Indiana Academic Standards
Mathematics
Vertical Articulation: Kindergarten - Grade 2

Introduction

The Indiana Academic Standards for mathematics are the result of a process designed to identify, evaluate, synthesize, and create the highest quality, rigorous standards for Indiana students. The standards are designed to ensure that all Indiana students are prepared for both college and career opportunities upon graduation. In alignment with Indiana's plan under the Every Student Succeeds Act (ESSA), the standards reflect the core belief that all students are capable of high-level achievement.

What are the Indiana Academic Standards?

The Indiana Academic Standards are designed to help educators, parents, students, and community members understand what students need to know and be able to do at each grade level, and within each content strand, in order to exit high school college- and career-ready. The academic standards should form the basis for strong Tier 1 instruction at each grade level and for each content area for all students, in alignment with Indiana's vision for Multi-Tiered Systems of Supports (MTSS). While the standards have identified the academic content or skills that Indiana students need to be prepared for both college and career, they are not an exhaustive list. Students require a wide range of physical, social, and emotional support to be successful. This leads to a second core belief outlined in Indiana's ESSA plan that learning requires an emphasis on the whole child.

While the standards may be used as the basis for curriculum, the Indiana Academic Standards are not a curriculum. Curricular tools, including textbooks, are selected by the corporation/school and adopted through the local school board. However, a strong standards-based approach to instruction is encouraged, as most curricula will not align perfectly with the Indiana Academic Standards. Additionally, attention should be given at the corporation- and school-level to the instructional sequence of the standards as well as to the length of time needed to teach each standard. Every standard has a unique place in the continuum of learning - omitting one will certainly create gaps - but each standard will not require the same amount of time and attention. A deep understanding of the vertical articulation of the standards will enable educators to make the best instructional decisions. The Indiana Academic Standards must also be complemented by robust, evidence-based instructional practices, geared to the development of the whole child. By utilizing well-chosen instructional practices, social-emotional competencies and employability skills can be developed in conjunction with the content standards.

What is the purpose of a Vertical Articulation Guide?

A Vertical Articulation Guide serves to support educators in planning instruction that builds upon foundational skills and leads to more advanced skills. This document demonstrates how each standard progresses between each grade level. Educators may use this document to guide instructional practices for remediation or enrichment and develop curriculum maps for each grade level.

Academic Impact

The COVID-19 pandemic has significantly impacted student learning. Students experienced moderate to significant impacts that require more than one year of supplemental academic support to recover the impact. Most students were impacted academically. Review additional information on the Executive Summary of the Indiana Academic Impact Analysis here.

Mathematics - *Number Sense*		
KINDERGARTEN	**GRADE 1**	**GRADE 2**
K.NS.1: Count to at least 100 by ones and tens and count on by one from any number.	**1.NS.1**: Count to at least 120 by ones, fives, and tens from any given number. In this range, read and write numerals and represent a number of objects with a written numeral.	**2.NS.1**: Count by ones, twos, fives, tens, and hundreds up to at least 1,000 from any given number.
K.NS.2: Write whole numbers from zero to 20 and recognize number words from zero to 10. Represent a number of objects with a written numeral zero to 20 (with zero representing a count of no objects).		**2.NS.2:** Read and write whole numbers up to 1,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 1,000.
	1.NS.3: Match the ordinal numbers first, second, third, etc., with an ordered set up to 10 items.	**2.NS.4:** Match the ordinal numbers first, second, third, etc., with an ordered set up to 30.
K.NS.3: Find the number that is one more than or one less than any whole number up to 20.	**1.NS.5:** Find mentally 10 more or 10 less than a given two-digit number without having to count, and explain the thinking process used to get the answer.	
K.NS.4: Say the number names in standard order when counting objects, pairing each object with one and only one number name and each number name with one and only one object. Understand that the last number name said describes the number of objects counted and that the number of objects is the same regardless of their arrangement or the order in which they were counted.		
K.NS.5: Count up to 20 objects arranged in a line, a rectangular array, or a circle. Count up to 10 objects in a scattered configuration. Count out the number of objects, given a number from one to 20.		**2.CA.5** Use addition to find the total number of objects arranged in rectangular arrays with up to five rows and up to five columns; write an equation to express the total as a sum of equal groups.

K.NS.6: Recognize sets of one to 10 objects in patterned arrangements and tell how many without counting.	**1.CA.1:** Demonstrate fluency with addition facts and the corresponding subtraction facts within 20. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13). Understand the role of zero in addition and subtraction.	**2.CA.1** Add and subtract fluently within 100.
K.NS.7: Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group (e.g., by using matching and counting strategies).	**1.NS.4:** Use place value understanding to compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	**2.NS.7:** Use place value understanding to compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
K.NS.8: Compare the values of two numbers from one to 20 presented as written numerals.		**2.NS.3:** Plot and compare whole numbers up to 1,000 on a number line.
K.NS.9: Correctly use the words for comparison, including: one and many; none, some and all; more and less; most and least; and equal to, more than and less than.		
K.NS.10: Separate sets of 10 or fewer objects into equal groups.		**2.NS.5:** Determine whether a group of objects (up to 20) has an odd or even number of members (e.g., by placing that number of objects in two groups of the same size and recognizing that for even numbers no object will be left over and for odd numbers one object will be left over, or by pairing objects or counting them by twos).
K.NS.11: Develop initial understandings of place value and the base 10 number system by showing equivalent forms of whole numbers from 10 to 20 as groups of tens and ones using objects and drawings.	**1.NS.2:** Understand that 10 can be thought of as a group of 10 ones — called a “ten." Understand that the numbers from 11 to 19 are composed of a 10 and one, two, three, four, five, six, seven, eight, or nine	**2.NS.6:** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (e.g., 706 equals 7 hundreds, 0 tens, and 6 ones). Understand that 100 can be thought of

	ones. Understand that the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and zero ones).	as a group of 10 tens — called a “hundred." Understand that the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and zero tens and zero ones).
	1.NS.6: Show equivalent forms of whole numbers as groups of tens and ones, and understand that the individual digits of a two-digit number represent amounts of tens and ones.	

Mathematics - *Computation and Algebraic Thinking*		
KINDERGARTEN	**GRADE 1**	**GRADE 2**
K.CA.1: Use objects, drawings, mental images, sounds, etc., to represent addition and subtraction within 10.	**1.CA.1:** Demonstrate fluency with addition facts and the corresponding subtraction facts within 20. Use strategies such as counting on; making 10 (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a 10 (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13). Understand the role of zero in addition and subtraction.	**2.CA.1:** Add and subtract fluently within 100.
K.CA.3: Use objects, drawings, etc., to decompose numbers less than or equal to 10 into pairs in more than one way, and record each decomposition with a drawing or an equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). [In kindergarten, students should see equations and be encouraged to trace them, however, writing equations is not required.]		
K.CA.4: Find the number that makes 10 when added to the given number for any number from one to nine (e.g., by using objects or drawings), and record the answer with a drawing or an equation.		
	1.CA.5: Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; describe the	**2.CA.4:** Add and subtract within 1000, using models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; describe the strategy and explain the reasoning used. Understand that in adding or subtracting three-digit

	strategy and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and that sometimes it is necessary to compose a 10.	numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones, and that sometimes it is necessary to compose or decompose tens or hundreds.
K.CA.2: Solve real-world problems that involve addition and subtraction within 10 (e.g., by using objects or drawings to represent the problem).	**1.CA.2:** Solve real-world problems involving addition and subtraction within 20 in situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all parts of the addition or subtraction problem (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem).	**2.CA.2:** Solve real-world problems involving addition and subtraction within 100 in situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all parts of the addition or subtraction problem (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). Use estimation to decide whether answers are reasonable in addition problems.
	1.CA.3: Create a real-world problem to represent a given equation involving addition and subtraction within 20.	**2.CA.3:** Solve real-world problems involving addition and subtraction within 100 in situations involving lengths that are given in the same units (e.g., by using drawings, such as drawings of rulers, and equations with a symbol for the unknown number to represent the problem).
	1.CA.4: Solve real-world problems that call for addition of three whole numbers whose sum is within 20 (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem).	
K.CA.5: Create, extend, and give an appropriate rule for simple repeating and growing patterns with numbers and shapes.	**1.CA.7:** Create, extend, and give an appropriate rule for number patterns using addition within 100.	**2.CA.7:** Create, extend, and give an appropriate rule for number patterns using addition and subtraction within 1000.
	1.CA.6: Understand the meaning of the equal sign, and determine if equations involving addition and	**2.CA.6:** Show that the order in which two numbers are added (commutative property) and how the

	subtraction are true or false (e.g., Which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2).	numbers are grouped in addition (associative property) will not change the sum. These properties can be used to show that numbers can be added in any order.

Mathematics - *Geometry*		
KINDERGARTEN	**GRADE 1**	**GRADE 2**
K.G.1: Describe the positions of objects and geometric shapes in space using the terms inside, outside, between, above, below, near, far, under, over, up, down, behind, in front of, next to, to the left of and to the right of.		
K.G.2: Compare two- and three-dimensional shapes in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).	**1.G.1:** Identify objects as two-dimensional or three-dimensional. Classify and sort two-dimensional and three-dimensional objects by shape, size, roundness and other attributes. Describe how two-dimensional shapes make up the faces of three-dimensional objects.	**2.G.1:** Identify, describe, and classify two- and three-dimensional shapes (triangle, square, rectangle, cube, right rectangular prism) according to the number and shape of faces and the number of sides and/or vertices. Draw two-dimensional shapes.
K.G.3: Model shapes in the world by composing shapes from objects (e.g., sticks and clay balls) and drawing shapes.	**1.G.2:** Distinguish between defining attributes of two- and three-dimensional shapes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size). Create and draw two-dimensional shapes with defining attributes.	**2.G.2:** Create squares, rectangles, triangles, cubes, and right rectangular prisms using appropriate materials.
K.G.4: Compose simple geometric shapes to form larger shapes (e.g., create a rectangle composed of two triangles).	**1.G.3**: Use two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.	**2.G.3:** Investigate and predict the result of composing and decomposing two- and three-dimensional shapes.

	[In grade 1, students do not need to learn formal names such as "right rectangular prism."]	
	1.G.4: Partition circles and rectangles into two and four equal parts; describe the parts using the words halves, fourths, and quarters; and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of, the parts. Understand for partitioning circles and rectangles into two and four equal parts that decomposing into equal parts creates smaller parts.	**2.G.4:** Partition a rectangle into rows and columns of same-size (unit) squares and count to find the total number of same-size squares.
		2.G.5: Partition circles and rectangles into two, three, or four equal parts; describe the shares using the words halves, thirds, half of, a third of, etc.; and describe the whole as two halves, three thirds, four fourths. Recognize that equal parts of identical wholes need not have the same shape.

Mathematics - *Measurement*		
KINDERGARTEN	**GRADE 1**	**GRADE 2**
K.M.1: Make direct comparisons of the length, capacity, weight, and temperature of objects, and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler, or holds more.	**1.M.1:** Use direct comparison or a nonstandard unit to compare and order objects according to length, area, capacity, weight, and temperature.	**2.M.1:** Describe the relationships among inch, foot, and yard. Describe the relationship between centimeter and meter.
		2.M.2: Estimate and measure the length of an object by selecting and using appropriate tools, such as rulers, yardsticks, meter sticks, and measuring tapes to the nearest inch, foot, yard, centimeter, and meter.
		2.M.3: Understand that the length of an object does not change regardless of the units used. Measure the length of an object twice using length units of different lengths for the two measurements. Describe how the two measurements relate to the size of the unit chosen.
		2.M.4: Estimate and measure volume (capacity) using cups and pints.

K.M.2: Understand concepts of time, including: morning, afternoon, evening, today, yesterday, tomorrow, day, week, month, and year. Understand that clocks and calendars are tools that measure time.	**1.M.2:** Tell and write time to the nearest half-hour and relate time to events (before/after, shorter/longer) using analog clocks. Understand how to read hours and minutes using digital clocks.	**2.M.5:** Tell and write time to the nearest five minutes from analog clocks, using a.m. and p.m. Solve real-world problems involving addition and subtraction of time intervals on the hour or half hour.
		2.M.6: Describe relationships of time, including: seconds in a minute; minutes in an hour; hours in a day; days in a week; and days, weeks, and months in a year.
	1.M.3: Identify the value of a penny, nickel, and dime and a collection of pennies, nickels, and dimes.	**2.M.7:** Find the value of a collection of pennies, nickels, dimes, quarters, and dollars.

Mathematics - *Data Analysis*

KINDERGARTEN	GRADE 1	GRADE 2
K.DA.1: Identify, sort, and classify objects by size, number, and other attributes. Identify objects that do not belong to a particular group and explain the reasoning used.	**1.DA.1:** Organize and interpret data with up to three choices (What is your favorite fruit? apples, bananas, oranges); ask and answer questions about the total number of data points, how many in each choice, and how many more or less in one choice compared to another.	**2.DA.1:** Draw a picture graph (with single-unit scale) and a bar graph (with single-unit scale) to represent a data set with up to four choices (What is your favorite color? red, blue, yellow, green). Solve simple put-together, take-apart, and compare problems using information presented in the graphs.