2022-2023 Three-Credit Hour Course: Elementary Math
Number Sense, Place Value, and Algebraic Thinking (Grades PK-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, Number Sense, Place Value and Algebraic Thinking are all important basic numeracy concepts that help 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. The course is self-paced but each checkpoint assignment that is submitted must be approved by the mentor (within 24 - 36 hours) before you can advance to the next checkpoint assignment. Each of the three topics requires a video-taped classroom implementation of an activity chosen from an approved list.

Number Sense: Strong number sense helps build a foundation for mathematical understanding. Focusing on number sense in the younger grades helps build the foundation necessary to compute and solve more complex problems in older grades. Building a love for math in children begins with building an understanding of numbers and what they represent.

Place Value: Place value is one of the hardest yet most important skills for primary students to master. "Place value is the understanding that the same numeral represents different amounts depending on which position it is in." (Charlesworth, 2012). Learning about place value helps children know how to "name" numbers and is a necessary conceptual understanding from preschool math to algebra.

Algebraic Thinking: Algebraic thinking is a crucial and fundamental element of mathematical thinking and reasoning. It initially involves recognizing patterns and general mathematical relationships among numbers, objects and geometric shapes. It is important that teachers at all levels provide meaningful experiences that promote and develop algebraic thinking in students.

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 Number Sense,*

▶ *Determine the classroom environment that promotes increased student engagement with number sense to develop fluency, through the use of number talks,*

▶ *Deliver and video a task that demonstrates appropriate use of tools strategically with an emphasis on visual representation, and*

▶ *Compose a reflection specific to classroom management routines that promote a mathematical community within the classroom with regard to number sense in a thinking classroom.*

▶ *Increase content knowledge regarding Grades PK-5 Foundations of Place Value,*

▶ *Determine the classroom environment that leads to increased student engagement and thinking and modeling with regard to place value,*

▶ *Deliver and video a task that demonstrates a culture of questioning and acceptance of students' divergent ideas through discourse, discussions and precise communication while showing respect. and*

▶ *Compose a reflection specific to a classroom environment that promotes thinking, communication of ideas and reasoning using models to understanding place value.*

▶ *Increase content knowledge regarding Grades PK-5 Foundations of Algebraic Thinking,*

▶ *Determine the classroom environment that leads to increased use of modeling mathematical situations to foster abstract thinking and collaborative problem solving,*

▶ *Deliver and video a task that demonstrates students using models while reasoning abstractly and quantitatively to collaboratively solve problems, and*

▶ *Compose a reflection specific to classroom management routines that promote a mathematical community within the classroom with regard to algebraic thinking.*

Session Overviews

▶ **Part One – Number Sense**
"Number sense is the foundation for all higher level mathematics." (Feikes and Schwingendorf, 2008). We are born with a built-in number sense! We have number sense because numbers have meaning for us just like words and music. Number sense encourages students to think flexibly and promotes confidence with numbers. It is acquired gradually as a result of exploration of numbers, seeing numbers in many contexts, and relating numbers in different ways. Students who lack a highly developed sense of numbers have difficulty developing the foundation for simple arithmetic which facilitates more complex mathematical concepts.

▶ **Part Two – Place Value**
Place value is one of the key concepts in mathematics curriculum and therefore it is explicitly in the standards in the lower grades. However, the need for understanding place value will follow students through their mathematics journey. It is essential that students understand the meaning of a number. In order to help students develop an authentic understanding of place value, it is crucial that they construct meaning for themselves through applicable, hands-on activities. Helping students build an authentic understanding of place value through base-ten work and interesting problems, will help them be more successful as mathematicians. Recognizing that numbers can be broken apart, and re-formed, gives students a better

understanding of how addition, subtraction, multiplication and division work. This is especially true when students have a sound understanding of what each part of a whole number represents. (Elizabeth Masalsky)

▸ ***Part Three – Algebraic Thinking***
Algebraic thinking and problem solving are linked by common skills and understandings. Algebraic thinking includes recognizing patterns and relationships, generalizing, and analyzing how things change. A big idea in algebraic thinking is the understanding of equality. Knowing that two mathematical expressions hold the same value is important. Children who understand equality have a way of representing arithmetic ideas and have a way to communicate about and reflect on those ideas. The ability to represent real life situations with symbols and to use those representations to solve problems, strengthens and gives meaning to computation task

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.