Bridging for Math Strength Resources

Standards of Learning Curriculum Framework (SOL)

Standard of Learning (SOL) 4.2b Represent equivalent fractions.



Student Strengths	Bridging Concepts	Standard of Learning
Students can name and write fractions and mixed numbers represented by a model. Students can represent fractions and mixed numbers with models and symbols.	Students can create a model to represent a fraction. (Area models tend to be easier for students to grasp while set and measurement models tend to be more difficult. Students may need additional support bridging their understanding of area models to help support their understanding of set and measurement models.)	Students can represent equivalent fractions.

Understanding the Learning Trajectory

Big Ideas:

- When two fractions are equivalent that means there are two ways of describing the same amount by using different sized fractional parts. (Van de Walle et al, 2019)
- A variety of representations and models can be used to identify different names for equivalent fractions: region/area, set and measurement models. (Students should use area representations, strips of paper, tape diagrams, number lines, counters and other manipulatives to reason about equivalence.)
- Intuitive methods using drawings and manipulatives support student understanding. Students can develop an understanding of equivalent fractions and also develop from that understanding a conceptually based algorithm. Delay sharing "a rule." (Van de Walle et al, 2019)

For more Learning Trajectory research see:

Cramer, K., Behr, M., Post T., Lesh, R., (2009) Rational Number Project: Initial Fraction Ideas.

- Rational Number Project Lesson and research on learning trajectory of initial fraction ideas
- Fraction Circles Colored
- OGAP Fraction Framework-OGAP is a systematic, intentional, and iterative formative assessment system grounded in the research on how students learn mathematics, Learn more at http://www.ogapmath.com/about.

Formative Assessment:

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- VDOE Just in Time Mathematics Quick Check 4.2b (PDF)
- VDOE Just in Time Mathematics Quick Check 4.2b (Desmos)

Important Assessment Look Fors:

- Evidence that the student is able to identify equivalent fractions modeled using a variety of different models: area, set and/or measurement.
- The student uses strategies like removing lines or adding additional lines to the area and number line models to show how the models are equivalent.
- The student is able to use a variety of strategies and can justify their reasoning as to why fractions are equivalent.
- When the student represents their fraction as models, they represent the whole using the same size and shape model. Click this link for more information about student representations.

Purposeful Questions:

- What strategy (or strategies) did you use to determine which fraction models are equivalent?
- Which fraction models are the easiest for you to identify? What made it easy?
- Which fraction models are the hardest for you to identify? What made it difficult?
- What relationships do you see?
- Can you create another equivalent model that is different from ones shown?

Bridging Activity to Support Standard	Instructional Tips
Routines Which One Doesn't Belong? Egg Fraction Action Same & Different: Shelly's Seashells	Display the 4 images and ask, "Which one doesn't belong?" There are no right or wrong answers as long as the students' reasoning is correct. Display pictures A and B and ask students to think about how they are the same and how are they different? Provide students with time to think. Then have the student share their thinking while the teacher records students' ideas on the board using a T-chart. Click on this link for more information about the Same and Different routine.
Rich Tasks Four Friends Swimming This task is adapted from the Fractions on a Number Line Formative Assessment Lesson from the Kentucky Department of Education.	Task 1: Four Friends Swimming The purpose of the Four Friends Swimming task is to have students explore the measurement model of fractions. Encourage students to fully explain their thinking using number lines, symbols and words. Provide blank numbers lines as a recording tool to help students represent their thinking and to keep their work organized. Misconceptions to look for in the students work include: • Student not equally partitioning the number line. • Student not counting correctly on the number line. For example, the student counts the hash marks but not the spaces. Some questions to ask students to during this task: • What are the parts of your whole? How many parts are there? • How do you know fractions are equivalent using number lines? • Can you draw or create another model to prove that the fractions are equivalent? Task 2: Eggs for the Bake Sale

Eggs for the Bake Sale This task is adapted from the Eggsactly Scaffolding Task from the Georgia Department of Education.	The purpose of the egg task is to have students use what they know about area models to help them to explore fractions of a set. Because eggs come packaged in a carton, the egg carton represents the area model of fractions while the eggs inside the carton represent the set model of fractions. Encourage students to fully explain their thinking using models, symbols and words. The use of graph paper as a recording tool will help to support students' thinking as they work to complete this task, as well as to keep their work organized. Students should have access to concrete and/or virtual manipulatives to use with this task. Some suggested manipulatives are: ● Counters (2-sided counters, plastic eggs, cereal pieces, etc.) ● Fraction strips Some questions to ask students to during this task: ● What equivalent fractions can you find that also represent the fractions of eggs? ● How do you know that your fractions are equivalent? ● Can you draw or create another model to prove that the fractions are equivalent?
Games/Tech Dozens of Eggs from the Math Learning Center	Dozens of Eggs is a game designed to help students use what they know about area models to help them to explore fractions of a set. The goal of this game is to give students practice building and recognizing equivalent fractions. The directions for how to play can be seen on the first two slides and the activity can be found on slide 3. To move between the slides, click on the small gray paper icon found in the lower right hand corner of the screen.
Racing Fractions to Eighths from the Math Learning Center	Racing Fractions to Eighths is a game designed to help students identify equivalent fractions. Students play using the fraction number lines on the Racing to Eighths game board. The goal is to be the first player to move all 4 of their game markers to 1 whole. This is a strategy game where students can use what they know about equivalent fractions to help them win. For example, if a student draws the fraction ½, they can move their marker on any number line as long as it is equivalent to ½. See pages 1-4 for directions. The game board and other printable resources needed to play the game are on pages 5-9.
Desmos 4.2ab Equivalent Fractions	In the Desmos activity, Equivalent Fractions, students compare fractions that are equivalent, group fractions that are equivalent, and shade equivalent fractions. Images on screens 3-6 are from http://www.fractiontalks.com
Desmos 4.2ab Fraction Card Sort	In the Desmos activity, Fraction Card Sort, students sort fractions, match equivalent fractions with and without models, and benchmark fractions to 0,1/2, and 1.

Other Resources:

- Links to interactive manipulatives
  - Interactive Area Fraction Models
  - Interactive Number Line
  - Interactive Fraction Strips
  - Interactive Fraction Circles
  - Interactive 2-Color Counters
  - Interactive 2-Color Counters Ten Frame
  - Interactive Bear Counters

- Additional Routines:
  - Same & Different: Partitions & Wholes
- Additional Rich Tasks:
  - Dessert Dilemma (partitioning area)
  - Fractions and Rectangles (area model)
  - Running Laps (measurement model)
  - Patricks Patios (exploring half)
- Additional Games:
  - Triplets
  - Equivalent Fractions Bingo
  - Fraction Escape: Make 1 whole
- VDOE Mathematics Instructional Plans (MIPS)
  - 4.2ab - Fraction Strips: Comparing and Ordering Fractions (Word) / PDF Version
- VDOE Word Wall Cards: Grade 4 (Word) | (PDF)
  - Equivalent
  - Less Than
  - Greater Than
  - Equal To
  - Numerator/Denominator
  - Proper Fraction
  - Improper Fraction
  - Mixed Number
- VDOE Instructional Videos for Teachers
  - Models for Teaching Fractions
- Desmos Activities
  - Equivalent Fractions
  - Fraction Card Sort

Learning Trajectory Resources:

Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. *Journal of Mathematics Education Leadership*, *7*(3), NCSM.

Common Core Standards Writing Team. (2019). Progressions for the Common Core State Standards for Mathematics. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Cramer, K., Behr, M., Post T., Lesh, R., (2009) Rational Number Project: Initial Fraction Ideas.Rational Number Project Lesson and research on learning trajectory of initial fraction ideas

OGAP Fraction Framework-OGAP is a systematic, intentional, and iterative formative assessment system grounded in the research on how students learn mathematics, Learn more http://www.ogapmath.com/about

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally.* (10th edition) New York: Pearson (2019:9780134802084)

Blackline masters from older addition available on web

VDOE Curriculum Framework for All Grades (2016) - Standard of Learning Curriculum Framework (SOL)