Bridging for Math Strength Resources

Standards of Learning Curriculum Framework (SOL)

Standard of Learning (SOL) 5.5a Estimate and determine the product and quotient of two numbers involving decimals. *Note this standard is assessed on the Virginia SOL without the use of a calculator.

Student Strengths	Bridging Concepts	Standard of Learning
Students can add and subtract decimals, and estimate to check their answer. Students can multiply and divide whole numbers.	Students can use reasoning and/or estimation to determine placement of the decimal in a multiplication or division problem. Students can use a variety of multiplication and division strategies, including area models, partial products, and partial quotients.	Students can estimate and determine the product and quotient of two numbers involving decimals.

Understanding the Learning Trajectory

Big Ideas:

- Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones. (Charles, 2005). For example, when dividing a decimal by a decimal, you can multiply both the dividend and divisor by the same powers of ten to work with whole numbers.
- Numerical calculations can be approximated by replacing numbers with other numbers that are close and easy to compute with mentally (Charles, 2005). This estimation can be used to determine a reasonable range for the answer and to verify its reasonableness.
- Division is the operation of making equal groups or shares. The fair-share concept of decimal division can be modeled, using manipulatives (e.g., base-ten blocks), arrays, paper folding, repeated addition, repeated subtraction, base-ten models, and area models.
- Algorithms for whole number multiplication and division can be used to help make sense of decimal number multiplication and division.

Formative Assessment:

- Just in Time Mathematics Quick Check 5.5a PDF
- Just in Time Mathematics Quick Check 5.5a Desmos

Important Assessment Look Fors:

- The student uses estimation and rounding in order to determine where to place the decimal in the product or quotient.
- The student models multiplication and division of decimals with various models as well as through computation. The student may champion a particular efficient strategy.
- The student interprets a model to determine what the product or quotient it is representing.

Purposeful Questions:

- How did you determine where the decimal should be placed in your product/quotient? How do you know this is a reasonable answer?
- When solving division problems, why do numbers need to be expressed as equivalent decimals by annexing zeros?
- How does this model represent the situation? Where do you see the (factors, product, dividend, divisor, quotient) represented?
- How is estimating with decimals similar or different to estimating with whole numbers?

Bridging Activity to Support Standard	Instructional Tips
Routines Number String Would You Rather	Create number strings that introduce patterning of decimal places with powers of ten and then with other factors/divisors.
Rich Tasks The Broken Calculator Adapted from Task 22: The Broken Calculator" from *Classroom Ready Rich Math Tasks Grade 4-5.* Task 1: Broken Calculator: Multiplication Task 2: Broken Calculator: Division	These tasks are meant to help students look for patterning in decimal placement. Students should not be taught "count place values over" but make sense of place value and decimal placement when multiplying and dividing with decimals. They should use estimation to check their answers for reasonableness. Task one: Using a calculator without a working decimal point students determine the product of various whole numbers and decimals. They use estimation and reasoning to determine placement. Task two: Similar to task one, however students are determining decimal placement for the quotient.
Games/Tech Multiplying Decimals Basketball Game Dividing Decimals Board Game-Online	In the Basketball game, students solve multiple problems with decimals. Scratch paper will probably be needed. In the Dividing Decimals Board Game, students divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Desmos 5.5a Discovering Base 10 Patterns: Decimal Division	In the Discovering Base 10 Patterns Desmos activity, students explore patterns within decimal division. The purpose is to strengthen students' understanding of the Base 10 system and how this system can be used to make division computation easier. The goal of this activity is not centered around computation which is why students are encouraged to utilize a calculator.
Desmos 5.5a Decimal Hopping: Connecting Models and Equations	In the Decimal Hopping Desmos activity, students manipulate a number line to divide decimals. This activity deepens students' understanding of decimals by including context, models, and connections to division and multiplication as inverse relationships.
Desmos 5.5a Demonstration: Decimal Multiplication Area Model	In this Desmos demonstration, students select decimal values for two factors. An area model is then created to represent the product of two decimals. Students can see the relationship between tenths, hundredths, thousandths, and ten thousandths. Students can manipulate the factors to make predictions and notice patterns. Through these models, students can reason about the value of decimal products and how the product compares to both factors.

Other Resources:

- *Sometimes. Always, Never:* Create examples where students must apply their learning to compare two examples. Example: The product of two factors is always bigger than either factor. Supporting Resources (manipulatives and tools for representation of the concept): grids, money, base-ten blocks, area models
- VDOE Algebra Readiness Formative Assessments
    - SOL 5.5a (Word) / PDF
- VDOE Word Wall Cards: Grade 5
    - Decimal Place Value Position
    - Round
    - Multiply
    - Divide

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.

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)