



Indiana Academic Standards for Mathematics – Fifth Grade Adopted April 2014 – Standards Resource Guide Document

This Teacher Resource Guide has been developed to provide supporting materials to help educators successfully implement the Indiana Academic Standards for Sixth Grade Mathematics – Adopted April 2014. These resources are provided to help you in your work to ensure all students meet the rigorous learning expectations set by the Academic Standards. Use of these resources is optional – teachers should decide which resource will work best in their school for their students.

This resource document is a living document and will be frequently updated. The Indiana Department of Education would like to thank Ben Kemp, Rachelle Curtis, and Jim Mirabelli for their contributions to this document. Please send any suggested links and report broken links to: Bill Reed

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The examples in this document are for illustrative purposes only, to promote a base of clarity and common understanding. Each example illustrates a standard but please note that examples are not intended to limit interpretation or classroom applications of the standards.

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GOOD WEBSITES FOR MATHEMATICS:

<http://nlvm.usu.edu/en/nav/vlibrary.html>

<http://www.math.hope.edu/swanson/methods/applets.html>

<http://learnzillion.com>

<http://illuminations.nctm.org>

<https://teacher.desmos.com>

<http://illustrativemathematics.org>

<http://www.insidemathematics.org>

<https://www.khanacademy.org/>

<https://www.teachingchannel.org/>

<http://map.mathshell.org/materials/index.php>

<https://www.istemnetwork.org/index.cfm>

<http://www.azed.gov/azccrs/mathstandards/>



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	Indiana Academic Standard for Mathematics Fifth Grade – Adopted April 2014	Highlighted Vocabulary Words from the Standard Defined	Specific Fifth Grade Example for the Standard	Specific Fifth Grade Electronic Resource for the Standard
Number Sense				
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.	Number line - a straight line on which there is indicated a one-to-one correspondence between points on the line and the set of real numbers.	Plot the following numbers on a number line and then compare all three numbers using >, =, and < symbols. $3\frac{1}{4}$, 2.75, $\frac{5}{2}$	https://www.illustrativemathematics.org/illustrations/1802
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.		Lou has 4 pieces of red candy and 5 pieces of blue candy. Describe how many pieces are red in terms of the total amount of pieces of candy and represent this as a fraction.	https://www.illustrativemathematics.org/illustrations/858
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.		a) Mary weighs a marshmallow to be 7.2 grams. How much would you expect 10 marshmallows to weigh? Why? b) Mary weighs 10 jellybeans to be 12.0 grams. How much would you expect 1 jellybean to weigh? Why? c) Mary weighs 10 erasers to be 312.4 grams. How much would you expect 1,000 erasers to weigh? Why?	https://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=5.NBT.1&commit=Search+lesson+5



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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.		<p>a) Evaluate each expression and describe any patterns that you notice.</p> $\begin{array}{cc} 5 \times 10^1 & 5 \times 10^2 \\ 5 \times 10^3 & 5 \times 10^4 \end{array}$ <p>b) Evaluate each expression and describe any patterns that you notice.</p> $\begin{array}{ccc} 26.34 \times 10^1 & 26.34 \times 10^2 & 26.34 \times 10^3 \\ 26.34 \div 10^1 & 26.34 \div 10^2 & 26.34 \div 10^3 \end{array}$	https://www.illustrativemathematics.org/illustrations/1620
MA.5.NS.5:	Use place value understanding to round decimal numbers up to thousandths to any given place value.	Place value - the value of the place, or position, of a digit in a number	What is 562.847 rounded to the nearest hundredth? tenth? one? ten? hundred?	https://www.illustrativemathematics.org/illustrations/1804
MA.5.NS.6:	Understand, interpret, and model percents as part of a hundred (e.g. by using pictures, diagrams, and other visual models).	Percent - means parts per 100	Erin has 75% of all the pens in her home. Draw a picture to represent 75%. If the total number of pens in Erin's home is 100, how many pens does Erin have?	http://www.ixl.com/math/grade-5/what-percentage-is-illustrated



Computation				
MA.5.C.1:	Multiply multi-digit whole numbers fluently using a standard algorithmic approach .	Algorithmic approach - using a list of well-defined instructions or a step-by-step procedure to solve a problem. Fluently - efficient and accurate	Evaluate each expression. <ul style="list-style-type: none">• 46×283• 3561×87	https://www.illustrativemathematics.org/illustrations/1812
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.	Quotient - when one number (dividend) is divided by another number (divisor), the result obtained is known as the quotient	a) What is $2072 \div 37$? b) What is $3912 \div 48$? Describe how you determined your answer.	http://www.ixl.com/math/grade-5/divide-by-2-digit-numbers-word-problems



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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.	Product - the result obtained after multiplying two or more numbers	<p>a) Determine which number is greater in each expression without multiplying and explain how you know.</p> <ul style="list-style-type: none"> 99 or $\frac{1}{4} \times 99$ $\frac{51}{100}$ or $\frac{51}{100} \times 301$ $\frac{13}{40}$ or $\frac{2}{3} \times \frac{13}{40}$ <p>b) Fill in the blank to complete this sentence. When multiplying 3 by $\frac{1}{2}$, the product will be _____ the size of 3.</p> <p>c) Fill in the blank to complete this sentence. When multiplying 40 by $5\frac{1}{9}$, the product will be slightly more than ____ times the size of 40.</p>	https://www.illustrativemathematics.org/illustrations/151
MA.5.C.4:	Add and subtract fractions with unlike denominators, including mixed numbers.		<p>Evaluate each expression.</p> <ul style="list-style-type: none"> $16\frac{7}{9} - 10\frac{1}{3}$ $\frac{7}{8} + \frac{2}{5}$ 	http://www.ixl.com/math/grade-5/add-and-subtract-fractions-with-unlike-denominators-word-problems
MA.5.C.5:	Use visual fraction models and numbers to multiply a fraction by a fraction or a whole number.		<p>a) What is $\frac{1}{8} \times \frac{4}{5}$? Represent this product using a visual fraction model.</p> <p>b) What is $7 \times \frac{3}{4}$? Represent this product using a visual fraction model.</p> <p>c) Evaluate: $\frac{2}{5} \times 6$</p>	https://www.illustrativemathematics.org/illustrations/321

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MA.5.C.6:	Explain why multiplying a number by a fraction greater than 1 results in a product greater than the given number. Explain why multiplying a 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.	Equivalence - having the same value	Will the product of each expression be greater or smaller than 100? $100 \times \frac{1}{2}$ $100 \times \frac{1}{10}$ $100 \times \frac{1}{4}$ $100 \times \frac{3}{2}$ Explain how to determine if the product of a whole number and a fraction will be greater or smaller than the given whole number.	https://www.illustrativemathematics.org/illustrations/49
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.	Unit fraction - a fraction where the numerator is 1	Evaluate each expression. <ul style="list-style-type: none">$8 \div \frac{1}{3}$$\frac{1}{5} \div 9$	https://www.illustrativemathematics.org/illustrations/958
MA.5.C.8:	Add, subtract, multiply, and divide decimals to hundredths, using models or drawings and strategies based on place value or the properties of operations. Describe the strategy and explain the reasoning.		Evaluate each expression. <ul style="list-style-type: none">$459.28 + 97.06$$5,078.07 - 1,461.3$1.3×5.4$52 \div 6.5$	http://www.ixl.com/math/grade-5/add-and-subtract-decimals-word-problems



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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.	Expression - a representation of a value	<p>a) Evaluate: $2x(3 + 5) \times 4 \times 2$</p> <p>b) Are the expressions below equivalent? Justify your answer.</p> <ul style="list-style-type: none">$3 + 5x(2 + 4)$$3 + (5x2 + 4)$$3 + 5x2 + 4$	<p>https://www.illustrativemathematics.org/illustrations/555</p> <p>https://www.illustrativemathematics.org/illustrations/1596</p>
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Algebraic Thinking				
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.	Equation - a mathematical sentence that uses the equal sign (=) to show that two expressions are equal	<p>a) Sarah wants to buy calculators for some of her friends. The calculators cost \$8 each. She has \$140 to spend on the calculators. For how many friends can Sarah buy a calculator?</p> <p>b) What is the smallest number of busses that can carry 250 students if each bus holds 36 students?</p> <p>c) A teacher wants to distribute 250 pencils evenly to 36 students. What is the largest number of pencils each student will receive? Explain how you determined your answer.</p>	https://www.illustrativemathematics.org/illustrations/1289
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 estimate mentally and assess whether the answer is reasonable.	<p>Number sense- refers to a person's understanding of number concepts, operations, and applications of numbers and operations</p> <p>Estimate- a close guess of an actual value, usually with some thought or calculation involved</p>	<p>a) Of the ice cream bars sold at a shop yesterday, $\frac{3}{4}$ were chocolate and $\frac{1}{5}$ were vanilla. What fraction of ice cream bars sold yesterday was either chocolate or vanilla?</p> <p>b) Nick's goal is to run 12 miles each week. Nick runs $2\frac{3}{5}$ miles on Monday. How many more miles does Nick need to run this week to reach his goal?</p>	https://www.illustrativemathematics.org/illustrations/481
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).		<p>a) Tony buys 18 roses for his mom. $\frac{5}{6}$ of them are pink. How many of the roses are pink?</p> <p>b) Ray exercised for $\frac{2}{3}$ hour last weekend. Betty exercised $3\frac{3}{4}$ times as long as Ray last weekend. How many hours did Betty exercise last weekend?</p>	https://www.illustrativemathematics.org/illustrations/297



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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).	Unit fraction - a fraction where the numerator is 1	a) How many $\frac{1}{3}$ cup servings are in 4 cups of oats? b) After Cam's party, he had $\frac{1}{5}$ of a large sheet cake left over. He divided it evenly for 3 of his friends to take home. What fractional amount of the cake did each friend take home?	https://www.illustrativemathematics.org/illustrations/1172
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).		a) Regan buys 3 shirts for a total cost of \$58.50. Each shirt costs the same amount. What is the cost of each shirt? b) Lee buys a pair of jeans for \$16.50 and 3 ties for \$9.25 each. What is the total cost of Lee's purchase?	http://www.ixl.com/math/grade-5/add-and-subtract-money-word-problems
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 y-coordinate).	Coordinates - a set of values that show an exact position Coordinate plane - the plane containing the "x" axis and "y" axis Origin - refers to the ordered pair (0, 0) in the coordinate plane; the point where the x- and y-axis intersect.	Graph the points below on a coordinate plane. (1, 4), (3, 0), (0, 5), (5, 4) Describe how to graph points, such as these, in the coordinate plane.	http://www.ixl.com/math/grade-5/coordinate-graphs-review-whole-numbers-only



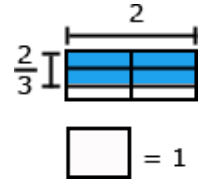
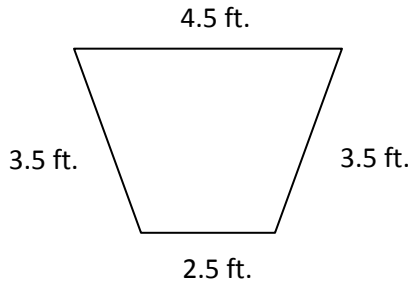
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MA.5.AT.7:	Represent real-world problems and equations by graphing ordered pairs in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	Ordered pairs - Two numbers written in a certain order. Usually written in parentheses like this: (4,5) Quadrant - Any of the four areas into which a plane is divided by the reference axes in a Cartesian coordinate system, designated first, second, third, and fourth, counting counterclockwise from the area in which both coordinates are positive	a) Complete the table of values for the equation $y = x + 3$ and graph the ordered pairs in the coordinate plane. <table border="1"><tr><td>x</td><td>y</td></tr><tr><td>0</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>6</td><td></td></tr></table> b) Ed created a map of his neighborhood on a coordinate plane. His home is located at (2, 3). His school is located 1 unit to the left and 5 units up from his home. What are the coordinates of the school?	x	y	0		2		4		6		http://www.ixl.com/math/grade-5/graph-linear-functions
x	y													
0														
2														
4														
6														
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.		Gary is buying calculators and notebooks for his class. Each calculator costs \$7 and each notebook costs \$2. Gary is not sure how many calculators and notebooks he will buy. <ul style="list-style-type: none">Write an expression to represent the total cost of Gary's purchase. Be sure to define your variables.How much will it cost if Gary buys 12 calculators and 25 notebooks?	http://www.ixl.com/math/grade-5/write-equations-to-represent-word-problems										




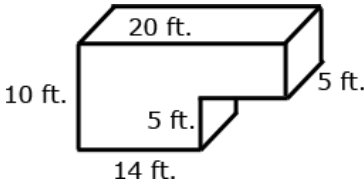
Geometry				
MA.5.G.1:	Identify, describe, and draw triangles (right , acute , obtuse) and circles using appropriate tools (e.g., ruler or straightedge, compass and technology). Understand the relationship between radius and diameter .	Right triangle - a triangle that has a right angle (90°) Acute triangle - a triangle that has all angles less than 90° Obtuse triangle - a triangle that has one angle greater than 90° Radius - the distance from the center to the edge of a circle Diameter - a straight line going through the center of a circle connecting two points on the circumference	a) Draw a right, acute, and obtuse triangle. Describe how the triangles are similar and different. b) Draw a circle with a diameter of 6 inches. Explain the steps you took to draw the circle.	http://www.ixl.com/math/grade-5/types-of-triangles
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.	Polygon - a closed shape (two-dimensional) bounded by three or more line segments Equilateral triangle - a triangle with all 3 sides of equal length; all 3 angles will also be of equal measure (60°) Isosceles triangle - a triangle with 2 sides of equal length; the angles opposite the equal sides have the same measure Scalene triangle - a triangle with all sides of different lengths	Consider the characteristics of a square and equilateral triangle. How are they similar? How are they different?	https://www.illustrativemathematics.org/illustrations/1505



Measurement				
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.		<p>a) Henry made 5 gallons of fruit punch. How many servings will this make if each serving is one cup?</p> <p>b) An adult elephant at a zoo weighs 4,200 kilograms. A baby elephant at the zoo weighs 105,000 grams. How many kilograms combined do they weigh?</p>	<p>https://www.illustrativemathematics.org/illustrations/293</p> <p>https://www.illustrativemathematics.org/illustrations/878</p>
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.		<p>a) The model below can be used to represent the area of a rectangle measuring 2 feet by $\frac{2}{3}$ foot. What is the area of the rectangle?</p> <div style="text-align: center;">  </div> <p>b) What is the area of a rectangle with length $3\frac{1}{4}$ inches and width $2\frac{1}{2}$ inches?</p>	<p>http://www.ixl.com/math/grade-3/area-of-figures-made-of-unit-squares</p>
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.		<p>Jim designs a sign in the shape of a trapezoid as shown below. The height of the trapezoid is 3 feet. What is the area and perimeter of the sign?</p> <div style="text-align: center;">  </div>	<p>http://www.ixl.com/math/grade-5/area-of-parallelograms-and-trapezoids</p>



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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.	Volume - the amount of 3-dimensional space an object occupies; capacity	Activity: Give students 24 unit cubes and have them make as many rectangular prisms as possible. They should record the types of prisms in a chart like the one below. Ask if they notice how the dimensions relate to the volume. <table><tr><th>Length</th><th>Width</th><th>Height</th><th>Volume</th></tr><tr><td>1</td><td>2</td><td>12</td><td>24</td></tr><tr><td>2</td><td>2</td><td>6</td><td>24</td></tr><tr><td>4</td><td>2</td><td>3</td><td>24</td></tr><tr><td>8</td><td>3</td><td>1</td><td>24</td></tr></table>	Length	Width	Height	Volume	1	2	12	24	2	2	6	24	4	2	3	24	8	3	1	24	http://www.ixl.com/math/grade-3/volume http://www.onlinemathlearning.com/measure-volume-5md5.html
Length	Width	Height	Volume																					
1	2	12	24																					
2	2	6	24																					
4	2	3	24																					
8	3	1	24																					
MA.5.M.5:	Apply the formulas $V = l \times w \times h$ and $V = B \times h$ 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.		Peter has a fish tank in the shape of a rectangular prism with dimensions 4 feet by 3 feet by 2 feet. How much water will completely fill the tank?	https://www.illustrativemathematics.org/illustrations/1308																				
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.	Solid figure - A three dimensional object: width, depth and height	a) What is the volume, in cubic units, of the figure?  b) Raul has a swimming pool as shown in the diagram. The pool is $\frac{4}{5}$ full of water. How much water is in the pool? 	https://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=5.MD.5c&commit=Search+lessons																				



Data Analysis and Statistics				
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.	<p>Observations- an act or instance of regarding attentively or watching</p> <p>Survey- a term in statistics for the method of collecting information by asking people questions</p> <p>Experiment- a test or investigation</p>	<p>a) Wendy asked each student in her class to answer the questions below. Which questions will generate responses that can be represented as categorical data? as numerical data? Explain how you know.</p> <ul style="list-style-type: none"> What is your favorite color? How many pets do you have? What is your favorite type of music? What is your favorite food? How tall are you? <p>b) Activity: Students can formulate a statistical question of interest and conduct an observation, survey, or experiment. They can collect, organize, and display their data, and make observations based on their data display. (Examples: conduct a survey about favorite sport, food, etc.; observe and tally the different colors of shirts classmates wear to school on a given day.)</p>	https://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=5.MD.2&commit=Search+lesson
MA.5.DS.2:	Understand and use measures of center (mean and median) and frequency (mode) to describe a data set.	<p>Mean - a measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list.</p> <p>Median - a measure of center in a set of numerical data; the value appearing at the center of a sorted list – or the mean of the two central values if the list contains an even number of values.</p> <p>Mode- the most frequently occurring number in a data set.</p>	<p>Abe records his test scores, as percentages, in his science class as shown below. What is the mean, median, and mode of his test scores?</p> <p style="text-align: center;">85, 88, 75, 90, 85</p>	https://learnzillion.com/lessons?utf8=%E2%9C%93&filters%5Bsubject%5D=math&query=6.SP.3