Thinking Tool for Diverse Learner Lesson Design - Template for General Education Classrooms

Based on UDL Principles and Reflecting Diverse Learner Groups
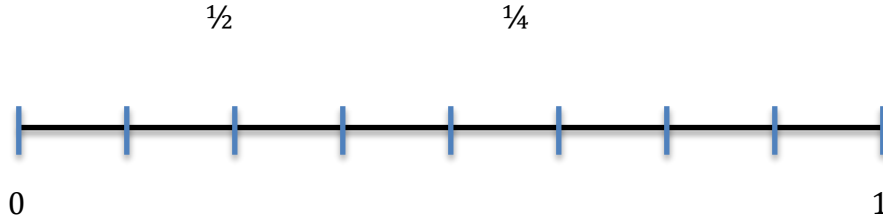(English Language Learners, Gifted, Students with Disabilities)

Instructor:	**Grade: 3**
Subject/Unit: **Equivalent Fractions**	
Standards:	
Essential Understandings:	
Pre-Assessment:	
Post-Assessment:	
Materials/Resources:	
Pre-Planning Activities:	

Equivalent Fraction Lesson

Lesson Element	Lesson Goals/Objectives	Potential Barriers for Learning	Differentiated Instruction including use of Formative Assessment and UDL* Framework	Student Learning Targets
Pre-Assessment	**ALL:** Students will be able to place fractions with denominators 2, 4, and 8 on a number line. Students will demonstrate understanding of equivalent fractions with denominators of 2, 4, 8.		**SWD:** Determine accommodations and/or modifications for IEPs. **ELL:** Determine interventions needed. **G/T:** Determine enhancements or extensions needed.	**ALL:** Assess student proficiency

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Pre-Assessment

1.   Write each of the fractions on the number line where they should be.

½   ¼

0   1
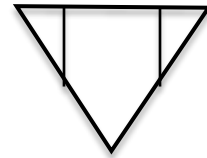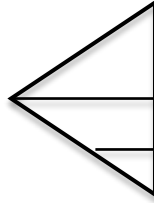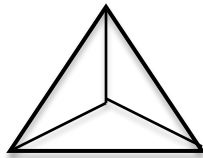
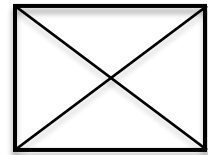Circle one of the fractions and explain why you know it belongs where you wrote it.
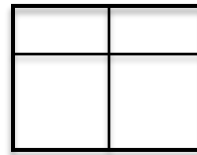
_____

_____
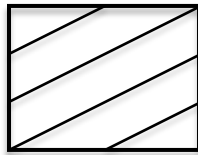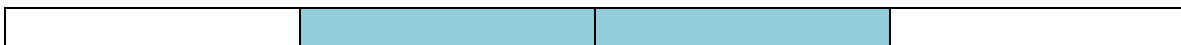
2. Circle the shape that shows a fair share or fractional pars and explain why. (Draw lines better.)

3. Circle the shape that does <u>not </u>show fair shares or fractional parts and explain why?

4. Circle the answer that represents the shaded part.

2/4   ½   both fractions   none of these fractions

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5. Explain or draw a pictures of each of the math words:

Fraction	
Unit fraction	
Equivalent	

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Lesson Opening

Lesson Element	Lesson Goals/Objectives	Potential Barriers for Student Learning	Differentiated Instruction including use of Formative Assessment and UDL* Framework	Student Outcomes
Lesson Opening **Present an enlarged version of 1 inch on a ruler.* **Do a partner think-pair share or KWLR chart to generate ideas and prior knowledge about the purpose and observations about markings on a ruler.* **Dialogue using a think aloud approach about observed uniform markings and prior knowledge of those markings.*	1. Students will recognize equivalent, repeated parts of a single unit on a ruler. 2. Students will describe the utility of equivalent parts and lines on a ruler. 3. Student will use a ruler to identify fractions of a single inch using the lines on the ruler.	**SWD: Lack of prior exposure to rule or standard units of measure, students with emotional disability may use ruler as weapon** **ELL:** Terminology, possibly prior knowledge of metric system rather than standard measures. **G/T: Prior mastery of use of ruler with fractions of 2, 4, or 8.**	**ALL: Think aloud dialogue allows for students to express ideas at their own level. Questions asked to prompt discussion can respond to students' demonstration of prior knowledge. Students who may use ruler as weapon could be provided paper ruler.** **SWD: Larger rulers with tactile markings.** **ELL: Using a ruler with both metric and standard measures to allow for connection.** **G/T: Incorporate discussion of markings for fractions with denominator of 16.**	**ALL:** **Verbal acknowledgement of purposeful markings on a ruler.** **Students point to a specific marking for a quick check.** **All students participate.**

Give each student a ruler or paper copy of a ruler, measured in inches. Use Think-Pair-Share to have students to identify segments on the ruler that are the same. Lead a discussion about the many different pieces on the ruler that represent the same length. Discuss the word *equivalent.* Make sure they understand that numbers that are equivalent will represent the same length on the ruler.

Show an enlarged 1 inch segment on the overhead or projector. Choose segments on the ruler and have students find the segment on their rulers. Ask students to identify segments on the projected ruler. Choose segments so that many of the students have the opportunity to participate.

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Guided Practice

Lesson Element	Lesson Goals/Objectives	Potential Barriers for Learning	Differentiated Instruction including use of Formative Assessment and UDL* Framework	Student Learning Targets
*Guided Practice *Have students fold paper ruler to identify equivalent parts making the whole.*	1. The student will create equivalent fractions using paper models.	**SWD: Physical problems with folding a straight line. Difficulty grabbing flat tools.** **ELL: Verbal directions alone may be a problem.** **G/T: Creative use of paper to do something more entertaining.**	**SWD: Pre-print fold lines on the paper. Work with a peer, if appropriate. Offer alternative 3D or digital manipulatives (cuisinaire rods, unifix cubes, iPad, etc.)** **ELL: Teacher models with the paper while giving the verbal directions.** **G/T: Use a foot length to show twelfths.**	**ALL: Students will have an enlarged paper model of the unit of measure.**
Guided discussion of the number of various fractional parts that equal other fractional parts.	2. The student will name pairs of equivalent fractions with denominators 2, 4, and 8	SWD: Possible confusion of terminology (denominator/numerator, equivalent), off fold lines may not represent the equivalency ELL: Vocabulary G/T: Too basic.	SWD: Posted chart with visual cues for terms, have pre-cut paper strips to use for this model ELL: Posted chart with cues for terms G/T: Looking for equivalent fractions with denominators of 16 or using the 12 inches in a ruler.	Model equivalent fractions with their paper strips.
Teacher models writing number sentences for equivalent fractions. Students use white boards to work simultaneously.	2. The student will write a number sentence to demonstrate equivalent fractions.	SWD: Could possibly not connect if teacher only wrote on board. ELL: none anticipated G/T: Pace may be too slow for students already mastered this.	SWD: Use of white boards to work along helps add kinesthetic input. Use a buddy to quick check work. ELL: N/A G/T: Have students create novel equivalent fractions with unique denominators.	**Students will write an equivalent fraction number sentence on a white board for teacher to quick check.**
Student work in groups to generate combinations of fractions that equal a whole and collectively write number sentences to represent those combinations.	2. The student will name pairs of equivalent fractions with denominators 2, 4, and 8. 3. The student will write number sentences to show addition of fractions to equal a whole.	SWD: Left out of group due to lack of confidence or understanding, group pace does not match student's pace, may not be ready to move on to abstract and still need tangible models ELL: Communication between group members G/T: Take over the group or pace may not match.	ALL: Use of guided math groups based on pre-assessment SWD: Continue to use strips to form fractions, have strips labeled with fractions so plus signs just need to be inserted between tangible strips to create equation, students could hold the strips as a group to physically move themselves to create equation. ELL: Using physical modeling (see above) to demonstrate task G/T: Group students together for this task	Students write equations to show fractions added together to create whole.

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Groups share out their equation work with the class, modeling their work	4. The student will communicate mathematical reasoning and demonstrate understanding using one or more models.	SWD: Confidence in sharing with the group, language use to explain reasoning ELL: Use of language G/T: Inability to explain such fast thinking or ability to translate quantitative to visual, task low level (application without synthesis or evaluation)	SWD: Model in front of the class using the manipulates, smart board, etc. ELL: Model in front of the class using the manipulates, smart board, etc. G/T: Create a creative presentation (song, poem) to explain thinking that includes a visual model, create a real world example of when their created equation might be used in practice	

Guided Practice
(Note: This activity could use cuisnaire rods, unifix cubes, or other 3-D manipultives instead of the paper strips.)

Give each group of students an expanded view of a one-inch segment of a ruler. Also, give each group five strips of different color construction paper that are the same length as the expanded 1-inch ruler. Depending on your students you could ask them to cut the strips. Ask the students to discuss what it means to say that each of the strips each represents "one whole." Ask the students to label one strip "one whole" and write the numeral "1" on it.

For the next step, you might choose to have the positions to be cut already drawn on the strips for students how might have difficulty.

Ask the students to take another strip and fold it carefully in half. Ask them to discuss what part of the whole each segment represents and how to write this as a fraction. Have the students write one-half and the fraction $\frac{1}{2}$ on each part and cut on the fold line. Point out that the numerator of 1 indicates that the fraction represents one part when the whole is divided into two parts. Ask them to line up the two-parts below the expanded 1-inch ruler.

Have them take another strip and fold in half two times. Ask the students to write one-fourth on each part and the fraction $\frac{1}{4}$ and then cut them apart.   Ask them to explain the meaning of the numerator and the denominator of the fraction. Have them line these sections below the halves on the ruler.

Ask the students to take another strip and fold it in half four times. Repeat the above procedure with $\frac{1}{8}$.
Depending on the students, you may wish to use the last strip and explore

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sixteenths.

Ask each group of students to choose pieces from each of their strips to line up next to one another on the ruler so that the total is one whole. Have them write the addition of the value of each piece that they have lined up. Help them write this as an addition equation that is equal to 1. Have the groups share their equations on the board and explain how they arrived at their answer.

Lesson Element	Lesson Goals/Objectives	Potential Barriers for Learning	Differentiated Instruction including use of Formative Assessment and UDL* Framework	Student Learning Targets
Independent Practice **Use a ruler to measure small objects (less than 1 inch long) and then identify size (OR larger objects with blown up whole unit divided into halves, fourths, eights, sixteenths)* **Name equivalent fraction for the object's size.* **Identify how many equal objects are needed to equal one whole inch.*		SWD: Manipulation of small objects may be difficult for student with fine motor problems. ELL: G/T:	All: Self-selected objects. SWD: Use of larger objects and blown up "whole unit" ruler ELL: G/T:	

Have students use a ruler to measure small objects (less than 1 inch long) and then identify size. (Some students will be more successful with larger objects with blown up whole unit divided into halves, fourths, eights, sixteenths so that they can use the large paper ruler from the guided practice.)

Have the students give the length of each object using as many equivalent fractions for the object's size that they can find.

Ask them to choose one of the objects and identify how many of these objects would be needed to have a total length of one inch. Ask them what part of an inch one of these objects represents. Have them write a fraction to describe the object as a part of a whole.
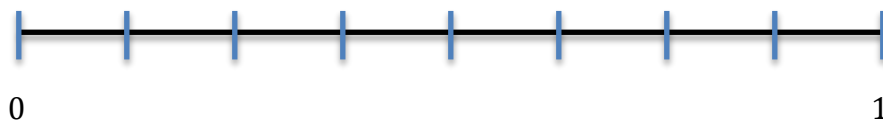
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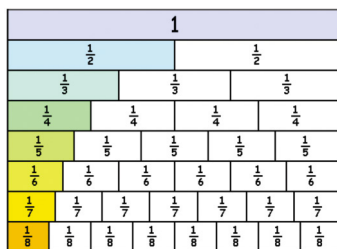| Lesson Element	Lesson Goals/Objectives	Potential Barriers for Learning	Differentiated Instruction including use of Formative Assessment and UDL* Framework	Student Learning Targets
Closure and Post-Assessment (Summative)	*The student will color in a divided shape and state two equivalent fractions to represent that image.* *The student will locate equivalent fractions on a number.*			ALL:

Post-Assessment

1. Write each of the fractions on the number line where they should be.

⅛   ½   ¼

0   1

Circle one of the fractions and explain why you know it belongs where you wrote it.

2. Find a picture of a fraction wall
   Show a 1 whole, ½, 1/3, ¼, 1/6, and 1/8

Write or shade 2 equivalent fractions _____

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3. Draw a picture to help you find the answer to one of the following problem.

   The class is taking a field trip to a _____. One group of 4 students will share 2 subs (or 3 subs) for lunch. How much sub will each student have to eat?

Or

   The class is taking a field trip to a _____. One group of 4 students will share 2 subs for lunch. Another group of 4 students will share 3 subs for lunch. How much sub will each student eat. Is this fair? Why or why not.
Use visual models, numbers and words to show your thinking.

5. Explain the meaning of each word and give an example

Words	Meaning	Example
Fraction		
Unit fraction		
Equivalent		