Bridging for Math Strength Resources

Standards of Learning Curriculum Framework

Standard of Learning (SOL) 6.6c Simplify numerical expressions involving integers.

Student Strengths	Bridging Concepts	Standard of Learning
Students can perform operations with whole numbers. Students can simplify expressions using order of operations without exponents.	Students can perform operations using integers. Students understand that absolute value is the distance from zero. Students understand that an exponent is repeated multiplication.	Students can simplify numerical expressions involving integers.

Understanding the Learning Trajectory

Big Ideas:

- An expression is a phrase about a mathematical situation while an equation shows that two expressions are equivalent in value.
- Properties of operations can be used to make connections between integer operations and whole number operations (Common Core Standards Writing Team, 2019).
- Working with numerical expressions prepares students for working with algebraic expressions.
- The order of operations tells us how to interpret expressions (Common Core Standards Writing Team, 2019).
- Integers are the whole numbers and their opposites on the number line, where zero is its own opposite.
- The real-world actions for operations with integers are the same for operations with whole numbers (Charles, 2005).
- The sum of opposite integers is equal to zero (Common Core Standards Writing Team, 2019).
- There are multiple meanings of the negative sign: a) a subtraction sign, b) a negative sign, c) an *opposite* sign.

Formative Assessment:

- VDOE Just in time Quick Check SOL 6.6c (Word) / PDF / Desmos

Important Assessment Look Fors:

- The student follows the order of operations when simplifying expressions.
- The student completes multiplication/division or addition/subtraction from left to right.
- The student recognizes parentheses, a fraction bar, and absolute value as grouping symbols.
- The student shows all steps required when simplifying an expression.
- The student can identify errors in simplifying expressions.

Purposeful Questions:

- What is your first step in simplifying this expression?
- How does the absolute value symbol affect this term?
- How can you determine if an equation is true or false?
- How might your solution change if you do not follow the order of operations?

Bridging Activity to Support Standard	Instructional Tips
Routine Number Talks Henrico County	In the Number Talks routine, students will talk through their thinking and strategy for simplifying expressions using the order of operations. A conversation should be had around slides 3-4 regarding how not using order of operations would give a different solution.
Rich Tasks Open Middle Order of Operations	In this Open Middle task students need to use the numbers 0-9 to create expressions that will simplify to different odd numbers. Students should be encouraged to find multiple solutions.
Games/Tech Desmos 6.6c Twin Puzzles OOO Dice	In the Twin Puzzles Desmos activity, learners use sketch to solve "twin puzzles" as a way to practice their order of operations skills. Teachers can use the overlay feature in the teacher dashboard to assess the class at a glance and to facilitate class-wide error analysis discussions, or the response view to identify individual students who need additional support. In the game OOO Dice, students use numbers rolled on multiple dice to create expressions with the largest or smallest possible value. Students apply the order of operations to find the value of their expressions. You may vary the number of dice available and the types of dice (standard dice or polyhedral dice) to adjust the level of challenge.

Other Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - Order Up (Word) / PDF
- VDOE Algebra Readiness Formative Assessments
  - 6.6c (Word) / PDF
- VDOE Algebra Readiness Remediation Plans
  - Simplify Numerical Expressions – Order of Operations (Word) / PDF
- VDOE Word Wall Cards: Grade 6 (Word) / PDF
  - Order of Operations
- Desmos Activity
  - Twin Puzzles

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.

Clements, D. H., & Sarama, J. (2019). Learning and teaching with learning trajectories [LT]2. Marsico Institute, Morgridge College of Education, University of Denver. https://www.learningtrajectories.org/

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.

Richardson, K. (2012). How Children Learn Number Concepts: A Guide to Critical Learning Phases. Bellingham: Math Perspectives Teacher Development Center.

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)