | <ul> <li>Solve a 2-step story</li> </ul>   |                      |
| from a given number 100–900.                   | problem                                    |                      |
|  | that involves finding                      |                      |
| 2.NBT.B.9                                      | the difference between                     |                      |
| Explain why addition and subtraction           | a 2-digit number and                       |                      |
| strategies work, using place value and the     | 100.                                       |                      |
| properties of operations.                      |  |                      |
|  | <ul> <li>Solve comparison story</li> </ul> |                      |
| 2.MD.B.6                                       | problems with a bigger                     |                      |
| Represent whole numbers as lengths from 0 on   | unknown.                                   |                      |
| a number line diagram with equally             |  |                      |
| Spaced points corresponding to the             | Read, write, count and                     |                      |
|  | compare numbers to                         |                      |
|  | 1,000.                                     |                      |

| numbers 0, 1, 2,, and represent whole-<br>number sums and differences within 100 on a<br>number line diagram.   | <ul> <li>Count by 5s, 10s, and<br/>100s within 1,000.</li> </ul>                                       |
|---|--|
| <ul> <li>2.MD.C.8</li> <li>Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using</li> <li>\$ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?</li> </ul> | <ul> <li>Read, write, count and compare numbers to 1,000.</li> <li>Add fluently within 100.</li> </ul> |
|   | <ul> <li>Add/subtract 10 or 100<br/>to/from numbers<br/>within 1,000.</li> </ul>                       |

Unit Six: Modeling with DataTimeline: 12 SessionsUnit Description: In this unit students focus on developing strategies for accurately measuring length with nonstandard and standard units<br/>(e.g., craft sticks, cubes, inches, feet, yards, centimeters, and meters) and tools (e.g., inch-brick measuring tools, rulers, yardsticks, and meter<br/>sticks) and for considering the relationship between different units and tools (e.g., the larger the unit, the smaller the count will be).

| Standards Alignment                             | Unit Concept/Big Ideas   | Essential Questions/           | Instructional Materials/ |
|---|--------------------------|--------------------------------|--------------------------|
|   |                          | Learning Targets               | Assessments              |
| 2.0A.A.1  | Identifying contexts for | Essential Questions            | Montessori Materials     |
| Use addition and subtraction within             | measurement              | How can we measure and         | No specific Montessori   |
| 100 to solve one- and two-step word problems    |                          | compare lengths?               | materials necessary      |
| involving situations of adding to, taking from, | Comparing lengths        |                                |                          |
| putting together, taking apart, and comparing,  |                          | Can we use nonstandard units   | Investigations Unit 6 –  |
| with unknowns in all positions, e.g., by using  | Accurately using         | to measure length?             | Would You Rather Be an   |
| drawings and equations with a symbol for the    | measuring tools          |                                | Eagle or a Whale?        |
| unknown number to represent the problem.        |                          | How can we use subtraction to  |                          |
|   | Inches, feet, yards      | compare lengths?               | <u>Assessments</u>       |
| 2.NBT.B.5                                       |                          |                                | <b>Formative</b>         |
| Fluently add and subtract within 100 using      | Centimeters, meters      | Why do we have standard        | Student Exercises        |
| strategies based on place value, properties     |                          | measurement units for length?  | Peer Questioning         |
| of operations, and/or the relationship between  | Length and width         |                                | Classroom                |
| addition and subtraction.                       |                          | How can the length of one      | Discussions              |
|   | Representing and         | object be used to measure      | Quick Check sheets       |
| 2.MD.A.2  | describing a set of      | another?                       | Vocabulary checks        |
| Measure the length of an object twice, using    | measurement data in a    |                                | Problem Solving          |
| length units of different lengths for the two   | table and on a line plot | What strategies can we use to  | Challenges               |
| measurements; describe how the two              |                          | add or subtract measurements   | Exit Tickets             |
| measurements relate to the size of the unit     |                          | in the same unit?              | 3-Period Lesson          |
| chosen.   |                          |                                |                          |
|   |                          | How can we represent           | Summative                |
| 2.MD.A.3  |                          | measurement data in a table or | Montessori Three-        |
| Estimate lengths using units of inches, feet,   |                          | on a line plot?                | Period Lesson            |
| centimeters, and meters.                        |                          |                                | including                |

| 2.MD.A.4<br>Measure to determine how much longer one<br>object is than another, expressing the length<br>difference in terms of a standard<br>length unit.   | Learning Targetsintroduction,Students will:practice,• Recognize that, when<br>measuring the same<br>length, larger units<br>yield smaller countsand assessment o• Problem-based | ry. |
|--|---|-----|
| 2.MD.B.5   | (and vice versa). interactive Learnin<br>activities   | ng  |
| Use addition and subtraction within<br>100 to solve word problems involving lengths<br>that are given in the same units, e.g., by using<br>drawings (such as drawings of rulers) and<br>equations with a symbol for the unknown  | Estimate and measure<br>lengths in inches, feet,<br>centimeters, and<br>meters.   |     |
| number to represent the problem.   | <ul> <li>Solve comparison and<br/>other story problems</li> </ul>   |     |
| 2.MD.D.9   | about lengths.  |     |
| Generate measurement data by measuring<br>lengths of several objects to the nearest<br>whole unit, or by making repeated<br>measurements of the same object. Show the<br>measurements by making a line plot, where the<br>horizontal scale is marked off in whole-number | <ul> <li>Represent<br/>measurement data on<br/>a line plot.</li> </ul>  |     |
| units.   |   |     |

| Unit Seven: Addition, Subtraction, and the Number System 4Timeline: 24 SessionsUnit Description: The focus of this unit is on working with equal groups as the foundation of multiplication by investigating even and oddnumbers and by representing equal groups with arrays and tables. |                            |   |                              |
|---|----------------------------|---|------------------------------|
| Standards Alignment   | Unit Concept/Big Ideas     | Essential Questions/                    | Instructional Materials/     |
|   |                            | Learning Targets                        | Assessments                  |
| 2.OA.B.2  | Adding two-digit numbers   | Essential Questions                     | Montessori Materials         |
| Fluently add and subtract within 20 using   |                            | What is an array?                       | Bead cabinet                 |
| mental strategies. By end of Grade 2, know  | Sums can be represented    |   | Multiplication board         |
| from memory all sums of two one-digit   | as lengths on a number     | What is the relationship                | Multiplication ticket box    |
| numbers.  | line                       | between a number of equal               | Multiplication finger charts |
|   |                            | groups and their total?                 | Pythagorean board            |
| 2.NBT.A.2   | Numbers can be grouped     |   | Division board               |
| Count within 1000; skip-count by 5s, 10s, and   | and added in any order     | Can all numbers be made into            | Division ticket box          |
| 100s.   |                            | two equal parts?                        | Division finger charts       |
|   | Regrouping                 |   | Cards and counters           |
| 2.NBT.B.5   |                            | How are multiplication and              |                              |
| Fluently add and subtract within 100 using  | Subtracting two-digit      | division related?                       | Investigations Unit 7 – How  |
| strategies based on place value, properties   | numbers                    |   | Many Tens? How Many          |
| of operations, and/or the relationship between  |                            | How can skip counting help us           | Ones?                        |
| addition and subtraction.   | Differences can be         | solve math problems?                    |                              |
|   | calculated using a number  |   | <u>Assessments</u>           |
|   | line                       | Learning Targets                        | <u>Formative</u>             |
|   |                            | Students will:                          | Student Exercises            |
|   | Using addition to check    | Numbers can and                         | Peer Questioning             |
|   | Subtraction                | cannot be made into                     | Classroom                    |
|   |                            | groups of two or two                    | Discussions                  |
|   | Any number that can be     | equal groups.                           | Quick Check sheets           |
|   | divided into groups of two |   | Vocabulary checks            |
|   | can also be divided into   | <ul> <li>Understand that any</li> </ul> | Problem Solving              |
|   | two equal groups.          | number that can be                      | Challenges                   |
|   |                            | divided into groups of                  | Exit Tickets                 |

| two can also be divided • 3-Period Lesson   |
|---|
| into two equal groups                       |
| (and vice versa). <u>Summative</u>          |
| Characterize even and     Montessori Three- |
| odd numbers as those Period Lesson          |
| that do or do not make including            |
| groups of two introduction,                 |
| (partners) and two practice,                |
| equal groups (teams). and assessment of     |
| the %                                       |
| Represent an even     of concept mastery.   |
| number as the sum of     Problem-based      |
| two equal addends and interactive Learning  |
| an odd number as the activities             |
| sum of two equal    Performance             |
| addends plus 1. assessment                  |
| Consider whether                            |
| observations about                          |
| even or odd numbers                         |
| apply to all even                           |
| numbers or all odd                          |
| numbers.                                    |
| Add equal groups.                           |
|   |
| Use an equation to                          |
| model adding equal                          |
| groups.                                     |
| Describe the                                |
| relationship between a                      |

| number of equal         |
|-------------------------|
| groups and their total. |
|                         |
| - Poprosont             |
| Represent               |
| multiplicative          |
| relationships with      |
| tables.                 |
|                         |
|                         |
| Compare situations      |
| that look different but |
| have the same           |
|                         |
| equal group structure.  |
|                         |
| Solve problems          |
| involving equal groups  |
| and the total number    |
|                         |
| of objects.             |

Unit Eight: Addition, Subtraction, and the Number System 5Timeline: 20 SessionsUnit Description: This unit focuses on developing and achieving fluency with subtraction within 100, and on achieving fluency with addition<br/>and subtraction facts within 20

| Standards Alignment                             | Unit Concept/Big Ideas     | Essential Questions/             | Instructional Materials/   |
|---|----------------------------|----------------------------------|----------------------------|
|   |                            | Learning Targets                 | Assessments                |
| 2.0A.A.1  | Fluency with addition and  | Essential Questions:             | Montessori Materials       |
| Use addition and subtraction within             | subtraction within 20      | How can we demonstrate           | Money Roll-out             |
| 100 to solve one- and two-step word problems    |                            | fluency with addition and        | Three-part money cards     |
| involving situations of adding to, taking from, | Using standard notation    | subtraction within 20.           | Coin amount matching cards |
| putting together, taking apart, and comparing,  | to represent addition and  |                                  | Making change matching     |
| with unknowns in all positions, e.g., by using  | subtraction situations     | How can knowing doubles help     | cards                      |
| drawings and equations with a symbol for the    |                            | us solve addition or subtraction | Stamp game                 |
| unknown number to represent the problem.        | Coin equivalences for      | problems?                        | Teacher-made materials     |
|   | \$1.00                     |                                  | Golden beads               |
| 2.OA.B.2  |                            | How can we solve make-           | Place value cards          |
| Fluently add and subtract within 20 using       | Strategies for subtracting | change story problems?           | Stamp game                 |
| mental strategies. By end of Grade 2, know      | 2-digit numbers            |                                  |                            |
| from memory all sums of two one-digit           |                            | Where do we start when we        |                            |
| numbers.  | Place value                | add three-digit numbers?         | Investigations Unit 8 –    |
|   |                            |                                  | Enough for the class?      |
| 2.NBT.A.3                                       | Expanded notation          | Learning Targets:                | Enough for the grade?      |
| Read and write numbers to 1000 using            |                            | Students will:                   |                            |
| base-ten numerals, number names, and            | Rounding to the nearest    | Solve a comparison               |                            |
| expanded form.                                  | 10 and 100                 | story                            | <u>Assessments</u>         |
|   |                            | problem with a smaller           | <u>Formative</u>           |
| 2.NBT.A.3                                       | Adding and subtracting     | unknown.                         | Student Exercises          |
| Read and write numbers to 1000 using            | three-digit numbers        |                                  | Peer Questioning           |
| base-ten numerals, number names, and            | accurately                 | Fluently subtract 2-             | Classroom                  |
| expanded form.                                  |                            | digit                            | Discussions                |
|   |                            | numbers.                         | Quick Check sheets         |

| 2.NBT.B.5                                       |   | Vocabulary checks                   |
|---|---|-------------------------------------|
| Fluently add and subtract within 100 using      | <ul> <li>Fluently add and</li> </ul>    | <ul> <li>Problem Solving</li> </ul> |
| strategies based on place value, properties     | subtract                                | Challenges                          |
| of operations, and/or the relationship between  | within 20.                              | Exit Tickets                        |
| addition and subtraction.                       |   | • 3-Period Lesson                   |
|   | <ul> <li>Represent and solve</li> </ul> |                                     |
| 2.NBT.B.7                                       | addition and S                          | ummative                            |
| Add and subtract within 1000, using concrete    | subtraction problems                    | Montessori Three-                   |
| models or drawings and strategies based on      | with 3-digit numbers.                   | Period Lesson                       |
| place value, properties of operations, and/or   |   | including                           |
| the relationship between addition and           | Name, notate, and tell                  | introduction,                       |
| subtraction; relate the strategy to a written   | time                                    | practice,                           |
| method.   | to the nearest 5                        | and assessment of                   |
| Understand that in adding or subtracting three- | minutes using analog                    | the %                               |
| digit numbers, one adds or subtracts hundreds   | and digital formats and                 | of concept mastery.                 |
| and hundreds, tens and tens, ones and ones;     | associate A.M. and                      | <ul> <li>Problem-based</li> </ul>   |
| and sometimes it is necessary to compose or     | P.M. with time of day.                  | interactive Learning                |
| decompose tens or hundreds.                     |   | activities                          |
|   |   | Performance                         |
| 2.NBT.B.9                                       |   | assessment                          |
| Explain why addition and subtraction            |   |                                     |
| strategies work, using place value and the      |   |                                     |
| properties of operations.                       |   |                                     |
|   |   |                                     |
| 2.MD.B.6  |   |                                     |
| Represent whole numbers as lengths from 0 on    |   |                                     |
| a number line diagram with equally              |   |                                     |
| Spaced points corresponding to the              |   |                                     |
| numbers 0, 1, 2,, and represent whole-          |   |                                     |
| number sums and differences within 100 on a     |   |                                     |
| number line diagram.                            |   |                                     |

| 2.MD.C.7<br>Tell and write time from analog and digital<br>clocks to the nearest five minutes, using<br>a.m. and p.m.  |  |  |
|--|--|--|
| 2.MD.C.8<br>Solve word problems involving dollar bills,<br>quarters, dimes, nickels, and pennies, using<br>\$ and ¢ symbols appropriately. Example: If you<br>have 2 dimes and 3 pennies, how many cents<br>do you have? |  |  |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 3<sup>rd</sup> Grade

#### **Curriculum Framework for Mathematics**

 School: Sussex Montessori School
 Curricular Resources: Montessori Materials and Lessons / Investigations
 3
 Grade: 3

 Unit One: Understanding Equal Groups, Multiplication and Division I
 Timeline: 23 Sessions

 Unit Description:
 In this unit students focus on understanding the meaning of multiplication, modeling multiplication using arrays, and understanding the inverse relationship between multiplication and division.

| Standards Alignment                              | Unit Concept/Big Ideas     | Essential Questions/               | Instructional Materials/              |
|--|----------------------------|------------------------------------|---------------------------------------|
|  |                            | Learning Targets                   | Assessments                           |
| 3.0A.A.1   | Multiplication is          | <b>Essential Questions</b>         | Montessori Materials                  |
| Interpret products of whole numbers, e.g.,       | combining equal groups.    | What is the relationship among     | Multiplication board,                 |
| interpret 5×7 as the total number of objects in  |                            | skip counting, repeated            | tickets, and finger charts            |
| 5 groups of 7 objects each. For example,         | Represent and solve        | addition, and multiplication?      |                                       |
| describe a context in which a total number of    | problems using             |                                    | Division board, tickets, and          |
| objects can be expressed as 5×7.                 | multiplication and         | Does doubling (or halving) on      | finger charts                         |
|  | division.                  | factor in a multiplication         |                                       |
| 3.0A.A.2   |                            | expression double (or halve)       | Bead cabinet                          |
| Interpret whole-number quotients of whole        | Multiply and divide within | the product?                       |                                       |
| numbers, e.g., interpret 56÷8 as the number of   | 100.                       |                                    | Teacher-made materials                |
| objects in each share when 56 objects are        |                            | How can we model                   |                                       |
| partitioned equally into 8 shares, or as a       | Solve problems using the   | multiplication situations with     | Geometry cabinet                      |
| number of shares when 56 objects are             | four operations, and       | arrays?                            |                                       |
| partitioned into equal shares of 8 objects each. | identify patterns in       |                                    | Investigations Unit 1 –               |
| For example, describe a context in which a       | arithmetic.                | What is the square of a            | Understanding Equal                   |
| number of shares or a number of groups can       |                            | number?                            | Groups                                |
| be expressed as 56÷8.                            | Geometric measurement:     |                                    |                                       |
|  | Understand the concept     | What is a prime number?            |                                       |
| 3.0A.A.3   | of area and relate area to |                                    | <u>Assessments</u>                    |
| Use multiplication and division within 100 to    | multiplication and         | Learning Targets                   | <u>Formative</u>                      |
| solve word problems in situations involving      | addition.                  | Students will:                     | <ul> <li>Student Exercises</li> </ul> |
| equal groups, arrays, and measurement            |                            | <ul> <li>Demonstrate an</li> </ul> | <ul> <li>Peer Questioning</li> </ul>  |
| quantities, e.g., by using drawings and          |                            | understanding of                   | Classroom                             |
|  |                            | multiplication and                 | Discussions                           |

| acception of with a symplect for the contractor                         |  |                                       |
|---|--|---------------------------------------|
| equations with a symbol for the unknown                                 | division as involving  | Vocabulary checks                     |
| number to represent the problem.  | equal groups.  | Problem Solving                       |
|   |  | Challenges                            |
| 3.OA.A.4  | <ul> <li>Solve multiplication</li> </ul>                       | <ul> <li>Exit Tickets</li> </ul>      |
| Determine the unknown whole number in a                                 | and related division   |                                       |
| multiplication or division equation relating                            | problems by using skip Sum                                     | <u>imative</u>                        |
| three whole numbers. For example,                                       | counting or known  | <ul> <li>Montessori Three-</li> </ul> |
| determine the unknown number that makes                                 | multiplication facts.  | Period Lesson                         |
| the equation true in each of the equations                              |  | including                             |
| 8×?=48, 5=?÷3, 6×6=?.   | <ul> <li>Interpret and use</li> </ul>                          | introduction,                         |
|   | multiplication and   | practice,                             |
| 3.OA.B.5  | division notation.   | and assessment of                     |
| Apply properties of operations as strategies to                         |  | the %                                 |
| multiply and divide. Examples: If 6×4=24 is                             | Demonstrate fluency  | of concept mastery.                   |
| known, then 4×6=24 is also known.                                       | with   | <ul> <li>Problem-based</li> </ul>     |
| (Commutative property of multiplication.)                               | multiplication facts ×1,                                       | interactive Learning                  |
| $3\times5\times2$ can be found by $3\times5=15$ , then $15\times2=30$ , | ×2, ×5, and ×10.   | activities                            |
| or by 5×2=10, then 3×10=30. (Associative                                | ~2, ~5, and ~10.   |                                       |
| property of multiplication.) Knowing that                               | • Colve multiplication   | Performance                           |
| 8×5=40 and 8×2=16, one can find 8×7as                                   | <ul> <li>Solve multiplication<br/>and division word</li> </ul> | assessment                            |
| 8×(5+2)=(8×5)+(8×2)=40+16=56.   |  |                                       |
| (Distributive property.)  | problems and write   |                                       |
| (Distributive property.)  | equations to represent   |                                       |
| 3.OA.B.6  | the problems.  |                                       |
|   |  |                                       |
| Understand division as an unknown-                                      | Solve multi-step   |                                       |
| factor problem. For example, find 32÷8                                  | problems involving   |                                       |
| by finding the number that makes 32 when                                | multiplication and   |                                       |
| multiplied by 8.  | addition.  |                                       |
|   |  |                                       |
| 3.0A.C.7  |  |                                       |

| Fluently multiply and divide within 100, using strategies such as the relationship between |  |
|--|--|
| multiplication and division (e.g., knowing that  |  |
| 8×5=40, one knows 40÷5=8) or properties of   |  |
| operations. By the end of Grade 3, know from   |  |
| memory all products of two one-digit numbers.  |  |
|  |  |
| 3.OA.D.8   |  |
| Solve two-step word problems using the four  |  |
| operations. Represent these problems using   |  |
| equations with a letter standing for the   |  |
| unknown quantity. Assess the reasonableness  |  |
| of answers using mental computation and  |  |
| estimation strategies including rounding.  |  |
| 3.0A.D.9   |  |
| Identify arithmetic patterns (including patterns   |  |
| in the addition table or multiplication table),  |  |
| and explain them using properties of   |  |
| operations. For example, observe that 4 times  |  |
| a number is always even, and explain why 4   |  |
| times a number can be decomposed into two  |  |
| equal addends.   |  |
|  |  |
| 3.MD.C.7   |  |
| Relate area to the operations of multiplication  |  |
| and addition.  |  |
| 3.MD.C.7.b   |  |
| Multiply side lengths to find areas of rectangles  |  |
| with whole number side lengths in the context  |  |
|  |  |

| of solving real world and mathematical<br>problems, and represent whole-number<br>products as rectangular areas in mathematical<br>reasoning.  |  |  |
|--|--|--|
| 3.MD.C.7.c<br>Use tiling to show in a concrete case that the<br>area of a rectangle with whole-number side<br>lengths a and b+c is the sum of a×b and a×c.<br>Use area models to represent the distributive<br>property in mathematical reasoning. |  |  |

**Timeline: 15 Sessions** Unit Two: Graphs and Line Plots, Modeling with Data **Unit Description:** In this unit students focus on using bar graphs, pictographs, and line plots to represent, describe, and compare categorical and numerical data. They solve one- and two-step "how many more" and "how many less" problems using information presented in the graphs. Students also generate measurement data in inches, half-inches, feet, and yards. **Essential Questions/** Instructional Materials/ **Standards Alignment** Unit Concept/Big Ideas Learning Targets Assessments 3.MD.B.3 Represent and interpret **Essential Questions Montessori Materials** Draw a scaled picture graph and a scaled bar What is the relationship Teacher-made materials for data graph to represent a data set with several between feet and inches? measurement and graphing, but no specific Montessori categories. Solve one- and two-step "how many Reading and interpreting more" and "how many less" problems using bar graphs and Can we combine feet and materials information presented in scaled bar pictographs inches to get a total Graphs. For example, draw a bar graph in which measurement? Investigations Unit 2 each square in the bar graph might represent 5 Using data to compare **Graphs and Line Plots** How can we organize and pets. groups summarize collected data? Assessments 3.MD.B.4 Feet and inches Formative Generate measurement data by measuring What is categorical data? Student Exercises lengths using rulers marked with halves and Measure to the nearest Peer Questioning • fourths of an inch. Show the data by making a half inch When should we use a Classroom • line plot, where the horizontal scale is marked pictograph, line plot, or bar Discussions Using and interpreting a off in appropriate units-whole numbers, graph to organize data? Vocabulary checks scale on a bar graph or halves, or quarters. Problem Solving • pictograph with intervals Learning Targets Challenges Students will: larger than 1 Exit Tickets • Organize, represent, • and describe Summative categorical data, Montessori Three-• choosing categories Period Lesson that help including

|  | <ul> <li>make sense of the data.</li> <li>Make a line plot for a set of measurement data, with a scale that includes inches and half inches.</li> <li>Generate measurement data by measuring lengths to the half inch.</li> <li>Make and interpret bar graph and a pictograph, including use of scales greater than 1.</li> <li>Describe and summarize a set of data, describing concentrations of data and what those concentrations mean in terms of the situation the data represent.</li> </ul> |
|--|---|
|--|---|

Unit Three: Addition, Subtraction, and the Number System 1Timeline: 25 SessionsUnit Description: In this unit focuses on understanding and extending knowledge of place value and the number system to 1,000, and adding<br/>and subtracting accurately and efficiently. Students use a place value context to represent numbers as hundreds, tens, and ones, and find<br/>equivalent ways to use 100s, 10s, and 1s to represent a given number.

| Standards Alignment                              | Unit Concept/Big Ideas     | Essential Questions/           | Instructional Materials/ |
|--|----------------------------|--------------------------------|--------------------------|
|  |                            | Learning Targets               | Assessments              |
| 3.OA.D.9   | Use place-value            | Essential Questions            | Montessori Materials     |
| Identify arithmetic patterns (including patterns | understanding and          | What is the relationship       | Golden bead materials    |
| in the addition table or multiplication table),  | properties of operations   | between 1, 10, 100, and 100?   |                          |
| and explain them using properties of             | to perform multi-digit     |                                | Stamp games              |
| operations. For example, observe that 4 times    | arithmetic.                | How many groups of 10s are in  |                          |
| a number is always even, and explain why 4       |                            | a 3-digit number (e.g., there  | Bead frames              |
| times a number can be decomposed into two        | Solve problems using the   | are 27 tens in 276)?           |                          |
| equal addends.                                   | four operations, and       |                                | Place value/expanded     |
|  | identify patterns in       | How can place-value            | notation cards           |
| 3.NBT.A.1  | arithmetic.                | understanding help us to round |                          |
| Use knowledge of place value to read, write,     |                            | whole numbers to the nearest   | Bead cabinet             |
| sequence, and round numbers up to 1,000.         | Use place value            | ten or hundred?                |                          |
|  | understanding and          |                                | Number lines             |
| 3.NBT.A.2  | properties of operations   | How can number lines be used   |                          |
| Fluently add and subtract within 1000 using      | to perform multi-digit     | to represent solutions to      | Problem tickets          |
| strategies and algorithms based on place value,  | arithmetic.                | comparison problems?           |                          |
| properties of operations, and/or the             |                            |                                | Clock materials          |
| relationship between addition and subtraction.   | Solve problems involving   | Learning Targets               |                          |
|  | measurement and            | Students will:                 | Investigations Unit 3 –  |
| 3.MD.A.1   | estimation of intervals of | Use knowledge of place         | Travel Stories and       |
| Tell and write time to the nearest minute and    | times, liquid volumes, and | value to read, write,          | Collections              |
| measure time intervals in minutes. Solve word    | masses of objects.         | sequence, and round            |                          |
| problems involving addition and subtraction of   |                            | numbers up to 1,000.           | <u>Assessments</u>       |
| time intervals in minutes, e.g., by representing | Using expanded notation.   |                                | Formative                |
| the problem on a number line diagram.            |                            |                                | Student Exercises        |

| Using place value to<br>determine the size of any<br>number to 1,000. | <ul> <li>Solve addition<br/>problems with 3-digit<br/>numbers (up to 400) by<br/>using strategies that</li> </ul>   | <ul> <li>Peer Questioning</li> <li>Classroom<br/>Discussions</li> <li>Vocabulary checks</li> </ul>  |
|---|---|---|
|   | involve breaking each<br>number apart by place,<br>or by adding one<br>number in parts.   | <ul> <li>Problem Solving<br/>Challenges</li> <li>Exit Tickets</li> </ul>  |
|   | <ul> <li>Solve subtraction<br/>problems with 2- and<br/>3-digit numbers (up to<br/>300) by using strategies<br/>that involve either<br/>subtracting one<br/>number in parts,<br/>adding up, or<br/>subtracting back.</li> <li>Tell time to the nearest</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning</li> </ul> |
|   | minute.   | <ul><li>activities</li><li>Performance<br/>assessment</li></ul>   |

#### Unit Four: Perimeter, Area, and Polygons, 2-D Geometry and Measurement Timeline: 17 Sessions Unit Description: In this unit students focus on understanding and finding perimeter and area using standard units of measurement, and on classifying 2-D figures. Students use standard measurement tools to measure the length of objects and the distance around 2-dimensional figures (perimeter). They use square units to measure the amount of space a given object covers (area). Students build on work connecting arrays and multiplication, and find area by multiplying length and width.

| Standards Alignment  | Unit Concept/Big Ideas                                 | Essential Questions/<br>Learning Targets      | Instructional Materials/<br>Assessments |
|--|--|---|---|
| 3.MD.C.5   | Geometric measurement:                                 | Essential Questions                           | Montessori Materials                    |
| Recognize area as an attribute of plane figures and understand concepts of area      | Understand the concept of area and relate area to      | How can we find perimeter?                    | Geometric cabinet                       |
| measurement.   | multiplication and addition.                           | Can different shapes have the same perimeter? | Measurement materials                   |
| 3.MD.C.5.a   |  |   | Investigations Unit 4 –                 |
| A square with side length 1 unit, called "a unit                                     | Recognize perimeter as an                              | How can we find perimeter of                  | Perimeter, Area, and                    |
| square," is said to have "one square unit" of area, and can be used to measure area. | attribute of plane figures,<br>and distinguish between | an irregular shape?                           | Polygons                                |
|  | linear and area  | How can we find an unknown                    | <u>Assessments</u>                      |
| 3.MD.C.5.b   | measurements.  | side length if we know the                    | <u>Formative</u>                        |
| A plane figure which can be covered without  |  | perimeter and some side                       | Student Exercises                       |
| gaps or overlaps by <i>n</i> unit squares is said to                                 | Rectangles can have the                                | lengths?                                      | Peer Questioning                        |
| have an area of <i>n</i> square units.   | same perimeter and                                     |   | Classroom                               |
|  | different areas of the                                 | What are some possible                        | Discussions                             |
| 3.MD.C.6   | same area and different                                | sources of measurement error?                 | Vocabulary checks                       |
| Measure areas by counting unit squares   | perimeters.  |   | Problem Solving                         |
| (square cm, square m, square in, square ft, and                                      |  | Learning Targets                              | Challenges                              |
| improvised units).   | Reason with shapes and                                 | Students will:                                | Exit Tickets                            |
|  | their attributes.                                      | <ul> <li>Measure and find the</li> </ul>      |   |
| 3.MD.C.7   |  | perimeter of 2-D                              | Summative                               |
| Relate area to the operations of multiplication                                      |  | figures using U.S.                            | Montessori Three-                       |
| and addition.  |  | standard and metric                           | Period Lesson                           |
|  |  | units.  | including                               |

| <ul> <li>3.MD.C.7.d</li> <li>Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</li> <li>3.MD.D.8</li> <li>Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.</li> </ul> | • | Find the area of 2-D<br>figures using U.S.<br>standard and metric<br>units.<br>Categorize<br>quadrilaterals,<br>including squares,<br>rhombuses and<br>rectangles, based on<br>their attributes. | <ul> <li>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|--|---|--|--|
| 3.G.A.1<br>Understand that shapes in different categories<br>(e.g., rhombuses, rectangles, and others) may<br>share attributes (e.g., having four sides), and<br>that the shared attributes can define a larger<br>category (e.g., quadrilaterals). Recognize<br>rhombuses, rectangles, and squares as<br>examples of quadrilaterals, and draw examples<br>of quadrilaterals that do not belong to any of<br>these subcategories.  |   |  |  |

| Standards Alignment                              | Unit Concept/Big Ideas      | Essential Questions/            | Instructional Materials/         |
|--|-----------------------------|---------------------------------|----------------------------------|
| 2.0.1.1  | <u></u>                     | Learning Targets                | Assessments                      |
| 3.OA.A.1   | Division can be             | Essential Questions             | Montessori Materials             |
| Interpret products of whole numbers, e.g.,       | represented as equal        | What are the multiples of 3, 4, | Bead Cabinet                     |
| interpret 5×7 as the total number of objects in  | groups.                     | and 6?                          |                                  |
| 5 groups of 7 objects each. For example,         |                             |                                 | Multiplication board,            |
| describe a context in which a total number of    | Distributive property       | What is the relationship        | tickets, and finger charts       |
| objects can be expressed as 5×7.                 |                             | between multiplication and      |                                  |
|  | Represent and solve         | division?                       | Division board, tickets, and     |
| 3.OA.A.2   | problems using              |                                 | finger charts                    |
| Interpret whole-number quotients of whole        | multiplication and          | How can knowing the             |                                  |
| numbers, e.g., interpret 56÷8 as the number of   | division.                   | multiplication facts be used to | Place value/expanded             |
| objects in each share when 56 objects are        |                             | solve division problems?        | notation cards                   |
| partitioned equally into 8 shares, or as a       | Represent and compare       |                                 |                                  |
| number of shares when 56 objects are             | multiplication problems     | What happens to a product       | Investigations Unit 5 – Cube     |
| partitioned into equal shares of 8 objects each. | with pictures, diagrams, or | when we double one factor in a  | Patterns, Arrays, and            |
| For example, describe a context in which a       | models.                     | multiplication expression?      | Multiples of 10                  |
| number of shares or a number of groups can       |                             |                                 |                                  |
| be expressed as 56÷8.                            | Multiply and divide within  | What do parentheses in a        | Assessments                      |
| •  | 100.                        | problem mean?                   | Formative                        |
| 3.OA.A.3   |                             |                                 | Student Exercises                |
| Use multiplication and division within 100 to    | Solve problems using the    | Learning Targets                | Peer Questioning                 |
| solve word problems in situations involving      | four operations, and        | Students will:                  | Classroom                        |
| equal groups, arrays, and measurement            | identify patterns in        | Solve division problems         | Discussions                      |
| quantities, e.g., by using drawings and          | arithmetic.                 | (2-digit number divided         | Vocabulary checks                |
| equations with a symbol for the unknown          |                             | by a single-digit               |                                  |
| number to represent the problem.                 | Use place value             | number).                        | Problem Solving     Challenges   |
| number to represent the problem.                 | understanding and           | numberj.                        | Challenges                       |
|  |                             |                                 | <ul> <li>Exit Tickets</li> </ul> |

| 3.0A.A.4   | properties of operations  | Solve multiplication  |   |
|--|---|---|---|
| <ul> <li>3.OA.A.4</li> <li>Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8×?=48, 5=?÷3, 6×6=?.</li> <li>3.OA.B.5</li> <li>Apply properties of operations as strategies to multiply and divide. Examples: If 6×4=24 is known, then 4×6=24 is also known.</li> <li>(Commutative property of multiplication.)</li> <li>3×5×2 can be found by 3×5=15, then 15×2=30, or by 5×2=10, then 3×10=30. (Associative property of multiplication.) Knowing that 8×5=40 and 8×2=16, one can find 8×7as 8×(5+2)=(8×5)+(8×2)=40+16=56.</li> <li>(Distributive property.)</li> <li>3.OA.B.6</li> <li>Understand division as an unknownfactor problem. For example, find 32÷8 by finding the number that makes 32 when multiplied by 8.</li> <li>3.OA.C.7</li> <li>Fluently multiply and divide within 100, using</li> </ul> | properties of operations<br>to perform multi-digit<br>arithmetic.<br>Use place-value<br>understanding and<br>properties of operations<br>to perform multi-digit<br>arithmetic.<br>Geometric measurement:<br>Understand the concept<br>of area and relate area to<br>multiplication and<br>addition. | <ul> <li>Solve multiplication<br/>and division word<br/>problems and write<br/>equations to represent<br/>the problems.</li> <li>Multiply a single-digit<br/>number by a multiple<br/>of 10, up to 90.</li> <li>Represent and explain<br/>the<br/>relationship between<br/>multiplication and<br/>division.</li> <li>Solve multi-step<br/>problems involving<br/>multiplication and<br/>addition.</li> <li>Demonstrate fluency<br/>with<br/>multiplication facts to<br/>10×10.</li> </ul> | <ul> <li>Summative</li> <li>Montessori Three-<br/>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
| strategies such as the relationship between<br>multiplication and division (e.g., knowing that   |   |   |   |

| 8×5=40, one knows 40÷5=8) or properties of        |  |  |
|---|--|--|
| operations. By the end of Grade 3, know from      |  |  |
| memory all products of two one-digit numbers.     |  |  |
| 3.OA.D.9  |  |  |
| Identify arithmetic patterns (including patterns  |  |  |
| in the addition table or multiplication table),   |  |  |
| and explain them using properties of              |  |  |
| operations. For example, observe that 4 times     |  |  |
| a number is always even, and explain why 4        |  |  |
| times a number can be decomposed into two         |  |  |
| equal addends.                                    |  |  |
|   |  |  |
| 3.NBT.A.3   |  |  |
| Multiply one-digit whole numbers by multiples     |  |  |
| of 10 in the range 10–90 (e.g., 9×80, 5×60)       |  |  |
| using strategies based on place value and         |  |  |
| properties of operations.                         |  |  |
|   |  |  |
| 3.MD.C.7.b  |  |  |
| Multiply side lengths to find areas of rectangles |  |  |
| with whole number side lengths in the context     |  |  |
| of solving real world and mathematical            |  |  |
| problems, and represent whole-number              |  |  |
| products as rectangular areas in mathematical     |  |  |
| reasoning.  |  |  |
|   |  |  |
| 3.MD.C.7.c  |  |  |
| Use tiling to show in a concrete case that the    |  |  |
| area of a rectangle with whole-number side        |  |  |
| lengths a and b+c is the sum of a×b and a×c.      |  |  |

| Use area models to represent the distributive |  |  |
|---|--|--|
| property in mathematical reasoning.           |  |  |

| <b>Unit Description:</b> I this unit students focus on un<br>about equivalent fractions; comparing fractions;<br>knowledge of fractions and fraction equivalents | and using notation to model                         | fractions and fraction relationships                               | . Students build their                  |
|--|---|--|---|
| Standards Alignment  | Unit Concept/Big Ideas                              | Essential Questions/<br>Learning Targets                           | Instructional Materials/<br>Assessments |
| 3.NF.A.1   | Develop an understanding                            | Essential Questions  | Montessori Materials                    |
| Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned   | of fractions as numbers.                            | How can we represent fractional parts of an area?                  | Fraction skittles                       |
| into b equal parts; understand a fraction a/b as the quantity formed by a part of size 1/b.  | Fractional parts are<br>constructed of unit         | How can fractions be   | Fraction box                            |
| 3.NF.A.2   | fractions.  | represented on a number line?                                      | Fraction insets                         |
| Understand a fraction as a number on the number line; represent fractions on a number  | A unit fraction is a number represented on a number | How can representations help<br>us to visualize how fractions      | Number lines                            |
| line diagram.  | line.   | relate to each other?  | Geometric cabinet                       |
| 3.NF.A.2. a  | The size of a fraction is                           | Learning Targets   | Investigations Unit 6 – Fair            |
| Represent a fraction 1/b on a number line  | determined by the size of                           | Students will:   | Shares and Fractions on                 |
| diagram by defining the interval from 0 to 1 as<br>the whole and partitioning it into b equal parts.   | the whole.  | <ul> <li>Partition a quantity<br/>into equal parts, and</li> </ul> | Number Lines                            |
| Recognize that each part has size 1/b and that   | Different-shaped pieces                             | name those parts as  | <u>Assessments</u>                      |
| the endpoint of the part based at 0 locates the  | are the same fraction of a                          | fractions.   | <u>Formative</u>                        |
| number 1/b on the number line.   | whole.  |  | <ul> <li>Student Exercises</li> </ul>   |
|  |   | Represent fractions as   | <ul> <li>Peer Questioning</li> </ul>    |
| 3.NF.A.2. b  | Represent and interpret                             | numbers on a number  | <ul> <li>Classroom</li> </ul>           |
| Represent a fraction a/b on a number line  | data.   | line.  | Discussions                             |
| diagram by marking off a length 1/b from 0.  |   |  | <ul> <li>Vocabulary checks</li> </ul>   |
| Recognize that the resulting interval has size   | Reason with shapes and                              | Compare fractions with   | <ul> <li>Problem Solving</li> </ul>     |
| a/b and that its endpoint locates the number   | their attributes.                                   | the same numerator or  | Challenges                              |
| a/b on the number line.  |   |  | <ul> <li>Exit Tickets</li> </ul>        |

|  | same denominator by                          |
|--|--|
| 3.NF.A.3   | reasoning Summative                          |
| Explain equivalence of fractions in special      | about their size. • Montessori Three-        |
| cases, and compare fractions by reasoning        | Period Lesson                                |
| about their size.                                | Identify equivalent including                |
|  | fractions. introduction,                     |
| 3.NF.A.3.a                                       | practice,                                    |
| Understand two fractions as equivalent (equal)   | Measure to the nearest     and assessment of |
| if they are the same size, or the same point on  | fourth inch and the %                        |
| a number line.                                   | represent of concept mastery.                |
|  | measurement data to                          |
| 3.NF.A.3.b                                       | the nearest fourth inch interactive Learning |
| Recognize and generate simple equivalent         | on a line plot. activities                   |
| fractions, e.g., 1/2=2/4, 4/6=2/3. Explain       | Performance                                  |
| why the fractions are equivalent, e.g., by using | assessment                                   |
| a visual fraction model.                         |  |
| 3.NF.A.3.c                                       |  |
| Express whole numbers as fractions, and          |  |
| recognize fractions that are equivalent to       |  |
| whole numbers. Examples: Express 3 in the        |  |
| form 3=3/1; recognize that 6/1=6; locate 4/4     |  |
| and 1 at the same point of a number line         |  |
| diagram.   |  |
|  |  |
| 3.NF.A.3.d                                       |  |
| Compare two fractions with the same              |  |
| numerator or the same denominator                |  |
| by reasoning about their size. Recognize that    |  |
| comparisons are valid only when the two          |  |
| fractions refer to the same whole. Record the    |  |

| results of comparisons with the symbols >, =,<br>or <, and justify the conclusions, e.g., by using<br>a visual fraction model.   |  |  |
|--|--|--|
| 3.MD.B.4<br>Generate measurement data by measuring<br>lengths using rulers marked with halves and<br>fourths of an inch. Show the data by making a<br>line plot, where the horizontal scale is marked<br>off in appropriate units—whole numbers,<br>halves, or quarters. |  |  |
| 3.G.A.2<br>Partition shapes into parts with equal areas.<br>Express the area of each part as a unit fraction<br>of the whole. For example, partition a shape<br>into 4 parts with equal area, and describe the<br>area of each part as 1/4of the area of the<br>shape.   |  |  |

Unit Seven: How Many Miles? Addition, Subtraction, and the Number System 2Timeline: 18 SessionsUnit Description: In this unit students focus on understanding the operations of addition and subtraction, and adding and subtracting fluently.Students add multiples of 10 and 100 to, and subtract them from, 3-digit numbers. They use multiples of 100 as landmarks as they solveaddition and subtraction problems with 3-digit numbers, including problems that involve liquid volume and mass.

| Standards Alignment                                 | Unit Concept/Big Ideas     | Essential Questions/        | Instructional Materials/              |
|---|----------------------------|-----------------------------|---------------------------------------|
|   |                            | Learning Targets            | Assessments                           |
| 3.OA.D.8  | Solve problems using the   | Essential Questions         | Montessori Materials                  |
| Solve two-step word problems using the four         | four operations, and       | How can we solve multi-step |                                       |
| operations. Represent these problems using          | identify patterns in       | word problems?              | Stamp game                            |
| equations with a letter standing for the            | arithmetic.                |                             |                                       |
| unknown quantity. Assess the reasonableness         |                            | How can we solve addition   | Bead frame                            |
| of answers using mental computation and             | Solve addition problems    | problems with more than 2   |                                       |
| estimation strategies including rounding.           | with more than 2           | addends?                    | Teacher-made or purchased             |
|   | addends.                   |                             | problems                              |
| 3.NBT.A.2   |                            | How can we solve addition   |                                       |
| Fluently add and subtract within 1000 using         | Use place-value            | problems with 3- or 4-digit | Measurement materials                 |
| strategies and algorithms based on place value,     | understanding and          | numbers?                    |                                       |
| properties of operations, and/or the                | properties of operations   |                             | Investigations Unit 7 – How           |
| relationship between addition and subtraction.      | to perform multi-digit     | How do we know when to      | Many Miles?                           |
|   | arithmetic.                | measure in volume, mass, or |                                       |
| 3.MD.A.2  |                            | length?                     | Assessments                           |
| Measure and estimate liquid                         | Use place value            |                             | <u>Formative</u>                      |
| volumes and masses of objects using standard        | understanding and          | Learning Targets            | <ul> <li>Student Exercises</li> </ul> |
| units of grams (g), kilograms (kg), and liters (I). | properties of operations   | Students will:              | Peer Questioning                      |
| Add, subtract, multiply, or divide to solve         | to perform multi-digit     | Solve addition and          | Classroom                             |
| one-step word problems involving masses or          | arithmetic.                | subtraction                 | Discussions                           |
| volumes that are given in the same units, e.g.,     |                            | problems involving          | <ul> <li>Vocabulary checks</li> </ul> |
| by using drawings (such as a beaker with a          | Solve problems involving   | masses or volumes.          | Problem Solving                       |
| measurement scale) to represent the problem.        | measurement and            |                             | Challenges                            |
|   | estimation of intervals of |                             | Exit Tickets                          |
|   | times, liquid volumes,     |                             |                                       |

| masses of objects, and money. | <ul> <li>Estimate and measure<br/>liquid volume and mass<br/>using standard units.</li> <li>Solve 3-digit addition<br/>problems using at least<br/>one strategy fluently.</li> <li>Solve 3-digit<br/>subtraction problems<br/>fluently.</li> </ul> | Summative•Montessori Three-<br>Period Lesson<br>including<br>introduction,<br>practice,<br>and assessment of<br>the %<br>of concept mastery.•Problem-based<br>interactive Learning<br>activities•Performance |
|-------------------------------|--|--|
|                               |  | assessment   |

# Unit Eight: Large Numbers and Multi-Step Problems: Multiplication and Division IIITimeline: 16 SessionsUnit Description: In this unit students focus on solving multiplication and division problems, learning the division facts, identifying arithmetic<br/>patterns, and solving multi-step problems. Students develop strategies to solve multiplication and division problems, including problems with<br/>remainders.

| Standards Alignment                              | Unit Concept/Big Ideas     | Essential Questions/             | Instructional Materials/     |
|--|----------------------------|----------------------------------|------------------------------|
| 2.04.4.2   |                            | Learning Targets                 | Assessments                  |
| 3.OA.A.2   | Represent and solve        | Essential Questions              | Montessori Materials         |
| Interpret whole-number quotients of whole        | problems using             | Why is it helpful to internalize | Multiplication board,        |
| numbers, e.g., interpret 56÷8 as the number of   | multiplication and         | division facts?                  | tickets, and finger charts   |
| objects in each share when 56 objects are        | division.                  |                                  |                              |
| partitioned equally into 8 shares, or as a       |                            | How do we know when to           | Division board, tickets, and |
| number of shares when 56 objects are             | Multiply and divide within | measure in volume, mass, or      | finger charts                |
| partitioned into equal shares of 8 objects each. | 100.                       | length?                          |                              |
| For example, describe a context in which a       |                            |                                  | Stamp games                  |
| number of shares or a number of groups can       | Solve problems using the   | What is the relationship         |                              |
| be expressed as 56÷8.                            | four operations, and       | between perimeter and area?      | Bead frames                  |
|  | identify patterns in       |                                  |                              |
| 3.OA.A.3   | arithmetic.                | Learning Targets                 | Geometric cabinet            |
| Use multiplication and division within 100 to    |                            | Students will:                   |                              |
| solve word problems in situations involving      | Solve problems involving   | Solve multiplication             | Investigations Unit 8 –      |
| equal groups, arrays, and measurement            | measurement and            | and                              | Large Numbers and Multi-     |
| quantities, e.g., by using drawings and          | estimation of intervals of | division problems                | Step Problems                |
| equations with a symbol for the unknown          | times, liquid volumes, and | within 100.                      |                              |
| number to represent the problem.                 | masses of objects.         |                                  | Assessments                  |
|  |                            | Demonstrate an                   | Formative                    |
| 3.OA.A.4   | Geometric measurement:     | understanding of                 | Student Exercises            |
| Determine the unknown whole number in a          | Understand the concept     | multiplication and               | Peer Questioning             |
| multiplication or division equation relating     | of area and relate area to | division as involving            | Classroom                    |
| three whole numbers. For example,                | multiplication and         | equal groups.                    | Discussions                  |
| determine the unknown number that makes          | addition.                  |                                  | Vocabulary checks            |
| the equation true in each of the equations       |                            |                                  |                              |

| 8×?=48, 5=?÷3, 6×6=?.                           | Use tables to identify and interpret arithmetic | <ul> <li>Demonstrate fluency<br/>with the</li> </ul> | Problem Solving     Challenges |
|---|---|--|--------------------------------|
| 3.OA.B.5  | patterns.                                       | division facts.                                      | Exit Tickets                   |
| Apply properties of operations as strategies to |   |  |                                |
| multiply and divide. Examples: If 6×4=24 is     |   | <ul> <li>Solve multi-step</li> </ul>                 | Summative                      |
| known, then 4×6=24 is also known.               |   | problems involving                                   | Montessori Three-              |
| (Commutative property of multiplication.)       |   | more than one  | Period Lesson                  |
| 3×5×2 can be found by 3×5=15, then 15×2=30,     |   | operation.   | including                      |
| or by 5×2=10, then 3×10=30. (Associative        |   |  | introduction,                  |
| property of multiplication.) Knowing that       |   | <ul> <li>Solve multiplication</li> </ul>             | practice,                      |
| 8×5=40 and 8×2=16, one can find 8×7as           |   | and division problems                                | and assessment of              |
| 8×(5+2)=(8×5)+(8×2)=40+16=56.                   |   | involving masses or                                  | the %                          |
| (Distributive property.)                        |   | volumes.   | of concept mastery.            |
|   |   |  | Problem-based                  |
| 3.OA.B.6  |   | • Find the area of a                                 | interactive Learning           |
| Understand division as an unknown-              |   | rectangular  | activities                     |
| factor problem. For example, find 32÷8          |   | array by breaking it                                 | Performance                    |
| by finding the number that makes 32 when        |   | apart (using the                                     | assessment                     |
| multiplied by 8.                                |   | distributive property).                              |                                |
| 3.0A.C.7  |   |  |                                |
| Fluently multiply and divide within 100, using  |   |  |                                |
| strategies such as the relationship between     |   |  |                                |
| multiplication and division (e.g., knowing that |   |  |                                |
| 8×5=40, one knows 40÷5=8) or properties of      |   |  |                                |
| operations. By the end of Grade 3, know from    |   |  |                                |
| memory all products of two one-digit numbers.   |   |  |                                |
|   |   |  |                                |
| 3.OA.D.8  |   |  |                                |

|   | <br> |
|---|------|
| Solve two-step word problems using the four         |      |
| operations. Represent these problems using          |      |
| equations with a letter standing for the            |      |
| unknown quantity. Assess the reasonableness         |      |
| of answers using mental computation and             |      |
| estimation strategies including rounding.           |      |
|   |      |
| 3.OA.D.9  |      |
| Identify arithmetic patterns (including patterns    |      |
| in the addition table or multiplication table),     |      |
| and explain them using properties of                |      |
| operations. For example, observe that 4 times       |      |
| a number is always even, and explain why 4          |      |
| times a number can be decomposed into two           |      |
| equal addends.                                      |      |
| 3.MD.A.2  |      |
| Measure and estimate liquid                         |      |
| volumes and masses of objects using standard        |      |
| units of grams (g), kilograms (kg), and liters (l). |      |
| Add, subtract, multiply, or divide to solve         |      |
| one-step word problems involving masses or          |      |
| volumes that are given in the same units, e.g.,     |      |
| by using drawings (such as a beaker with a          |      |
| measurement scale) to represent the problem.        |      |
|   |      |
| 3.MD.C.7.c  |      |
| Use tiling to show in a concrete case that the      |      |
| area of a rectangle with whole-number side          |      |
| lengths a and b+c is the sum of a×b and a×c.        |      |
|   |      |

| Use area models to represent the distributive |  |  |
|---|--|--|
| property in mathematical reasoning.           |  |  |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 4<sup>th</sup> Grade

#### Curriculum Framework for Mathematics

 School: Sussex Montessori School
 Curricular Resources: Montessori Materials and Lessons / Investigations 3
 Grade: 4

 Unit One: Multiplication and Division I
 Timeline: 12 Sessions
 Grade: 4

 Unit Description: In this unit students focus on using arrays and multiplicative comparison problems to understand multiplication, and gaining
 Grade: 4

familiarity with factors and multiples. Students use arrays to model multiplication situations and to find factors and identify prime numbers to 100.

| Standards Alignment                             | Unit Concept/Big Ideas          | Essential Questions/                      | Instructional Materials/              |
|---|---------------------------------|---|---------------------------------------|
|   |                                 | Learning Targets                          | Assessments                           |
| 4.OA.A.1  | Determining multiples and       | Essential Questions:                      | Montessori Materials                  |
| Interpret a multiplication equation as a        | factors                         | What is a factor? What is a               | Stamp game                            |
| comparison, e.g., interpret 35 = 5 × 7 as a     |                                 | multiple?                                 |                                       |
| statement that 35 is 5 times as many as 7 and 7 | Factors of 100                  |   | Checkerboard                          |
| times as many as 5. Represent verbal            |                                 | What are prime numbers?                   |                                       |
| statements of multiplicative comparisons as     | Using known factors to          |   | Pegboard                              |
| multiplication equations.                       | find related factors for a      | How can we find factors using             |                                       |
|   | given number (e.g., if          | arrays?                                   | Investigations Unit 1 –               |
| 4.OA.A.2  | 4 × 25 = 100, then 8 × 25       |   | Arrays, Factors, and                  |
| Multiply or divide to solve word problems       | = 200)                          | Learning Targets:                         | Multiplicative Comparison             |
| involving multiplicative comparison, e.g., by   |                                 | Students will:                            |                                       |
| using drawings and equations with a symbol for  | Using representations to        | <ul> <li>Use multiplication to</li> </ul> | <u>Assessments</u>                    |
| the unknown number to represent the             | show that a factor of a         | solve                                     | <u>Formative</u>                      |
| problem, distinguishing multiplicative          | number is also a factor of      | multiplicative                            | <ul> <li>Student Exercises</li> </ul> |
| comparison from additive comparison.            | its multiples (e.g., if 25 is a | comparison problems.                      | <ul> <li>Peer Questioning</li> </ul>  |
|   | factor of 100, then 25 is       |   | Classroom                             |
| 4.OA.B.4  | also a factor of 300)           | Determine whether                         | Discussions                           |
| Find all factor pairs for a whole number        |                                 | numbers                                   | <ul> <li>Vocabulary checks</li> </ul> |
| in the range 1–100. Recognize that a whole      | Representing                    | up to 100 are prime or                    | <ul> <li>Problem Solving</li> </ul>   |
| number is a multiple of each of its factors.    | multiplicative comparison       | composite.                                | Challenges                            |
| Determine whether a given whole number in       | problems with                   |   | Exit Tickets                          |
| the range 1–100 is a multiple of a given one-   | multiplication or division      | <ul> <li>Find factors of</li> </ul>       |                                       |
| digit number. Determine whether a given         | equations                       | numbers up                                | <u>Summative</u>                      |

| whole number in the range 1–100 is prime or composite. | to 100 and recognize<br>multiples of 1-digit | Montessori Three-<br>Period Lesson |
|--|--|------------------------------------|
| composite.   | numbers.                                     | including                          |
| 4.NBT.B.5  | numbers.                                     | introduction,                      |
| Multiply a whole number of up to four                  |  | practice,                          |
| digits by a one-digit whole number, and                |  | and assessment of                  |
| multiply two two-digit numbers, using                  |  | the %                              |
| strategies based on place value and the                |  | of concept mastery.                |
| properties of operations. Illustrate and explain       |  | <ul> <li>Problem-based</li> </ul>  |
| the calculation by using equations, rectangular        |  | interactive Learning               |
| arrays, and/or area models.                            |  | activities                         |
|  |  | Performance                        |
|  |  | assessment                         |

#### Unit Two: Modeling with Data Timeline: 11 Sessions

**Unit Description:** In this unit students focus on using line plots to represent, describe, and compare measurement data; on modeling realworld problems with mathematics; and on constructing arguments based on data. Students measure and compare the heights of first and fourth graders. They collect measurement data of their choosing, and use line plots to represent and analyze the data.

| Standards Alignment                                  | Unit Concept/Big Ideas     | Essential Questions/                   | Instructional Materials/              |
|--|----------------------------|--|---------------------------------------|
|  |                            | Learning Targets                       | Assessments                           |
| 4.MD.A.1   | Organizing ordered,        | Essential Questions                    | Montessori Materials                  |
| Know relative sizes of measurement units             | numerical data to describe | How can we develop and revise          | Teacher-made materials to             |
| within one system of units including km, m, cm;      | a data set                 | a data question?                       | augment what is                       |
| kg, g; lb, oz.; l, ml; hr, min, sec. Within a single |                            |  | commercially available                |
| system of measurement, express                       | Using a line plot to       | How can we use a line plot to          |                                       |
| measurements in a larger unit in terms of a          | represent ordered,         | represent measurement data?            | Investigations Unit 2 –               |
| smaller unit. Record measurement equivalents         | numerical data             |  | Generating and                        |
| in a two-column table. For example, know that        |                            | How can we describe a data             | <b>Representing Measurement</b>       |
| 1 ft is 12 times as long as 1 in. Express the        | Representing two sets of   | set?                                   | Data                                  |
| length of a 4 ft snake as 48 in. Generate a          | data in order to compare   |  |                                       |
| conversion table for feet and inches listing the     | them                       | How can we represent a data            | <u>Assessments</u>                    |
| number pairs (1, 12), (2, 24), (3, 36),              |                            | set?                                   | <u>Formative</u>                      |
|  | Considering how well a     |  | <ul> <li>Student Exercises</li> </ul> |
| 4.MD.A.2   | data representation        | How can we collect and                 | <ul> <li>Peer Questioning</li> </ul>  |
| Use the four operations to solve word                | communicates               | accurately record data?                | Classroom                             |
| problems involving distances, intervals of time,     | information to an          |  | Discussions                           |
| liquid volumes, masses of objects, and money,        | audience                   | Learning Targets                       | <ul> <li>Vocabulary checks</li> </ul> |
| including problems involving simple fractions or     |                            | Students will:                         | <ul> <li>Problem Solving</li> </ul>   |
| decimals, and problems that require expressing       | Using a line plot to       | <ul> <li>Use a line plot to</li> </ul> | Challenges                            |
| measurements given in a larger unit in terms of      | represent measurement      | organize,                              | Exit Tickets                          |
| a smaller unit. Represent measurement                | data that includes         | represent, and analyze                 |                                       |
| quantities using diagrams such as number line        | fractions                  | measurement data                       | Summative                             |
| diagrams that feature a measurement scale.           |                            | about two groups in                    | Montessori Three-                     |
|  | Describing the shape of a  | order to compare the                   |                                       |
| 4.MD.B.4   | data set                   | two groups.                            |                                       |

| Make a line plot to display a data set of<br>measurements in fractions of a unit<br>(1/2, 1/4, 1/8). Solve problems involving<br>addition and subtraction of fractions by using<br>information presented in line plots. For<br>example, from a line plot find and interpret the<br>difference in length between the longest and<br>shortest specimens in an insect collection. | Describing what is typical<br>about the data set as a<br>whole<br>Describing and<br>interpreting data that<br>compare two groups | <ul> <li>Use a line plot to<br/>organize,<br/>represent, and analyze<br/>measurement data<br/>about two groups in<br/>order to compare the<br/>two groups.</li> </ul> | <ul> <li>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning</li> </ul> |
|--|--|---|---|
|  | Comparing two sets of<br>data using the shape of<br>the data   | <ul> <li>Design a data question<br/>that<br/>involves measurement<br/>to compare two</li> </ul>   | <ul><li>activities</li><li>Performance<br/>assessment</li></ul>   |
|  | Developing arguments based on data   | groups.   |   |
|  | Recording and keeping track of data  | <ul> <li>Use a line plot to<br/>represent<br/>measurement data that<br/>includes fractions.</li> </ul>  |   |
|  | Developing and revising a data question  |   |   |

Montessori Three-

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**Unit Three: Multiplication and Division 2 Timeline: 18 Sessions** Unit Description: In this unit students focus on solving multiplication problems with 2-digit numbers, understanding the meaning and structure of, and the relationship between, multiplication and division, and using that understanding to solve multiplication and division problems. Students use marked and unmarked arrays to represent multiplication strategies that involve breaking numbers apart. Unit Concept/Big Ideas **Essential Questions/** Instructional Materials/ **Standards Alignment** Learning Targets Assessments Solving division problems **Montessori Materials** 4.0A.A.1 **Essential Questions:** Interpret a multiplication equation by making groups of the How can we use the Stamp Game relationship between as a comparison, e.g., interpret divisor  $35 = 5 \times 7$  as a statement that 35 is 5 times as multiplication and division to Checkerboard solve division problems? many as 7 and 7 times as many as 5. Represent Using the relationship between multiplication verbal statements of multiplicative Million Cube comparisons as and division to solve How can we use pictures, multiplication equations. division problems diagrams, or models to Investigations Unit 3 -**Multiple Towers and** represent multiplication 4.0A.A.2 Using known multiples of problems? **Cluster Problems** Multiply or divide to solve word a number to find other problems involving multiplicative comparison, multiples of that number How can we use known e.g., by using drawings and equations with a multiples of a number to find Assessments symbol for the unknown number to represent Finding multiples of 2-digit other multiples of that Formative the problem, distinguishing multiplicative numbers number? Student Exercises • comparison Peer Questioning • from additive comparison. Understanding the effect How can we find multiples of 2-• Classroom of multiplying by a digit numbers? Discussions 4.0A.A.3 multiple of 10 Vocabulary checks Solve multistep word problems Learning Targets Problem Solving posed with whole numbers and having whole-Determining the effect on Students will: Challenges number answers using the four operations, the product when one • Multiply a 2-digit Exit Tickets • including problems in which remainders must factor is doubled and one number by 1-digit and be interpreted. Represent these problems factor is halved small 2-digit numbers Summative using (e.g., 12, 15, 20), using

|  |                         | 1                                 |
|--|-------------------------|-----------------------------------|
| equations with a letter standing for the         | strategies that involve | Period Lesson                     |
| unknown quantity. Assess the reasonableness      | breaking the numbers    | including                         |
| of answers using mental computation and          | apart.                  | introduction,                     |
| estimation strategies including rounding.        | Multiply a number by a  | practice,                         |
|  | multiple of 10.         | and assessment of                 |
| 4.NBT.B.5  |                         | the %                             |
| Multiply a whole number of up to four            | Solve division problems | of concept mastery.               |
| digits by a one-digit whole number, and          | (2-digit and small 3-   | <ul> <li>Problem-based</li> </ul> |
| multiply two two-digit numbers, using            | digit numbers divided   | interactive Learning              |
| strategies based on place value and the          | by 1-digit numbers),    | activities                        |
| properties of operations. Illustrate and explain | including some that     | Performance                       |
| the calculation by using                         | result in a remainder.  | assessment                        |
| equations, rectangular arrays, and/or area       |                         |                                   |
| models.  |                         |                                   |
|  |                         |                                   |
| 4.NBT.B.6  |                         |                                   |
| Find whole-number quotients and                  |                         |                                   |
| remainders with up to four-digit dividends and   |                         |                                   |
| one-digit divisors, using strategies based on    |                         |                                   |
| place value, the properties of operations,       |                         |                                   |
| and/or the relationship between multiplication   |                         |                                   |
| and  |                         |                                   |
| division. Illustrate and explain the calculation |                         |                                   |
| by using equations,                              |                         |                                   |
| rectangular arrays, and/or area models.          |                         |                                   |

| symmetry and area.<br>Standards Alignment        | Unit Concept/Big Ideas     | Essential Questions/            | Instructional Materials/  |
|--|----------------------------|---------------------------------|---------------------------|
|  |                            | Learning Targets                | Assessments               |
| 4.OA.A.3   | Using U.S. standard units  | Essential Questions:            | Montessori Materials      |
| Solve multistep word problems                    | to measure lengths longer  | What is perimeter?              | Montessori protractor     |
| posed with whole numbers and having whole-       | than the measuring tool    |                                 |                           |
| number answers using the four operations,        |                            | What is area?                   | Box of Sticks             |
| including problems in which remainders must      | Measuring accurately       |                                 |                           |
| be interpreted. Represent these problems         |                            | How can we find the area of a   | Investigations Unit 4 –   |
| using equations with a letter standing for the   | Using U.S. standard and    | rectangle?                      | Measuring and Classifying |
| unknown quantity. Assess the reasonableness      | metric units to accurately |                                 | Shapes                    |
| of answers using mental computation and          | measure length             | What are polygons?              |                           |
| estimation strategies including rounding.        |                            |                                 | <u>Assessments</u>        |
|  | Estimating lengths in      | How can we make polygons?       | <u>Formative</u>          |
| 4.NBT.B.5  | common units               |                                 | Student Exercises         |
| Multiply a whole number of up to four            | (centimeter, inch, foot,   | How can we find the area of     | Peer Questioning          |
| digits by a one-digit whole number, and          | yard, meter)               | polygons?                       | Classroom                 |
| multiply two two-digit numbers, using            |                            |                                 | Discussions               |
| strategies based on place value and the          | Identifying measurement    | What are the parts of a line?   | Vocabulary checks         |
| properties of operations. Illustrate and explain | equivalents                |                                 | Problem Solving           |
| the calculation by using                         |                            | How can we distinguish angles?  | Challenges                |
| equations, rectangular arrays, and/or area       | Converting measurements    |                                 | Exit Tickets              |
| models.  | from larger units to       | How do we use a protractor?     |                           |
|  | smaller units              |                                 | Summative                 |
| 4.NBT.B.6  |                            | How can create specific angles? | Montessori Three-         |
| Find whole-number quotients and remainders       | Finding perimeter using    |                                 | Period Lesson             |
| with up to four-digit dividends and one-digit    | standard units             | What is the line of symmetry?   | including                 |
| divisors, using strategies based on place value, |                            |                                 | introduction,             |
| the properties of operations, and/or the         |                            | Learning Targets                | practice,                 |

| relationship between multiplication and              | Using a generalizable       | Students will:                             | and assessment of                 |
|--|-----------------------------|--|-----------------------------------|
| division. Illustrate and explain the calculation     | method to determine the     | Convert linear                             | the %                             |
| by using equations, rectangular arrays, and/or       | perimeter of a rectangle    | measurements                               | of concept mastery.               |
| area models.   |                             | from a larger unit to a                    | <ul> <li>Problem-based</li> </ul> |
|  | Identifying right, acute,   | smaller unit.                              | interactive Learning              |
| 4.MD.A.1   | and obtuse angles           |  | activities                        |
| Know relative sizes of measurement                   |                             | • Draw and identify lines                  | Performance                       |
| units within one system of units including km,       | Identifying and creating    | and angles, including                      | assessment                        |
| m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a | 90-degree angles            | parallel and                               |                                   |
| single system of measurement, express                |                             | perpendicular lines,                       |                                   |
| measurements in a larger unit in terms of a          | Using known angles to       | and classify polygons                      |                                   |
| smaller unit. Record measurement equivalents         | build and find the          | by properties of their                     |                                   |
| in a two-column table. For example, know that        | measure of other angles     | sides and angles.                          |                                   |
| 1 ft is 12 times as long as 1 in. Express the        |                             |  |                                   |
| length of a 4 ft snake as 48 in. Generate a          | Drawing angles of a         | <ul> <li>Add or subtract angles</li> </ul> |                                   |
| conversion table for feet and inches listing the     | specific measure            | to determine the size                      |                                   |
| number pairs (1, 12), (2, 24), (3, 36),              |                             | of angles.                                 |                                   |
|  | Understanding the           |  |                                   |
| 4.MD.A.2   | relationship between the    | Use a protractor to                        |                                   |
| Use the four operations to solve word                | degree measure of an        | measure angles and                         |                                   |
| problems involving distances, intervals of time,     | angle and rotation in a     | sketch angles of                           |                                   |
| liquid volumes, masses of objects, and money,        | circular arc                | specific sizes.                            |                                   |
| including problems involving simple fractions or     |                             |  |                                   |
| decimals, and problems that require expressing       | Measuring angles using a    | <ul> <li>Identify lines of</li> </ul>      |                                   |
| measurements given in a larger unit in terms of      | protractor                  | symmetry in polygons.                      |                                   |
| a smaller unit. Represent measurement                |                             |  |                                   |
| quantities using diagrams such as number line        | Finding the area of         |  |                                   |
| diagrams that feature a measurement scale.           | symmetrical shapes          |  |                                   |
|  |                             |  |                                   |
| 4.MD.A.3   | Dividing irregular polygons |  |                                   |
|  | into two shapes that have   |  |                                   |

| Apply the area and perimeter formulas for           | equal area               |  |
|---|--------------------------|--|
| rectangles in real world and mathematical           |                          |  |
| problems. For example, find the width of a          | Using symmetry and       |  |
| rectangular room given the area of the flooring     | congruence to identify   |  |
| and the length, by viewing the area formula as      | equal areas              |  |
| a multiplication equation with an unknown           |                          |  |
| factor.   | Finding the area of      |  |
|   | polygons using square    |  |
| 4.MD.C.5  | units                    |  |
| Recognize angles as geometric shapes that are       |                          |  |
| formed wherever two rays share a common             | Finding the area of      |  |
| endpoint, and understand concepts of angle          | polygons by decomposing  |  |
| measurement:  | shapes                   |  |
|   |                          |  |
| 4.MD.C.5.a  | Finding the area of a    |  |
| An angle is measured with reference                 | rectangle                |  |
| to a circle with its center at the common           |                          |  |
| endpoint of the rays, by considering the            | Using a generalizable    |  |
| fraction of the circular arc between the points     | method to determine the  |  |
| where the two rays intersect the circle. An         | area of a rectangle      |  |
| angle that turns through 1/360 of a circle is       | C C                      |  |
| called a "one-degree angle," and can be used to     | Determining an unknown   |  |
| measure angles.                                     | dimension of a rectangle |  |
| č   | when one dimension and   |  |
| 4.MD.C.5.b  | the area are known       |  |
| An angle that turns through <i>n</i> one-degree     |                          |  |
| angles is said to have an angle measure of <i>n</i> | Defining polygons as     |  |
| degrees.  | closed figures with line |  |
| 5   | segments as sides that   |  |
| 4.MD.C.6  | come together at points  |  |
| -   | called vertices          |  |

| Measure angles in whole-number degrees            |                             |
|---|-----------------------------|
| using a protractor. Sketch angles of specified    | Identifying geometric       |
| measure.  | figures including: points,  |
|   | lines, rays, line segments, |
|   |                             |
| 4.MD.C.7  | and parallel and            |
| Recognize angle measure as additive.              | perpendicular lines         |
| When an angle is decomposed into non-             |                             |
| overlapping parts, the angle measure of the       | Identifying shapes with     |
| whole is the sum of the angle measures of the     | parallel or perpendicular   |
| parts. Solve addition and subtraction problems    | sides                       |
| to find unknown angles on a diagram in real       |                             |
| world and mathematical problems, e.g., by         | Combining polygons to       |
| using an equation with a symbol for the           | make new polygons           |
| unknown angle measure.                            |                             |
|   | Recognizing number of       |
| 4.G.A.1   | sides as a descriptor of    |
| Draw points, lines, line segments, rays, angles   | various polygons            |
| (right, acute, obtuse), and perpendicular and     |                             |
| parallel lines. Identify these in two-dimensional | Classifying polygons by     |
| figures.  | attribute, including        |
|   | number and relative         |
| 4.G.A.2   | length of sides, size of    |
| Classify two-dimensional figures based on the     | angles, and absence or      |
| presence or absence of parallel or                | presence of parallel or     |
| perpendicular lines, or the presence or absence   | perpendicular sides         |
| of angles of a specified size. Recognize right    |                             |
| triangles as a category, and identify right       | Determining lines of        |
| triangles.  | symmetry in a two-          |
|   | dimensional figure          |
| 4.G.A.3   | _                           |
| Recognize a line of symmetry for a two-           |                             |

| dimensional figure as a line across the figure    | Making designs with |  |
|---|---------------------|--|
| such that the figure can be folded along the line | mirror symmetry     |  |
| into matching parts. Identify line-symmetric      |                     |  |
| figures and draw lines of symmetry.               |                     |  |

| Standards Alignment                             | Unit Concept/Big Ideas         | Essential Questions/<br>Learning Targets | Instructional Materials/<br>Assessments |
|---|--------------------------------|--|---|
| 4.OA.A.3  | Reading, writing, and          | Essential Questions:                     | Montessori Materials                    |
| Solve multistep word problems                   | sequencing numbers to          | How can we represent addition            | Million Cube                            |
| posed with whole numbers and having whole-      | 10,000                         | and subtraction on a number              |   |
| number answers using the four operations,       | 10,000                         | line?                                    | Checkerboard                            |
| ncluding problems in which remainders must      | Understanding the              |  | Checkerbourd                            |
| e interpreted. Represent these problems         | structure of 10,000 and its    | How can we find combinations             | Place Value cards                       |
| ising   | equivalence to one             | of 3-digit numbers that add up           |   |
| equations with a letter standing for the        | thousand 10s, one              | to 1,000?                                | Stamp game                              |
| inknown quantity. Assess the reasonableness     | hundred 100s, and ten          |  | Stamp game                              |
| f answers using mental computation and          | 1,000s                         | How can we determine what                | Investigations Unit 5 –                 |
| estimation strategies including rounding.       | 1,0003                         | subtraction strategy to use to           | Large Numbers and                       |
|   | Writing multidigit             | solve a problem?                         | Landmarks                               |
| NBT.A.1   | <b>v v</b>                     |  | Lanumarks                               |
|   | numbers using expanded<br>form | Loorning Torgets                         | Accessments                             |
| Recognize that in a multi-digit whole           | Iorm                           | Learning Targets<br>Students will:       | <u>Assessments</u><br>Formative         |
| number, a digit in one place represents ten     |                                |  |   |
| imes what it represents in the place to its     | Using place-value              | Read, write, and                         | Student Exercises                       |
| ight. For example, recognize that               | understanding to round         | compare                                  | Peer Questioning                        |
| $00 \div 70 = 10$ by applying concepts of place | numbers to any place           | numbers up to                            | <ul> <li>Classroom</li> </ul>           |
| alue and division.                              |                                | 1,000,000 and round                      | Discussions                             |
|   | Adding 3- and 4-digit          | them to any place.                       | <ul> <li>Vocabulary checks</li> </ul>   |
| .NBT.A.2  | numbers fluently               |  | <ul> <li>Problem Solving</li> </ul>     |
| ead and write multi-digit whole                 |                                | Fluently solve                           | Challenges                              |
| numbers using base-ten numerals, number         | Using clear and concise        | multidigit                               | <ul> <li>Exit Tickets</li> </ul>        |
| names, and expanded form. Compare two           | notation to record             | addition and                             |   |
| multi-digit numbers based on meanings of the    | addition strategies            | subtraction problems                     | <u>Summative</u>                        |
|   |                                | using a variety of                       | Montessori Three                        |

|  |                           |                                      | 1                                 |
|--|---------------------------|--------------------------------------|-----------------------------------|
| digits in each place, using > , =, and < symbols | Understanding the steps   | strategies, including                | Period Lesson                     |
| to record the                                    | and notation of the U.S.  | the U.S. standard                    | including                         |
| results of comparisons.                          | standard algorithm for    | algorithm.                           | introduction,                     |
|  | addition                  | <ul> <li>Use addition and</li> </ul> | practice,                         |
| 4.NBT.A.3  |                           | subtraction to solve                 | and assessment of                 |
| Use place value understanding to round multi-    | Adding using the U.S.     | word problems                        | the %                             |
| digit whole numbers to any place.                | standard algorithm for    | involving                            | of concept mastery.               |
|  | addition                  | measurement.                         | <ul> <li>Problem-based</li> </ul> |
| 4.NBT.B.4  |                           |                                      | interactive Learning              |
| Fluently add and subtract multi-digit            | Solving subtraction       |                                      | activities                        |
| whole numbers using the standard algorithm.      | problems using different  |                                      | Performance                       |
|  | strategies                |                                      | assessment                        |
| 4.MD.A.2   |                           |                                      | assessment                        |
| Use the four operations to solve word            | Understanding the         |                                      |                                   |
| problems involving distances, intervals of time, | meaning of the steps and  |                                      |                                   |
| liquid volumes, masses of objects, and money,    | notation of the U.S.      |                                      |                                   |
| including problems involving simple fractions or | standard algorithm for    |                                      |                                   |
|  | -                         |                                      |                                   |
| decimals, and problems that require expressing   | subtraction               |                                      |                                   |
| measurements given in a larger unit in terms of  |                           |                                      |                                   |
| a smaller unit. Represent measurement            | Using story contexts and  |                                      |                                   |
| quantities using diagrams such as number line    | representations to        |                                      |                                   |
| diagrams that                                    | support explanations      |                                      |                                   |
| feature a measurement scale.                     | about related subtraction |                                      |                                   |
|  | expressions               |                                      |                                   |

Unit Six: Fractions and Decimals Timeline: 24 Sessions

**Unit Description:** In this unit students focus on understanding the meaning of fractions and decimals; and comparing fractions and decimals including finding equivalents. Students use contexts and representations such as rectangles (an area model) and number lines (a linear model) to add, subtract, and multiply fractions.

| Standards Alignment                                 | Unit Concept/Big Ideas      | Essential Questions/                    | Instructional Materials/              |
|---|-----------------------------|---|---------------------------------------|
|   |                             | Learning Targets                        | Assessments                           |
| 4.NBT.A.1   | Finding fractional parts of | Essential Questions:                    | Montessori Materials                  |
| Recognize that in a multi-digit whole               | a rectangle                 | How can we represent                    | Fraction material squares             |
| number, a digit in one place represents ten         |                             | fractions greater than 1?               |                                       |
| times what it represents in the place to its        | Interpreting the meaning    |   | Fraction box                          |
| right. For example, recognize that                  | of the numerator and the    | How can we represent                    |                                       |
| 700 ÷ 70 = 10 by applying concepts of place         | denominator of a fraction   | fractions on a number line?             | Fraction cabinet                      |
| value and division.                                 |                             |   |                                       |
|   | Representing fractions      | How can we identify equivalent          | Decimal box materials                 |
| 4.NF.A.1  | greater than 1              | fractions?                              |                                       |
| Explain why a fraction a/b is equivalent to         |                             |   | Investigations Unit 6 –               |
| a fraction (n × a)/(n × b) by using visual fraction | Reading and writing         | What is the relationship                | Fraction Cards and Decimal            |
| models, with attention to how the number and        | tenths and hundredths       | between fractions and                   | Grids                                 |
| size of the parts differ even though the two        |                             | decimals?                               |                                       |
| fractions   | Representing tenths and     |   | <u>Assessments</u>                    |
| themselves are the same size. Use this principle    | hundredths as parts of an   | How can we add and subtract             | <u>Formative</u>                      |
| to recognize and generate equivalent fractions.     | area                        | fractions and mixed numbers?            | <ul> <li>Student Exercises</li> </ul> |
|   |                             |   | <ul> <li>Peer Questioning</li> </ul>  |
| 4.NF.A.2  | Identifying equivalent      | How do we multiply fractions            | Classroom                             |
| Compare two fractions with different                | fractions and explaining    | by a whole number?                      | Discussions                           |
| numerators and different denominators, e.g.,        | why they are equivalent     |   | Vocabulary checks                     |
| by creating common denominators or                  |                             | Learning Targets                        | Problem Solving                       |
| numerators, or by comparing to a benchmark          | Identifying relationships   | Students will:                          | Challenges                            |
| fraction such as 1/2. Recognize that                | between unit fractions      | <ul> <li>Identify equivalent</li> </ul> | Exit Tickets                          |
| comparisons are valid only when the two             | when one denominator is     | fractions                               |                                       |
| fractions refer to the same whole.                  | a multiple of the other     |   | Summative                             |

| <ul> <li>Record the results of comparisons with symbols &gt;, =, or &lt;, and justify the conclusions, e.g., by using a visual fraction model.</li> <li>4.NF.B.3</li> <li>Understand a fraction a/b with a &gt; 1 as a sum of fractions 1/b.</li> <li>4.NF.B.3.a</li> <li>Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</li> <li>4.NF.B.3.b</li> <li>Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.</li> <li>4.NF.B.3.c</li> <li>Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and</li> </ul> | <ul> <li>(e.g., halves and fourths, thirds and sixths)</li> <li>Comparing the same fractional parts of different-sized wholes</li> <li>Comparing and ordering fractions and justifying their order through reasoning about fraction equivalencies and relationships</li> <li>Representing fractions on a number line</li> <li>Comparing and ordering decimals and justifying their order through reasoning about representations and justifying their order through reason fractions to the landmarks 0, 1/2, 1, and 2</li> <li>Comparing and ordering decimals and justifying their order through reasoning about representations and the meaning of the numbers</li> </ul> | <ul> <li>and explain why they<br/>are equivalent.</li> <li>Compare fractions with<br/>like and unlike<br/>denominators.</li> <li>Add and subtract<br/>fractions and mixed<br/>numbers with like<br/>denominators.</li> <li>Multiply a fraction by a<br/>whole number.</li> <li>Read, write, and<br/>compare decimals in<br/>tenths and hundredths.</li> <li>Add tenths and<br/>hundredths.</li> <li>Represent data on a<br/>line plot including<br/>fourths and eighths.</li> </ul> | <ul> <li>Montessori Three-<br/>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|---|--|
| the relationship between addition and subtraction.<br>4.NF.B.3.d  |  |   |  |

| Solve word problems involving addition and<br>subtraction of fractions referring to<br>the same whole and having like denominators,<br>e.g., by using visual fraction models and<br>equations to represent the problem.  |  |  |
|--|--|--|
| 4.NF.B.4<br>Apply and extend previous<br>understandings of multiplication to multiply a<br>fraction by a whole number.   |  |  |
| 4.NF.B.4. a<br>Understand a fraction a/b as a multiple<br>of 1/b. For example, use a visual fraction model<br>to represent 5/4 as the product 5<br>$\times$ (¼), recording the conclusion by the equation<br>5/4 = 5 $\times$ (¼).   |  |  |
| 4.NF.B.4.c<br>Solve word problems involving<br>multiplication of a fraction by a whole number,<br>e.g., by using visual fraction models and<br>equations to represent the problem. For<br>example, if each person at a party will eat 3/8<br>of a pound of roast<br>beef, and there will be 5 people at the party,<br>how many pounds of roast beef will be<br>needed? Between what two whole numbers<br>does your answer lie? |  |  |
| 4.NF.C.5   |  |  |

| Express a fraction with denominator 10 as an     |  |  |
|--|--|--|
| equivalent fraction with denominator             |  |  |
| 100, and use this technique to add two           |  |  |
| fractions with respective denominators 10 and    |  |  |
| 100. For example, express 3/10 as                |  |  |
| 30/100, and add 3/10 + 4/100 = 34/100.           |  |  |
|  |  |  |
| 4.NF.C.6   |  |  |
| Use decimal notation for fractions with          |  |  |
| denominators 10 or 100. For example, rewrite     |  |  |
| 0.62 as 62/100; describe a length as 0.62        |  |  |
| meters; locate 0.62 on a number line diagram.    |  |  |
|  |  |  |
| 4.NF.C.7   |  |  |
| Compare two decimals to hundredths               |  |  |
| by reasoning about their size. Recognize that    |  |  |
| comparisons are valid only when the two          |  |  |
| decimals refer to the same whole. Record the     |  |  |
| results of comparisons with the symbols >, =, or |  |  |
| <, and justify the conclusions, e.g., by using a |  |  |
| visual model.                                    |  |  |
|  |  |  |
| 4.MD.A.2   |  |  |
| Use the four operations to solve word            |  |  |
| problems involving distances, intervals of time, |  |  |
| liquid volumes, masses of objects, and money,    |  |  |
| including problems involving simple fractions or |  |  |
| decimals, and problems that require expressing   |  |  |
| measurements given in a larger unit in terms of  |  |  |
| a smaller unit. Represent measurement            |  |  |

| quantities using diagrams such as number line diagrams that |  |  |
|---|--|--|
| feature a measurement scale.                                |  |  |
| 4.MD.B.4  |  |  |
| Make a line plot to display a data set of                   |  |  |
| measurements in fractions of a unit                         |  |  |
| (1/2, 1/4, 1/8). Solve problems involving                   |  |  |
| addition and subtraction of fractions by using              |  |  |
| information presented in line plots. For                    |  |  |
| example, from a line plot find and interpret the            |  |  |
| difference in length  |  |  |
| between the longest and shortest specimens in               |  |  |
| an insect collection.                                       |  |  |

Unit Seven: Multiplication and Division 3Timeline: 18 SessionsUnit Description: In this unit students focus on the operations of multiplication and division, including problems involving converting<br/>measurements. Students refine their strategies for solving multiplication problems with two 2-digit numbers and with a 4-digit number and a<br/>1-digit number, and they use the relationship between multiplication and division to develop and practice strategies for solving division<br/>problems with up to a 4-digit dividend and a 1-digit divisor.

| Standards Alignment  | Unit Concept/Big Ideas   | Essential Questions/<br>Learning Targets  | Instructional Materials/<br>Assessments  |
|--|--|---|--|
| 4.OA.A.2   | Identifying factors of a   | Essential Questions:  | <u>`Montessori Materials</u>   |
| Multiply or divide to solve word problems involving multiplicative comparison,   | number   | How can we use pictures or diagrams, including arrays and   | Peg board  |
| e.g., by using drawings and equations with a symbol for the unknown number to represent  | Solving division problems by breaking the problem  | pictures of groups to represent<br>a multiplication problem?  | Stamp game   |
| the problem, distinguishing multiplicative comparison from additive comparison.  | into parts<br>Representing a division<br>problem with pictures or  | How can we estimate answers to division problems?   | Division with hierarchical<br>materials (Test tube<br>division)  |
| 4.OA.A.3<br>Solve multistep word problems<br>posed with whole numbers and having whole-  | diagrams, including arrays,<br>and pictures of groups  | How can we use multiples of 10 to solve division problems?  | Investigations Unit 7: How<br>many Packages and<br>Groups?   |
| number answers using the four operations, including problems in which remainders must  | Solving multiplication problems by breaking a  | How can we use breaking apart, reordering, rounding, or   | <u>Assessments</u>   |
| be interpreted. Represent these problems<br>using<br>equations with a letter standing for the<br>unknown quantity. Assess the reasonableness<br>of answers using mental computation and<br>estimation strategies including rounding.<br>4.NBT.B.5<br>Multiply a whole number of up to four | <ul> <li>problem into smaller parts<br/>and combining the sub-<br/>products</li> <li>Dividing a 4-digit number<br/>by a 1-digit number</li> <li>Breaking apart,<br/>reordering, rounding, or<br/>changing</li> </ul> | changing numbers mentally to<br>determine a reasonable<br>estimate?<br><u>Learning Targets</u><br>Students will:<br>• Multiply two 2-digit<br>numbers and up to a 4-<br>digit number by a 1-<br>digit number. | <ul> <li>Formative</li> <li>Student Exercises</li> <li>Peer Questioning</li> <li>Classroom<br/>Discussions</li> <li>Vocabulary checks</li> <li>Problem Solving<br/>Challenges</li> <li>Exit Tickets</li> </ul> |

| digits by a one-digit whole number, and              | numbers mentally to        |  | Summative                         |
|--|----------------------------|--|-----------------------------------|
| multiply two two-digit numbers, using                | determine a reasonable     | Solve division problems                                  | Montessori Three-                 |
| strategies based on place value and the              | estimate                   | with up to 4-digit                                       | Period Lesson                     |
| properties of operations. Illustrate and explain     |                            | dividends and 1-digit                                    | including                         |
| the calculation by using                             | Using four operations to   | divisors.  | introduction,                     |
| equations, rectangular arrays, and/or area           | solve word problems        |  | practice,                         |
| models.  | involving measurement      | <ul> <li>Solve measurement<br/>and conversion</li> </ul> | and assessment of the %           |
| 4.NBT.B.6  | Using a story problem      | problems.  | of concept mastery.               |
| Find whole-number quotients and                      | represented by a           |  | <ul> <li>Problem-based</li> </ul> |
| remainders with up to four-digit dividends and       | multiplication expression  |  | interactive Learning              |
| one-digit divisors, using strategies based on        | to keep track of parts of  |  | activities                        |
| place value, the properties of operations,           | the problem                |  | Performance                       |
| and/or the relationship between multiplication       |                            |  | assessment                        |
| and  | Converting measurements    |  |                                   |
| division. Illustrate and explain the calculation     | in larger units to smaller |  |                                   |
| by using equations,                                  | units                      |  |                                   |
| rectangular arrays, and/or area models.              |                            |  |                                   |
|  | Making tables of           |  |                                   |
| 4.MD.A.1   | equivalent measurements    |  |                                   |
| Know relative sizes of measurement                   |                            |  |                                   |
| units within one system of units including km,       | Using multiplication to    |  |                                   |
| m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a | convert measurements       |  |                                   |
| single system of                                     |                            |  |                                   |
| measurement, express measurements                    | Using the four operations  |  |                                   |
| in a larger unit in terms of a smaller unit.         | to solve word problems     |  |                                   |
| Record measurement equivalents in a two              | involving measurements     |  |                                   |
| column table. For example, know that 1 ft is 12      |                            |  |                                   |
| times as long as 1 in. Express the length of a 4 ft  | Solving multi-step         |  |                                   |
| snake as 48 in. Generate a conversion table for      | problems                   |  |                                   |
|  |                            |  |                                   |

| feet and inches listing the number pairs (1, 12), | Writing equations using a |  |
|---|---------------------------|--|
| (2, 24), (3, 36),                                 | letter for the unknown    |  |
|   | quantity                  |  |
| 4.MD.A.2  |                           |  |
| Use the four operations to solve word             |                           |  |
| problems involving distances, intervals of time,  |                           |  |
| liquid volumes, masses of objects, and money,     |                           |  |
| including problems involving simple fractions or  |                           |  |
| decimals, and problems that require expressing    |                           |  |
| measurements given in a larger unit in terms of   |                           |  |
| a smaller unit. Represent measurement             |                           |  |
| quantities using diagrams such as number line     |                           |  |
| diagrams that                                     |                           |  |
| feature a measurement scale.                      |                           |  |

| to model situations. Two contexts (Penny Jars an  |                            |   |                                       |
|---|----------------------------|---|---------------------------------------|
| Standards Alignment                               | Unit Concept/Big Ideas     | Essential Questions/                      | Instructional Materials/              |
|   |                            | Learning Targets                          | Assessments                           |
| 4.OA.A.3  | Using tables to model      | Essential Questions:                      | Montessori Materials                  |
| Solve multistep word problems                     | situations                 | What are the features of a                | Teacher-made materials to             |
| posed with whole numbers and having whole-        |                            | pattern?                                  |                                       |
| number answers using the four operations,         | Using symbolic notation to |   | augment what is                       |
| including problems in which remainders must       | model situations           | How can we develop a rule that            | commercially available                |
| be interpreted. Represent these problems          |                            | describes a pattern?                      | Investigations Unit: Penny            |
| using equations with a letter standing for the    | Using letters in equations |   | Jars and Towers                       |
| unknown quantity. Assess the reasonableness       | to represent unspecified   | Learning Targets                          | Jais and Towers                       |
| of answers using mental computation and           | quantities                 | Students will:                            | <u>Assessments</u>                    |
| estimation strategies including rounding.         |                            | Model the                                 |                                       |
|   | Generating number          | mathematics of a                          | <u>Formative</u>                      |
| 4.OA.C.5  | patterns and identifying   | situation with tables                     | <ul> <li>Student Exercises</li> </ul> |
| Generate a number or shape pattern                | features of the pattern    | and with mathematical                     | Peer Questioning                      |
| that follows a given rule. Identify apparent      |                            | notation, including                       | Classroom                             |
| features of the pattern that were not explicit in | Articulating a rule that   | using letters to                          | Discussions                           |
| the rule itself. For example, given the rule "Add | describes a number         | represent unspecified                     | Vocabulary checks                     |
| 3" and the starting number 1, generate terms      | pattern                    | quantities.                               | <ul> <li>Problem Solving</li> </ul>   |
| in the resulting sequence and observe that the    |                            |   | Challenges                            |
| terms appear to alternate between odd and         | Comparing situations       | <ul> <li>Solve multi-step word</li> </ul> | Exit Tickets                          |
| even numbers. Explain informally why the          | represented by arithmetic  | problems using the                        |                                       |
| numbers will continue to alternate in this way.   | sequences                  | four operations.                          | <u>Summative</u>                      |
|   |                            |   | Montessori Three-                     |
|   | Analyzing arithmetic       | Generate a number                         | Period Lesson                         |
|   | patterns to solve          | pattern that follows a                    | including                             |
|   | problems                   | given rule and analyze                    | introduction,                         |
|   |                            | features of the pattern                   | practice,                             |

| Representing and solving<br>multi-step problems<br>involving more than one<br>operation | in order to solve<br>problems. | <ul> <li>and assessment of the %</li> <li>of concept mastery.</li> <li>Problem-based interactive Learning activities</li> <li>Performance assessment</li> </ul> |
|---|--------------------------------|---|
|---|--------------------------------|---|

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 5<sup>th</sup> Grade

### Curriculum Framework for Mathematics

| School: Sussex Montessori School  | Curricular Resources: Montessori N | <u> 1aterials and Lessons / Investiga</u> | <u>tions 3</u> Grade: <u>5</u> |
|---|------------------------------------|---|--------------------------------|
| Unit One: Multiplication and Division 1 Timeline: 19 Sessions   |                                    |   |                                |
| Unit Description: In this unit students focus on the operations of multiplication and division. Students refine their strategies for solving  |                                    |   |                                |
| multiplication problems with 2-digit numbers, and use the relationship between multiplication and division to develop and practice strategies |                                    |   |                                |
| for solving division problems. They use order of operations to solve computation problems   |                                    |   |                                |
| Standards Alignment   | Unit Concept/Big Ideas             | Essential Questions/                      | Instructional Materials/       |

| Standards Alignment                                      | Unit Concept/Big Ideas     | Essential Questions/            | Instructional Materials/              |
|--|----------------------------|---------------------------------|---------------------------------------|
|  |                            | Learning Targets                | Assessments                           |
| 5.OA.A.1   | Using arrays to represent  | Essential Questions:            | Montessori Materials                  |
| Use parentheses, brackets, or braces in                  | multiplication             | How can knowing the             | Stamp Game                            |
| numerical expressions, and evaluate                      |                            | properties of numbers help us   |                                       |
| expressions with these symbols.                          | Determining whether one    | solve problems?                 | Checker Board Materials               |
|  | number is a factor or      |                                 |                                       |
| 5.OA.A.2   | multiple of another        | What strategies can we use to   | Investigations Unit 1 –               |
| Write simple expressions that record                     |                            | solve 2-digit by 2-digit        | Puzzles, Clusters, and                |
| calculations with numbers, and interpret                 | Identifying prime, square, | multiplication problems?        | Towers                                |
| numerical expressions without evaluating                 | even, and odd numbers      |                                 |                                       |
| them. For example, express the calculation               |                            | How do we multiply by 10 and    | Assessments                           |
| "add 8 and7, then multiply by 2" as $2 \times (8 + 7)$ . | Using properties (even,    | what happens to our product     | <u>Formative</u>                      |
| Recognize that 3 × (18932 + 921) is three times          | odd, prime, square) and    | when we do?                     | <ul> <li>Student Exercises</li> </ul> |
| as large as 18932 +921, without having to                | relationships (factor,     |                                 | <ul> <li>Peer Questioning</li> </ul>  |
| calculate the indicated sum or product.                  | multiple) of numbers to    | What is the order of            | Classroom                             |
|  | solve problems             | operations? Why is it           | Discussions                           |
| 5.NBT.A.2  |                            | important to know? What         | Vocabulary checks                     |
| Explain patterns in the number of zeros of the           | Identifying and learning   | happens if the order is not     | Problem Solving                       |
| product when multiplying a number by powers              | multiplication facts not   | followed?                       | Challenges                            |
| of 10, and explain patterns in the placement of          | yet fluently known         |                                 | Exit Tickets                          |
| the decimal point when a decimal is                      |                            | How can we use a picture or     |                                       |
| Multiplied or divided by a power of 10. Use              | Solving 2-digit by 2-digit | diagram to represent a division | Summative                             |
| whole-number exponents to denote powers                  | multiplication problems    | problem?                        | Montessori Three-                     |
| of 10.   |                            |                                 |                                       |

|  | Describing and comparing  | How can I use the                | Period Lesson                     |
|--|---------------------------|----------------------------------|-----------------------------------|
| 5.NBT.B.6                                      | strategies used to solve  | multiplication strategies I know | including                         |
| Find whole-number quotients of whole           | multiplication problems   | to estimate a product of two 2-  | introduction,                     |
| numbers with up to four-digit dividends        |                           | digit numbers?                   | practice,                         |
| and two-digit divisors, using strategies based | Creating a story problem  |                                  | and assessment of                 |
| on place value, the properties of operations,  | represented by a          | How can knowing multiples of     | the %                             |
| and/or the relationship between multiplication | multiplication expression | ten help me solve division       | of concept mastery.               |
| and division. Illustrate and explain the       |                           | problems?                        | <ul> <li>Problem-based</li> </ul> |
| calculation by using equations, rectangular    | Multiplying fluently by   |                                  | interactive Learning              |
| arrays, and/or area models.                    | multiples of 10           | Learning Targets                 | activities                        |
|  |                           | Students will:                   | Performance                       |
|  | Comparing multiplication  | • Solve 2-digit by 2-digit       | assessment                        |
|  | problems to determine     | multiplication                   |                                   |
|  | which product is greater  | problems                         |                                   |
|  |                           | efficiently.                     |                                   |
|  | Estimating the product of |                                  |                                   |
|  | two numbers               | Solve division problems          |                                   |
|  |                           | with 1-digit and 2-digit         |                                   |
|  | Breaking apart            | divisors.                        |                                   |
|  | multiplication problems   |                                  |                                   |
|  | efficiently               | Use the order of                 |                                   |
|  |                           | operations to solve              |                                   |
|  | Using clear and concise   | computation problems.            |                                   |
|  | notation                  |                                  |                                   |
|  |                           |                                  |                                   |
|  | Solving problems using    |                                  |                                   |
|  | the order of operations   |                                  |                                   |
|  |                           |                                  |                                   |
|  | Writing and interpreting  |                                  |                                   |
|  | expressions involving     |                                  |                                   |
|  | grouping symbols          |                                  |                                   |

| Representing a division<br>problem with a picture or<br>diagram  |
|--|
| Creating a story problem<br>represented by a division<br>expression  |
| Describing and comparing<br>strategies used to solve<br>division problems  |
| Using knowledge of<br>multiples of 10 to solve<br>division problems  |
| Using and interpreting<br>notation that represents<br>division, and relating<br>division and multiplication<br>notations (e.g., $170 \div 15 =$<br>, and×<br>15 = 170) |
| Solving division problems<br>with 2-digit divisors   |
| Making sense of<br>remainders in terms of<br>problem contexts  |

| Solving a division problem<br>by breaking the dividend<br>into parts        |  |
|---|--|
| Comparing division<br>problems to determine<br>which quotient<br>is greater |  |

Unit Two: 3-D Geometry and Measurement Timeline: 12 Sessions Unit Description: In this unit students focus on the structure and volume of three-dimensional (3-D) shapes, specifically on rectangular prisms and solids composed of rectangular prisms. Students build models and patterns for boxes that hold quantities of cubes and calculate the volume of these boxes, using a cube as a unit of measure.

| Standards Alignment  | Unit Concept/Big Ideas  | Essential Questions/<br>Learning Targets   | Instructional Materials/<br>Assessments  |
|--|---|--|--|
| 5.MD.C.3<br>Recognize volume as an attribute of solid<br>figures and understand concepts of volume   | Decomposing 3-D shapes<br>and then recombining<br>them to make a given  | Essential Questions:<br>What are the important<br>attributes of 3-D shapes and   | Montessori Materials<br>Volume materials   |
| measurement.<br>5.MD.C.3a  | solid<br>Determining the number   | how can we use them to create<br>new 3-D shapes?   | Geometric solids Investigations Unit 2 –   |
| A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.   | of cubes that will fit into<br>the box made by a given<br>pattern   | How do we find the volume of<br>a rectangular prism?<br>How does volume change when  | Assessments<br>Formative   |
| <ul> <li>5.MD.C.3b</li> <li>A solid figure which can be packed without gaps or overlaps using <i>n</i> unit cubes is said to have a volume of <i>n</i> cubic units.</li> <li>5.MD.C.4</li> <li>Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.</li> <li>5.MD.C.5</li> <li>Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.</li> </ul> | Developing a strategy for<br>determining the volume<br>of rectangular prisms<br>Designing patterns for<br>boxes with given<br>dimensions<br>Considering how the<br>dimensions of a box<br>change when the<br>volume is changed<br>(doubled or halved) | <ul> <li>How does volume change when we join rectangular prisms?</li> <li>How can we measure a large space – what unit of measure should we use?</li> <li>Learning Targets Students will: <ul> <li>Find the volume of rectangular prisms, including the use of volume formulas.</li> </ul></li></ul> | <ul> <li>Student Exercises</li> <li>Peer Questioning</li> <li>Classroom<br/>Discussions</li> <li>Vocabulary checks</li> <li>Problem Solving<br/>Challenges</li> <li>Exit Tickets</li> </ul> Summative<br>Period Lesson<br>including<br>introduction, |

| 5.MD.C.5a<br>Find the volume of a right rectangular prism   | Organizing rectangular packages to fit in   | • Find the volume of a solid composed of two              | and assessment of the %                                     |
|---|---|---|---|
| with whole-number side lengths by packing it<br>with unit cubes, and show that the volume is  | rectangular boxes   | rectangular prisms.                                       | <ul><li>of concept mastery.</li><li>Problem-based</li></ul> |
| the same as would be found by multiplying the<br>edge lengths, equivalently by multiplying the<br>height by the area of the base. Represent<br>threefold whole-number products as volumes,<br>e.g., to represent the associative property of<br>multiplication. | Using formulas to find the<br>volume of rectangular<br>prisms<br>Finding the volume of a<br>solid composed of two<br>rectangular prisms | <ul> <li>Use standard units to measure volume.</li> </ul> | <ul> <li>Performance<br/>assessment</li> </ul>              |
| Apply the formulas $V = I \times w \times h$ and $V = b \times h$<br>for rectangular prisms to find volumes of right<br>rectangular prisms with whole-number edge<br>lengths in the context of solving real world and<br>mathematical problems.                 | Designing a box that can<br>be completely filled with<br>several differently-shaped<br>rectangular packages<br>Determining the volume,  |   |   |
| 5.MD.C.5c<br>Recognize volume as additive. Find volumes of<br>solid figures composed of two non-overlapping   | in cubic centimeters, of a small rectangular prism  |   |   |
| right rectangular prisms by adding the volumes<br>of the non-overlapping parts, applying this<br>technique to solve real world problems.  | Constructing units of<br>volume—cubic<br>centimeter, cubic inch,<br>cubic foot, cubic yard<br>(optional), cubic meter                   |   |   |
|   | Choosing an appropriate<br>unit of volume to measure<br>a large space   |   |   |

| Describing and defending<br>measurement methods              |
|--|
| Finding the volume of a<br>large space using cubic<br>meters |

Unit Three: Rational Numbers: Addition and Subtraction 1Timeline: 19 SessionsUnit Description: In this unit students focus on deepening and extending students' understanding of fractions and equivalent fractions and<br/>representing fractions using an area model (rectangles), a rotation model (a clock), and a linear model (number lines). They use these<br/>understandings to add and subtract fractions and mixed numbers.

| Standards Alignment                                      | Unit Concept/Big Ideas      | Essential Questions/          | Instructional Materials/ |
|--|-----------------------------|-------------------------------|--------------------------|
|  |                             | Learning Targets              | Assessments              |
| 5.OA.A.2   | Finding fractional parts of | Essential Questions:          | Montessori Materials     |
| Write simple expressions that record                     | a whole or of a group       | How can we represent          | Fractions cabinet        |
| calculations with numbers, and interpret                 |                             | fractions of different-sized  |                          |
| numerical expressions without evaluating                 | Identifying fraction        | rectangles?                   | Fraction circles box     |
| them. For example, express the calculation               | equivalents through         |                               |                          |
| "add 8 and7, then multiply by 2" as $2 \times (8 + 7)$ . | reasoning about             | How can we find fractional    | Decimal box materials    |
| Recognize that 3 × (18932 + 921) is three times          | representations and         | units for a whole?            |                          |
| as large as 18932 +921, without having to                | relationships               |                               | Investigations Unit 3 –  |
| calculate the indicated sum or product.                  |                             | How can we show fractional    | Rectangles, Clocks, and  |
|  | Representing fractions on   | parts on a number line?       | Tracks                   |
| 5.NF.A.1   | different-sized rectangles  |                               |                          |
| Add and subtract fractions with unlike                   |                             | What are common               | <u>Assessments</u>       |
| denominators (including mixed numbers) by                | Ordering fractions and      | denominators?                 | <u>Formative</u>         |
| replacing given fractions with equivalent                | justifying their order      |                               | Student Exercises        |
| fractions in such a way as to produce an                 | through reasoning about     | How can we add and subtract   | Peer Questioning         |
| equivalent sum or difference of fractions with           | fraction equivalents and    | fractions with unlike         | Classroom                |
| like denominators. For example, 2/3 + 5/4 =              | relationships               | denominators?                 | Discussions              |
| 8/12 + 15/12 = 23/12. (In general, a/b + c/ d =          |                             |                               | Vocabulary checks        |
| (ad + bc)/bd.)   | Comparing fractions to      | How can we use our fraction   | Problem Solving          |
|  | the landmarks 0, 1/2, and   | knowledge to estimate sums    | Challenges               |
| 5.NF.A.2   | 1                           | and differences of fractions? | Exit Tickets             |
| Solve word problems involving addition and               |                             |                               |                          |
| subtraction of fractions referring to the same           | Finding and comparing       | Learning Targets              | <u>Summative</u>         |
| whole, including cases of unlike denominators,           | fractional parts of a whole | Students will:                | Montessori Three-        |
|  | or a group                  |                               |                          |

| e.g., by using visual fraction models or<br>equations to represent the problem. Use<br>benchmark fractions and number sense of<br>fractions to estimate mentally and assess the<br>reasonableness of answers. For example,<br>recognize an incorrect result 2/5 + ½ = 3/7, by<br>observing that 3/7 < 1/2.<br>5.MD.B.2<br>Make a line plot to display a data set of<br>measurements in fractions of a unit (1/2,<br>1/4, 1/8). Use operations on fractions for this<br>grade to solve problems involving information<br>presented in line plots. For example, given<br>different measurements of liquid in identical<br>beakers, find the amount of liquid each beaker<br>would contain if the total amount in all the<br>beakers were redistributed equally. | Comparing fractional parts<br>of different-sized wholes<br>Using equivalent fractions<br>to solve problems<br>Comparing fractions on a<br>number line<br>Finding fractional parts of<br>the rotation around a<br>circle<br>Adding fractions by using<br>a rotation model<br>Representing fractions on<br>a number line<br>Finding combinations of<br>fractions with sums<br>between 0 and 2<br>Adding and subtracting<br>fractions by using a<br>number line<br>Adding and subtracting<br>fractions through<br>reasoning about | <ul> <li>Add fractions with<br/>unlike denominators.</li> <li>Subtract fractions with<br/>unlike denominators.</li> <li>Represent data<br/>including fractions on a<br/>line plot and solve<br/>addition and<br/>subtraction problems<br/>about data.</li> </ul> | <ul> <li>Period Lesson<br/>including<br/>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|--|--|
|---|--|--|--|

| fraction equivalents and relationships  |  |
|---|--|
| Using common<br>denominators to add and<br>subtract fractions   |  |
| Adding and subtracting<br>fractions and mixed<br>numbers  |  |
| Finding general rules for<br>adding and subtracting<br>fractions  |  |
| Making a line plot to<br>display a data set of<br>measurements involving<br>fractions                               |  |
| Using addition and<br>subtraction of fractions to<br>solve problems involving<br>information given in line<br>plots |  |
| Using benchmark fractions<br>to estimate sums and<br>differences  |  |

 Unit Four: Multiplication and Division 2
 Timeline: 17 Sessions

 Unit Description: In this unit students focus on the operations of multiplication and division. Students refine their strategies for solving multiplication problems fluently, including using the U.S. standard algorithm. Students continue using the relationship between multiplication and division to efficiently solve division problems with 4-digit dividends and 2-digit divisors.

| Standards Alignment                             | Unit Concept/Big Ideas     | Essential Questions/                      | Instructional Materials/              |
|---|----------------------------|---|---------------------------------------|
|   |                            | Learning Targets                          | Assessments                           |
| 5.OA.B.3  | Solving multiplication     | Essential Questions:                      | Montessori Materials                  |
| Generate two numerical patterns using two       | problems fluently          | How can we find the product of            | Division with hierarchical            |
| given rules. Identify apparent relationships    |                            | two multi-digit numbers?                  | materials (Test Tube                  |
| between corresponding terms. Form ordered       | Describing and comparing   |   | Division)                             |
| pairs consisting of corresponding terms from    | strategies used to solve   | How can we use our known                  |                                       |
| the two patterns, and graph the ordered pairs   | multidigit multiplication  | multiplication strategies to              | Place value cards                     |
| on a coordinate plane. For example, given the   | problems                   | estimate the product in                   |                                       |
| rule "Add 3" and the starting number 0, and     |                            | multiplication problems?                  | Checkerboard materials                |
| given the rule "Add 6" and the starting number  | Estimating answers to      |   |                                       |
| 0, generate terms in the resulting sequences,   | multiplication problems    | How can we deduce what                    | Investigations Unit 4 – How           |
| and observe that the terms in one sequence      |                            | operations(s) are necessary in a          | Many People and Teams?                |
| are twice the corresponding terms in the other  | Understanding the U.S.     | multi-step word problem?                  |                                       |
| sequence. Explain informally why this is so.    | standard algorithm for     |   | <u>Assessments</u>                    |
|   | multiplication             | How can we use diagrams or                | <u>Formative</u>                      |
| 5.NBT.A.2                                       |                            | pictures to represent division            | <ul> <li>Student Exercises</li> </ul> |
| Explain patterns in the number of zeros of the  | Multiplying using the U.S. | problems?                                 | <ul> <li>Peer Questioning</li> </ul>  |
| product when multiplying a number by powers     | standard algorithm for     |   | Classroom                             |
| of 10, and explain patterns in the placement of | multiplication             |   | Discussions                           |
| the decimal point when a decimal is             |                            | Learning Targets                          | <ul> <li>Vocabulary checks</li> </ul> |
| Multiplied or divided by a power of 10. Use     | Using clear and concise    | Students will:                            | <ul> <li>Problem Solving</li> </ul>   |
| whole-number exponents to denote powers         | notation                   | <ul> <li>Fluently solve multi-</li> </ul> | Challenges                            |
| of 10.  |                            | digit multiplication                      | Exit Tickets                          |
|   | Solving multi-step word    | problems using a                          |                                       |
| 5.NBT.B.5                                       | problems                   | variety of strategies                     | <u>Summative</u>                      |
|   |                            |   | Montessori Three-                     |

| Fluently multiply multi-digit whole numbers  | Using all four operations | including the standard  | Period Lesson   |
|--|---------------------------|-------------------------|---|
| using the standard algorithm.  | to solve problems         | algorithm.              | including   |
|  |                           |                         | introduction,   |
| 5.NBT.B.6  | Solving division problems | Solve division problems | practice,   |
| Find whole-number quotients of whole   | with a 2-digit divisor    | with up to 4-digit      | and assessment of   |
| numbers with up to four-digit dividends and  | efficiently               | dividends and 2-digit   | the %   |
| two-digit divisors, using strategies based on place value, the properties of operations, | Representing a division   | divisors efficiently.   | <ul><li>of concept mastery.</li><li>Problem-based</li></ul> |
| and/or the relationship between multiplication   | problem with a picture or |                         | interactive Learning  |
| and division. Illustrate and explain the   | diagram                   |                         | activities  |
| calculation by using equations, rectangular  |                           |                         | Performance   |
| arrays, and/or area models.  | Creating a story context  |                         | assessment  |
|  | for a division expression |                         |   |
|  |                           |                         |   |
|  | Describing and comparing  |                         |   |
|  | strategies used to solve  |                         |   |
|  | division problems         |                         |   |

Unit Five: Analyzing Patterns and RulesTimeline: 14 SessionsUnit Description: In this unit students focus on using coordinate graphs, ordered pairs, tables, and symbolic notation to model real world and<br/>mathematical situations. Students analyze arithmetic patterns in tables and the shapes of graphs to describe and compare these situations.<br/>Students work both with situations that follow patterns, allowing predictions of future values (e.g., how the area of a square varies as the<br/>length of a side increases) and situations based on data (e.g., temperature over time).

| Standards Alignment  | Unit Concept/Big Ideas  | Essential Questions/<br>Learning Targets   | Instructional Materials/<br>Assessments  |
|--|---|--|--|
| 5.0A.A.2   | Understanding the   |  |  |
| Write simple expressions that record<br>calculations with numbers, and interpret<br>numerical expressions without evaluating<br>them. For example, express the calculation<br>"add 8 and7, then multiply by 2" as 2 × (8 + 7).<br>Recognize that 3 × (18932 + 921) is three times<br>as large as 18932 +921, without having to<br>calculate the indicated sum or product.<br>5.OA.B.3  | Understanding the<br>meaning of points on a<br>coordinate graph<br>Plotting points on a<br>coordinate grid<br>Generating ordered pairs<br>and recording them in a<br>table  | Essential Questions:<br>What are the x- and y-<br>coordinates of a point on a<br>coordinate grid?<br>What are the points on a<br>coordinate graph?<br>How can we record generated<br>ordered pairs on a table?   | Montessori Materials<br>Teacher-made materials to<br>extend commercially<br>available products<br>Investigations Unit 5 –<br>Temperature, Height, and<br>Growth<br><u>Assessments</u><br>Formative   |
| Generate two numerical patterns using two<br>given rules. Identify apparent relationships<br>between corresponding terms. Form ordered<br>pairs consisting of corresponding terms from<br>the two patterns, and graph the ordered pairs<br>on a coordinate plane. For example, given the<br>rule "Add 3" and the starting number 0, and<br>given the rule "Add 6" and the starting number<br>0, generate terms in the resulting sequences,<br>and observe that the terms in one sequence<br>are twice the corresponding terms in the other<br>sequence. Explain informally why this is so. | Identifying points in a<br>graph with corresponding<br>ordered pairs in a table<br>Identifying the<br>x- and y-coordinates of a<br>point on a coordinate grid<br>Comparing situations by<br>describing differences in<br>their graphs | How can we then identify these<br>pairs as points on a graph?<br>How can we think through and<br>articulate a rule that describes<br>a numerical pattern?<br>How can we use tables or<br>graphs or compare two<br>situations of sets of data?<br><u>Learning Targets</u><br>Students will: | <ul> <li>Student Exercises</li> <li>Peer Questioning</li> <li>Classroom<br/>Discussions</li> <li>Vocabulary checks</li> <li>Problem Solving<br/>Challenges</li> <li>Exit Tickets</li> </ul> Summative<br>• Montessori Three-<br>Period Lesson<br>including |

| <ul> <li>5.G.A.1</li> <li>Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</li> <li>5.G.A.2</li> <li>Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</li> </ul> | Articulating a rule that<br>describes a numerical<br>pattern<br>Describing the<br>relationship between two<br>varying quantities related<br>by a rule (e.g., age and<br>height)<br>Using a numerical<br>relationship generated by<br>a given rule to solve<br>problems in that context<br>Writing an equation that<br>describes the relationship<br>between two varying<br>quantities<br>Analyzing and comparing<br>numerical patterns<br>generated by different<br>rules<br>Interpreting values of the<br>points on a coordinate<br>grid in the context of the<br>situation | <ul> <li>Use tables to record<br/>ordered pairs and<br/>construct coordinate<br/>graphs to represent the<br/>relationship between x-<br/>coordinates and y-<br/>coordinates.</li> <li>Determine what values<br/>are represented by<br/>points on a coordinate<br/>grid.</li> <li>Represent real world<br/>and mathematical<br/>problems by graphing<br/>points in the<br/>coordinate plane and<br/>interpret the graph in<br/>the context of the<br/>situation.</li> <li>Use tables and graphs<br/>to compare two<br/>situations governed by<br/>rules that generate<br/>numerical patterns.</li> </ul> | <ul> <li>introduction,<br/>practice,<br/>and assessment of<br/>the %<br/>of concept mastery.</li> <li>Problem-based<br/>interactive Learning<br/>activities</li> <li>Performance<br/>assessment</li> </ul> |
|---|--|---|--|
|---|--|---|--|

| Interpreting a numerical<br>pattern in a table in terms<br>of the situation it<br>represents                  |
|---|
| Interpreting the shape of a<br>graph in terms of the<br>situation the graph<br>represents                     |
| Using symbolic letter<br>notation to represent the<br>value of one varying<br>quantity in terms of<br>another |

Unit Six: Rational Numbers: Addition and Subtraction 2 Timeline: 17 Sessions Unit Description: In this unit students focus on deepening and extending students' understanding of decimals and the base-10 number system. Students represent decimals on grids and number lines. They use their understanding of decimals to compare, add, and subtract decimals.

| Standards Alignment   | Unit Concept/Big Ideas                          | Essential Questions/<br>Learning Targets                          | Instructional Materials/<br>Assessments                                      |
|---|---|---|--|
| 5.NBT.A.1   | Identifying everyday uses                       | Essential Questions:  | Montessori Materials   |
| Recognize that in a multi-digit number, a digit in one place represents 10 times  | of fractions and decimals                       | How do we use decimals and fractions everyday?                    | Fraction cabinet   |
| as much as it represents in the place to its right<br>and 1/10 of what it represents in the place to  | Representing decimals as parts of an area       | How are decimals and fractions                                    | Decimal board materials  |
| its left.   | Reading and writing                             | related?  | Million Cube   |
| 5.NBT.A.3<br>Read, write, and compare decimals to<br>thousandths.   | tenths, hundredths, and thousandths             | How can we show decimals on a number line?                        | Investigations Unit 6 –<br>Between 0 and 1                                   |
| 5.NBT. A.3a<br>Read and write decimals to thousandths using   | Identifying decimal and fraction equivalents    | How do we write decimals in expanded form?                        | Assessments<br>Formative<br>• Student Exercises                              |
| base-ten numerals, number names, and<br>Expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times 100 + 20 \times 100 + $ | Representing decimals on a number line          | How do we add and subtract decimals with fidelity to place value? | <ul> <li>Peer Questioning</li> <li>Classroom</li> <li>Discussions</li> </ul> |
| (1/1000).   | Rounding decimals to the nearest one, tenth, or | Learning Targets  | <ul><li>Vocabulary checks</li><li>Problem Solving</li></ul>                  |
| 5.NBT. A.3b<br>Compare two decimals to thousandths based  | hundredth                                       | <ul> <li>Students will:</li> <li>Write, compare, and</li> </ul>   | Challenges <ul> <li>Exit Tickets</li> </ul>                                  |
| on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.  | Writing decimals in<br>expanded form            | round decimals to thousandths.                                    | Summative  |
| 5.NBT.A.4   | Comparing decimals to thousandths               | <ul> <li>Add and subtract decimals.</li> </ul>                    | <ul> <li>Montessori Three-<br/>Period Lesson<br/>including</li> </ul>        |

| Use place value understanding to round<br>decimals to any place.<br>5.NBT.B.7<br>Add, subtract, multiply, and divide decimals to<br>hundredths, using concrete models or drawings<br>and strategies based on place value, properties<br>of operations, and/or the relationship between<br>addition and subtraction; relate the strategy to<br>a written method and explain the reasoning<br>used. | Ordering decimals and<br>justifying their order<br>through reasoning about<br>decimal representations,<br>equivalents, and<br>relationships<br>Comparing decimals to<br>the landmarks 0, 1/2, and<br>1<br>Estimating sums and<br>differences of decimals<br>Using representations to<br>add and subtract tenths,<br>hundredths, and<br>thousandths<br>Adding and subtracting<br>decimals through<br>reasoning about place<br>value, equivalents, and<br>representations | introduction,<br>practice,<br>and assessment of<br>the %<br>of concept mastery.<br>Problem-based<br>interactive Learning<br>activities<br>Performance<br>assessment |
|---|---|---|
|   | differences of decimal<br>numbers to determine<br>which is greater  |   |

# Unit Seven: Rational Numbers: Multiplication and DavisonTimeline: 26 SessionsUnit Description: In this unit students focus on multiplying and dividing rational numbers, which includes extending students' understanding<br/>of the meaning of those operations and of place value. Students use contexts and representations (fraction bars, arrays, and grids) to solve<br/>problems involving multiplication and division of fractions and decimals. Students also apply their understandings of multiplication and<br/>division to solve measurement conversion problems.

| Standards Alignment  | Unit Concept/Big Ideas                           | Essential Questions/<br>Learning Targets | Instructional Materials/<br>Assessments |
|--|--|--|---|
| 5.NBT.A.1  | Using a representation to                        | Essential Questions:                     | Montessori Materials                    |
| Recognize that in a multi-digit number, a digit  | multiply a fraction and a                        | How do we multiply a fraction            | Peg board                               |
| in one place represents 10 times   | whole number                                     | by a whole number?                       | Champa anns a                           |
| as much as it represents in the place to its right<br>and 1/10 of what it represents in the place to | Extending understanding                          |  | Stamp game                              |
| its left.  | of the operation of                              | What can we estimate about               | Checkerboard                            |
|  | multiplication to include                        | the product of two factors               |   |
| 5.NBT.A.2  | fractions  | based on what we know about              | Place value cards                       |
| Explain patterns in the number of zeros of the   |  | each factor?                             |   |
| product when multiplying a number by powers  | Writing multiplication                           | How can we represent a                   | Division with hierarchical              |
| of 10, and explain patterns in the placement of the decimal point when a decimal is                  | equations for multiplying a fraction and a whole | fractional part of a quantity?           | materials (Test tube division)          |
| Multiplied or divided by a power of 10. Use  | number   | How can we use arrays to                 |   |
| whole-number exponents to denote powers  |  | represent the multiplication of          | Investigations Unit 7 –                 |
| of 10.   | Writing and interpreting                         | fractions?                               | Races, Arrays, and Grids                |
|  | multiplication equations                         |  |   |
| 5.NBT.B.7  | involving a fraction and a                       | What representations can we              | Assessments                             |
| Add, subtract, multiply, and divide decimals to  | whole number                                     | use to solve problems requiring          | Formative                               |
| hundredths, using concrete models or drawings  |  | the division of a whole number           | <ul> <li>Student Exercises</li> </ul>   |
| and strategies based on place value, properties  | Using a representation                           | by a fraction or a fraction by a         | <ul> <li>Peer Questioning</li> </ul>    |
| of operations, and/or the relationship between   | and reasoning to multiply                        | whole number?                            | Classroom                               |
| addition and subtraction; relate the strategy to   | a whole number by a                              |  | Discussions                             |
|  | fraction or mixed number                         |  | Vocabulary checks                       |

| a written method and explain the reasoning               |                             | What is the relationship                   | Problem Solving      |
|--|-----------------------------|--|----------------------|
| used.  | Comparing the size of the   | between fractions and                      | Challenges           |
|  | product to the size of one  | division?                                  | Exit Tickets         |
| 5.NF.B.3   | factor based on the size of |  |                      |
| Interpret a fraction as division of the                  | the other factor            | How can we find equivalencies              | Summative            |
| numerator by the denominator $(a/b = a \div b)$ .        |                             | between fractions and                      | Montessori Three-    |
| Solve word problems involving division of                | Multiplying a fraction or   | decimals?                                  | Period Lesson        |
| whole numbers leading to answers in the form             | mixed number and a          |  | including            |
| of fractions or mixed numbers, e.g., by using            | whole number                | Learning Targets                           | introduction,        |
| visual fraction models or equations to                   |                             | Students will:                             | practice,            |
| represent the problem. For example, interpret            | Multiplying a fraction by a |  | and assessment of    |
| ¾ as the result of dividing 3 by 4, noting that          | fraction                    | <ul> <li>Multiply fractions,</li> </ul>    | the %                |
| ¾ multiplied by 4 equals 3, and that when 3              |                             | mixed numbers, and                         | of concept mastery.  |
| wholes are shared equally among 4 people                 | Representing a fractional   | whole numbers.                             | Problem-based        |
| each person has a share of size 3/4. If 9 people         | part of a fractional        |  | interactive Learning |
| want to share a 50-pound sack of rice equally            | quantity                    | Compare the size of                        | activities           |
| by weight, how many pounds of rice should                |                             | the factors and the size                   | Performance          |
| each person get? Between what two whole                  | Using arrays to represent   | of the product and                         | assessment           |
| numbers does your answer lie?                            | multiplication of fractions | explain their                              |                      |
|  |                             | relationship.                              |                      |
| 5.NF.B.4   | Understanding the           |  |                      |
| Apply and extend previous understandings of              | relationship between the    | <ul> <li>Divide a unit fraction</li> </ul> |                      |
| multiplication to multiply a fraction or whole           | denominators and            | by a whole number and                      |                      |
| number by a fraction.                                    | numerators of the factors   | a whole number by a                        |                      |
|  | and the denominator and     | unit fraction.                             |                      |
| 5.NF.B.4a  | numerator of the product    |  |                      |
| Interpret the product $(a/b) \times q$ as a parts of a   |                             | <ul> <li>Recognize and use</li> </ul>      |                      |
| partition of q into b equal parts; equivalently,         | Using representations to    | place value                                |                      |
| as the result of a sequence of operations                | solve problems involving    | relationships to explain                   |                      |
| $a \times q \div b$ . For example, use a visual fraction | dividing a whole number     | patterns when                              |                      |
| model to show $(2/3) \times 4 = 8/3$ , and create a      | by a unit fraction and      | multiplying and                            |                      |

| story context for this equation. Do the same        | dividing a unit fraction by | dividing by powers of   |
|---|-----------------------------|-------------------------|
| with (2/3) × (4/5) =8/15. (In general, (a/b) ×      | a whole number              | 10, including           |
| (c/d) = ac/bd.)                                     |                             | placement of the        |
|   | Using reasoning, and the    | decimal point.          |
| 5.NF.B.4b   | relationship between        |                         |
| Find the area of a rectangle with fractional side   | division and                | Multiply and divide     |
| lengths by tiling it with unit squares of the       | multiplication, to solve    | decimals to             |
| appropriate unit fraction side lengths, and         | division problems           | hundredths.             |
| show that the area is the same as would be          | involving whole numbers     |                         |
| found by multiplying the side lengths. Multiply     | and unit fractions          |                         |
| fractional side lengths to find areas of            |                             | Solve division problems |
| rectangles, and represent fraction products as      | Solving problems that       | with two whole          |
| rectangular areas.                                  | involve dividing a whole    | numbers resulting in a  |
|   | number by a whole           | fraction or a mixed     |
| 5.NF.B.5  | number resulting in a       | number.                 |
| Interpret multiplication as scaling (resizing), by: | fraction or a mixed         |                         |
|   | number                      | Solve measurement       |
| 5.NF.B.5a   |                             | conversion problems     |
| Comparing the size of a product to the size of      | Interpreting fractions as   | including multi-step    |
| one factor on the basis of the size of the other    | division                    | word problems.          |
| factor, without performing the indicated            |                             |                         |
| multiplication.                                     | Identifying decimal and     |                         |
|   | fraction equivalents        |                         |
| 5.NF.B.5b   |                             |                         |
| Explaining why multiplying a given number by a      | Interpreting the meaning    |                         |
| fraction greater than 1 results in a product        | of digits in a decimal      |                         |
| greater than the given number (recognizing          | number                      |                         |
| multiplication by whole numbers greater than 1      |                             |                         |
| as a familiar case); explaining why multiplying a   | Using representations and   |                         |
| given number by a fraction less than 1 results in   | reasoning to multiply       |                         |
| a product smaller than the given number; and        | whole numbers by powers     |                         |

|  |                              | I |  |
|--|------------------------------|---|--|
| relating the principle of fraction equivalence               | of 10 (including 1, 0.1, and |   |  |
| $a/b = (n \times a)/(n \times b)$                            | 0.01)                        |   |  |
| to the effect of multiplying a/b by 1.                       |                              |   |  |
|  | Explaining the patterns in   |   |  |
| 5.NF.B.6   | the placement of the         |   |  |
| Solve real world problems involving                          | decimal point when a         |   |  |
| multiplication of fractions and mixed numbers,               | decimal is multiplied by a   |   |  |
| e.g., by using visual fraction models or                     | power of 10                  |   |  |
| equations to represent the problem.                          |                              |   |  |
|  | Estimating products of       |   |  |
| 5.NF.B.7   | decimals                     |   |  |
| Apply and extend previous understandings of                  |                              |   |  |
| division to divide unit fractions by whole                   | Multiplying decimals to      |   |  |
| numbers and whole numbers by unit fractions.                 | hundredths through           |   |  |
| (Students able to multiply fractions in general              | reasoning about place        |   |  |
| can develop strategies to divide fractions in                | value and multiplication     |   |  |
| general, by reasoning about the relationship                 |                              |   |  |
| between multiplication and division. But                     | Writing a strategy for       |   |  |
| division of a fraction by a fraction is not a                | multiplying decimals         |   |  |
| requirement at this grade.)                                  | 170                          |   |  |
|  | Using representations and    |   |  |
| 5.NF.B.7a  | reasoning to divide whole    |   |  |
| Interpret division of a unit fraction by a non-              | numbers by powers of 10      |   |  |
| zero whole number, and compute such                          | (including 1, 0.1, and 0.01) |   |  |
| quotients. For example, create a story context               | (                            |   |  |
| for $(1/3) \div 4$ , and use a visual fraction model to      | Explaining the patterns in   |   |  |
| show the quotient. Use the relationship                      | the placement of the         |   |  |
| between multiplication and division to explain               | decimal point when a         |   |  |
| that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$ . | decimal is divided by a      |   |  |
|  | power of 10                  |   |  |
| 5.NF.B.7b  |                              |   |  |
|  |                              |   |  |

| Interpret division of a whole number<br>by a unit fraction, and compute such quotients.<br>For example, create a story context for $4 \div$<br>(1/5), and use a visual fraction model to show<br>the quotient. Use the relationship between<br>multiplication and division to explain that $4 \div$<br>(1/5) = 20 because 20 × (1/5) = 4.   | Estimating quotients of<br>decimals<br>Dividing decimals to<br>hundredths through<br>reasoning about<br>place value and division |  |
|---|--|--|
| 5.NF.B.7c<br>Solve real world problems involving<br>division of unit fractions by non-zero whole<br>numbers and division of whole numbers by unit<br>fractions, e.g., by using visual fraction models<br>and equations to represent the problem. For<br>example, how much chocolate will each person<br>get if 3 people share ½ lb. of chocolate equally?<br>How many 1/3-cup servings are in 2 cups of<br>raisins? | Converting U.S. standard<br>and metric measurements<br>Solving multi-step word<br>problems involving<br>measurement              |  |
| 5.MD.A.1<br>Convert among different-sized standard<br>measurement units within a given<br>measurement system (e.g., convert 5 cm to<br>0.05 m), and use these conversions in solving<br>multi-step, real world problems.  |  |  |

 Unit Eight: 2-D Geometry and Measurement
 Timeline: 10 Sessions

 Unit Description: In this unit students focus on classifying triangles and quadrilaterals based on their properties and on using patterns to describe how the perimeters and areas of rectangles change when the dimensions of the rectangle change. Students examine how categories of polygons are related and how a figure can below to more than one category.

 Standards Alignment
 Unit Concept/Big Ideas
 Essential Questions/
 Instructional Materials/

| Stanuarus Angriment                             | Onit Concept/ big ideas  | Essential Questions/                     | instructional waterials/              |
|---|--------------------------|--|---------------------------------------|
|   |                          | Learning Targets                         | Assessments                           |
| 5.OA.B.3  | Comparing the perimeters | Essential questions                      | Montessori Materials                  |
| Generate two numerical patterns using two       | and areas of rectangles  | Can a polygon belong to more             | Geometry cabinet                      |
| given rules. Identify apparent relationships    | when the dimensions are  | than one category?                       |                                       |
| between corresponding terms. Form ordered       | multiplied by given      |  | Box of Sticks                         |
| pairs consisting of corresponding terms from    | amounts                  | What happens to the perimeter            |                                       |
| the two patterns, and graph the ordered pairs   |                          | and area when dimensions of a            | Teacher-made extension                |
| on a coordinate plane. For example, given the   | Using numerical and/or   | rectangle are multiplied by a            | materials                             |
| rule "Add 3" and the starting number 0, and     | geometric patterns to    | given amount?                            |                                       |
| given the rule "Add 6" and the starting number  | describe how the         |  | Investigations Unit 8 –               |
| 0, generate terms in the resulting sequences,   | perimeters and areas of  | Can rectangles with the same             | Properties of Polygons                |
| and observe that the terms in one sequence      | rectangles change when   | area have different perimeters?          |                                       |
| are twice the corresponding terms in the other  | the dimensions change    |  | Assessments:                          |
| sequence. Explain informally why this is so.    |                          | Learning Targets                         | <u>Formative</u>                      |
|   | Using representations to | Students will:                           | <ul> <li>Student Exercises</li> </ul> |
| 5.NF.A.1  | explain how perimeters   | <ul> <li>Classify polygons by</li> </ul> | <ul> <li>Peer Questioning</li> </ul>  |
| Add and subtract fractions with unlike          | and areas of rectangles  | their attributes and                     | Classroom                             |
| denominators (including mixed numbers) by       | change                   | know that some                           | Discussions                           |
| replacing given fractions with equivalent       |                          | quadrilaterals can be                    | <ul> <li>Vocabulary checks</li> </ul> |
| fractions in such a way as to produce an        | Creating different       | classified in more than                  | <ul> <li>Problem Solving</li> </ul>   |
| equivalent sum or difference of fractions with  | rectangles with the same | one way.                                 | Challenges                            |
| like denominators. For example, $2/3 + 5/4 =$   | area but different       |  | Exit Tickets                          |
| 8/12 + 15/12 = 23/12. (In general, a/b + c/ d = | perimeters               | <ul> <li>Identify and explain</li> </ul> |                                       |
| (ad + bc)/bd.)                                  |                          | numerical patterns                       | <u>Summative</u>                      |
|   | Creating different       | when comparing                           | Montessori Three-                     |
| 5.NF.B.4b                                       | rectangles with the same |  |                                       |

|   | 1                            | <b>_</b>               |                      |
|---|------------------------------|------------------------|----------------------|
| Find the area of a rectangle with fractional side | perimeter but different      | perimeters and areas   | Period Lesson        |
| lengths by tiling it with unit squares of the     | areas                        | of related rectangles. | including            |
| appropriate unit fraction side lengths, and       |                              |                        | introduction,        |
| show that the area is the same as would be        | Describing the shapes of     |                        | practice,            |
| found by multiplying the side lengths. Multiply   | rectangles that have the     |                        | and assessment of    |
| fractional side lengths to find areas of          | same area or the same        |                        | the %                |
| rectangles, and represent fraction products as    | perimeter                    |                        | of concept mastery.  |
| rectangular areas.                                |                              |                        | Problem-based        |
|   | Identifying attributes of    |                        | interactive Learning |
| 5.NF.B.6  | polygons                     |                        | activities           |
| Solve real world problems involving               |                              |                        | Performance          |
| multiplication of fractions and mixed numbers,    | Classifying triangles by the |                        | assessment           |
| e.g., by using visual fraction models or          | sizes of their angles and    |                        |                      |
| equations to represent the problem.               | the lengths of their sides   |                        |                      |
|   | _                            |                        |                      |
| 5.G.B.3   | Using attributes to classify |                        |                      |
| Understand that attributes belonging to a         | quadrilaterals               |                        |                      |
| category of two-dimensional figures also          |                              |                        |                      |
| belong to all subcategories of that category. For | Identifying the properties   |                        |                      |
| example, all rectangles have four right angles    | of categories of             |                        |                      |
| and squares are rectangles, so all squares have   | quadrilaterals               |                        |                      |
| four right angles.                                |                              |                        |                      |
|   | Recognizing that a           |                        |                      |
| 5.G.B.4   | polygon can belong to        |                        |                      |
| Classify two-dimensional figures in a hierarchy   | more than one category       |                        |                      |
| based on properties.                              |                              |                        |                      |
|   |                              |                        |                      |

Attachment 4D - Math Maps

# Sussex Montessori School Mathematics Curriculum 6<sup>th</sup> Grade

#### Attachment 4D - Math Maps

#### Curriculum Framework for Mathematics

 School: Sussex Montessori School
 Curricular Resources: Montessori Materials and Lessons / Investigations
 3
 Grade: 6

 Unit One: Factors and Multiples
 Timeline: 22 Lessons

 Unit Description: Through this unit, students will understand relationships among factors, multiples, divisors, and products. They will understand why two expressions are equivalent.
 They will

| Standards Alignment                              | Unit Concept/Big Ideas   | Essential Questions/             | Assessments                           |
|--|--------------------------|----------------------------------|---------------------------------------|
|  |                          | Learning Targets                 |                                       |
| 6.NS.B.4   | Make sense of problems   | Essential Questions:             | Montessori Materials:                 |
| Find the greatest common factor of two whole     | and persevere in solving | How can you find all the factors | Pegboard                              |
| numbers less than or equal to 100 and the least  | them.                    | (or divisors) of a number?       |                                       |
| common multiple of two whole numbers less        |                          |                                  | Teacher-made extension                |
| than or equal to 12. Use the distributive        | Reason abstractly and    | What information about a         | materials                             |
| property to express a sum of two whole           | quantitatively.          | number can you find by looking   |                                       |
| numbers 1–100 with a common factor as a          |                          | at its factors?                  | <b>Connected Mathematics</b>          |
| multiple of a sum of two whole numbers with      | Construct viable         |                                  | Project: Prime Time                   |
| no common factor.                                | arguments and critique   | If you know one factor of a      |                                       |
|  | the reasoning of others. | number, how can you find         | <u>Assessments</u>                    |
| 6.EE.A.1   |                          | another factor of the number?    | <b>Formative</b>                      |
| Write and evaluate numerical expressions         | Model with mathematics.  |                                  | Student Exercises                     |
| involving whole-number exponents.                |                          | How do you know when you         | <ul> <li>Peer Questioning</li> </ul>  |
|  | Use appropriate tools    | have found all of the factors of | Classroom                             |
| 6.EE.A.2.B                                       | strategically.           | a number?                        | Discussions                           |
| Identify parts of an expression using            |                          |                                  | <ul> <li>Vocabulary checks</li> </ul> |
| mathematical terms (sum, term, product,          | Attend to precision.     | How can you find the least       | Problem Solving                       |
| factor, quotient, coefficient); view one or more |                          | common multiple of two or        | Challenges                            |
| parts of an expression as a single entity. For   | Look for and make use of | more numbers?                    | • Exit Tickets                        |
| example, describe the expression 2 (8 + 7) as a  | structure.               |                                  |                                       |
| product of two factors; view (8 + 7) as both a   |                          | How can you decide when          | Summative                             |
| single entity and a sum of two terms.            | Look for and express     | finding common factors is        | Montessori Three-                     |
|  | regularity in repeated   | useful in solving a problem?     | Period Lesson                         |
| 6.EE.A.2.C                                       | reasoning.               |                                  | including                             |

| Evaluate expressions at specific values of their       |                            | How can you find the greatest   | introduction,                     |
|--|----------------------------|---------------------------------|-----------------------------------|
| variables. Include expressions that arise from         | Exponential notation       | common factor of two            | practice,                         |
| formulas used in real-world problems. Perform          |                            | numbers?                        | and assessment of                 |
| arithmetic operations, including those involving       | Sum, product, factor       |                                 | the %                             |
| whole-number exponents, in the conventional            |                            | How can you find the prime      | of concept mastery.               |
| order when there are no parentheses to specify         | Distributive property      | factorization of a number?      | <ul> <li>Problem-based</li> </ul> |
| a particular order (Order of Operations). For          |                            |                                 | interactive Learning              |
| example, use the formulas $V = s^3$ and $A = 6 s^2$ to | Writing numeric and        | How many unique prime           | activities                        |
| find the volume and surface area of a cube with        | symbolic expressions and   | factorizations of a number are  | Performance                       |
| sides of length s = 1/2                                | sentences to represent     | there?                          | assessment                        |
|  | the operations required to |                                 |                                   |
| 6.EE.A.3   | solve problems             | How can the prime               |                                   |
| Apply the properties of operations to generate         |                            | factorization of a number be    |                                   |
| equivalent expressions.                                | The mathematical           | used to find the LCM and GCF    |                                   |
|  | meaning of <i>term</i>     | of two or more numbers?         |                                   |
| 6.EE.A.4   | _                          |                                 |                                   |
| The idea that equivalence means two                    | Order of operations        | What characteristics of         |                                   |
| expressions give the same outputs is first             |                            | numbers, such as factors and    |                                   |
| highlighted in Investigation 4 of Prime Time.          | Reasoning quantitatively   | multiples did you use to answer |                                   |
| Featuring applications of the distributive             | about inequalities         | the questions?                  |                                   |
| property, the most common principle for                |                            |                                 |                                   |
| generating equivalent expressions, Problem 4.3         |                            | What special numbers, such as   |                                   |
| of that investigation states the property in           |                            | prime numbers, composite        |                                   |
| generality with letter names for variables $a(b + a)$  |                            | numbers, and square numbers,    |                                   |
| c) = a(b) + a(c).                                      |                            | did you use?                    |                                   |
|  |                            | ,                               |                                   |
| 6.EE.B.5   |                            | How do you decide whether a     |                                   |
| Understand solving an equation or inequality as        |                            | number is even or odd?          |                                   |
| a process of answering a question: which               |                            |                                 |                                   |
| values from a specified set, if any, make the          |                            |                                 |                                   |
| equation or inequality true? Use substitution to       |                            |                                 |                                   |

| determine whether a given number in a         | How is the Distributive                             |
|---|---|
| specified set makes an equation or inequality | Property used to create                             |
| true.   | equivalent expressions?                             |
|   | How is finding the area of a                        |
|   | rectangle related to the                            |
|   | Distributive Property?                              |
|   | How do you decide the order                         |
|   | when you work on number                             |
|   | sentences with more than one                        |
|   | operation?  |
|   | How do you decide what                              |
|   | operations are needed in a                          |
|   | given situation?                                    |
|   | Learning Targets                                    |
|   | Students will:                                      |
|   | • If a number <i>N</i> can be                       |
|   | written as a product of                             |
|   | two whole numbers, N                                |
|   | $= a \times b$ , then a and b                       |
|   | are factors of N.                                   |
|   | Multiples of a can be                               |
|   | found using the                                     |
|   | expression $a \times$ (some                         |
|   | whole number), such                                 |
|   | as 2 <i>a</i> , 3 <i>a</i> , 4 <i>a</i> , etc. Some |
|   | numbers can be                                      |

| expressed in                                       |
|--|
| exponential notation,                              |
| such as a <sup>2</sup> , a <sup>3</sup> , a4, etc. |
|  |
| When all factors of a                              |
| number are broken                                  |
| down into prime                                    |
| numbers, you have a                                |
| unique prime                                       |
| factorization. Finding                             |
| -  |
| the prime factorization                            |
| of two numbers can be                              |
| useful in finding the                              |
| least common multiple                              |
| and greatest common                                |
| factor of the numbers.                             |
|  |
| <ul> <li>When calculating the</li> </ul>           |
| value of an expression,                            |
| the operations have to                             |
| be performed in a                                  |
| conventional order, the                            |
| order of operations.                               |
|  |
| Sometimes a numerical                              |
| expression can be                                  |
| written in different                               |
| ways but the                                       |
| expressions are                                    |
| equivalent because the                             |
| value is the same.                                 |
|  |

equation or inequality true? Use substitution to

determine whether a given number in a

**Problem Solving** 

Challenges

**Timeline: 25 Lessons** Unit Two: Estimating and Ordering Rational Numbers **Unit Description:** In this unit, students understand fractions and decimals as numbers that can be located on the number line, compared, counted, partitioned, and Decomposed. They understand ratios as comparisons. They understand equivalence of fractions and ratios, and use equivalence to solve problems. **Standards Alignment Unit Concept/Big Ideas Essential Questions**/ Assessments Learning Targets Make sense of problems 6.NS.B.4 **Essential Questions:** Montessori Materials: Find the greatest common factor of two whole How can we order and and persevere in solving numbers less than or equal to 100 and the least them. compare rational numbers on a Fraction cabinet common multiple of two whole numbers less number line? than or equal to 12. Use the distributive Reason abstractly and Fraction box How can we find decimal property to express a sum of two whole quantitatively. numbers 1–100 with a common factor as a equivalents? Decimal checkerboard multiple of a sum of two whole numbers with Construct viable How can we know which values Teacher-made extension no common factor. arguments and critique the reasoning of others. from a specified set, if any. materials make the equation or 6.EE.A.1 Model with mathematics. Write and evaluate numerical expressions inequality true? **Connected Mathematics** involving whole-number exponents. **Project: Comparing Bits** Use appropriate tools and Pieces Learning Targets: Students will: 6.EE.A.3 strategically. Apply the properties of operations to generate Rational numbers can Assessments equivalent expressions. Attend to precision. be written in fraction Formative form or decimal form Student Exercises • 6.EE.B.5 Look for and make use of and can be represented Peer Questioning Understand solving an equation or inequality as structure. as points or distances Classroom • a process of answering a question: which on a number line. The Discussions values from a specified set, if any, make the Look for and express absolute value of a • Vocabulary checks

number is its distance

from 0 on the number

regularity in repeated

reasoning.

| specified set makes an equation or inequality             |                        | line. A number-line        | Exit Tickets                          |
|---|------------------------|----------------------------|---------------------------------------|
| true.   | Order of operations    | representation is useful   |                                       |
|   |                        | for ordering and           | <u>Summative</u>                      |
| 6.EE.B.8  | Exponential notation   | comparing rational         | <ul> <li>Montessori Three-</li> </ul> |
| Write an inequality of the form x > c or x < c to         |                        | numbers.                   | Period Lesson                         |
| represent a constraint or condition in a real-            | Equivalence            |                            | including                             |
| world or mathematical problem. Recognize                  |                        | Benchmarks are useful      | introduction,                         |
| that inequalities of the form x > c or x < c have         | Inequity               | for estimating values of   | practice,                             |
| infinitely many solutions; represent solutions of         |                        | fractions and decimals.    | and assessment of                     |
| such inequalities on number line diagrams.                | Ordering and comparing |                            | the %                                 |
|   | rational numbers on a  | Ratios are comparisons     | of concept mastery.                   |
| 6.EE.B.9  | number line            | between two numbers.       | <ul> <li>Problem-based</li> </ul>     |
| Use variables to represent two quantities in a            |                        | You can scale ratios to    | interactive Learning                  |
| real-world problem that change in relationship            | Use substitution to    | make equivalent ratios.    | activities                            |
| to one another; write an equation to express              | determine whether a    | Percents are ratios        | Performance                           |
| one quantity, thought of as the dependent                 | given number in a      | where 100 parts            | assessment                            |
| variable, in terms of the other quantity,                 | specified set makes an | represent the whole.       |                                       |
| thought of as the independent variable.                   | equation or inequality |                            |                                       |
| Analyze the relationship between the                      | true.                  | A rate is a particular     |                                       |
| dependent and independent variables and                   |                        | kind of ratio, where the   |                                       |
| graphs.   |                        | amounts compared are       |                                       |
|   |                        | in different units. A unit |                                       |
| 6.RP.A.1  |                        | rate is a ratio in which   |                                       |
| Understand the concept of a ratio and use ratio           |                        | one of the quantities      |                                       |
| language to describe a ratio relationship                 |                        | being compared has a       |                                       |
| between two quantities.                                   |                        | value of 1.                |                                       |
| 6.RP.A.2  |                        | Fractions and decimals     |                                       |
| Understand the concept of a unit rate <i>a</i> / <i>b</i> |                        | can be renamed or          |                                       |
| associated with a ratio $a : b$ with $b \neq 0$ , and use |                        | repartitioned to find      |                                       |
|   |                        | equivalent fractions or    |                                       |

| rate language in the context of a ratio           | decimals. Equivalence   |
|---|-------------------------|
| relationship.                                     | is useful for moving    |
|   | between fraction and    |
| 6.RP.A.3  | decimal                 |
| Use ratio and rate reasoning to solve real-world  | representations and for |
| and mathematical problems, e.g., by reasoning     | solving problems.       |
| about tables of equivalent ratios, tape           | Equivalent ratios       |
| diagrams, double number line diagrams, or         | represent the same      |
| equations.  | relationship between    |
|   | quantities.             |
| 6.NS.C.5  | 4                       |
| Understand that positive and negative numbers     |                         |
| are used together to describe quantities having   |                         |
| opposite directions or values (e.g., temperature  |                         |
| above/below zero, elevation above/below sea       |                         |
| level, credits/debits, positive/negative electric |                         |
| charge); use positive and negative numbers to     |                         |
| represent quantities in real world contexts,      |                         |
| explaining the meaning of 0 in each situation.    |                         |
|   |                         |
| 6.NS.C.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.                 |                         |
| 6.NS.C.7  |                         |
| Understand ordering and absolute value of         |                         |
| rational numbers                                  |                         |
| rauonarnumbers                                    |                         |

#### Unit Three: Understanding Fraction Operations Timeline: 20 Lessons

**Unit Description:** In this unit, students will understand that estimation can be used as a tool in a variety of situations including checking answers and making decisions, and develop strategies for estimating results of arithmetic operations. They will revisit and continue to develop meanings for the four arithmetic operations and skill at using algorithms for each. They will use variables to represent unknown values and equations to represent relationships.

| Standards Alignment                             | Unit Concept/Big Ideas      | Essential Questions/           | Assessments                |
|---|-----------------------------|--------------------------------|----------------------------|
|   |                             | Learning Targets               |                            |
| 6.NS.A.1  | Use benchmarks and          | Essential Questions:           | Montessori Materials:      |
| Interpret and compute quotients of fractions,   | other strategies to         | What are some strategies for   | Pegboard                   |
| and solve word problems involving division of   | estimate results of         | estimating the sums of         |                            |
| fractions by fractions, e.g., by using visual   | operations with fractions.  | fractions?                     | Teacher-made extension     |
| fraction models and equations to represent the  |                             |                                | materials                  |
| problem.  | Use estimates to check      | What strategies can you use to |                            |
|   | the reasonableness of       | multiply all combinations of   | Connected Mathematics      |
| 6.NS.B.3  | exact computations          | factors including whole        | Project: Let's Be Rational |
| Fluently add, subtract, multiply, and divide    |                             | numbers, fractions, and mixed  |                            |
| multi-digit decimals using the standard         | Give various reasons to     | numbers?                       | <u>Assessments</u>         |
| algorithm for each operation.                   | estimate and identify       |                                | <u>Formative</u>           |
|   | when a situation calls for  | What are some strategies for   | Student Exercises          |
| 6.NS.B.4  | an overestimate or an       | adding and subtracting         | Peer Questioning           |
| Find the greatest common factor of two whole    | underestimate.              | fractions?                     | Classroom                  |
| numbers less than or equal to 100 and the least |                             |                                | Discussions                |
| common multiple of two whole numbers less       | Use estimates and exact     | How do you know if your        | Vocabulary checks          |
| than or equal to 12. Use the distributive       | solutions to make           | estimate is an underestimate   | Problem Solving            |
| property to express a sum of two whole          | decisions.                  | or overestimate?               | Challenges                 |
| numbers 1–100 with a common factor as a         |                             |                                | Exit Tickets               |
| multiple of a sum of two whole numbers with     | Determine when addition,    | What information does an       |                            |
| no common factor.                               | subtraction,                | underestimate or overestimate  | Summative                  |
|   | multiplication, or division | tell you?                      | Montessori Three-          |
| 6.EE.A.3  | is the appropriate          |                                | Period Lesson              |
|   |                             |                                | including                  |
|   |                             |                                | including                  |

| Apply the properties of operations to generate   | operation to solve a           | What are some strategies for             | introduction,                     |
|--|--------------------------------|--|-----------------------------------|
| equivalent expressions.  | problem.                       | adding and subtracting mixed<br>numbers? | practice,<br>and assessment of    |
| 6.EE.B.6   | Develop ways to model          |  | the %                             |
| Use variables to represent numbers and write   | sums, differences,             | How does an area model relate            | of concept mastery.               |
| expressions when solving a real-world or   | products, and quotients        | to multiplying fractions?                | <ul> <li>Problem-based</li> </ul> |
| mathematical problem; understand that a  | with areas, fraction strips,   |  | interactive Learning              |
| variable can represent an unknown number, or,  | and number lines.              | How can you use number                   | activities                        |
| depending on the purpose at hand, any  |                                | properties and equivalent                | Performance                       |
| number in a specified set.   | Use knowledge of               | fractions to multiply rational           | assessment                        |
|  | fractions and equivalence      | numbers?                                 |                                   |
| 6.EE.B.7   | of fractions to develop        |  |                                   |
| Solve real-world and mathematical problems   | algorithms for adding,         | What does it mean to divide a            |                                   |
| by writing and solving equations of the form x +   | subtracting, multiplying,      | fraction by a fraction? What             |                                   |
| <i>p</i> = <i>q</i> and <i>px</i> = <i>q</i> for cases in which <i>p</i> , <i>q</i> and <i>x</i> | and dividing fractions.        | strategies help you divide a             |                                   |
| are all nonnegative rational numbers.  |                                | fraction by a fraction?                  |                                   |
|  | Write fact families with       |  |                                   |
|  | fractions to show the          | What does it mean to divide a            |                                   |
|  | inverse relationship           | whole number or mixed                    |                                   |
|  | between addition and           | number by a fraction? What               |                                   |
|  | subtraction, and between       | strategies help you divide a             |                                   |
|  | multiplication and             | whole number or mixed                    |                                   |
|  | division.                      | number by a fraction?                    |                                   |
|  | Compare and contrast           | What does it mean to divide a            |                                   |
|  | dividing a whole number        | fraction by a whole number?              |                                   |
|  | by a fraction to dividing a    | What strategies help you divide          |                                   |
|  | fraction by a whole<br>number. | a fraction by a whole number?            |                                   |
|  | Recognize that when you        |  |                                   |

| multiply or divide a       | What is an efficient algorithm       |
|----------------------------|--------------------------------------|
| fraction, your answer      | for division problems involving      |
| might be less than or      | fractions and mixed numbers?         |
| more than the numbers      |                                      |
| you started with.          | How do fact families help you        |
| Solve real-world problems  | solve equations such as $4/5 - N$    |
| using arithmetic           | = 3/8 ?                              |
| operations on fractions    |                                      |
|                            | How do fact families help you        |
| Represent unknown real-    | solve equations such as $2/9 \div N$ |
| world and abstract values  | = 2 /3?                              |
| with variables.            |                                      |
|                            | How do you know when a               |
| Write equations (or        | particular operation is called       |
| number sentences) to       | for to solve a problem?              |
| represent relationships    |                                      |
| among real-world and       | How do you represent the             |
| abstract values.           | problem with a number                |
|                            | sentence?                            |
| Use fact families to solve |                                      |
| for unknown values         |                                      |
|                            | Learning Targets:                    |
|                            | Students will:                       |
|                            | Understand that                      |
|                            | estimation as a tool for             |
|                            | a variety of situations              |
|                            | and develop strategies               |
|                            | for estimating results               |
|                            | of arithmetic                        |
|                            |                                      |
|                            | operations.                          |
|                            |                                      |

| <ul> <li>Understand that         <ul> <li>estimation as a tool for                 a variety of situations                 and develop strategies                 for estimating results                 of arithmetic                 operations.</li> </ul> </li> </ul> |
|---|
| <ul> <li>Revisit and develop<br/>meanings for the four<br/>arithmetic operations<br/>and skill at using<br/>algorithms for each.</li> </ul>   |
| <ul> <li>Understand that<br/>variables can represent<br/>unknown values and<br/>equations to represent<br/>relationships.</li> </ul>  |
| <ul> <li>Use variables to<br/>represent unknown<br/>values and equations<br/>to represent<br/>relationships.</li> </ul>   |

Timeline: 23 Lessons

**Unit Description:** In this unit, students will understand that perimeter is a measure of linear units needed to surround a two-dimensional shape and that area is a measure of square units needed to cover a two-dimensional shape. They will understand that the linear measurements of the base, height, and slanted height of parallelograms and triangles are essential to finding the area and perimeter of these shapes. Additionally, they will understand that the surface area of a three-dimensional shape is the sum of the areas of each two-dimensional surface of the shape and that the volume of a rectangular prism is a measure in cubic units of the capacity of the prism.

| Standards Alignment                                    | Unit Concept/Big Ideas    | Essential Questions/            | Assessments                         |
|--|---------------------------|---------------------------------|-------------------------------------|
|  |                           | Learning Targets                |                                     |
| 6.EE.A.2.A   | Deepen the understanding  | Essential Questions:            | Montessori Materials:               |
| Write expressions that record operations with          | of area and perimeter of  | What are the formulas for       | Box of Sticks                       |
| numbers and with letters standing for numbers.         | rectangular and           | finding the area and perimeter  |                                     |
| For example, express the calculation "Subtract y       | nonrectangular shapes.    | of a rectangle? Explain why     | Geometric solids                    |
| from 5" as 5 - y.                                      |                           | they work.                      |                                     |
|  | Relate area to covering a |                                 | Geometry cabinet                    |
| 6.EE.A.2.C   | figure.                   | For a fixed area, what are the  |                                     |
| Evaluate expressions at specific values of their       |                           | shape and perimeter of the      | Teacher-made extension              |
| variables. Include expressions that arise from         | Relate perimeter to       | rectangles with the greatest    | materials                           |
| formulas used in real-world problems. Perform          | surrounding a figure.     | and least perimeters?           |                                     |
| arithmetic operations, including those involving       |                           |                                 | <b>Connected Mathematics</b>        |
| whole-number exponents, in the conventional            | Analyze what it means to  | For a fixed perimeter, what are | Project: Prime Time                 |
| order when there are no parentheses to specify         | measure area and          | the shape and area of the       |                                     |
| a particular order (Order of Operations). For          | perimeter.                | rectangles the greatest and     | <u>Assessments</u>                  |
| example, use the formulas $V = s^3$ and $A = 6 s^2$ to |                           | least area?                     | <u>Formative</u>                    |
| find the volume and surface area of a cube with        | Develop and use formulas  |                                 | Student Exercises                   |
| sides of length s = 1/2                                | for calculating area and  | What is a formula for finding   | Peer Questioning                    |
|  | perimeter.                | the area of a triangle?         | Classroom                           |
| 6.EE.A.3   |                           | Does it make any difference     | Discussions                         |
| Apply the properties of operations to generate         | Develop techniques for    | which side is used as the base  | Vocabulary checks                   |
| equivalent expressions.                                | estimating the area and   | when finding the area of a      | <ul> <li>Problem Solving</li> </ul> |
|  | perimeter of an irregular | triangle?                       | Challenges                          |
| 6.EE.A.4   | figure.                   |                                 | Exit Tickets                        |
|  |                           |                                 |                                     |

| The idea that equivalence means two                   | Explore relationships      | What can you say is true and    | Summative                         |
|---|----------------------------|---------------------------------|-----------------------------------|
| expressions give the same outputs is first            | between perimeter and      | what can you say is not true    | Montessori Three-                 |
| highlighted in Investigation 4 of <i>Prime Time</i> . | area, including that one   | about triangles that have the   | Period Lesson                     |
| Featuring applications of the distributive            | can vary considerably      | same base and height?           | including                         |
| property, the most common principle for               | while the other stays      |                                 | introduction,                     |
| generating equivalent expressions, Problem 4.3        | fixed.                     | What conditions for a triangle  | practice,                         |
| of that investigation states the property in          |                            | produce triangles that have the | and assessment of                 |
| generality with letter names for variables $a(b + a)$ | Visually represent         | same area? Do they have the     | the %                             |
| c) = a(b) + a(c).                                     | relationships between      | same shape? Explain.            | of concept mastery.               |
|   | perimeter and area on a    | What is a strategy for finding  | <ul> <li>Problem-based</li> </ul> |
| 6.EE.B.6  | graph.                     | the area of a parallelogram?    | interactive Learning              |
| Use variables to represent numbers and write          |                            | Explain why the strategy works. | activities                        |
| expressions when solving a real-world or              | Solve problems involving   |                                 | Performance                       |
| mathematical problem; understand that a               | area and perimeter of      | What can you say about two      | assessment                        |
| variable can represent an unknown number, or,         | rectangles.                | parallelograms that have the    |                                   |
| depending on the purpose at hand, any                 |                            | same base and height?           |                                   |
| number in a specified set.                            | Analyze how the area of a  |                                 |                                   |
|   | triangle and the area of a | Under what conditions will two  |                                   |
| 6.EE.C.9  | parallelogram are related  | or more parallelograms have     |                                   |
| Use variables to represent two quantities in a        | to each other and to the   | the same area? Do these         |                                   |
| real-world problem that change in relationship        | area of a rectangle.       | parallelograms have the same    |                                   |
| to one another; write an equation to express          |                            | shape? Explain.                 |                                   |
| one quantity, thought of as the dependent             | Recognize that a triangle  |                                 |                                   |
| variable, in terms of the other quantity,             | can be thought of as half  | How can you find the area of a  |                                   |
| thought of as the independent variable.               | of a rectangle whose sides | polygon drawn on a coordinate   |                                   |
| Analyze the relationship between the                  | are equal to the base and  | graph? On grid paper?           |                                   |
| dependent and independent variables using             | height of the triangle.    |                                 |                                   |
| graphs and tables, and relate these to the            |                            | What is a strategy for finding  |                                   |
| equation.   | Recognize that a           | the surface area of a           |                                   |
|   | parallelogram can be       | rectangular prism? Explain why  |                                   |
| 6.G.A.1   | decomposed into two        | the strategy works.             |                                   |

| Find the area of right triangles, other triangles,             | triangles. Thus the area of |   |  |
|--|-----------------------------|---|--|
| special quadrilaterals, and polygons by                        | a parallelogram is twice    | What is a strategy for finding          |  |
| composing into rectangles or decomposing into                  | the area of a triangle with | the volume of a rectangular             |  |
| triangles and other shapes; apply these                        | the same base and height    | prism? Explain why the                  |  |
| techniques in the context of solving real-world                | as the parallelogram.       | strategy works.                         |  |
| and mathematical problems.                                     |                             |   |  |
|  | Know that the choice of     | What is a strategy for finding          |  |
| 6.G.A.2  | base of a triangle (or      | the surface area of three-              |  |
| Find the volume of a right rectangular prism                   | parallelogram) is arbitrary | dimensional object? Explain             |  |
| with fractional edge lengths by packing it                     | but that the choice of the  | why the strategy works.                 |  |
| with unit cubes of the appropriate unit fraction               | base determines the         |   |  |
| edge lengths, and show that the volume is the                  | height.                     | Learning Targets:                       |  |
| same as would be found by multiplying the                      |                             | Students will:                          |  |
| edge lengths of the prism. Apply the formulas V                | Recognize that there are    | <ul> <li>Understand area and</li> </ul> |  |
| = <i>lwh</i> and <i>V</i> = <i>bh</i> to find volumes of right | many triangles (or          | perimeter as a                          |  |
| rectangular prisms with fractional edge lengths                | parallelograms) that can    | measure.                                |  |
| in the context of solving real-world and                       | be drawn with the same      |   |  |
| mathematical problems.   | base and height.            | Perimeter is a measure                  |  |
|  |                             | of linear units needed                  |  |
|  | Develop formulas and        | to surround a two-                      |  |
| 6.G.A.3  | strategies, stated in words | dimensional shape and                   |  |
| Draw polygons in the coordinate plane given                    | or symbols, for finding the | that area is a measure                  |  |
| coordinates for the vertices; use coordinates to               | area and perimeter of       | of square units needed                  |  |
| find the length of a side joining points with the              | triangles and               | to cover a two-                         |  |
| same first coordinate or the same second                       | parallelograms.             | dimensional shape.                      |  |
| coordinate. Apply these techniques in the                      |                             |   |  |
| context of solving real-world and mathematical                 | Find the side lengths and   | A fixed number of area                  |  |
| problems.  | area of polygons on a       | units can be enclosed                   |  |
|  | coordinate grid.            | by many different                       |  |
| 6.G.A.4  |                             | perimeters, and a fixed                 |  |
| Represent three-dimensional figures using nets                 |                             | number of perimeter                     |  |

| made up of rectangles and triangles, and use    | Solve problems involving    | units can enclose many   |
|---|-----------------------------|--------------------------|
| the nets to find the surface area of these      | area and perimeter of       | different areas.         |
| figures. Apply these techniques in the context  | parallelograms and          |                          |
| of solving real-world and mathematical          | triangles.                  | Formulas for the area    |
| problems.                                       |                             | and perimeter of a       |
|   | Solve problems involving    | rectangle can help you   |
|   | area and perimeter of       | solve problems by        |
| 6.NS.C.8  | polygons by composing       | reasoning about the      |
| Solve real-world and mathematical problems      | into rectangles or          | relationship between     |
| by graphing points in all four quadrants of the | decomposing into            | values.                  |
| coordinate plane. Include use of coordinates    | triangles.                  |                          |
| and absolute value to find distances between    | _                           | Understand area and      |
| points with the same first coordinate or the    | Extend the understanding    | perimeter of             |
| same second coordinate.                         | of the volume of            | parallelograms and       |
|   | rectangular prisms.         | triangles.               |
|   |                             |                          |
|   | Relate volume to filling a  | Linear measurements      |
|   | three-dimensional figure.   | of the base, height, and |
|   |                             | slanted height of        |
|   | Extend understanding of     | parallelograms and       |
|   | the strategies for finding  | triangles are essential  |
|   | the volume of rectangular   | to finding the area and  |
|   | prisms to accommodate       | perimeter of these       |
|   | fractional side lengths.    | shapes.                  |
|   |                             |                          |
|   | Relate finding area of two- | The area of a triangle   |
|   | dimensional shapes to       | and the area of a        |
|   | finding the surface area of | parallelogram are        |
|   | three-dimensional           | related to each other    |
|   | objects.                    | and to the area of a     |
|   |                             | rectangle.               |

| Develop strategies for      |                          |
|-----------------------------|--------------------------|
| finding the surface area of | There are many           |
| three-dimensional objects   | triangles (and           |
| made from rectangles and    | parallelograms) that     |
| triangles.                  | can be drawn with the    |
|                             | same base and height.    |
| Make sense of problems      |                          |
| and persevere in solving    | Polygons and irregular   |
| them.                       | figures can be           |
|                             | decomposed into          |
| Reason abstractly and       | triangles and            |
| quantitatively.             | rectangles to find the   |
|                             | area of the figures.     |
| Construct viable            |                          |
| arguments and critique      | Understand the surface   |
| the reasoning of others.    | area and volume of a     |
|                             | three-dimensional        |
| Model with mathematics.     | shape.                   |
|                             | Shape.                   |
| Use appropriate tools       | • The volume of a prism  |
| strategically.              | is a measure in cubic    |
|                             | units of the capacity of |
| Attend to precision.        | the prism and can be     |
|                             | thought of as            |
| Look for and make use of    | multiplying a base layer |
| structure.                  |                          |
|                             | of unit cubes by the     |
| Look for and express        | number of layers         |
| regularity in repeated      | needed to fill the       |
| reasoning.                  | prism.                   |
| reasoning.                  |                          |

| Surface areas of three-<br>dimensional solids can<br>be found by adding the<br>areas of the faces. |
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|  |
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|  |

Unit Five: Computing with Decimals and Percents Timeline: 23 Lessons

**Unit Description:** In this unit, students will understand that estimation can be used as a tool in a variety of situations, including as a way to check answers and make decisions. They will revisit and continue to develop meanings for the four arithmetic operations on rational numbers, and practice using algorithms to operate on decimals. Students will use variables to represent unknown values and number sentences to represent relationships between values and develop understanding of percents through various contexts, such as sales tax, tips, discounts, and percent increases

| Standards Alignment                              | Unit Concept/Big Ideas      | Essential Questions/            | Assessments                          |
|--|-----------------------------|---------------------------------|--------------------------------------|
|  |                             | Learning Targets                |                                      |
| 6.EE.A.2.A                                       | Use estimates to solve      | Essential Questions:            | Montessori Materials:                |
| Write expressions that record operations with    | problems and check          | What signals in a real- world   | Decimal checkerboard                 |
| numbers and with letters standing for numbers.   | answers.                    | problem tell you which          |                                      |
| For example, express the calculation "Subtract y |                             | operation to use?               | Fraction cabinet                     |
| from 5" as 5 - y.                                | Recognize when addition,    |                                 |                                      |
|  | subtraction,                | When you work with decimal      | Fraction circles box                 |
| 6.NS.A.1   | multiplication, or division | computations, what strategies   |                                      |
| Interpret and compute quotients of fractions,    | is the appropriate          | can you use to estimate the     | Connected Mathematics                |
| and solve word problems involving division of    | operation to solve a        | results?                        | Project: Decimal Ops                 |
| fractions by fractions, e.g., by using visual    | problem.                    |                                 |                                      |
| fraction models and equations to represent the   |                             | How can you express a unit      | Assessments                          |
| problem.   | Use place value to          | rate as a decimal and use it to | Formative                            |
|  | develop understanding of    | solve problems?                 | Student Exercises                    |
| 6.NS.B.3   | algorithms and to relate    |                                 | <ul> <li>Peer Questioning</li> </ul> |
| Fluently add, subtract, multiply, and divide     | operations with decimals    | How do you subtract one         | Classroom                            |
| multi-digit decimals using the standard          | to the same operations      | decimal number from another?    | Discussions                          |
| algorithm for each operation.                    | with fractions.             |                                 | Vocabulary checks                    |
|  |                             | Do fact families apply to       | <ul> <li>Problem Solving</li> </ul>  |
| 6.EE.A.2.A                                       | Extend understanding of     | operations with decimal         | Challenges                           |
| Write expressions that record operations with    | multiplication and division | numbers?                        | Exit Tickets                         |
| numbers and with letters standing for numbers.   | of multidigit whole         |                                 |                                      |
| For example, express the calculation "Subtract y | numbers.                    | How do you find the product of  | Summative                            |
| from 5" as 5 - y.                                |                             | any two decimal numbers?        | Montessori Three-                    |
|  | 1                           | 1                               |                                      |

|   | Develop standard            |                                      | Period Lesson                     |
|---|-----------------------------|--------------------------------------|-----------------------------------|
| 6.EE.A.3  | algorithms for multiplying  | What algorithm can be used to        | including                         |
| Apply the properties of operations to generate          | and dividing decimals with  | find any decimal product?            | introduction,                     |
| equivalent expressions.                                 | the aid of, at most, paper  | How can a decimal division           | practice,                         |
|   | and pencil                  | problem be written in                | and assessment of                 |
| 6.EE.B.5  |                             | equivalent fraction and whole        | the %                             |
| Understand solving an equation or inequality as         | Find a repeating or         | number form?                         | of concept mastery.               |
| a process of answering a question: which                | terminating decimal         |                                      | <ul> <li>Problem-based</li> </ul> |
| values from a specified set, if any, make the           | equivalent to a given       | How can you carry out a              | interactive Learning              |
| equation or inequality true? Use substitution to        | fraction                    | decimal division using a             | activities                        |
| determine whether a given number in a                   |                             | method similar to long division      | Performance                       |
| specified set makes an equation or inequality           | Solve problems using        | of whole numbers?                    | assessment                        |
| true.   | arithmetic operations on    |                                      |                                   |
|   | decimals, including finding | How can you complete a long          |                                   |
| 6.EE.B.6  | unit rates.                 | division problem that doesn't        |                                   |
| Use variables to represent numbers and write            |                             | give a whole number quotient?        |                                   |
| expressions when solving a real-world or                | Write number sentences      | That is, how do you express          |                                   |
| mathematical problem; understand that a                 | to represent relationships  | remainders in decimal form?          |                                   |
| variable can represent an unknown number, or,           | between both real-world     |                                      |                                   |
| depending on the purpose at hand, any                   | and abstract values.        | How do you find the tax and          |                                   |
| number in a specified set.                              |                             | the total cost of an item from a     |                                   |
|   | Use fact families to write  | given selling price and tax rate?    |                                   |
| 6.EE.B.7  | and solve equivalent        | How do you find the base price       |                                   |
| Solve real-world and mathematical problems              | number sentences.           | from a given tax rate and            |                                   |
| by writing and solving equations of the form $x$ +      |                             | amount?                              |                                   |
| p = q and $px = q$ for cases in which $p$ , $q$ and $x$ | Use multiplication          | Linus da suas final da stin and da s |                                   |
| are all nonnegative rational numbers.                   | sentences to check          | How do you find the tip and the      |                                   |
|   | division sentences.         | total cost of a restaurant meal      |                                   |
| 6.RP.A.1  | Dovelon models for          | from a given meal price and tip      |                                   |
| Understand the concept of a ratio and use ratio         | Develop models for          | rate? How do you find the meal       |                                   |
| language to describe a ratio relationship               | percent problems.           |                                      |                                   |

| between two quantities. For example, "The                 |                                       | price from a given tip percent |
|---|---------------------------------------|--------------------------------|
| ratio of wings to beaks in the bird house at the          | Write and solve number                | and amount?                    |
| zoo was 2:1, because for every 2 wings there              | sentences involving                   |                                |
| was 1 beak." "For every vote candidate A                  | percents.                             | How do you find the discount   |
| received, candidate C received nearly three               |                                       | and the total cost of an item  |
| votes."   | Make sense of problems                | from a given selling price and |
|   | and persevere in solving              | discount rate? How do you find |
| 6.RP.A.2  | them.                                 | the base price from a given    |
| Understand the concept of a unit rate <i>a/b</i>          |                                       | discount rate and amount?      |
| associated with a ratio $a : b$ with $b \neq 0$ , and use | Reason abstractly and                 |                                |
| rate language in the context of a ratio                   | quantitatively.                       | How can you express a change   |
| relationship.   | · · · · · · · · · · · · · · · · · · · | in a given amount as a percent |
|   | Construct viable                      | change?                        |
| 6.RP.A.3  | arguments and critique                |                                |
| Use ratio and rate reasoning to solve real-world          | the reasoning of others.              | How do you decide which        |
| and mathematical problems, e.g. by reasoning              |                                       | operations to perform when a   |
| about tables of equivalent ratios, tape                   | Model with mathematics.               | problem involves decimals and  |
| diagrams, double number line diagrams, or                 |                                       | percents?                      |
| equations.  | Use appropriate tools                 |                                |
|   | strategically.                        | Learning Targets:              |
| 6.RP.A.Cb   | strategicany.                         | Students will:                 |
| Solve unit rate problems including those                  | Attend to precision.                  | Understand that                |
| involving unit pricing and constant speed. For            | Attend to precision.                  | estimation can be used         |
| example, if it took 7 hours to mow 4 lawns,               | Look for and make use of              | as a tool in a variety of      |
| then at that rate, how many lawns could be                | structure.                            | situations to solve            |
| mowed in 35 hours? At what rate were lawns                |                                       |                                |
| being mowed?  | Look for and express                  | problems.                      |
|   | regularity in repeated                |                                |
| 6.RP.A.3C   | • • •                                 | Estimation is an               |
| UNFIAIOU  | reasoning.                            | important part of              |
| Find a percent of a quantity as a rate per 100            |                                       | reasoning                      |
| (e.g., 30% of a quantity means 30/100 times               |                                       | quantitatively. It helps       |
|   | 1                                     | I                              |

| the quantity); solve problems involving finding | you make sense of a                  |
|---|--------------------------------------|
| the whole, given a part and the percent.        | situation, allows you to             |
|   | recognize errors, and                |
| 6.NS.B.2  | complements other                    |
| Fluently divide multi-digit numbers using the   | problem solving skills.              |
| standard algorithm.                             |                                      |
|   | <ul> <li>Use variables to</li> </ul> |
|   | represent unknown                    |
|   | values and number                    |
|   | sentences to represent               |
|   | relationships between                |
|   | values.                              |
|   | Writing number                       |
|   | sentences to represent               |
|   | relationships between                |
|   | both real- world and                 |
|   | abstract values                      |
|   | contributes to an initial            |
|   | understanding of                     |
|   | algebra.                             |
|   |                                      |
|   | Fact families can be                 |
|   | used to write and solve              |
|   | equivalent number                    |
|   | sentences.                           |
|   |                                      |
|   | Use variables to                     |
|   | represent unknown                    |
|   | values and number                    |
|   | sentences to represent               |

| relationships between     |
|---------------------------|
| values.                   |
|                           |
| Writing number            |
|                           |
| sentences to represent    |
| relationships between     |
| both real- world and      |
| abstract values           |
| contributes to an initial |
| understanding of          |
|                           |
| algebra.                  |
|                           |
| Fact families can be      |
| used to write and solve   |
| equivalent number         |
| sentences.                |
|                           |
| Develop understanding     |
| of percents through       |
| various contexts.         |
|                           |
| Using models for          |
|                           |
| percent helps you to      |
| develop the meaning of    |
| percent and to solve      |
| problems involving        |
| sales tax, tips,          |
| discounts, and percent    |
| increases.                |
| ווונוכמסכס.               |

| Standards Alignment                              | Unit Concept/Big Ideas                              | Essential Questions/<br>Learning Targets | Assessments   |
|--|---|--|---|
| 6.RP.A.3   | Explore problem                                     | Essential Questions:                     | Montessori Materials:                                   |
| Use ratio and rate reasoning to solve real-world | situations that involve                             | How can you construct a graph            | Teacher-made extension                                  |
| and mathematical problems, e.g. by reasoning     | variables and                                       | from a table of data that                | materials   |
| about tables of equivalent ratios, tape          | relationships.                                      | depicts change over time? How            |   |
| diagrams, double number line diagrams, or        |   | is the pattern of change                 | Connected Mathematics                                   |
| equations.                                       | Identify the dependent<br>and independent variables | represented in the graph?                | Project: Variables and<br>Patterns                      |
| 6.NS.C.8   | and describe how they are                           | What are the advantages and              | 1 atterns   |
| Solve real-world and mathematical problems       | related in a situation.                             | disadvantages of tables and              | Assessments   |
| by graphing points in all four quadrants of the  |   | graphs in representing and               | Formative   |
| coordinate plane. Include use of coordinates     | Interpret the "stories" told                        | describing the patterns of               | Student Exercises                                       |
| and absolute value to find distance between      | by patterns in tables and                           | change in a variable over time?          |   |
| points with the same first coordinate or the     | coordinate graphs of                                |  | <ul> <li>Peer Questioning</li> <li>Classroom</li> </ul> |
| same second coordinate.                          | numeric ( <i>x</i> , <i>y</i> ) data.               | Which representation of data –           | e clussi com  |
| 6.EE.A.2.A                                       |   | table, graph, or written notes-          | Discussions   |
| Write expressions that record operations with    | Represent the pattern of                            | seems to better show patterns            | Vocabulary checks                                       |
| numbers and with letters standing for numbers.   | change that relates two                             | of change in distance over               | Problem Solving   |
| For example, express the calculation "Subtract y | variables in words, data                            | time, and why?                           | Challenges  |
|  |   | time, and wry!                           | Exit Tickets  |
| from 5" as 5 - y.                                | tables, graphs, and                                 |  |   |
|  | equations.  | How do you calculate average             | <u>Summative</u>  |
| 6.EE.A.2.B                                       | Investigate situations that                         | speed for a trip? How do a               | Montessori Three  |
| Identify parts of an expression using            | Investigate situations that                         | table and graph of (time,                | Period Lesson   |
| mathematical terms (sum, term, product,          | change over time.                                   | distance) data show speed?               | including   |
| factor, quotient, coefficient); view one or more |   |  | introduction,   |
| parts of an expression as a single entity. For   | Examine increasing and                              | How do you analyze and                   | practice,   |
| example, describe the expression 2 (8 + 7) as a  | decreasing patterns of                              | compare the relationship                 | and assessment of                                       |
|  | change.   |  | the %   |

| product of two factors; view (8 + 7) as both a   |  | between variables given in                                 | of concept mastery.               |
|--|--|--|-----------------------------------|
| single entity and a sum of two terms.  | Compare linear and                                 | different representations?                                 | <ul> <li>Problem-based</li> </ul> |
|  | nonlinear patterns of                              |  | interactive Learning              |
| 6.EE.A.2.C   | change by using tables or                          | How are the relationships                                  | activities                        |
| Evaluate expressions at specific values of their   | graphs.  | between independent and                                    | Performance                       |
| variables. Include expressions that arise from   |  | dependent variables in this                                | assessment                        |
| formulas used in real-world problems. Perform  | Use tables, graphs, and                            | Problem different from those in                            |                                   |
| arithmetic operations, including those involving   | equations to find the                              | Problem 2.1? How are the                                   |                                   |
| whole-number exponents, in the conventional  | value of a variable given                          | differences shown in tables and                            |                                   |
| order when there are no parentheses to specify   | the value of the                                   | graphs of data?  |                                   |
| a particular order (Order of Operations). For  | associated variable.                               |  |                                   |
| example, use the formulas $V = s^3$ and $A = 6 s^2$ to   |  | How are the variables, tour                                |                                   |
| find the volume and surface area of a cube with  | Explore relationships that                         | <i>income</i> and <i>tour profit,</i> related              |                                   |
| sides of length s = 1/2  | require graphing in all four quadrants.            | to each other?   |                                   |
| 6.EE.A.3   |  | How do you plot data points                                |                                   |
| Apply the properties of operations to generate   | Describe advantages and                            | with one or both coordinates                               |                                   |
| equivalent expressions.  | disadvantages of using                             | negative?  |                                   |
|  | words, tables, graphs, and                         |  |                                   |
| 6.EE.B.7   | equations to represent                             | When the relationship between                              |                                   |
| Solve real-world and mathematical problems   | patterns of change                                 | dependent and independent                                  |                                   |
| by writing and solving equations of the form $x + p = q$ , and $px = q$ for cases in which $p$ and $q$ and | relating two variables and make connections across | variables is displayed in a                                |                                   |
| p = q, and $px = q$ for cases in which p and q and x are all nonnegative rational numbers.                 | those representations                              | graph, what can you learn<br>about the relationship from a |                                   |
| x are all nonnegative rational numbers.  | those representations                              | rising graph, a level graph, and                           |                                   |
| 6.EE.C.9   | Write an equation to                               | a falling graph?   |                                   |
| Use variables to represent two quantities in a   | express the relationship                           |  |                                   |
| real-world problem   | between two variables in                           | In what kinds of situations will                           |                                   |
| that change in relationship to one another;  | one and two operations:                            | the equation between                                       |                                   |
| write an equation to express one quantity,   | y=mx, $y=b+x$ , and $y=b+mx$                       | dependent and independent                                  |                                   |
| thought of as the dependent variable, in terms   |  |  |                                   |
| thought of as the dependent variable, in terms   |  |  |                                   |

| of the other quantity, thought of as the                  | Calculate average speed     | variables be in the form         |  |
|---|-----------------------------|----------------------------------|--|
| independent variable. Analyze the relationship            | and show how it is          | y=x+k? y=x-k?y=kx? y=x/k?        |  |
| between the dependent and independent                     | reflected in a table or     |                                  |  |
| variables using graphs and tables, and relate             | graph and vice versa.       | What can you tell about the      |  |
| these to the equation.                                    |                             | relationship between             |  |
|   | Recognize and express       | dependent and independent        |  |
| 6.RP.A.2  | direct proportionality      | variables in an equation of the  |  |
| Understand the concept of a unit rate <i>a</i> / <i>b</i> | relationships with a unit   | form y = mx? How is that         |  |
| associated with a ratio $a : b$ with $b \neq 0$ , and use | rate (y=mx) and represent   | relationship shown in a table    |  |
| rate language in the context of a ratio                   | these relationships in rate | and a graph of sample (x, y)     |  |
| relationship.   | tables and graphs.          | values? Why is the point (1, m)  |  |
|   |                             | on every graph?                  |  |
| 6.RP.A.3  | Solve problems that         |                                  |  |
| Use ratio and rate reasoning to solve real-world          | involve variables.          | How do you calculate values of   |  |
| and mathematical problems, e.g., by reasoning             |                             | y from an equation like y = 3x + |  |
| about tables of equivalent ratios, tape                   | Develop understanding of    | 5 when values of x are given?    |  |
| diagrams, double number line diagrams, or                 | expressions and             | How about y = 5 + 3x? When do    |  |
| equations.  | equations.                  | you need such equations that     |  |
|   |                             | involve two operations?          |  |
| 6.RP.A.3A   | Use properties of           |                                  |  |
| Make tables of equivalent ratios relating                 | operations, including the   | When an equation relating two    |  |
| quantities with whole-number measurements,                | Distributive Property and   | variables involves two or more   |  |
| find missing values in the tables, and plot the           | the Order of Operations,    | operations, how do you use the   |  |
| pairs of values on the coordinate plane. Use              | to write equivalent         | equation to find values of the   |  |
| tables to compare ratios.                                 | expressions for the         | dependent variable from given    |  |
|   | dependent variable in       | values of the independent        |  |
| 6.RP.A.3B   | terms of the independent    | variable?                        |  |
| Solve unit rate problems including those                  | variable.                   |                                  |  |
| involving unit pricing and constant speed. For            |                             | Is it possible to have two       |  |
| example, if it took 7 hours to mow 4 lawns,               | Use tables, graphs, or      | different, but equivalent,       |  |
| then at that rate, how many lawns could be                | properties of numbers       |                                  |  |

| mowed in 35 hours? At what rate were lawns                  | such as the Distributive                                     | expressions for a given          |  |
|---|--|----------------------------------|--|
| being mowed?  | Property to show that two expressions are                    | situation? Explain.              |  |
| 6.RP.A.3d   | equivalent.  | What does it mean to say that    |  |
| Use ratio reasoning to convert measurement                  |  | two algebraic expressions are    |  |
| units; manipulate and transform units                       | Identify parts of an   | equivalent?                      |  |
| appropriately when multiplying or dividing                  | expression using   |                                  |  |
| quantities.   | mathematical terms (sum,                                     | How can expressions such as 3x   |  |
|   | term, product, factor,                                       | + 7x or                          |  |
| 6.NS.C.6  | quotient, coefficient);                                      | 3(x+2) be written in equivalent  |  |
| Understand a rational number as a point on the              | view one or more parts of                                    | form?                            |  |
| number line. Extend number line diagrams and                | an expression as a single                                    | What strategies can you use to   |  |
| coordinate axes familiar from previous grades               | entity.  | solve equations in the forms x + |  |
| to represent points on the line and in the plane            |  | a = b, x - a = b, ax = b, and    |  |
| with negative number coordinates.                           | Interpret and evaluate                                       | x ÷ a = b (a ≠ 0)?               |  |
|   | expressions in which   |                                  |  |
| 6.NS.C.B  | letters stand for numbers                                    | How can you represent and        |  |
| Write, interpret, and explain statements of                 | and apply the Order of                                       | find solutions for inequalities? |  |
| order for rational numbers in real-world                    | Operations as needed.  | · · - ·                          |  |
| contexts. For example, write $-3^{\circ}C > -7^{\circ}C$ to |  | Learning Targets:                |  |
| express the fact that -3°C is warmer than -7°C.             | Recognize that equations                                     | Students will:                   |  |
| 6.NS.C.6C   | are statements of  | Develop understanding            |  |
| Understand the absolute value of a rational                 | equivalence between two                                      | of variables and how             |  |
| number as its distance from 0 on the number                 | expressions.   | they are related.                |  |
| line; interpret absolute value as magnitude for             | Solve linear equations of                                    | Develop understanding            |  |
| a positive or negative quantity in a real-world             | the forms <i>y=ax, y=b+x,</i>                                | of expressions and               |  |
| situation. For example, for an account balance              | and y=b+ax using numeric                                     | equations                        |  |
| of -30 dollars, write  -30  = 30 to describe the            | guess and check, tables of                                   |                                  |  |
| size of the debt in dollars.                                | ( <i>x</i> , <i>y</i> ) values, and graphs or fact families. |                                  |  |

| <ul> <li>6.EE.A.1,</li> <li>Write and evaluate numerical expressions involving whole-number exponents.</li> <li>6.EE.A.2</li> <li>Write, read, and evaluate expressions in which letters stand for numbers.</li> <li>6.EE.A.4</li> <li>Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the</li> </ul>                                    | Write an inequality and<br>associate it with an<br>equation to find solutions<br>and graph the solutions on<br>a number line. | <ul> <li>Understand and use<br/>the process of<br/>statistical investigation.</li> <li>The process of<br/>statistical investigation<br/>involves posing<br/>questions, collecting<br/>and analyzing data, and<br/>interpreting answers.</li> <li>Understand the role of<br/>multiple<br/>representations of data</li> </ul>                                  |
|--|---|--|
| same number regardless of which number y stands for.   |   | distributions.   |
| <ul> <li>6.EE.B.5</li> <li>Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</li> <li>6.EE.B.6</li> <li>Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or,</li> </ul> |   | <ul> <li>Finding measures of<br/>center or variability<br/>and graphing data are<br/>useful for summarizing<br/>the information in a<br/>variable data set. Visual<br/>representations of a<br/>data set can help you<br/>interpret the measures<br/>of center and spread<br/>and relate this to the<br/>overall shape of the<br/>representation.</li> </ul> |

| depending on the purpose at hand, any                 | <ul> <li>Distinguish data and</li> </ul> |
|---|--|
| number in a specified set.                            | data types.                              |
|   |  |
| 6.EE.B.8  | The answers to a                         |
| Write an inequality of the form $x > c$ or $x < c$ to | statistical question are                 |
| represent a constraint or condition in a real-        | called data. Data can                    |
| world or mathematical problem. Recognize that         | be either numerical or                   |
| inequalities of the form $x > c$ or $x < c$ have      | categorical.                             |
| infinitely many solutions; represent solutions of     |  |
| such inequalities on number line diagrams.            | <ul> <li>Understand that a</li> </ul>    |
|   | single number may be                     |
|   | used to characterize                     |
|   | the center of a                          |
|   | distribution of data and                 |
|   | the degree of                            |
|   | variability (or spread).                 |
|   | variability (of spicad).                 |
|   | There are several ways                   |
|   | to try to say what is                    |
|   | typical of a set of data;                |
|   | in each case a single                    |
|   | number, called a                         |
|   | measure of center,                       |
|   | summarizes the data.                     |
|   | Because various                          |
|   | measures of center are                   |
|   | calculated differently,                  |
|   | they respond                             |
|   | differently to changes                   |
|   | in the data or to                        |
|   | unusual data values.                     |
|   | ullusual uata values.                    |

| <ul> <li>The variability of a set<br/>of data can be<br/>measured, interpreted,<br/>and compared with the<br/>variability of other data<br/>sets. Measures of<br/>variability tell you how<br/>spread out the data are<br/>in relation to each<br/>other or to the center.</li> </ul> |
|---|
|   |

| Unit Seven: Statistics and Data Analysis Tir      | meline: 23 Lessons           |   |                                       |
|---|------------------------------|---|---------------------------------------|
| Unit Description: In this unit, students understa | nd and use the process of st | atistical investigation, distinguish da | ata and data types, and display       |
| data with multiple representations.               |                              |   |                                       |
| Standards Alignment                               | Unit Concept/Big Ideas       | Essential Questions/                    | Assessments                           |
|   |                              | Learning Targets                        |                                       |
| 6.NS.B.4  | Understand and use the       | Essential Questions:                    | Montessori Materials:                 |
| Find the greatest common factor of two whole      | process of statistical       | What are "data"? How do you             | Pegboard                              |
| numbers less than or equal to 100 and the least   | investigation.               | represent data using a                  |                                       |
| common multiple of two whole numbers less         |                              | frequency table or a line plot?         | Teacher-made extension                |
| than or equal to 12. Use the distributive         | Ask questions, collect       | How can you compare two                 | materials                             |
| property to express a sum of two whole            | and analyze data, and        | distributions of data?                  |                                       |
| numbers 1–100 with a common factor as a           | interpret data to            |   | Connected Mathematics                 |
| multiple of a sum of two whole numbers with       | answer questions.            | What are the measures of                | Project: Data About Us                |
| no common factor.                                 |                              | central tendency and variability        |                                       |
|   | Describe data with           | (or spread)? How do you                 | <u>Assessments</u>                    |
| 6.EE.A.1  | respect to its shape,        | compare and use mode and                | <u>Formative</u>                      |
| Write and evaluate numerical expressions          | center, and variability      | range?                                  | Student Exercises                     |
| involving whole-number exponents.                 | or spread.                   |   | Peer Questioning                      |
|   |                              | How do you identify and use             | Classroom                             |
| 6.EE.A.2.A  | Construct and use            | the median? How can you                 | Discussions                           |
| Write expressions that record operations with     | simple surveys as a          | compare two distributions of            | <ul> <li>Vocabulary checks</li> </ul> |
| numbers and with letters standing for numbers.    | method of collecting         | data using the medians?                 | Problem Solving                       |
| For example, express the calculation "Subtract y  | data.                        |   | Challenges                            |
| from 5" as 5 - y.                                 |                              | How do you go about finding a           | Exit Tickets                          |
|   | Distinguish data and         | number that is a good estimate          |                                       |
| 6.EE.A.2.B  | data types.                  | of typical household size based         | <u>Summative</u>                      |
| Identify parts of an expression using             |                              | on the given data?                      | Montessori Three-                     |
| mathematical terms (sum, term, product,           | Recognize that data          |   | Period Lesson                         |
| factor, quotient, coefficient); view one or more  | consist of counts or         | How do you interpret,                   | including                             |
| parts of an expression as a single entity. For    | measurements of a            | compute, and use the mean?              | introduction,                         |
| example, describe the expression 2 (8 + 7) as a   | variable, or an              |   | practice,                             |

| product of two factors; view (8 + 7) as both a                             | attribute; these        | How do the median and the      | and assessment of    |
|--|-------------------------|--------------------------------|----------------------|
| single entity and a sum of two terms.                                      | observations comprise   | mean respond to the data in a  | the %                |
| <i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,                               | a distribution of data  | distribution? How do you       | of concept mastery.  |
| 6.EE.A.2.C   | values.                 | choose which measure of        | Problem-based        |
| Evaluate expressions at specific values of their                           |                         | center to use when describing  | interactive Learning |
| variables. Include expressions that arise from                             | Distinguish between     | what is typical?               | activities           |
| formulas used in real-world problems. Perform                              | categorical data and    |                                | Performance          |
| arithmetic operations, including those involving                           | numerical data, and     | How do you distinguish         | assessment           |
| whole-number exponents, in the conventional                                | identify which graphs   | different types of data? What  |                      |
| order when there are no parentheses to specify                             | and statistics can be   | statistics are used with       |                      |
| a particular order (Order of Operations). For                              | used to represent each  | different types of data?       |                      |
| example, use the formulas $V = s^3$ and $A = 6 s^2$ to                     | kind of data.           |                                |                      |
| find the volume and surface area of a cube with                            |                         | What information does the      |                      |
| sides of length s = 1/2  | Display data with       | interquartile range provide    |                      |
|  | multiple                | about how data vary in a       |                      |
| 6.EE.A.3   | representations.        | distribution?                  |                      |
| Apply the properties of operations to generate                             |                         |                                |                      |
| equivalent expressions.  | Organize and represent  | How is the interquartile range |                      |
|  | data using tables, dot  | used to make comparisons       |                      |
| 6.EE.A.4   | plots, line plots,      | among distributions?           |                      |
| The idea that equivalence means two  | ordered-value bar       |                                |                      |
| expressions give the same outputs is first                                 | graphs, frequency bar   | What information does the      |                      |
| highlighted in Investigation 4 of <i>Prime Time</i> .                      | graphs, histograms, and | mean absolute deviation        |                      |
| Featuring applications of the distributive                                 | box-and-whisker plots.  | provide about how data vary in |                      |
| property, the most common principle for                                    |                         | a distribution?                |                      |
| generating equivalent expressions, Problem 4.3                             | Make informed           |                                |                      |
| of that investigation states the property in                               | decisions about which   | How can you use a histogram    |                      |
| generality with letter names for variables $a(b + b) = a(b) + b(b) + b(b)$ | graphs or tables can be | to help you interpret data?    |                      |
| c) = a(b) + a(c).  | used to display a       |                                |                      |
|  | particular set of data. | How can you interpret data     |                      |
|  |                         | using a box-and-whisker plot?  |                      |

| Decognize that a gray h                 |   |
|---|---|
| Recognize that a graph                  | How can you compare and                             |
| shows the overall shape                 | How can you compare and                             |
| of a distribution,                      | contrast data represented by                        |
| whether the data                        | dot plots, histograms, and box                      |
| values are symmetrical                  | plots?  |
| around a central value,                 |   |
| and whether the graph                   | Learning Targets:                                   |
| contains any unusual                    | Students will:                                      |
| characteristics such as                 | Understand  |
| gaps, clusters, or                      | relationships among                                 |
| outliers                                | factors, multiples,                                 |
|   | divisors, and products.                             |
| Recognize that a single                 |   |
| number may be used to                   | • If a number <i>N</i> can be                       |
| characterize the center                 | written as a product of                             |
| of a distribution of data               | two whole numbers, N                                |
| and the degree of                       | $= a \times b$ , then a and b                       |
| variability (or spread).                | are factors of N.                                   |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | Multiples of a can be                               |
| Distinguish between                     | found using the                                     |
| and compute measures                    | expression $a \times (some$                         |
| of central tendency                     | whole number), such                                 |
| (mean, median, and                      | as 2 <i>a</i> , 3 <i>a</i> , 4 <i>a</i> , etc. Some |
| mode) and measures of                   | numbers can be                                      |
| spread (range,                          | expressed in  |
| interquartile range                     |   |
|   | exponential notation,                               |
| (IQR), and mean                         | such as a2, a3, a4, etc.                            |
| absolute deviation                      |   |
| (MAD)).                                 | When all factors of a                               |
|   | number are broken                                   |
|   | down into prime                                     |

| Identify how the         | numbers, you have a     |
|--------------------------|-------------------------|
| median and mean          | unique prime            |
| respond to changes in    | factorization. Finding  |
| the data values of a     | the prime factorization |
| distribution.            | of two numbers can be   |
|                          | useful in finding the   |
| Relate the choice of     | least common multiple   |
| measures of central      | and greatest common     |
| tendency and variability | factor of the numbers   |
| to the shape of the      | and in classifying      |
| distribution and the     | numbers as prime,       |
| context.                 | composite, even, odd,   |
|                          | or square.              |
| Describe the amount of   | ·                       |
| variability in a         | Understand why two      |
| distribution by noting   | expressions are         |
| whether the data         | equivalent.             |
| values cluster in one or |                         |
| more areas or are fairly | When calculating the    |
| spread out.              | value of an expression, |
| spicaa out.              | the operations have to  |
| Use measures of center   | be performed in a       |
| and spread to compare    | •                       |
| data distributions.      | conventional order, the |
| uata distributions.      | order of operations.    |
|                          |                         |
|                          | Sometimes a numerical   |
|                          | expression can be       |
|                          | written in different    |
|                          | ways but the            |
|                          | expressions are         |
|                          | equivalent because the  |

| value is the same.      |
|-------------------------|
| Properties of           |
| operations, including   |
| the Distributive        |
| Property, are essential |
| tools for writing       |
| equivalent expressions. |