ESSENTIAL ELEMENTS FOR GRADE 5: MATHEMATICS

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

Number and Operations in Base 10

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 5 Standard for Mathematics: 5.NBT.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.			
EE.5.NBT.1: Compare numbers up to 99 using base-ten models.	**EE.5.NBT.H.1**: The student can compare two quantities up to 99 using base-ten models.	**EE.5.NBT.M.1**: The student can compare two quantities (0-20) using models.	**EE.5.NBT.L.1**: The student can compare two quantities of objects (0-10) with extreme differences to determine which set has more.
Michigan Grade 5 Standard for Mathematics: 5.NBT.2: Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.			
EE.5.NBT.2: Use the number of zeros in numbers that are powers of 10 to determine which values are equal, greater than, or less than.	**EE.5.NBT.H.2**: The student can order numbers that are multiples of ten ranging from 0 to 10,000 in sequential order least to greatest.	**EE.5.NBT.M.2**: The student can order multiples of ten ranging from 0-50 in sequential order least to greatest.	**EE.5.NBT.L.2**: The student can identify the sequential order of numbers up to 10.

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 5 Standard for Mathematics: 5.NBT.3: Read, write, and compare decimals to thousandths. **Michigan Grade 5 Standard for Mathematics: 5.NBT.3.a**: Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). **Michigan Grade 5 Standard for Mathematics: 5.NBT.3.b**: Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.			
EE.5.NBT.3: Compare whole numbers up to 100 using symbols (<, >, =).	**EE.5.NBT.H.3**: The student can compare whole numbers up to 100 using symbols (=, <, >).	**EE.5.NBT.M.3**: The student can identify which numerals (0-10) are "greater than", "more than", "less than" or "fewer than" a target numeral.	**EE.5.NBT.L.3**: The student can identify which numeral, paired with a visual representation of its quantity, is greater than another numeral paired with a visual representation of its quantity (numerals 1-10).
Michigan Grade 5 Standard for Mathematics: 5.NBT.4: Use place value understanding to round decimals to any place.			
EE.5.NBT.4: Round two-digit whole numbers to the nearest 10 from 0—90.	**EE.5.NBT.H.4**: The student can round two-digit whole numbers (0-90) to the nearest ten using a number line indicating the tens.	**EE.5.NBT.M.4**: The student can round whole numbers (0-20) to the nearest ten using a number line.	**EE.5.NBT.L.4**: The student can determine if a single-digit number is closer to 0 or 10 on a number line.
Michigan Grade 5 Standard for Mathematics: 5.NBT.5: Fluently multiply multi-digit whole numbers using the standard algorithm.			
EE.5.NBT.H.5: Multiply numbers up to 5 x 5.	**EE.5.NBT.H.5**: The student can multiply numbers up to 5 x 5.	**EE.5.NBT.M.5**: The student can use visual models or objects to depict repeated addition related to a multiplication problem using single digits to 3.	**EE.5.NBT.L.5**: The student can combine two sets with an equal number of objects in each set.

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 5 Standard for Mathematics: 5.NBT.6: Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Michigan Grade 5 Standard for Mathematics: 5.NBT.7**: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.			
EE.5.NBT.6-7: Illustrate the concept of division using fair and equal shares.	**EE.5.NBT.H.6-7**: The student can partition a set into equal subsets to solve a problem.	**EE.5.NBT.M.6-7**: The student can divide objects into two equal sets.	**EE.5.NBT.L.6-7**: The student can replicate or identify an equal set from a model.

Number and Operations - Fractions

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 5 Standard for Mathematics: 5.NF.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*			
EE.5.NF.1: Identify models of halves (1/2, 2/2) and fourths (1/4, 2/4, 3/4, 4/4).	**EE.5.NF.H.1**: The student can differentiate between halves (1/2, 2/2) and fourths (1/4, 2/4, 3/4, 4/4).	**EE.5.NF.M.1**: The student can identify one-half and one-fourth in a model.	**EE.5.NF.L.1**: The student can differentiate between a whole and one-half.
Michigan Grade 5 Standard for Mathematics: 5.NF.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*			
EE.5.NF.2: Identify models of thirds (1/3. 2/3, 3/3) and tenths (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10).	**EE.5.NF.H.2**: The student can recognize thirds (1/3, 2/3, 3/3) and tenths (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10) on a model.	**EE.5.NF.M.2**: The student can identify the unit fractions 1/3 and 1/10 when provided with models.	**EE.5.NF.L.2**: The student can identify how many equal parts a shape or object are separated into, limited to 1 and 3.

****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 5 Standard for Mathematics: 5.G.1: Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **Michigan Grade 5 Standard for Mathematics**: 5.G.2: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. **Michigan Grade 5 Standard for Mathematics**: 5.G.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.* **Michigan Grade 5 Standard for Mathematics**: 5.G.4: Classify two-dimensional figures in a hierarchy based on properties.			
EE.5.G.1-4: Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.	EE.5.G.H.1-4: The student can sort two-dimensional figures using attributes (e.g., angles, numbers of sides) they have in common.	EE.5.G.M.1-4: The student can identify two-dimensional figures with a common attribute.	EE.5.G.L.1-4: The student can identify two-dimensional shapes (circle, square, star).

Measurement and Data

Target Essential Element	Michigan Range of Complexity		
	High Range	Medium Range	Low Range
Michigan Grade 5 Standard for Mathematics: **5.MD.3**: Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **Michigan Grade 5 Standard for Mathematics**: **5.MD.3.a**: A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. **Michigan Grade 5 Standard for Mathematics**: **5.MD.3.b**: A solid figure, which can be packed without gaps or overlaps using *n* unit cubes, is said to have a volume of *n* cubic units.			
EE.5.MD.3: Identify common three-dimensional shapes.	**EE.5.MD.H.3**: The student can identify a sphere, cube, cone, and cylinder.	**EE.5.MD.M.3**: The student can match objects to their outlines.	**EE.5.MD.L.3**: The student can differentiate between round and square or sphere and cube.
Michigan Grade 5 Standard for Mathematics: **5.MD.4**: Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft, and improvised units. **Michigan Grade 5 Standard for Mathematics**: **5.MD.5**: Relate volume to the operations of multiplication and addition, and solve real-world and mathematical problems involving volume. **Michigan Grade 5 Standard for Mathematics**: **5.MD.5.a**: Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. **Michigan Grade 5 Standard for Mathematics**: **5.MD.5.b**: Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. **Michigan Grade 5 Standard for Mathematics**: **5.MD.5.c**: Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.			
EE.5.MD.4-5: Determine the volume of a rectangular prism by counting units of measure (unit cubes).	**EE.5.MD.H.4-5**: The student can determine the volume of a rectangular prism by counting unit cubes.	**EE.5.MD.M.4-5**: The student can demonstrate understanding that 3D shapes have volume.	**EE.5.MD.L.4-5**: The student can differentiate between empty and full.

****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 5 Standard for Mathematics: 5.MD.1: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.			
EE.5.MD.1.a: Tell time using an analog or digital clock to the half or quarter hour.	**EE.5.MD.H.1.a**: The student can tell time to the quarter hour using a digital clock or to the half hour using an analog clock.	**EE.5.MD.M.1.a**: The student can tell time to the hour using a digital clock or analog clock.	**EE.5.MD.L.1.a**: The student can associate activities with morning and afternoon.
EE.5.MD.1.b: Use standard units to measure weight and length of objects.	**EE.5.MD.H.1.b**: The student can use an appropriate tool and customary units of measurement to measure length (inches/feet) and weight of objects (ounces/pounds).	**EE.5.MD.M.1.b**: The student can identify the appropriate tool for measuring length and weight.	**EE.5.MD.L.1.b**: The student can compare the lengths or masses of two objects to determine which one is longer or heavier, where the difference is vastly different.
EE.5.MD.1.c: Indicate relative value of collections of coins.	**EE.5.MD.H.1.c**: The student can tell the amount of money using collections of coins up to and including $10.00.	**EE.5.MD.M.1.c**: The student can identify an equivalent value of a nickel, dime, and quarter.	**EE.5.MD.L.1.c**: The student can match coins of the same denomination (penny, nickel, dime, and quarter) when presented within a group.

Michigan Grade 5 Standard for Mathematics: **5.MD.2**: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*			
EE.5.MD.2: Represent and interpret data on a picture, line plot, or bar graph.	**EE.5.MD.H.2**: The student can read and interpret data from charts, tables, graphs, tallies and pictographs.	**EE.5.MD.M.2**: The student can identify what type or quantity of data are needed to answer a question, solve a problem, or complete a chart or pictograph.	**EE.5.MD.L.2**: The student can identify the category in a bar graph or picture graph that has the most or least when the quantities have extreme differences.

****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 5 Standard for Mathematics: 5.OA.3: Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*			
EE.5.OA.3: Identify and extend numerical patterns.	EE.5.OA.H.3: The student can create, describe and extend simple number patterns that involve a simple addition or subtraction rule.	EE.5.OA.M.3: The student can extend a simple ABAB, ABC or ABBA pattern involving shapes, numbers or objects.	EE.5.OA.L.3: The student can extend a simple AB pattern using pictures, objects or familiar symbols.

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