



2022-2023 Three-Credit Hour Course: Elementary Math Addition & Subtraction (Grades PK-4), Multiplication & Division (Grades 2-5), and Fractions (Grades 1-5)

- ▶ **Audience:** Active West Virginia Teachers/Educators
- ▶ **Type:** Self-Paced with Rolling Enrollment
- ▶ **Enrollment:** September 1, 2022 - April 14, 2023
- ▶ **Duration:** September 1, 2022 - May 19, 2023

Description: The three mathematical topics covered in this course, Addition & Subtraction, Multiplication & Division, and Fractions are all important numeracy concepts and form the foundation for understanding of more advanced mathematics concepts. After completing the initial Important Information and the Getting Started: Orientation, you may choose the content topic that best matches what is being taught in your classroom at the current time, but ideally you should complete all the activities and the checkpoint assignments for that topic including the video-taped lesson implementation and reflection before starting on another topic. All three topics must be completed successfully in order to receive credit for the course. If the grade level that you teach is not included in one of the topics, you will need to “borrow” a class in which to complete and videotape a classroom lesson implementation for that topic.

Addition & Subtraction: Addition and subtraction are useful for many activities of everyday life, like setting the table, making change at the supermarket, and playing some games. Addition and subtraction prepare children for learning about other math topics, including multiplication and division, and is essential for the development of later concepts including calculations arising from measurements and algebra.

Multiplication & Division: It’s very important that students have an understanding of what they are doing – and not just memorize steps and procedures. They need to be able to analyze and think critically about numbers and how they are related. The traditional multiplication and division algorithms are important (as are the addition and subtraction algorithms) and every student does need to know how to use them, but not until after they have solidified their understanding. Starting with a concrete concept, moving to the pictorial and finally ending with the abstract will help students develop fully mastery of the four basic arithmetic operations.

Fractions: From cooking and carpentry to sports and sewing, we can’t escape fractions in our daily lives. Many teachers will agree that teaching fractions can be complex and confusing, but that understanding fractions is a necessary skill for students to have as they get older. Instead of using rote methods to teach fractions or relying on old techniques such as pie charts, the newer methods of teaching fractions use techniques to help kids really understand what fractions mean through number lines or models.



Checkpoints: Each content topic will have various activities designed to build pedagogical understanding of how to best teach mathematical concepts. Each of the content topics in the course (Number Sense, Place Value, and Algebraic Thinking) is arranged into four sections containing several activities and a “Checkpoint” assignment. Each of the Checkpoints has a specific emphasis:

- Checkpoint #1: Content and Classroom Environment
- Checkpoint #2: Mathematical Habits of Mind and Instructional Strategies
- Checkpoint #3: Application — planning, teaching and video-taping an activity
- Checkpoint #4: Reflection— with a lens on the classroom instruction captured via the video

Course Goals:

- ▶ *Increase content knowledge regarding Grades PK-5 Foundations of Operations: Addition and Subtraction.*
- ▶ *Determine the classroom environment that leads to students applying past knowledge to new situations.*
- ▶ *Deliver and video a task that demonstrates regularity in repeated reasoning, modeling of math situations and acceptance of multiple solution paths.*
- ▶ *Compose a reflection specific to classroom management routines that promote a mathematical community within the classroom with regard to a creative classroom.*
- ▶ *increase content knowledge regarding Grades PK-5 Foundations of Multiplication and Division.*
- ▶ *Determine the classroom environment that leads to the students’ ability to do math and a positive attitude remaining open to learning.*
- ▶ *Deliver and video a task that demonstrates student performing tasks such as modeling mathematical situations while looking for structure in making sense of problems and persevering in solving them.*
- ▶ *Compose a reflection specific to classroom management routines that promote a mathematical community within the classroom with regard to multiplication and division.*
- ▶ *Increase content knowledge regarding Grades PK-5 Foundations of Fractions.*
- ▶ *Determine the classroom environment that leads to increased student engagement and hands-on exploration to make sense of fractions.*
- ▶ *Deliver and video a task that demonstrates acceptance of students’ divergent ideas and shows a culture supportive of quantitative reasoning and construction of viable arguments regarding fractions.*
- ▶ *Compose a reflection specific to classroom management routines that promote a mathematical community within the classroom with regard to fractions.*

Session Overviews

▶ **Part One – Addition and Subtraction (Grades PK-4)**

“Unpacking ideas related to addition and subtraction is a critical step in establishing deeper understanding. Those who teach young students are aware of the subtleties and complexities of the ideas themselves and the challenges of presenting them clearly and coherently in the classroom. Teachers of young students also have an idea of the importance of addition and its inverse operation, subtraction. These are powerful foundational concepts in mathematics,



with applications to many problem situations and connections to many other topics. Addition determines the whole in terms of the parts, and subtraction determines a missing part. This anchors teachers' understanding and their instruction." (NCTM, *Developing Essential Understanding of Addition and Subtraction for Teaching Mathematics in PreK-Grade 2*)

► **Part Two – Multiplication and Division (Grades 2-5)**

Multiplication and division are an important part of everyday life skills. Handling money, sharing items between friends, and cutting food into portions all use multiplication and division skills. Learning multiplication and division ideas and skills at an early age will mean gaining confidence in the subject and provide essential building blocks to higher order math such as algebra. Along the way they will learn how to utilize these skills in the wider world.

"Despite decades of evidence, some adults (teachers, administrators, parents, etc.) are surprised, and often a little incredulous, at the idea that young children can understand complex mathematical concepts and even invent strategies to add, subtract, multiply, and divide without explicitly being told how to do so. I distinctly remember in my third year of teaching watching the mathematics coach at my school engage children in tasks that encouraged them to develop and use the "partial products" algorithm for multiplication. I was astonished that I had never before seen or used this algorithm myself as a child or as a mathematics teacher, given how much sense it made to me (and my students) and how clearly it mapped onto concrete manipulatives and area representations." (Courtney Koestler, 2018)

► **Part Three – Fractions (Grades 1-5)**

Math concepts such as fractions that students do not master in the early grades can go on to confuse them later on and to cause them a great deal of math anxiety. Research shows that students need to intuitively understand concepts rather than just to memorize language or symbols, as such rote memorization does not lead to long-term understanding. Instead of using rote methods to teach fractions or relying on old techniques such as pie charts, the newer methods of teaching fractions use techniques to help kids really understand what fractions mean through number lines or models.

Students learn to add, subtract, multiply, and divide fractions and use these operations to solve problems. Students need a clear-cut model or definition of a fraction in order to come to grips with all of the arithmetic operations. Students who attend public schools now must learn to divide and multiply fractions by fifth grade, according to most state and national math standards.

Course Grades

All grades in the course gradebook must be a checkmark for successful course completion. A checkmark indicates that all work has been completed and the work meets the expectations for that assignment. Quiz scores must meet the minimum expectations as stated in the course.

