Strand: Computation and Estimation	
6.6 The student will **a) add, subtract, multiply, and divide integers;*** b) solve practical problems involving operations with integers; **c) simplify numerical expressions involving integers.***  *On the state assessment, items measuring this objective are assessed without the use of a calculator. (6.6a and c)	
Suggested Pacing	
First Nine Weeks- 6.6ab- 7 Instructional Days	
Spiraling Standards	
5.7 The student will simplify whole number numerical expressions using the order of operations.	**7.2** The student will solve practical problems involving operations with rational numbers. **8.14** The student will a) evaluate an algebraic expression for given replacement values of the variables; and b) simplify algebraic expressions in one variable **A.1** The student will b) evaluate algebraic expressions for given replacement values of the variables.
Essential Questions	**Common Misconceptions**
6.6a	

• How does the knowledge of zero pairs help when modeling operations with integers? • Under what circumstances will the sum or difference of integers result in a negative solution? • Under what circumstances will the product or quotient result in a negative solution? • What strategies are most useful in helping develop algorithms for adding, subtracting, multiplying, and dividing positive and negative numbers? • Will addition of integers ever result in a sum smaller than one or smaller than both of its addends? • Will subtraction of integers ever yield a difference greater than the minuend and/or subtrahend? • When will the sum of two integers be positive? Negative? Or zero? **6.6b** • What is a real world situation in which you have to add, subtract, multiply or divide both positive and negative integers? • How do you use integer operations to balance a checkbook or budget? **6.6c** • Why do we need an order of operations? • Why is multiplication and division performed from left to right? • Why is addition and subtraction performed from left to right? • If there are two different addition problems in an expression, is it ok to do the second one first? Explain using the properties of real numbers.	• Getting confused by parenthesis. The parenthesis below is only for separating the -8 from the addition sign. It does not mean multiply. $-5 + (-8) = -13$ • Getting confused by which number is larger. Student fail to see the connection between absolute value and integers. $-12 + 8 = -4$ The negative 12 is the larger number. (although on the number line it is smaller). Look at it this way, there are 12 negatives and 8 positives… which one are there more of? • Confusing rules for multiplying and dividing integers with rules for adding and subtracting integers. **6.6c** • Exponents are often evaluated incorrectly. 6^2 means 6×6 and not 6×2 • Students often take shortcuts when solving order of operation problems by skipping steps or using calculators. This makes it difficult for them to analyze the mistake(s) of given expressions. • Students struggle with solving from left to right for multiplication/ division and addition/subtraction. They follow the

	acronym PEMDAS to the letter which can cause them to arrive at the wrong answer ● Students change the order of the numbers when evaluating expression
Understanding the Standard	**Essential Knowledge and Skills**
● The set of integers is the set of whole numbers and their opposites (e.g., …-3, -2, -1, 0, 1, 2, 3…). Zero has no opposite and is neither positive nor negative. ● Integers are used in practical situations, such as temperature changes (above/below zero), balance in a checking account (deposits/withdrawals), golf, timelines, football yardage, and changes in altitude (above/below sea level). ● Concrete experiences in formulating rules for adding, subtracting, multiplying, and dividing integers should be explored by examining patterns using calculators, using a number line, and using manipulatives, such as two-color counters, drawings, or by using algebra tiles. ● Sums, differences, products and quotients of integers are either positive, negative, undefined or zero. This may be demonstrated through the use of patterns and models. ● The order of operations is a convention that defines the computation order to follow in simplifying an expression. Having an established convention ensures that there is only one correct result when simplifying an expression. ● The order of operations is as follows:	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** ● Model addition, subtraction, multiplication and division of integers using pictorial representations or concrete manipulatives. (a) ● Add, subtract, multiply, and divide two integers. (a) ● Solve practical problems involving addition, subtraction, multiplication, and division with integers. (b) ● Use the order of operations and apply the properties of real numbers to simplify numerical expressions involving more than two integers. Expressions should not include braces { } or brackets [ ], but may contain absolute value bars **.** Simplification will be limited to three operations, which may include simplifying a whole number raised to an exponent of 1, 2 or 3. (c)

– First, complete all operations within grouping symbols.[1] If there are grouping symbols within other grouping symbols, do the innermost operation first. – Second, evaluate all exponential expressions. – Third, multiply and/or divide in order from left to right. – Fourth, add and/or subtract in order from left to right. [1]Parentheses $()$, absolute value $\|\|$ (e.g., $\|3(-5+2)\|$), and the division bar (e.g., $\frac{3+4}{5+6}$) should be treated as grouping symbols. ● Expressions are simplified using the order of operations and applying the properties of real numbers. Students should use the following properties, where appropriate, to further develop flexibility and fluency in problem solving (limitations may exist for the values of a, b, or c in this standard): – Commutative property of addition: $a + b = b + a$. – Commutative property of multiplication: $a \cdot b = b \cdot a$. – Associative property of addition: $(a + b) + c = a + (b + c)$. – Associative property of multiplication: $(ab)c = a(bc)$. - Subtraction and division are neither commutative nor associative. – Distributive property (over addition/subtraction): $a(b + c) = ab + ac$ and $a(b - c) = ab - ac$. – Identity property of addition (additive identity property): $a + 0 = a$ *and* $0 + a = a$.	

- Identity property of multiplication (multiplicative identity property): $a \cdot 1 = a$ *and* $1 \cdot a = a$.
- The additive identity is zero (0) because any number added to zero is the number. The multiplicative identity is one (1) because any number multiplied by one is the number. There are no identity elements for subtraction and division.
- Inverse property of addition (additive inverse property): $a + (-a) = 0$ *and* $(-a) + a = 0$.
- Multiplicative property of zero: $a \cdot 0 = 0$ *and* $0 \cdot a = 0$
- Substitution property: If $a = b$ then b can be substituted for a in any expression, equation or inequality.

- The power of a number represents repeated multiplication of the number (e.g., $8^3 = 8 \cdot 8 \cdot 8$). The base is the number that is multiplied, and the exponent represents the number of times the base is used as a factor. In the example, 8 is the base, and 3 is the exponent.

Any number, except zero, raised to the zero power is 1. Zero to the zero power (0^0) is undefined.

Vocabulary	Instructional Activities Organized by Learning Objective
Integer set whole number opposite sum difference	**Textbook:** Eureka

Eureka Grade	Module	Topic	Lesson(s)
7	2	A	1-16

product quotient positive negative grouping symbols parentheses division bar exponents power simplify numerical expression	Virginia Math Connects, Course 2, ©2012, Price, et al, McGraw-Hill School Education Group 1 Integer Operations: page(s) 86 – 113; **Notes** SOL 7.3 Interactive Reading and Note taking **Resources** ● Print Virginia Department of Education Lesson Plan(s): Adding and Subtracting Integers Multiplying and Dividing Integers Algebra Readiness pgs 2-23 SOL 6.8 – lesson plan Math Shell Tasks Equations: Which Order? (Question set) [SMART Response question set] **Eureka** - Add & Subtract Integers-Lessons 1-6 ● Technology-based Operations with Integers **Gizmo** Adding and Subtracting Integers Adding on the Number Line Adding and Subtracting Integers with Chips Order of Operations Flocabulary-Order of Operations Brain Pop
Assessment PowerSchool 6.6	

	Adding and Subtracting Integers Order of Operations Station Activities Integer Activities 1 Integer Activities 2 Order of Operations
Cross-Curricular Connections	Tiered Differentiations
Operations with integers can be connected to many of the sports played during physical education classes. In Family and Consumer Science class, integers can be applied when students plan budgets and balance checkbooks.	Provide two sided counters/algebra tiles to assist in the visualization of the integer rule. Model and practice integer rules with number lines. During direct instruction and initial independent practice, model and solve real life scenarios involving integers. Provide the answers to order of operations problems to give students immediate feedback of their execution of correct procedures. This will also motivate to use to use order of operations correctly.