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Curriculum Area: <u>Mathematics/Geometry</u>

Unit Topic: (Measurement and) <u>Fractions</u>

Grade Level: <u>1</u>

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<u>Time Frame:</u>   ±6 lessons depending on the learners

<u>Summary of Unit/Concept Development:</u>
This unit will teach the concepts of fractions using Montessori curriculum, materials, activities, and lessons as well as readily-available instructional resources and materials. Students will use fraction skittles, fraction insets, and other hands-on manipulative materials to separate a whole into equal parts, identify one-third and one-fourth, separate a whole into parts using non-unit fractions, and determine how people use fractions in their every-day lives.

Unit Essential Question: How can we describe equal parts of a whole?	
Enduring Understanding/Big Idea	**Standards**
Fractions are equal parts of a whole.	1.G.3: Partition circles and rectangles into two and four equal shares. Describe the shares using the words halves, fourths, and quarters, and use the phrases *half of*, *fourth off* and *quarter of*. Describe the role as *two of*, or *four of* the shares Understand that decomposing into more equal shares creates small shares.

Learning Goals/Targets:

Students will understand :	Evidence of understanding will include:
Fractions are equal parts of a whole.	Students will verbally articulate that fractions must be equal. Students will draw and label a circle or square divided into 2, four, or three equal parts. Students will understand that halves of fourths (quarters) apply to wholes divided into two (four).

Students will be able to:	Evidence of ability will include:
Separate a given object or drawing into equal parts.	Working with fraction insets, students will distinguish between halves, quarters, and thirds.
Name and signify the equal parts of 1/2, 1/4, and 1/3.	Students will shade and label the fractions of 1/2, 1/4, and 1/3.
Identify that 1/2 and 2/4 are equivalent fractions.	Students will match equivalent fractions of 1/2 and 2/4.
Explain that the denominator is the bottom number in a fraction and tells how many parts make up a whole and the numerator is	Students will label the denominator and numerator in a fraction and match the correct definition to each.

| the top number in a fraction and tells how many parts of the whole. | |

Learning Sequence:

Unit organization – what are the teaching and learning strategies that will be use?

Prior knowledge will be assessed through/by: 1.) The teacher will introduce the topic of fractions by having the students put one-half of a pile of counters in one bowl and one-half into another. They will then break their group into halves, with the teacher in-cluded in case of an odd number of students in the lesson. The idea of fractions will be introduced through questioning the group using real-life examples of the use of the word "half," e.g.: half and hour, half a gallon of milk, half a cookie, half a mile. What do the students understand that word, half, to mean? Can they give other examples? The teacher will read *Apple Fractions* (Pallotta). If they are available, give each child 1/4 of an apple.

Lessons: 2.) The teacher will re-read *Apple Fractions* to re-awaken the idea of fractions then tell a brief history of fractions begin-ning with the origin of the word, "fraction," coming from the Latin *fractus* meaning broken. Many ancient peoples needed fractions primarily in trading and developed their own systems of writing fractions down. India had the most developed system, but it wasn't until about 1,500 years ago that Arabs began writing one number above another with a line or slash between the two. The teacher will show 1/2 on the smart board and use the language of one half, these explain that the bottom number, the denominator, tells how many parts make up the whole and the numerator, the top number, tells how many parts there are of the whole. The teacher will introduce the fraction skittles to show one-whole and give that terminology, halves, quarters, and thirds.

Follow-up work to this introduction will be practicing with the fraction skittles and labeling them. Children will have a check list of terms and understanding. As each term is correctly defined to a teacher, the child will be able to check it off on the list. Children will also make an entry in their math journals.

3.) The problem of the day on the board will be: "There were 4 birds on the sill. Half were black. How many were black?)

The teacher will read *The Hersey's Chocolate Fraction Book* and discuss the many ways a chocolate bar can be broken. Review the notion that "fraction" comes from the L *fractus*. "Does anyone remember what that word meant?" "What is important about how a chocolate bar should be broken when it is being shared?" "Do you care how a chocolate bar (or anything else) is separated when you have to share it? Why?" Review the nomenclature of denominator and numerator. Using the fraction skittles, review halves, quarters, and thirds. Bring out the fraction in-sets and stress the concept of a whole. "Which in-set needs to parts to make a whole?" etc.

Follow-up work is to practice and explore with the fraction in-sets. Children will also make an entry in their math journals.

4.) Re-read *The Hersey's Chocolate Fraction Book.* Using the fraction in-sets have children show a whole, half, third, and quarter. If more review is necessary, play a game: "Mike, this is a whole. Please hand this whole to Jamal and tell him it is a whole. Jamal, please hand the whole to Lewis and tell him what you are giving him." Do this also with a half, third, and quarter. Write 1/1, 1/2, 1/3, and 1/4 on cards to be placed under the appropriate in-set pieces. Ask the students what they notice. (They should notice that, the bigger the piece, the smaller the denominator and that the denominator tells how many parts the whole should have.)

Follow-up work for this lesson is a shading work sheet asking students to shade one whole, 1/2, 1/3, and 1/4 of a variety of shapes. Children will also make an entry in their math journals.

5.) Read *Give Me Half* (Murphy). Discuss the problem in the book and how the brother and sister solved it. "There were 8 slices of pizza. How many parts made up the whole?" "How many parts made up a half of the pizza?" "Have you ever eaten four pieces of pizza?" "If four parts made up half the pizza, how would we write that? What number would we need for the denominator and what number would we need for the numerator?" "Can anyone tell me another way to write this same amount of a pizza?" "How would you write that?" Show that 1/2 and 4/8 are "Equivalent fractions." "Using the fraction in-sets, can you find any other equiva-lent fraction for 1/2?" (The fraction in-sets will allow for 2/4, 3/6, 4/8, and 5/10.)

Follow-up work for this lesson is to trace the fraction in-set pieces, and show the discovered equivalences for 1/2. Children will also make an entry in their math journals.

6.) Re-read *Give Me Half* and have the children retell the story. Have them show their equivalency charts and explain what fraction in-sets they were able to use to make 1/2. Ask if the children notice anything about the relationship between the numerator and the denominator. Some may notice that if you double the numerator, you get the denominator. Have the children think about any other ways they have noticed fractions their lives, other than sharing a pizza pie. Describe the project the students will work on showing how fractions are used in daily life. They may work in the classroom and/or get ideas from home.

Follow-up work for this lesson is the culminating activity requiring the students to make booklet, poster or chart showing ways they or people use fractions in everyday life. Children will also make an entry in their math journals.

7.) If cooking is possible, work with the students to make apple crisp. Have the students cut apples into halves the quarters, etc. Measure out the amount of liquid and sugar needed using measuring cups, etc.

Children will also be exploring with the fraction skittles, in-sets, and circles and developing their projects.

8.) Students will complete a summative assessment to include shading in given amounts of a shape, dividing a shape into halves or quarters, and matching the words "whole, half, third, quarter/fourth, numerator, and denominator" to images depicting these terms.


Vocabulary: Fraction (from the L. *fractus*, broken); denominator, numerator, whole, half, quarter/fourth, third, equivalent.

Instruction Strategies: Literature, direct instruction, practice and exploration with hands-on Montessori and other available fractions tools, shading sheets, math journals.

Opportunities for teacher to provide feedback: Through direct instruction and small-group lessons, teachers will assess initial comprehension. As teachers check work done independently or with a peer using hands-on materials, they will assess growing comprehension and help children layer understanding via on-site challenges.

Opportunities for student self-reflection: Students will draw and write in their math journals, including responses to problems of the day.

Resources for students to use to explore ideas and solve problems: Montessori Fraction Skittles, Fraction In-sets, and circles.
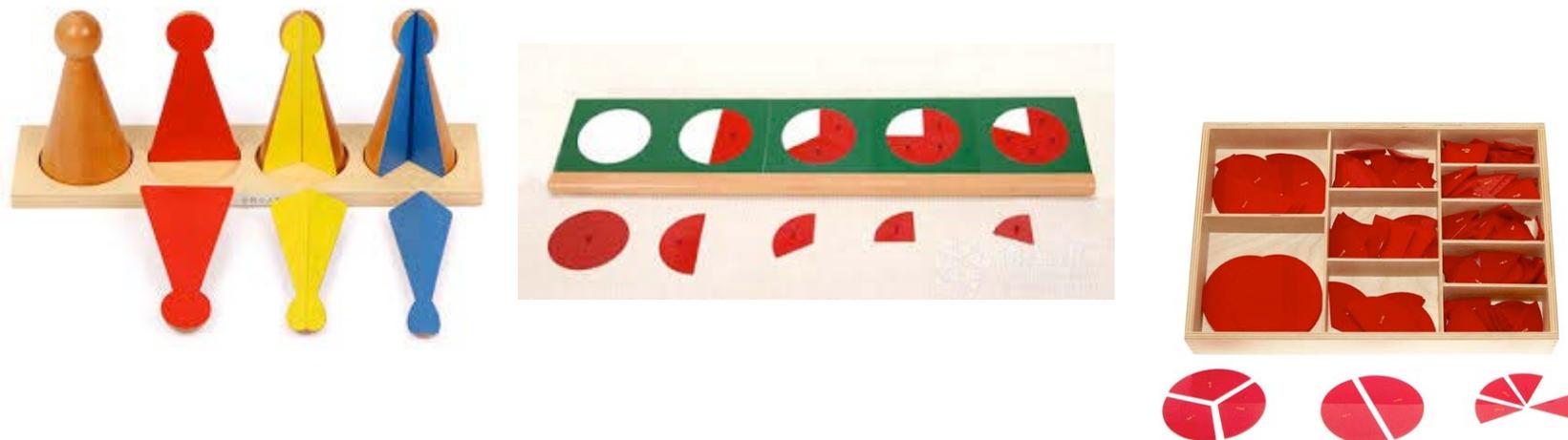
Other resources: *The Hersey's Chocolate Fraction Book* (Jerry Pallotta), *Fraction Action* (Loreen Leedy), *Give me Half* (Stuart Murphy), *Apple Fractions* (Donna Townsend); fraction bars; shading sheets

Ways for children to monitor own progress: Students will be challenged with a fractions-related problem of the day. Their responses, in words or pictures, will be recorded in a math journal to be discussed with the teacher. A check-list of terminology and concepts will be provided to each child who may check them off as mastered when each item as okayed by a teacher.

Collaborative learning components: Montessori materials lend themselves to partners work. In working together, the students will learn from and help each other discover equivalences, practice terminology, and correct errors.

Accessibility for All (Differentiation through readiness, process, content and/or product): Montessori groups are always based on readiness. While this lesson is designed for first grade, it is quite possible and likely that, in a K/1 classroom, there would be kindergarteners who would be ready for and included in this unit. Likewise, in a 1/2/3 class, there would be second graders who would

benefit from a "refresher" in this way before they moved on to more advanced fractions work. Hands-on, concrete Montessori didactic materials work well for tactile, visual/spacial learners. Auditory learners are initiated into fractions via literature and direct instruction. Students with interpersonal strength benefit from working with others, whereas those with interpersonal strength can choose to work on their own or with others. Because children must fetch materials from the classroom shelves to work with at their self-chosen work site, kinesthetic learners are able to move throughout their day in a Montessori classroom.

Rigorous, high level of student inquiry

- Examples of questions that will guide research and reflection

    o How do people use fractions in everyday life?

    o Why are fractions important?

    o Explain your thinking.

    o Can you tell me more about that?

    o Describe what you drew.

- Use of technology

    o Smart board Fraction Question of the Day to welcome children into the classroom and to provide a formative assessment check-in process throughout the progression of the lessons.

    o Montessori Youtube Fraction videos for those students who either need reinforcement or who respond well to screen resources

- Opportunities to form and revise explanations

    o Math journal short and extended written responses

    o Number/math talks

- o   Partners work discussions with a peer

- o   Informal teacher check-ins

- ☐   Opportunities to communicate results

    - o   Math journal short and extended written responses

    - o   Number/math talks

    - o   Partners work discussions with a peer

    - o   Formal student-teacher conference

    - o   Summative assessment

- ☐   Opportunities for higher-level thinking

    - o   Experimentation with Montessori hands-on materials

    - o   Students will create project that demonstrates their understanding and recognition of how fractions are used in everyday life.

Real World Context that allows students to make connections to the real world:

- • Practical life activities such as cooking and/or woodworking projects (measurement is prior knowledge taught before fractions

- • In the course of completing the aforementioned project, students will make real-world connections to fractions.
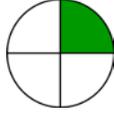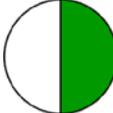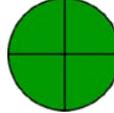
<u>Assessment:</u>

Formative
- • Student Exercises

- Peer questioning
- Classroom Discussion
- Problem Solving
- Challenges
- Exit Tickets
- Vocabulary checks

Summative
- Montessori Three-Period Lesson including introduction, practice, and assessment of the % of concept mastery.
- Problem-based interactive Learning activities
- Performance assessment

Concept of Fractions	Cannot describe the use of fractions or give an example.	Can give an example of a fraction but not link it to everyday life.	Can give an example of fractions use from everyday life.	Can describe the use of fractions in everyday life and give examples.
Naming of Fractions	Cannot identify a depiction, material, or numerical fraction with the correct fraction name.	Can name some depictions, materials, or numerical fraction with the correct fraction name.	Can name some depictions, materials, or numerical fraction with the correct fraction name.	Can consistently name depictions, materials, or numerical fractions with the correct fraction name.

Use of Terminology	Cannot identify numer-ator or denominator.	Can describe what a nu-merator or denomina-tor does but not use the correct nomenclature.	Can describe and name either the numerator or the denominator.	Can describe and name the numerator and the denominator.