Fraction Design
Task #1

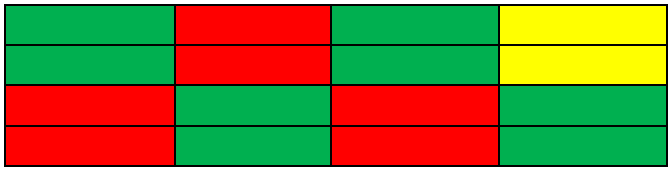
Adapted from North Carolina Department of Public Instruction

Student Objective: "I can build, compare, and explain fractions."

Standards to Measure	**Mathematical Practices**
4.NF.A.1 - Explain why a fraction *a/b* is equivalent to a fraction *(n x a)/(n x b)* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **4.NF.B.3** - Understand a fraction a/b with a>1 as a sum of fractions 1/b. **a.** Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **b.** 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 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 +1/8.*	3. Construct viable arguments and critique the reasoning of others. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

Materials:
1 inch square tiles (red, blue, yellow and green), 1 inch grid paper, crayons/markers, Task Cards

G **Engage Students with the Goal**	<u>State and Rate</u> Objective: "I can build and compare fractions." Students rate themselves to the goal (1, 2, 3, 4).	Setting Objectives and Providing Feedback
A **Access Prior Knowledge**	Draw 2 pizzas. Cut one in ¼ Cut one in 1/8 Ask students: "What do you notice about these 2 pizzas?"	Nonlinguistic Representation Identifying Similarities and Differences

N **New Information**	In this lesson students use 1 inch square tiles to create designs that follow certain criteria. **"Using the tiles at your desk, create a design that is one half blue."** Allow students a minute or two to create their design. As they do, circulate around the room looking for simple and creative examples to share with the class. After students complete their designs, discuss some of the differences in the class. • Did everyone use the same colors? • Does everybody's design look the same? Why not? How can that be since half of the design had to be blue? • Did everyone use the same amount of tile? Why or Why not? • How did you decide what you were going to do to create this pattern? • If we created another design, would you do it differently? How? You may need to repeat this activity a few times. Before moving on, students should see that there are many different options for each design. Just because the problem calls for a fraction in fourths, doesn't mean they need to use four tiles. They also need to understand that they may only receive part of the information needed to solve the problems; they will need to fill in the rest.	Similarities and Differences Nonlinguistic Representation Cues, Questions, and Advance Organizers
A **Application**	Students work in pairs or threes, to build designs with one inch tiles, based on the description given on a task card (attached). Each student builds their representation for the card. Once all students in the group have finished, they discuss their designs and decide on which one they will use for their representation for the class. Once the students agree upon the design, each student will copy it onto a sheet of 1 inch graph paper. Below the picture they are to write a description and an equation of all the colors used in their design. **EXAMPLE:**  "Our design has 1/8 yellow, 4/8 green and 3/8 red. 1/8 + 4/8 + 3/8 = 8/8 or 1 whole." Start with Card A and work towards Card H. Most groups will not be able to finish all 8 cards in the time allotted for the lesson.	Cooperative Learning Nonlinguistic Representation Providing Feedback Generating and Testing Hypotheses Practice and Homework

	Bring all the students together and have them share the results of task cards A, B, and C. **Suggested questions** • What did you do for your task card? • Do you think that this group's design fits the directions? • How can you prove it? • Compare two different designs, how are they similar and different? ***Time permitting give the students 8 tiles and tell them that as a class you need to make a design that is ½ red, ¼ green, 1/8 yellow and 1/8 blue. Ask students to describe how they know how many tiles of the region match up to a specific fraction.	
G **Revisit the Goal**	<u>State and Rate</u> Objective: "I can build and compare fractions." Students rate themselves to the goal (1, 2, 3, 4).	Setting Objectives and Providing Feedback

Evaluation of Students

Formative: As students are building the designs circulate around the room checking for misunderstandings. Are students using only the minimum number of tiles, can they use more?
How did they make the decision to use the number of tiles they did, and why did they choose these colors? Review the students' description for clarity.

Summative: Have students collect their descriptions of each task card they were able to finish, and staple them together in a book.

Plans for Individual Differences

Intervention: Students who are struggling with this activity may need help in determining the number of tiles that will be found in their design. These students may need to start with very basic designs, using the minimum number of tiles.

Extension: If I was only able to use a certain number of tiles in my design, create task cards that a class would be able to use. Ex: I can only use 16 tiles, so create a design with ¼ blue, 1/8 green, ½ red and the rest yellow.

Task Cards

The other parts of the design are student choice

CARD A Build a design that is… □ One fourth red □ One fourth green
CARD B Build a design that is… □ Two thirds yellow
CARD C Build a design that is… □ One eighth yellow □ Four eighths green
CARD D Build a design that is… □ One third blue □ Two thirds red

CARD E

Build a design that is…

- One half red
- One fourth yellow

CARD F

Build a design that is…

- Five twelfths blue
- One sixth red
- Two sixths green

CARD G

Build a design that is…

- One fifth red
- Four tenths green
- Two fifths blue

CARD H

Build a design that is…

- One third yellow
- One sixth red
- One half green