KYAE Standards for Mathematics Level 1 (0 – 1.9)

Beginning Adult Basic Education Literacy

KYAE Beginning ABE Literacy (NRS Level 1) Standards for Mathematics present basic math concepts required to function in society.

Guiding Principle: Use Math to Solve Problems and Communicate

Content Strand 1 of 10
Recognize and Compare Numbers

The focus of instruction in the Level 1 **Recognize and Compare Numbers** strand is on developing an understanding of counting, classification, whole numbers, place value and number relationships ("greater than," "less than").

Standard 1.1.1 The adult student will count objects in a given set containing between 1 and 100 objects and write the corresponding numeral.

	Benchmark	Applications	Instructor Notes
a.	Count reliably forward and backward up to 50	Counting items at the grocery express line Watching a digital timer on a microwave count down the time	Counting involves two separate skills: verbalizing the list of standard number words in order ("one, two, three,…") and connecting this sequence with the items in the set being counted, using one-to-one correspondence. Rote counting is a prerequisite skill for the understanding of addition, subtraction, and the ten-to-one concept of place value. Counting backward by rote lays the foundation for subtraction.
b.	Distinguish *odd* and *even numbers* up to 100	Finding a room in a hospital	The patterns developed as a result of skip counting are precursors for recognizing numeric patterns, functional relationships, and concepts underlying money, time telling, and multiplication. Skip counting by twos supports the development of the concept of even numbers.

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c.	Skip count to 50 by twos and to 100 by fives and tens	Counting nickels and dimes	Skip counting by fives lays the foundation for reading a clock effectively and telling time to the nearest five minutes, counting money, and developing the multiplication facts for five. Skip counting by tens is a precursor for use of place value, addition, counting money, and multiplying by multiples of 10.

Standard 1.1.2 The adult student will read aloud, write and compare numbers from 0 up to 100.

	Benchmark	**Applications**	**Instructor Notes**
a.	Group a collection of objects into tens and ones and write the corresponding numeral to develop an understanding of *place value*	Finding an address on a given street	Opportunities to experience the relationship between tens and ones through hands-on experiences with manipulatives are essential to developing an understanding of the ten-to-one place-value concept of our number system.
b.	Express statements of ***inequality*** using the words *greater than* and *less than*	4 is less than 7; 8 is greater than 6	Recording the numeral when using physical and pictorial models leads to an understanding that the position of each digit in a numeral determines the size of the group it represents.

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Content Strand 2 of 10
Rounding and Estimation

The focus of instruction in the Level 1 **Rounding and Estimation** strand is on developing an understanding of place value and establishing a foundation for mental math.

Standards 1.2.1 The adult student will make reasonable estimates.

	Benchmark	Applications	Instructor Notes
a.	Round to the nearest 10 (e.g., Is 63 closer to 60 or 70?)	Estimating amount of purchase to nearest $10	Rounding is finding the nearest easy-to-use number (e.g., the nearest 10) for the situation at hand. Number lines are useful tools for developing the concept of rounding to the nearest ten. Students can use the strategy of identifying a number on a number line and finding the multiple of ten that is closest to the identified number.
b.	Estimate to check the reasonableness of results	Checking possible answers on a test by using estimation	To estimate means to find a number that is close to the exact amount. When asking for an estimate, teachers might ask: "*about* how much?" or "*about* how many?"

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Content Strand 3 of 10
Number Theory and Mathematical Symbols

The focus of instruction in the Level 1 **Number Theory and Mathematical Symbols** strand is on developing a conceptual understanding of addition and subtraction and related symbols.

Standard 1.3.1 The adult student will model and apply meanings of addition and subtraction of numbers up to 100.

	Benchmark	Applications	Instructor Notes
a.	Demonstrate an understanding that combining two or more parts into one whole is *adding*	Using a ten dollar bill and two ones to pay a twelve dollar amount	Demonstrate joining and separating sets to investigate the relationship between addition and subtraction.
b.	Explain that addition can be performed in any order, so that 2 + 3= 3 + 2	Counting coins in any order will give you the same total	
c.	Demonstrate an understanding that *subtraction* represents removing a part or *parts* from the *whole*	Figuring how much of $20 is left after paying out $14	Subtraction is the inverse operation of addition and is used for different reasons: – to remove one amount from another; – to compare one amount to another; and – to find the missing quantity when the whole quantity and part of the quantity are known.
d.	Demonstrate an understanding of how addition and subtraction relate to each other	Add back to check subtraction (e.g., 10 – 6 = 4, 6 + 4 = 10)	Since addition and subtraction are inverse operations, one undoes the other: 3 + __ = 7 7 – 3 = __ 7 – __ = 3 __ + 3 = 7

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Standard 1.3.2 The adult student will identify and use mathematical symbols and words that represent those symbols.			
	Benchmark	**Applications**	**Instructor Notes**
a.	Explain that **+** represents addition	Helping children with homework	
b.	Explain that **–** represents subtraction		
c.	Explain that **=** signifies that the amounts on each side of the **=** are the same		

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Content Strand 4 of 10
Mathematical Operations

The focus of instruction in the Level 1 **Mathematical Operations** strand is on developing the ability to use addition and subtraction to solve a variety of real-world problems.

Standard 1.4.1 The adult student will use the operation of addition and related vocabulary (e.g., *add, sum of, total, plus,* etc.) without a calculator.

	Benchmark	Applications	Instructor Notes
a.	Add numbers with *sums* up to 100	Add the number of boys and the number of girls to get the total number of children in a group	Associate the terms *addition*, *adding*, and *sum* with the concept of joining or combining. Manipulatives may be used initially to develop an understanding of addition and subtraction facts and to engage students in meaningful memorization. Rote recall of the facts is often achieved through constant practice and may come in a variety of formats, including presentation through flash cards, practice sheets and/or games.

Standard 1.4.2 The adult student will use the operation of subtraction and related vocabulary (e.g., *difference, take away, less than, minus,* etc.) without a calculator.

	Benchmark	Applications	Instructor Notes
a.	Subtract single-digit numbers from numbers up to 100	Find the difference between teams' scores at a baseball game	Associate the terms *subtraction*, *subtracting*, *minus*, with the process of "taking away" (i.e., removing a set of objects (the part) from the given set of objects (the whole).

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Standard 1.4.3 The adult student will check calculations involving whole numbers with the use of a calculator.			
	Benchmark	**Applications**	**Instructor Notes**
a. **b.** **c.**	Demonstrate the ability to: identify the *signs for addition*, *subtraction* and *equality* key in numbers and operators in the correct order clear the display before starting a new calculation	Using a calculator to add the cost of items while grocery shopping	

Standard 1.4.4 The adult student will demonstrate the ability to select the appropriate operation to solve real-world problems involving whole numbers.			
	Benchmark	**Applications**	**Instructor Notes**
a.	Identify necessary information to determine whether to add or subtract in simple word problems	Solving mathematical problems that arise	Students should be exposed to both problem types related to addition and subtraction: • find the whole (addition) • find the part (subtraction)

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Content Strand 5 of 10
Measurements

The focus of instruction in the Level 1 **Measurements** strand is on developing the skills to use tools needed for measuring many aspects of everyday life, such as the calendar, clocks, thermometers, rulers and money.

Standard 1.5.1 The adult student will choose and use appropriate units and instruments to measure *length, weight, capacity, time* and *temperature*.

	Benchmark	Applications	Instructor Notes
a.	Use a ruler to measure an object to the nearest whole inch	Measuring the length and width of a photo	The process of measurement involves selecting a unit of measure, comparing the object to be measured to the unit, counting the number of times the object can be measured by the unit and arriving at an approximate total number of units.
b.	Read analog and digital clocks, explaining the use of *AM* and *PM*	Reading a bus schedule	Teaching measurement offers the challenge to involve students actively and physically in learning and to make connections to other math strands, especially geometry.
c.	Use date concepts in common formats (e.g., days of the week, numbers for months, etc.)	Completing forms requesting one's birth date	
d.	Read a thermometer to the nearest degree	Adjusting a thermostat	Temperature is measured using a thermometer. The U.S. Customary unit of measure is degrees Fahrenheit; the metric unit of measure is degrees Celsius.

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Standard 1.5.2 The adult student will identify U.S. currency and coins.			
	Benchmark	**Applications**	**Instructor Notes**
a.	Use different bills and coins to show equivalent amounts of money	Verifying change given by a cashier	
b.	Associate a half dollar with the symbol ½, and a quarter with the symbol ¼		The concept of fractions is introduced with familiar money at this level.
c.	Demonstrate an understanding that two halves make one *whole* and that four quarters make one *whole*	Making change for a one-dollar bill.	It is essential that the concept of *part* and *whole* be understood to lay the foundation for later work with fractions though the words *denominator* and *numerator* are not required.
d.	Demonstrate an understanding that two fourths and one half are equivalent	Making change for a 50-cent piece	

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Content Strand 6 of 10
Geometry

The focus of instruction in the Level 1 **Geometry** strand is on using basic geometric vocabulary to compare, investigate and identify two- and three-dimensional objects.

Standard 1.6.1 The adult student will investigate and explain common uses of shapes in the environment.

	Benchmark	Applications	Instructor Notes
a.	Compare and contrast the concepts **two-dimensional (2-D)** and **three-dimensional (3-D)** to classify geometric *shapes*	Comparing a picture or a drawing of a circle to a globe of the Earth	A two-dimensional figure is a closed shape. Circles and polygons are examples of two-dimensional geometric figures. A three-dimensional figure encloses a region of space. Cubes, cones and spheres are examples of three-dimensional figures.
b.	Draw simple **two-dimensional** figures and describe them using everyday language (e.g., straight, curved, number of sides, etc.)	Recognizing the shape and meaning of a triangular yield sign	Presentation of triangles, rectangles, and squares should be made in a variety of spatial orientations so that students do not develop the common misconception that triangles, rectangles and squares must have one side parallel to the bottom of the page on which they are printed.
c.	Identify and describe examples of **three-dimensional** objects in the environment	Describing a box, a bottle or a coffee cup	

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Standard 1.6.2 The adult student will use the conventions of *length* and *width* to describe a rectangle.			
	Benchmark	**Applications**	**Instructor Notes**
a.	Find the ***perimeter*** of rectangular or square figures up to 20 units	Measuring a floor tile	

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Content Strand 7 of 10
Using Ratios, Proportions and Percents

Concept introduced in Level 2.

Content Strand 8 of 10
Data Interpretation and Probability

The focus of instruction in the Level 1 **Data Interpretation** strand is on developing an understanding of data collection methods and common data displays.

Standard 1.8.1 The adult student will identify and interpret information displayed in various forms of data collection.

	Benchmark	Applications	Instructor Notes
a.	Identify and describe various forms of data collection in the world (e.g., counting, informal surveys, observations, voting, etc.)	Answering phone or written surveys, tracking consumer purchases, polling, grocery shoppers cards	Data is information collected about people or things. The primary purpose of collecting data is to answer questions. The collection of the data often leads to new questions to be investigated.
b.	Identify key features (titles, labels, keys, etc.) of simple *lists*, *graphs* and *tables*	Using a glossary, understanding sports team rankings, making a grocery list	The ability to retrieve information from lists and simple picture graphs is a necessary prerequisite to solving problems.
c.	Identify how *lists* can be ordered in different ways (e.g., *alphabetically, numerically, or randomly*)	Reading a nutrition graph on a health poster	
d.	Read values on a ***bar graph*** up to 100		
e.	Interpret and compare data displays using vocabulary such as *greater than, less than,* more, less, fewer and equal to		Statistics are used to describe and interpret with numbers the world around us; it is a tool for problem solving. Interpretation of the data could lead to additional questions to be investigated.

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Content Strand 9 of 10
Number Line and Grids

The focus of instruction in the Level 1 **Number Line and Grids** strand is on understanding direction as it relates to a number line or locations on a map.

Standard 1.9.1 The adult student will use a number line to represent the counting numbers to 20.

	Benchmark	Applications	Instructor Notes
a.	Demonstrate an understanding that a ***horizontal*** number line moves from left to right using lesser to greater values, and a ***vertical*** number line moves from the bottom up using lesser to greater values	Reading a thermometer	The number line serves as a spatial representation of the relationships between numbers. Familiarity with using the number line as a tool in addition and subtraction lays the foundation for computing with integers.
b.	Use a *number line* to demonstrate simple addition and subtraction problems	6 + 3 = 9 beginning at 6 and counting 3 spaces to the right to end at 9, or 5 -1 = 4 beginning at 5 and counting 1 space to the left to end at 4	

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Standard 1.9.2 The adult student will demonstrate an understanding of cardinal directions.

	Benchmark	Applications	Instructor Notes
a.	Locate **cardinal directions** (N, S, E, W) as displayed on a map	Understanding weather reports using radar tracking	An understanding of the cardinal directions is not only essential to map skills but serves as a precursor to an understanding of the coordinate grid.
b.	Use the **cardinal directions** to describe where one location is relative to another	Reading highway signs	
c.	Explain that *North* is the opposite direction from *South* and that *East* and is the opposite direction from *West*		

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Content Strand 10 of 10
Algebra

The focus of instruction in the Level 1 **Algebra** strand is on developing an understanding of patterns and number sentences.

Standard 1.10.1 The adult student will identify patterns in contextual situations.

	Benchmark	Applications	Instructor Notes
a.	Identify attributes of objects and classify such as *shape, size*, color and number	Sorting laundry	Patterns allow people to recognize order, to generalize and to predict. The simplest types of patterns are repeating patterns.
b.	Discover *patterns* of colors, *shapes* or numbers in everyday settings	Knowing on which side of the hallway a room number is located	To classify is to arrange or organize a set of materials according to a category or attribute (a quality or characteristic of a thing). Though general similarities and differences among items are easily observed, students should use two or more attributes to connect or differentiate sets, such as those found in nature (e.g., leaves with different colors and different shapes).

Standard 1.10.2 The adult student will explain mathematical concepts used in number sentences.

	Benchmark	Applications	Instructor Notes
a.	Demonstrate an understanding of **equality** by recognizing that the *equal sign (=)* links equivalent quantities (e.g., 4 + 3 = 5 + 2)		

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b.	Identify that a blank space in a number sentence represents a missing value and whether that value is a *part* or the *whole*	__ + 5 = 10 or 7 – 3 = ___	Students should begin to understand the use of a symbol (e.g., __, ?, or ☐) to represent an unknown quantity.

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