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Indiana Department of Education

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INCC/IAS Instructional and Assessment Guidance 2013-14

The purpose of this guidance document is to assist classroom teachers in their transition to Indiana's Common Core (INCC) from the Indiana Academic Standards (IAS) and to be transparent in providing guidance regarding the 2014 ISTEP+ Assessments. This is not meant to be a simple "checklist" for teachers, but more for instructional planning to ensure that the standards are developed and assessed appropriately.

The information below contains critical information for math instruction and assessment guidance.

- INCC Standards are identified at the cluster level as either **Major**, **Supporting**, or **Additional Clusters**.
    - Major Clusters contain standards that should be the primary instructional focus. These standards take additional time to master and are important to future mathematics.
    - Supporting Clusters are designed to support and strengthen the work within the Major Clusters.
    - Additional Clusters contain standards that do not explicitly connect to the major work of the grade, but connect to content in previous and/or subsequent grades.
- **The Standards for Mathematical Practice** must be practiced daily in connection with the math content to provide opportunities for students to develop skills of sense-making, reasoning, arguing and critiquing, modeling, attending to precision, etc.
- The Indiana indicators that appear in **parentheses** after a Common Core Standard represent strong alignment between IAS and INCC; therefore, instruction of the INCC standard will include the Indiana indicator and will not need separate attention.
- The Indiana indicators that appear separately below INCC standards with the Indiana indicator text must be taught. These indicators do not align well with INCC standards, but may be assessed on ISTEP+. Therefore, it is critical that students have an opportunity to learn this material.
- The Indiana indicators that have an **asterisk mark (*)** may be assessed on the 2014 ISTEP+ Applied Skills Assessment in March and Multiple-Choice Assessment in April/May. Be sure to cover this material before March to give students an opportunity to learn the material that may be assessed on the Applied Skills Assessment.
- All of the Indiana indicators listed in this document may be assessed on the 2014 ISTEP+ Multiple-Choice Assessment in April/May. The Indiana indicators not listed in this document will not be assessed on ISTEP+, therefore, should not be taught in order to allow more time to focus on the most critical content.
- There is important information regarding **IMAST students** in Grades (5 – 7) on the grade level summary page.

Grade 4 Mathematics: INCC/IAS Instructional and Assessment Guidance 2013-14

Major Clusters **Supporting Clusters** **Additional Clusters**

Operations and Algebraic Thinking

Use the four operations with whole numbers to solve problems.

4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 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.

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.

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.

IAS 4.3.1 Use letters, boxes, or other symbols to represent any number in simple expressions, equations, or inequalities.

IAS 4.3.6 Recognize and apply the relationships between addition and multiplication, between subtraction and division, and the inverse relationship between multiplication and division to solve problems.

IAS 4.3.7 Relate problem situations to number sentences involving multiplication and division.

Gain familiarity with factors and multiples.

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.

Generate and analyze patterns.

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.*

IAS 4.3.2 Use and interpret formulas to answer questions about quantities and their relationship.

IAS 4.3.4 Understand that an equation such as $y=3x+5$ is a rule for finding a second number when a first number is given.

IAS 4.3.5 Continue number patterns using multiplication and division.

Major Clusters | Supporting Clusters | Additional Clusters

Number and Operations in Base Ten

Generalize place value understanding for multi-digit whole numbers.

Grade 4 expectations in this doman are limited to whole numbers less than or equal to 1,000,000.

4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*

4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, 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. (*IAS 4.1.1, *4.1.4)

4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place. (*IAS 4.1.3)

***IAS 4.1.2** Identify and write whole numbers up to 1,000,000, given a place-value model.

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Grade 4 expectations in this doman are limited to whole numbers less than or equal to 1,000,000.

4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. (*IAS 4.2.1)

4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (*IAS 4.2.4, *4.2.5)

4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-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. (*IAS 4.2.6)

***IAS 4.2.10** Use a standard algorithm to add and subtract decimals (to hundredths).

Number and Operations - Fractions

Extend understanding of fraction equivalence and ordering.

Grade 4 expectations in this doman are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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.

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.

***IAS 4.1.5** Rename and rewrite whole numbers as fractions.

***IAS 4.1.6** Name and write mixed numbers, using objects or pictures.

***IAS 4.1.7** Name and write mixed numbers as improper fractions, using objects or pictures.

Major Clusters | Supporting Clusters | Additional Clusters

Number and Operations - Fractions

Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

Grade 4 expectations in this doman are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

4.NF.3 Understand a fraction *a/b* with *a* > 1 as a sum of fractions 1/*b* .

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

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.

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.

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.

4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

a. Understand a fraction *a/b* as a multiple of 1/*b* . *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*

b. Understand a multiple of a/b as a multiple of 1/*b* , and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*

c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

***IAS 4.2.8** Add and subtract simple fractions with different denominators, using objects or pictures.

Understand decimal notation for fractions, and compare decimal fractions.

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100.

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. Note: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade. *For example, express 3/10 as 30/100 and add 3/10 + 4/100 = 34/100.*

4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100 ; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*

4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

***IAS 4.1.8** Write tenths and hundredths in decimal and fraction notations. Know the fraction and decimal equivalents for halves and fourths. (e.g.,1/2 = 0.5 = 0.50, 7/4 = 1 3/4 = 1.75).

***IAS 4.1.9** Round two-place decimals to tenths or to the nearest whole number.

Major Clusters | Supporting Clusters | Additional Clusters

Measurement and Data

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

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), ...*

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. (*IAS 4.5.2, *4.5.9)

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.* (*IAS 4.5.3, *4.5.4)

***IAS 4.5.1** Measure length to the nearest quarter-inch, eighth-inch and millimeter.

Represent and interpret data

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.*

IAS 4.6.2 Interpret data graphs to answer questions about a situation.

IAS 4.6.3 Summarize and display the results of probability experiments in a clear and organized way.

Geometric measurement: understand concepts of angle and measure angles.

4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

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.

b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Major Clusters Supporting Clusters Additional Clusters

Geometry		***Draw and identify lines and angles, and classify shapes by properties of their lines and angles.***
	4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse, straight), and perpendicular, parallel, and oblique lines. Identify these in two-dimensional figures. (*IAS 4.4.1, *4.4.2)
	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.
	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. (*IAS 4.4.5)
	***IAS 4.4.3**	Identify, describe, and draw parallelograms, rhombuses, and trapezoids, using appropriate mathematical tools and technology.
	***IAS 4.4.4**	Identify congruent quadrilaterals and give reasons for congruence using sides, angels, parallels and perpendiculars.

Standards for Mathematical Practice

There are similarities among the Indiana Academic Problem Solving Standards and Indiana's Common Core Standards for Mathematical Practice (SMP). The SMPs should be included in daily instruction in connection with the content standards. These practices will be assessed during the Applied Skills portion of ISTEP+.

1. Make sense of problems and persever in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Grade 4 Instruction and Assessment Summary

The Standards for Mathematical Practice (SMP)

The SMP should be taught in connection with the math content. The SMP are similar to Indiana's Problem Solving Standards which are assessed on ISTEP+. Please ensure sufficient practice with the SMP to ensure that students are prepared for ISTEP+.

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

Operations and Algebraic Thinking	Number and Operations in Base Ten	Number and Operations - Fractions	Measurement and Data	Geometry
4.OA.1	4.NBT.1	4.NF.1	4.MD.1	4.G.1 (*IAS 4.4.1, *4.4.2)
4.OA.2	4.NBT.2 (*IAS 4.1.1, *4.1.4)	4.NF.2	4.MD.2 (*IAS 4.5.2, *4.5.9)	4.G.2
4.OA.3	4.NBT.3 (*IAS 4.1.3)	4.NF.3	4.MD.3 (*IAS 4.5.3, *4.5.4)	4.G.3 (*IAS 4.4.5)
4.OA.4	4.NBT.4 (*IAS 4.2.1)	4.NF.4	4.MD.4	
4.OA.5	4.NBT.5 (*IAS 4.2.4, *4.2.5)	4.NF.5	4.MD.5	
	4.NBT.6 (*IAS 4.2.6)	4.NF.6	4.MD.6	
		4.NF.7	4.MD.7	
IAS not aligned to INCC (and assessed on ISTEP+)				
IAS 4.3.1, 4.3.2, (4.3.4 – 4.3.7)	*IAS 4.1.2, *4.2.10	*IAS (4.1.5 – 4.1.9), *4.2.8	*IAS 4.5.1, 4.6.2, 4.6.3	*IAS 4.4.3, *4.4.4

***** *Content that may be assessed on the 2014 ISTEP+ Applied Skills Assessment in March and Multiple-Choice Assessment in April/May.*

Note: All of the Indiana indicators listed in this document may be assessed on the 2014 ISTEP+ Multiple-Choice Assessment in April/May. Also note that the Multiple-Choice Assessment makes up approximately 70% of a student's scale score and the Applied Skills Assessment makes up approximately 30% of a student's scale score.