Bridging for Math Strength Resources

Standards of Learning Curriculum Framework (SOL)

Bridging Standard of Learning (SOL) 4.4c Estimate and determine quotients of whole numbers, with and without remainders

Student Strengths	Bridging Concepts	Standard of Learning
Students understand the meanings of multiplication and division of whole numbers (developed through activities and practical problems involving equal-sized groups, arrays, and length models).	Students use their place value understanding and ability to round to estimate quotients. Students use their understanding of inverse operations for multiplication and division.	Students can estimate and determine quotients of whole numbers, with and without remainders.

Understanding the Learning Trajectory

Big Ideas:

- Flexible methods of computation involve taking apart (decomposing) and combining (composing) numbers in a variety of ways (Van de Walle et al., 2018).
- Students should explore and apply the properties of addition and multiplication as strategies for solving division problems using a variety of representations (e.g., manipulatives, diagrams, and symbols). (VDOE Grade 4 Curriculum Framework)
- Flexible methods for computation require deep understanding of the operations and the properties of operations (commutative property, associative property, and the distributive property). How addition and subtraction, as well as multiplication and division, are related as inverse operations is also critical knowledge (Van de Walle et al., 2018).
- Estimation can be used to determine the approximation for, and then to verify the reasonableness of, quotients of whole numbers. An estimate is a number that lies within a range of the exact solution, and the estimation strategy used in a particular problem determines how close the number is to the exact solution (VDOE Grade 4 Curriculum Framework).
- Some division situations will produce a remainder, but the remainder will always be less than the divisor. If the remainder is greater than the divisor, that means at least one more can be given to each group (fair sharing) or at least one more group of the given size (the dividend) may be created (Georgia Department of Education Grade 4 Curriculum).

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Formative Assessment:

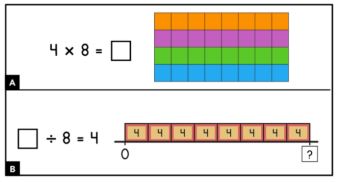
- VDOE Just in Time Mathematics Quick Check 4.4c (PDF)
- VDOE Just in Time Mathematics Quick Check 4.4c (Desmos)

Important Assessment Look Fors:

- The student uses methods they understand and can explain.
- The student's work shows that they understand and can apply the term quotient(s).
- The student identifies related facts that correlate with the problem.
- The student explains their solution and the reasonableness of their answer.
- The student uses a variety of strategies and representations.
- The student uses estimation to determine the reasonableness of their answer (ie, a little more than, a little less than, closer to, etc.).

Purposeful Questions:

- How did you represent your thinking?
- How do you know your answer is correct?
- How does your estimation relate to the actual answer?
- How do you know __ is closest to __?
- How do you know your answer is reasonable?
- Why did you choose that place value for your estimate?
- What is the meaning of a remainder in a division problem?
- What effect does a remainder have on a quotient?
- How are remainders and divisors related?

Bridging Activity to Support Standard	Instructional Tips
Routines: Same & Different: 4 & 8 Math Learning Center  Would you Rather? Fun in the Sun Math Learning Center 	For the Same & Different routine, 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 students share their thinking while the teacher records students' ideas on the board using a T-chart. Go to the Same but Different website for additional information on using this routine. Would you Rather? is a routine that provides students with two situations to select from. There are no right or wrong answers as long as the students' reasoning is mathematically correct.
Rich Tasks:	The purpose of the Apple Tree Farm task is to have students explore the division by

The Apple Tree Farm Adapted from The Apple Tree Farm Task, Region 1 The Field Trip Adapted from The Field Trip Task, Region 1	making arrays with equal sized rows. The purpose of the Field Trip task is to have students explore the division by making equal-sized groups and to discuss what happens when you have a remainder. Manipulatives such as counters or snap cubes will help to support students' thinking as they work to complete these tasks. Have students use graph paper as a recording tool to help them keep their work organized on the Apple Tree Farm task. Encourage students to fully explain their thinking using manipulatives, symbols, pictures, and words. Misconceptions to look for in the students' work are ● Students not creating equal rows or groups. ● Students not considering that there may be multiple correct answers. ● Students not considering the remainder (Field Trip task) Some questions to ask students during this Apple Tree Farm task: ● How many rows did you make? ● How many trees are in each row? ● Are there other ways to solve this problem? Some questions to ask students during this Field Trip task: ● How many groups did you make? ● How many students are in each group? ● Do all of the groups have the same number? Why or why not? ● Are there other ways to solve this problem?
Games/Tech: No Leftovers Wanted! tools4ncteachers.com Division Duel Tools4ncteachers.com Desmos 4.4c Division Riddle	The goal of No Leftovers Wanted! is to help students connect multiplication and division by building rectangular arrays without having any leftover tiles. The number of counters in one row is the player's score and the player with the highest score after six rounds is the winner. Division Duel is played like the classic war game except players use a deck of division cards. Each player chooses a card. The player with the largest quotient is the winner. The champion is the first player to win 14 rounds. In this Desmos activity, students walk through the solving of a division remainder riddle.

Other Resources:

- Additional Routines
  - Same & Different: Drip-Dyed Arrays
  - Would You Rather? Painting Murals
- Additional Games
  - Find the Unknown Number
  - Four Quotients
  - Race to the Resort
- Additional Rich Tasks
  - The Pumpkin Patch Task
  - Bundle of Books
  - Fun at the Fair
  - Party Time

- VDOE Mathematics Instructional Plans (MIPS)
  - Pears in a Basket: Dividing with Whole Numbers (Word) / PDF
- VDOE Word Wall Cards: Grade 4 (Word) / PDF
  - Multiply: Product
  - Divide: Quotient
  - Multiplication: Number Line Model
  - Division: Number Line Model

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.

Georgia Department of Education. (2021). Georgia Standards of Excellence Curriculum Frameworks: Mathematics, GSE Fourth Grade Unit 2. https://www.georgiastandards.org/Georgia-Standards/Frameworks/4th-Math-Unit-2.pdf

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)

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