ESSENTIAL ELEMENTS FOR GRADE 4: MATHEMATICS

**Claim #1: Students demonstrate increasingly complex understanding of number sense.

Operations and Algebraic Thinking

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 4 Standard for Mathematics: 4.OA.4: Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.			
EE.4.OA.4: Show one way to arrive at a product.	**Michigan Range of Complexity:** Not measured at state level, range of complexity determined at classroom level.		

Number and Operations in Base 10

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
Michigan Grade 4 Standard for Mathematics: 4.NBT.2: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.			
EE.4.NBT.2: Compare whole numbers to 10 using symbols (<, >, =).	**EE.4.NBT.H.2**: The student can compare whole numbers to 10 using symbols (<, >, =).	**EE.4.NBT.M.2**: The student can compare whole numbers to 10 using "more than," "less than", and "equal to."	**EE.4.NBT.L.2**: The student can compare 2 sets of objects with extreme differences to determine which has more.
Michigan Grade 4 Standard for Mathematics: 4.NBT.3: Use place value understanding to round multi-digit whole numbers to any place.			
EE.4.NBT.3: Round any whole number 0-30 to the nearest ten.	**EE.4.NBT.H.3**: The student can round whole numbers 0-30 to the nearest 10 using a number line.	**EE.4.NBT.M.3**: The student can round whole numbers 0-20 to the nearest 10 using a number line.	**EE.4.NBT.L.3**: The student can identify which number comes next on a number line using numbers to 5.
Michigan Grade 4 Standard for Mathematics: 4.NBT.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm.			
EE.4.NBT.4: Add and subtract two-digit whole numbers.	**EE.4.NBT.H.4**: The student can add and subtract numbers within 100 where both numbers are multiples of 10 and no regrouping is required.	**EE.4.NBT.M.4**: The student can add and subtract whole numbers within 20 using a number line and/or objects.	**EE.4.NBT.L.4**: The student can add 1 or subtract 1 from a number or quantity, using a number line and/or quantities of objects 1-5.

Number and Operations - Fractions

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
Michigan Grade 4 Standards for Mathematics: **4.NF.1**: Explain why a fraction *a/b* is equivalent to a fraction *(n × a)/(n × b)* by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **Michigan Grade 4 Standards for Mathematics**: **4.NF.2**: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.			
EE.4.NF.1-2: Identify models of one-half (1/2) and one-fourth (1/4).	**EE.4.NF.H.1-2**: The student can recognize that two halves and four fourths equal one whole using a model.	**EE.4.NF.M.1-2**: The student can recognize that two halves equal one whole using a model.	**EE.4.NF.L.1-2**: The student can identify one-half of a real-world object.
Michigan Grade 4 Standards for Mathematics: **4.NF.3**: Understand a fraction *a/b* with *a* > 1 as a sum of fractions *1/b.* **Michigan Grade 4 Standards for Mathematics**: **4.NF.3.a**: Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **Michigan Grade 4 Standards for Mathematics**: **4.NF.3.b**: Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* **Michigan Grade 4 Standards for Mathematics**: **4.NF.3.c**: Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. **Michigan Grade 4 Standards for Mathematics: 4.NF.3.d**: Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.			
EE.4.NF.3: Differentiate between whole and half.	**EE.4.NF.H.3**: The student can differentiate between one-half and one-fourth as related to one whole.	**EE.4.NF.M.3**: The student can differentiate between one half and one whole using a model/ representation of an object.	**EE.4.NF.L.3**: The student can differentiate between a whole object and a half of an object.

****Claim #2: Students demonstrate increasingly complex spatial reasoning and understanding of geometric principles.**

Geometry

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
Michigan Grade 4 Standard for Mathematics: 4.G.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.			
EE.4.G.1: Recognize parallel lines and intersecting lines.	**EE.4.G.H.1**: The student can differentiate between parallel and intersecting lines/line segments.	**EE.4.G.M.1**: The student can recognize intersecting lines/line segments.	**EE.4.G.L.1**: The student can identify a straight line.
Michigan Grade 4 Standard for Mathematics: 4.G.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.			
EE.4.G.2: Describe the defining attributes of two-dimensional shapes.	**Michigan Range of Complexity:** Not measured at state level, range of complexity determined at classroom level.		
Michigan Grade 4 Standard for Mathematics: 4.G.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures, and draw lines of symmetry.			
EE.4.G.3: Recognize that lines of symmetry partition shapes into equal areas.	**Michigan Range of Complexity:** Not measured at state level, range of complexity determined at classroom level.		

Measurement and Data

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
Michigan Grade 4 Standard for Mathematics: 4.MD.3: Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length by viewing the area formula as a multiplication equation with an unknown factor.*			
EE.4.MD.3: Determine the area of a square or rectangle by counting units of measure (unit squares).	**EE.4.MD.H.3**: The student can calculate the area of a rectangle by counting unit squares.	**EE.4.MD.M.3**: The student can differentiate between area and perimeter.	**EE.4.MD.L.3**: The student can match the perimeter (outline) of a shape.
Michigan Grade 4 Standard for Mathematics: **4.MD.5**: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: **Michigan Grade 4 Standard for Mathematics**: **4.MD.5.a**: An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. **Michigan Grade 4 Standard for Mathematics**: **4.MD.5.b**: An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.			
EE.4.MD.5: Recognize angles in geometric shapes.	**Michigan Range of Complexity:** Measured under **EE.4.MD.6**.		
Michigan Grade 4 Standard for Mathematics: 4.MD.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.			
EE.4.MD.6: Identify angles as larger and smaller.	**EE.4.MD.H.6**: The student can compare angles in geometric shapes and describe them as larger or smaller.	**EE.4.MD.M.6**: The student can match shapes with a common attribute (e.g., angles of the same size, same number of angles, same number of sides).	**EE.4.MD.L.6**: The student can identify which shape is the same when presented with a common two-dimensional shape.

****Claim #3: Students demonstrate increasingly complex understanding of measurement, data and analytic procedures.**

Using Measurement and Data

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 4 Standard for Mathematics: 4.MD.1: Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*			
EE.4.MD.1: Identify the smaller measurement unit that comprises a larger unit within a measurement system (inches/foot, centimeter/meter, minutes/ hour).	EE.4.MD.H.1: The student can identify the smaller unit of measure (limited to minutes/hour, inches/ foot), when presented with a real-world context.	EE.4.MD.M.1: The student can recognize minutes/hour as a measure of time and/or inches/foot as a measure of length.	EE.4.MD.L.1: The student can identify tools to measure time and length.
Michigan Grade 4 Standard for Mathematics: 4.MD.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.			
EE.4.MD.2.a: Tell time using a digital clock. Tell time to the nearest hour using an analog clock.	EE.4.MD.H.2.a: The student can tell time to the nearest hour using an analog clock and the nearest half hour using a digital clock.	EE.4.MD.M.2.a: The student can tell time to the hour using a digital clock.	EE.4.MD.L.2.a: The student can relate activities with approximate time of the day.
EE.4.MD.2.b: Measure mass or volume using standard tools.	EE.4.MD.H.2.b: The student can identify and use appropriate tools to measure mass (ruler, scale, measuring tape) and volume (measuring cups, beaker, etc.).	EE.4.MD.M.2.b: The student can measure mass and volume using non-standard units.	EE.4.MD.L.2.b: The student can compare 2 masses or 2 volumes as more or less when presented with amounts that are extremely different.

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
EE.4.MD.2.c: Use standard measurement to compare lengths of objects.	**EE.4.MD.H.2.c**: The student can use standard units of measure (inches/feet) to compare the lengths of 2 objects.	**EE.4.MD.M.2.c**: The student can compare lengths of different objects and describe them as longer, longest, shorter, or shortest.	**EE.4.MD.L.2.c**: The student can identify an object as being long or short when given two objects of vastly different lengths.
EE.4.MD.2.d: Identify coins (penny, nickel, dime, quarter) and their values.	**EE.4.MD.H.2.d**: The student can identify coins and their values (penny, nickel, dime, quarter).	**EE.4.MD.M.2.d**: The student can name coins (penny, nickel, dime, quarter).	**EE.4.MD.L.2.d**: The student can recognize money when compared with other common objects.
Michigan Grade 4 Standard for Mathematics: 4.MD.4: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*			
EE.4.MD.4.a: Represent data on a picture or bar graph given a model and a graph to complete.	**Michigan Range of Complexity:** Not measured at state level, range of complexity determined at classroom level.		
EE.4.MD.4.b: Interpret data from a picture or bar graph.	**EE.4.MD.H.4.b**: The student can use a pictograph or bar graph (with a scale of 1) to read data.	**EE.4.MD.M.4.b**: The student can recognize quantity of data as most or least in a bar graph or picture graph.	**EE.4.MD.L.4.b**: The student can recognize symbols as representing data on a simple graph (limited to 2 data points).

****Claim #4: Students solve increasingly complex mathematical problems, making productive use of algebra and functions.**

Problem Solving

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 4 Standard for Mathematics: **4.OA.1**: Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. **Michigan Grade 4 Standard for Mathematics**: **4.OA.2**: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.			
EE.4.OA.1-2: Demonstrate the connection between repeated addition and multiplication.	**EE.4.OA.H.1-2**: The student can use models of repeated addition to solve a multiplication problem.	**EE.4.OA.M.1-2**: The student can identify models that represent the sum of two sets of objects of the same quantity with sets of no more than 5.	**EE.4.OA.L.1-2**: The student can identify a group of objects or pictures with the same quantity as another group of objects or pictures.
Michigan Grade 4 Standard for Mathematics: **4.OA.3**: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.			
EE.4.OA.3: The student can solve one-step real-world problems using addition or subtraction within 100.	**EE.4.OA.H.3**: The student can solve one-step problems using addition or subtraction within 100 without regrouping.	**EE.4.OA.M.3**: The student can solve addition and subtraction problems within 20 without regrouping with or without the use of manipulatives, and/or a calculator.	**EE.4.OA.L.3**: The student can solve real-world addition and subtraction problems within 5 without regrouping with or without the use of manipulatives or a calculator.

Target Essential Element	Michigan Range of Complexity		
	High Range	**Medium Range**	**Low Range**
Michigan Grade 4 Standard for Mathematics: 4.OA.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*			
EE.4.OA.5: Use repeating patterns to make predictions.	**EE.4.OA.H.5**: The student can create, describe, and extend simple number patterns.	**EE.4.OA.M.5**: The student can create, describe, and/or extend simple number patterns or patterns involving counting objects or symbols.	**EE.4.OA.L.5**: The student can extend patterns involving objects or symbols.

Target Essential Elements as developed by: Dynamic Learning Maps Consortium (2013). Dynamic Learning Maps Essential Elements for Mathematics. Lawrence, KS: University of Kansas.