Grade 5 Math Content Connectors

Grade 5

PROCESS STANDARDS FOR MATHEMATICS

The Process Standards demonstrate the ways in which students should develop conceptual understanding of mathematical content, and the ways in which students should synthesize and apply mathematical skills.

PROCESS STANDARDS FOR MATHEMATICS	
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.
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.

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.
PROCESS STANDARDS FOR MATHEMATICS	
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.
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.

PS.6: Attend to precision.	Mathematically proficient students communicate precisely to others. They use clear definitions, including 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.
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.
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.

MATHEMATICS: GRADE 5

The Mathematics standards for grade 5 are supplemented by the Process Standards for Mathematics.

The Mathematics standards for grade 5 are made up of five strands: Number Sense; Computation; Algebraic Thinking; Geometry; Measurement; and Data Analysis and Statistics. The skills listed in each strand indicate what students in grade 5 should know and be able to do in Mathematics.

NUMBER SENSE

Indiana Academic Standards	Content Connectors
MA.5.NS.1: Use a number line to compare and order fractions, mixed numbers, and decimals to thousandths. Write the results using >, =, and < symbols.	**MA.5.NS.1.a.1**: Compare two fractions using symbols <, >, and = symbols and vocabulary.
	MA.5.NS.1.a.2: Compare two decimals to the hundredths place with a value of less than 1 using symbols <, >, and = symbols and vocabulary.
MA.5.NS.2: Explain different interpretations of fractions, including: as parts of a whole, parts of a set, and division of whole numbers by whole numbers.	**MA.5.NS.2.a.1:** Represent fractions as part of a set, whole, or division of whole numbers.

MA.5.NS.3: Recognize the relationship 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 inversely, a digit in one place represents 1/10 of what it represents in the place to its left.	**MA.5.NS.3.a.1**: Compare the value of a digit when it is represented in different place values of 2 three-digit numbers.
MA.5.NS.4: 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.	
MA.5.NS.5: Use place value understanding to round decimal numbers up to thousandths to any given place value.	**MA.5.NS.5.a.1**: Round decimals to the nearest whole number.
MA.5.NS.6: Understand, interpret, and model percent's as part of a hundred (e.g. by using pictures, diagrams, and other visual models).	**MA.5.NS.6.a.1**: Use a model to represent percent as part of 100.

COMPUTATION

Indiana Academic Standards	Content Connectors
MA.5.C.1: Multiply multi-digit whole numbers fluently using a standard algorithmic approach.	**MA.5.C.1.a.1**: Multiply two-digit numbers by two-digit numbers.
Indiana Academic Standards	**Content Connectors**
MA.5.C.2: Find whole-number quotients and remainders 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. Describe the strategy and explain the reasoning used.	**MA.5.C.2.a.1**: Divide multi-digit whole numbers with dividends up to 100 without remainders.
MA.5.C.3: Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	
MA.5.C.4: Add and subtract fractions with unlike denominators, including mixed numbers.	**MA.5.C.4.a.1:** Add and subtract fractions with unlike denominators, limiting denominators to halves, fourths, fifths, and tenths.
MA.5.C.5: Use visual fraction models and numbers to multiply a fraction by a fraction or a whole number.	**MA.5.C.5.a.1:** Use models to multiply a fraction by a whole number.
MA.5.C.6: Explain why multiplying a positive number by a fraction greater than 1 results in a product greater than the given number. Explain why multiplying a positive number by a fraction less than 1 results in a product smaller than the given number. Relate the principle of fraction equivalence, $a/b = (n \times a)/(n \times b)$, to the effect of multiplying a/b by 1.	**MA.5.C.6.a.1:** Determine whether the product will increase or decrease based on the multiplier.

MA.5.C.7: Use visual fraction models and numbers to divide a unit fraction by a non-zero whole number and to divide a whole number by a unit fraction.	**MA.5.C.7.a.1**: Use models to divide whole numbers by one half to solve for total number of parts.
MA.5.C.8: Add, subtract, multiply, and divide decimals to hundredths, using models or drawings and strategies based on place value or the properties of operations. Describe the strategy and explain the reasoning.	**MA.5.C.8.a.1**: Solve one-step problems using decimals.
MA.5.C.9: Evaluate expressions with parentheses or brackets involving whole numbers using the commutative properties of addition and multiplication, associative properties of addition and multiplication, and distributive property.	**MA.5.C.9.a.1**: Evaluate an expression with one set of parentheses.

ALGEBRAIC THINKING

Indiana Academic Standards	Content Connectors
MA.5.AT.1: Solve real-world problems involving multiplication and division of whole numbers (e.g. by using equations to represent the problem). In division problems that involve a remainder, explain how the remainder affects the solution to the problem.	**MA.5.AT.1.a.1**: Solve problems or word problems using up to 2-digit multiplication or 3-digit dividend with no remainder.
MA.5.AT.2: Solve real-world problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators (e.g., by using visual fraction models and equations to represent the problem). Use benchmark fractions and number sense of fractions to	**MA.5.AT.2.a.1**: Solve word problems involving the addition and subtraction of fractions with unlike denominators of halves, fourths, fifths, tenths.
Indiana Academic Standards	**Content Connectors**
estimate mentally and assess whether the answer is reasonable.	
MA.5.AT.3: Solve real-world problems involving multiplication of fractions, including mixed numbers (e.g., by using visual fraction models and equations to represent the problem).	**MA.5.AT.3.a.1**: Solve real-world problems involving multiplication of a fraction and a whole number.
MA.5.AT.4: Solve real-world problems involving division of unit fractions by non-zero whole numbers, and division of whole numbers by unit fractions (e.g., by using visual fraction models and equations to represent the problem).	**MA.5.AT.4.a.1**: Solve real-world problems involving the division of a whole number by one half to find the total parts.
MA.5.AT.5: Solve real-world problems involving addition, subtraction, multiplication, and division with decimals to hundredths, including problems that involve money in decimal notation (e.g. by using equations to represent the problem).	**MA.5.AT.5.a.1:** Solve one-step real-world problems involving addition, subtraction, multiplication, and division with decimals to the hundredths place.

MA.5.AT.6: Graph points with whole number coordinates on a coordinate plane. Explain how the coordinates relate the point as the distance from the origin on each 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 ycoordinate).	**MA.5.AT.6.a.1**: Locate points on a graph and identify x and y axis.
MA.5.AT.7: Represent real-world problems and equations by graphing ordered pairs in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	**MA.5.AT.7.a.1**: Graph ordered pairs in the first quadrant of the coordinate plane.
MA.5.AT.8: Define and use up to two variables to write linear expressions that arise from real-world problems, and evaluate them for given values.	**MA.5.AT.8.a.1:** Given a real-world problem, evaluate the expressions for the specific values of up to two variables.

GEOMETRY AND MEASUREMENT

Indiana Academic Standards	Content Connectors
MA.5.G.1: Identify, describe, and draw triangles (right, acute, obtuse) and circles using appropriate tools (e.g., ruler or straightedge, compass and technology). Understand the relationship between radius and diameter.	**MA.5.G.1.a.1**: Categorize angles as right, acute, or obtuse.
	MA.5.G.1.a.2: Identify the diameter and radius of a circle.
MA.5.G.2: Identify and classify polygons including quadrilaterals, pentagons, hexagons, and triangles (equilateral, isosceles, scalene, right, acute and obtuse) based on angle measures and sides. Classify polygons in a hierarchy based on properties.	**MA.5.G.2.a.1**: Recognize properties of simple plane figures by counting the number of sides.
	MA.5.G.2.a.2: Distinguish plane figures by the name of the shape and number of sides.
MA.5.M.1: Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step real-world problems.	**MA.5.M.1.a.1**: Convert measurements of time (days in a week, hours in a day, months in a year, minutes in an hour, seconds in a minute).
	MA.5.M.1.a.2: Solve problems involving time lapse.
Indiana Academic Standards	**Content Connectors**
MA.5.M.2: Find the area of a rectangle with fractional side lengths by modeling with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	**MA.5.M.2.a.1**: Multiply whole numbers to find the area of a rectangle.
MA.5.M.3: Develop and use formulas for the area of triangles, parallelograms and trapezoids. Solve real-world and other mathematical problems that involve perimeter and area of triangles, parallelograms and trapezoids, using appropriate units for measures.	**MA.5.M.3.a.1**: Provided the formula, students will insert the correct numbers into the correct location of the formula.

MA.5.M.4: 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 or multiplying the height by the area of the base.	**MA.5.M.4.a.1**: Model volume by counting the number of cubic units that fit into a rectangular prism.
MA.5.M.5: Apply the formulas V= l × w × h and V = B × h for right rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths to solve real-world problems and other mathematical problems involving shapes.	**MA.5.M.5.a.1**: Provided the formula, students will insert the correct numbers into the correct location of the formula.
MA.5.M.6: 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 and other mathematical problems.	**MA.5.M.6.a.1**: Provided the formula, solve for volume.

DATA ANALYSIS AND STATISTICS

Indiana Academic Standards	Content Connectors
MA.5.DS.1: Formulate questions that can be addressed with data and make predictions about the data. Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (including frequency tables), line plots, bar graphs, and line graphs. Recognize the differences in representing categorical and numerical data.	**MA.5.DS.1.a.1**: Use data (from a bar graph) to determine questions that could be answered with the graph, or answer a simple question about the graph (e.g., average height among 3 classrooms, # of boys and girls).
MA.5.DS.2: Understand and use measures of center (mean and median) and frequency (mode) to describe a data set.	**MA.5.DS.2.a.1**: Use a completed line plot to find mode and median.