Grade 6 Mathematics

This document provides correlations between the 2023 Indiana Academic Standards (IAS) and the Common Core State Standards (CCSS) for easy reference. This correlation guide is intended to help support conversations regarding state and national standards and may be used as one of many tools to help inform a variety of local decisions (e.g., selection of high-quality curricular materials, curriculum maps).

The 2023 Indiana Academic Standards resulted from the standards streamlining process required by Indiana Code (IC) 20-31-3-1(c-d) and were adopted by the Indiana State Board of Education in June 2023. Standards designated as essential (E) for student mastery by the end of the grade level are shaded in gray and all standards were renumbered to avoid gaps in sequencing.

2023 Indiana Academic Standard		Common Core State Standard		Differences Between 2023 IAS and CCSS
Domain: Number Sense				
Number	**Text**	**Number**	**Text**	**Description**
6.NS.1	Use positive and negative numbers to represent and compare quantities in real-world contexts, explaining the meaning of 0 in each situation. (E)	**6.NS.5**	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	*No content differences identified.*

6.NS.2	Explain how opposite signs of numbers indicate locations on opposite sides of 0 on the number line; identify the opposite of the opposite of a number.	**6.NS.6.a**	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.	*No content differences identified.*
6.NS.3	Compare and order rational numbers and plot them on a number line. Write, interpret, and explain statements of order for rational numbers in real-world contexts.	**6.NS.6c**	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	CCSS includes positioning numbers on a coordinate plane and horizontal number lines.
		6.NS.7	Understand ordering and absolute value of rational numbers.	
		6.NS.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.	
6.NS.4	Solve real-world problems with positive fractions and decimals by using one or two operations. (E)			
6.NS.5	Apply the order of operations and properties of operations (i.e., identity, inverse, commutative properties of addition and multiplication, associative properties of addition and multiplication, and	**6.EE.2c**	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in	IAS includes using properties to evaluate expressions. CCSS includes evaluating expressions for values of variables and using real-world problems.

	distributive property) to evaluate numerical expressions with nonnegative rational numbers, including those using grouping symbols, such as parentheses, and involving whole number exponents. (E)		the conventional order when there are no parentheses to specify a particular order (Order of Operations).	
6.NS.6	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers from 1 to 100, with a common factor as a multiple of a sum of two whole numbers with no common factor.	**6.NS.4**	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.	*No content differences identified.*
6.NS.7	Apply the properties of operations (i.e., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions and to justify whether two linear expressions are equivalent when the two expressions name the same number regardless of which value is substituted into them. (E)	**6.EE.3**	Apply the properties of operations to generate equivalent expressions.	IAS requires students to justify why two linear expressions are equivalent.
		6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).	

6.NS.8	Evaluate positive rational numbers with whole number exponents.	**6.EE.1**	Write and evaluate numerical expressions involving whole-number exponents.	CCSS includes writing numerical expressions with whole number exponents.
2023 Indiana Academic Standard		**Common Core State Standard**		**Differences Between 2023 IAS and CCSS**
Domain: Ratios and Proportional Reasoning				
Number	**Text**	**Number**	**Text**	**Description**
6.RP.1	Convert between any two representations (fractions, decimals, percents) of positive rational numbers without the use of a calculator. (E)			
6.RP.2	Understand the concept of a unit rate and use terms related to rate in the context of a ratio relationship.	**6.RP.2**	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.	*No content differences identified.*
6.RP.3	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane.	**6.RP.3a**	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.	CCSS includes using tables to compare ratios.
6.RP.4	Solve real-world and other mathematical problems involving rates and ratios using models and strategies such as reasoning about	**6.RP.3**	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape	IAS includes using models to solve rates and ratio problems.

	tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. (E)		diagrams, double number line diagrams, or equations.	
6.RP.5	Use variables to represent two quantities in a proportional relationship in a real-world problem; write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (E)	**6.EE.9**	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	*No content differences identified.*
2023 Indiana Academic Standard		**Common Core State Standard**		**Differences Between 2023 IAS and CCSS**
Domain: Algebra and Functions				
Number	**Text**	**Number**	**Text**	**Description**
6.AF.1	Define and use multiple variables when writing expressions to represent real-world and other mathematical problems, and evaluate them for given values. (E)	**6.EE.6**	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	IAS requires students to define variables when writing expressions and to evaluate these expressions for given values.

6.AF.2	Demonstrate which values from a specified set, if any, make the equation or inequality true. Use substitution to determine whether a given number in a specified set makes an equation or inequality true. (E)	**6.EE.5**	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	*No content differences identified.*
6.AF.3	Solve equations of the form x + p = q, x - p = q, px = q, and x/p = q fluently for cases in which p, q and x are all nonnegative rational numbers. Represent real-world problems using equations of these forms and solve such problems. (E)	**6.EE.7**	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.	IAS includes writing and solving equations of the form x - p = q and x/p = q.
6.AF.4	Write an inequality of the form x > c, x ≥ c, x < c, or x ≤ c, where c is a rational number, to represent a constraint or condition in a real-world or other mathematical problem. Explain that inequalities have infinitely many solutions and how to represent solutions on a number line diagram.	**6.EE.8**	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	IAS includes writing inequalities of the form x ≥ c and x ≤ c.
6.AF.5	Solve real-world and other mathematical problems by graphing points with rational number coordinates on a coordinate plane. Include the use of coordinates and	**6.NS.8**	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances	IAS specifies graphing points with rational number coordinates. CCSS specifies graphing points in all four quadrants.

	absolute value to find distances between points with the same first coordinate or the same second coordinate. (E)		between points with the same first coordinate or the same second coordinate.	
2023 Indiana Academic Standard		**Common Core State Standard**		**Differences Between 2023 IAS and CCSS**
Domain: Geometry and Measurement				
Number	**Text**	**Number**	**Text**	**Description**
6.GM.1	Convert between measurement systems (Customary to metric and metric to Customary) given the conversion factors, and use these conversions in solving real-world problems.	**6.RP.3d**	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	IAS specifies converting between measurement systems and emphasizes solving real-world problems. CCSS specifies using ratio reasoning to convert measurement units.
6.GM.2	Apply the sums of interior angles of triangles and quadrilaterals to solve real-world and mathematical problems.			
6.GM.3	Find the area of complex shapes composed of polygons by composing or decomposing into simple shapes; apply this technique to solve real-world and other mathematical problems.	**6.G.1**	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	CCSS specifies finding the area of specific shapes.

6.GM.4	Find the volume of a right rectangular prism with fractional edge lengths using unit cubes of the appropriate unit fraction edge lengths (e.g., using technology or concrete materials) and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = lwh and V = Bh to find volumes of right rectangular prisms with fractional edge lengths to solve real-world and other mathematical problems. (E)	**6.G.2**	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	*No content differences identified.*
2023 Indiana Academic Standard		**Common Core State Standard**		**Differences Between 2023 IAS and CCSS**
Domain: Data Analysis and Statistics				
Number	**Text**	**Number**	**Text**	**Description**
6.DS.1	Select, create, and interpret graphical representations of numerical data, including line plots, histograms, and box plots.	**6.SP.4**	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	IAS specifies that students select, create, and interpret the graphical representations of numerical data.
6.DS.2	Formulate statistical questions; collect and organize the data (e.g., using technology), and display and interpret the data with graphical representations (e.g., using technology). (E)			

6.DS.3	Summarize numerical data sets in relation to their context in multiple ways, such as: a. report the number of observations; b. describe the nature of the attribute under investigation, including how it was measured and its units of measurement; c. determine quantitative measures of center (mean and/or median) and spread (range and interquartile range); d. describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered; e. relate the choice of measures of center and spread to the shape of the data distribution and the context in which the data were gathered. (E)	**6.SP.5**	Summarize numerical data sets in relation to their context, such as by:	IAS uses the term spread for variability and includes range as a measure of spread. CCSS includes mean absolute deviation as a measure of variability.
		6.SP.5a	Reporting the number of observations.	
		6.SP.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.	
		6.SP.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	
		6.SP.5d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	

Mathematics Process Standards

2023 Indiana Academic Standard	Common Core State Standard	Differences Between 2023 IAS and CCSS
PS.1: Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway, rather than simply jumping into a solution attempt. They consider analogous problems and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” and "Is my answer reasonable?" They understand the approaches of others to solving complex problems and identify correspondences between different approaches. Mathematically proficient students understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	**MP.1: Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.

	students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.	
PS.2: Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	**MP.2: Reason abstractly and quantitatively.** Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	*No content differences identified.*

PS.3: Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They analyze situations by breaking them into cases and recognize and use counterexamples. They organize their mathematical thinking, justify their conclusions and communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. They justify whether a given statement is true always, sometimes, or never. Mathematically proficient students participate and collaborate in a mathematics community. They listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	**MP.3: Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.	IAS explains that mathematically proficient students can justify statements that are true always, sometimes, or never. IAS also states that mathematically proficient students participate and collaborate in a mathematics community. CCSS gives examples of what mathematically proficient students might do at different grade levels.

PS.4: Model with mathematics. Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace using a variety of appropriate strategies. They create and use a variety of representations to solve problems and to organize and communicate mathematical ideas. Mathematically proficient students apply what they know and are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	**MP.4: Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.

PS.5: Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Mathematically proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. Mathematically proficient students identify relevant external mathematical resources, such as digital content, and use them to pose or solve problems. They use technological tools to explore and deepen their understanding of concepts and to support the development of learning mathematics. They use technology to contribute to concept development, simulation, representation, reasoning, communication and problem solving.	**MP.5: Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.

PS.6: Attend to precision. Mathematically proficient students communicate precisely to others. They use clear definitions, including precision. correct mathematical language, in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They express solutions clearly and logically by using the appropriate mathematical terms and notation. They specify units of measure and label axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently and check the validity of their results in the context of the problem. They express numerical answers with a degree of precision appropriate for the problem context.	**MP.6: Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.
PS.7: Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. They step back for an overview and shift perspective. They recognize and use properties of operations and equality. They organize and classify geometric shapes based on their attributes. They see expressions, equations, and geometric figures as single objects or as being composed of several objects.	**MPS.7: Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.

	the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	
PS.8: Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated and look for general methods and shortcuts. They notice regularity in mathematical problems and their work to create a rule or formula. Mathematically proficient students maintain oversight of the process, while attending to the details as they solve a problem. They continually evaluate the reasonableness of their intermediate results.	**MP.8: Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the	IAS summarizes what mathematically proficient students can do, while CCSS gives examples of what mathematically proficient students might do at different grade levels.

	details. They continually evaluate the reasonableness of their intermediate results.	