

## 2014 IN Math Standards Workshop

### Grades 3-4-5

#### Day 1

- Welcome and Introductions (20 minutes)
- What does College and Career Readiness mean in Indiana? (20 minutes)
- What are the goals for this workshop? (20 minutes)
- Review the handouts – together and at tables (1 hour)
  - IN Math Standards (IDOE)
  - Correlation Guide (IDOE)
  - Resources Guide (IDOE)
  - Vertical Articulation (IDOE)
  - Sequencing Map
  - Math Processes Posters
  - Task Analysis Guide
  - “What’s All This Talk About Rigor?” article
  - Depth of Knowledge chart
  - Activity Two – Creating a Task

(Teachers will move into grade level work and need to be in groups of 4-5)

- Station Rotation Activity –Delving into the 2014 IN Math Standards (each rotation will take about 20 minutes – complete 3 rotations prior to lunch)
  - What’s new?
  - What’s going to be a challenge for students?
  - What’s going to be a challenge for teachers?
  - What grade levels ask for “fluency” or mastery of skills?
  - Follow the progression of skills across grade levels...how are they building upon one another?

LUNCH (30 minutes)

- Finish the last 3 rounds of the Station Rotation Activity (1 hour)
- Process standards activity (1 hr 15 minutes)

## **2014 IN Math Standards Workshop**

### **Grades 3-4-5**

#### **Day 2**

- Questions from Day 1 (15 minutes)
- Continue with the Process Standards Activity (1 hour)
- “Math Class Needs a Makeover” (15 minutes)
- Task Activity (1 ½ hours)
  - Read and discuss the “What’s All This Talk About Rigor?” article
  - Use your task analysis guide and Depth of Knowledge chart to develop rigorous questions
  - Choose one standard from each strand
  - Identify 1-2 math process standards imbedded within the task

#### **LUNCH (30 minutes)**

- Finish the task activity (30 minutes)
- Construct a grade level sequencing document (2 hours)
- Workshop Evaluation



## INDIANA ACADEMIC STANDARDS

Mathematics: **Grade 3**

Draft for release: May 1, 2014

## I. Introduction

The Indiana Academic Standards for Mathematics are the result of a process designed to identify, evaluate, synthesize, and create the most high-quality, rigorous standards for Indiana students. The standards are designed to ensure that Indiana students are prepared to enter and successfully complete postsecondary education, and that they are prepared for long-term, economically-viable career opportunities.

### Standards Process

The Indiana Academic Standards were created through a collaborative process with input from teams of K-12 educators, representing school districts located throughout the state of Indiana; professors of higher education, representing a wide range of Indiana's public and private colleges and universities; and representatives from Indiana businesses and industries. The purpose of the standards process was to design college and career ready standards that would ensure that students who complete high school in Indiana are ready for college and careers.

### History

Public Law 286 was passed by the Indiana General Assembly in 2013, which creates Indiana Code 20-19-2-14.5. The law requires the Indiana State Board of Education to perform a comprehensive review of Indiana's current standards (which were the Common Core State Standards) and to adopt college and career readiness educational standards no later than July 1, 2014.

In the fall of 2013, the Indiana Department of Education established Technical Teams, which were comprised of K-12 educators in English/Language Arts and Mathematics. The Technical Teams were responsible for reviewing the existing Indiana Academic Standards (Common Core State Standards) and providing suggestions for edits and word changes to improve the clarity and progression of the standards. The Department also created Advisory Teams, which were made up of educators from higher education institutions across Indiana. The Advisory Teams were responsible for reviewing the work of the Technical Teams and providing additional input.

### Evaluation Process

In January of 2014, the Indiana Department of Education, in collaboration with the Indiana State Board of Education, established Evaluation Teams. The Evaluation Teams were responsible for going several steps further than the Technical and Advisory Teams. The Evaluation Teams were tasked with conducting a comprehensive analysis of several sets of standards, with the goal of identifying the standards that most clearly aligned with the skills that Hoosier students would need to know and be able to do in order to be college and career ready.

Membership for the Evaluation Teams was gleaned from individuals who had previously participated on either a Technical Team or an Advisory Team. The Evaluation Team members were selected for their subject matter expertise (in English/Language Arts or Mathematics) and their classroom teaching experience. The Evaluation Teams were made up of K-12 educators who represented a wide variety of Indiana school districts and over 445 years of combined classroom teaching experience, and higher education subject matter experts in English/Language Arts and Mathematics, representing Indiana's public and private institutions of higher education.

The Evaluation Teams met for the first time in February of 2014. The English/Language Arts evaluation teams were given the E/LA Common Core State Standards, as well as Indiana's 2006 E/LA Academic Standards and the standards created by the National Council of Teachers of English. The Mathematics

evaluation teams were given the Mathematics Common Core State Standards, as well as Indiana's 2000 Math Academic Standards, Indiana's 2009 Math Academic Standards, and the standards created by the National Council of Teachers of Mathematics.

The panel was instructed to independently evaluate each set of standards, identifying whether the standard was wholly aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready; partially aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready; or not aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready. The results of the evaluation were processed according to a forced consensus requirement—a majority requirement was calculated for each group of standards that was reviewed. Any standard that received a fully aligned rating by the majority of reviewers was marked as fully aligned; any standard that received a not aligned rating by the majority of reviewers was marked as not aligned; and any standard that received a partially aligned rating by the majority, or did not have a majority result, was marked as partially aligned.

Once the evaluations were complete, the results were compiled, and the Evaluation Teams were brought together to conduct a consensus process. The consensus process was blind (meaning that the Evaluation Team members did not know the origin of the standards that they were discussing). Through the consensus process, the Evaluation Teams were asked to select the standards that best and most thoroughly represented what students should know and be able to do in various areas of English/Language Arts and Mathematics in order to be college and career ready. The Evaluation Teams selected the standards that they found to be most appropriate; combined standards to create a more appropriate, rigorous, or clear standard; or, if they determined that gaps existed, wrote their own standards, or reviewed standards from other states (for example, the English/Language Arts Evaluation Teams reviewed the 2010 draft standards from Massachusetts).

Once the Evaluation Teams had selected the standards (from Common Core State Standards, Indiana Academic, or other states) or had written their own where they found gaps, the list of skills identified as necessary for students to be college and career ready was posted for public comment.

#### **Public Comment, Public Hearings, and National Expert Review**

The draft college and career ready standards were posted for the public to review on February 19, 2014. The public was invited to provide comment through March 12. Thousands of public comments were received. There were also three public hearings held in southern, central, and northern Indiana to receive public comment on the draft standards.

The comments from both the online public comment and the public hearings were compiled and reviewed and used to contribute to further iterations of the standards.

In addition, a variety of national experts were contacted to review the draft standards posted on February 19<sup>th</sup>. The results of the reviews were discussed, and portions of the reviews were incorporated into further iterations of the standards.

#### **Reconvening of Evaluation Teams**

The Evaluation Teams were reconvened in March of 2014. The teams were tasked with incorporating public comment, as well as national expert review, and with further reviewing the draft standards to ensure that they were aligned across grade levels and showed appropriate progression from grade to grade. The Evaluation Teams were also tasked with editing and revising standards for clarity, and addressing any other public comments around grade appropriateness, bias, embedded pedagogy, or other factors.

Once the Evaluation Teams completed their reviews, the results were sent to the College and Career Ready Panels for final review and approval. The results were also shared with additional national experts, who provided reviews. The results of those reviews were analyzed and synthesized and shared with the CCR Panels.

### **College and Career Ready Panels**

The College and Career Ready (CCR) Panels were created in order to ensure that the standards that Indiana developed were aligned with what colleges, universities, industries, and businesses deem necessary for students to be college and career ready. The CCR Panels were made up of subject matter experts from a variety of Indiana public and private colleges and universities, as well as individuals representing Indiana's businesses and industries.

The CCR Panels were brought together in late March of 2014 to review the draft Indiana Academic Standards that had been reviewed and vetted by the Evaluation Teams in mid-March of 2014. The CCR Panels were tasked with reviewing the standards from 12<sup>th</sup> grade through kindergarten to ensure that the standards were clear and understandable; aligned across grade levels, showing appropriate progression from grade to grade; and designed to prepare students for college and career readiness. The CCR panels met several times throughout the end of March 2014 and early April 2014 to accomplish this task. At their last meeting, the CCR panel members were asked to sign off on the draft standards, indicating whether, in their professional opinion, the standards were poised to prepare Hoosier students to be college and career ready.

### **Indiana Academic Standards (College and Career Ready)**

The culmination of the efforts of the Technical Teams, Advisory Teams, Evaluation Teams, and CCR Panels is the Indiana Academic Standards that are college and career ready. While many of the standards originated from various sources, including the Common Core State Standards; 2000, 2006, and 2009 Indiana Academic Standards; Massachusetts 2010 Draft English/Language Arts Standards; Virginia Standards of Learning; Nebraska English/Language Arts Standards; the National Council of Teachers of Mathematics; and the National Council of Teachers of English, a number of original standards were also written by members of the Evaluation Teams or CCR Panels.

**The process was designed to identify the clearest, most rigorous, and best aligned standards in Mathematics and English/Language Arts to ensure that Hoosier students will graduate from high school with the knowledge, skills, and abilities to be lifelong learners who can succeed in post-secondary education and economically-viable career opportunities.**

### What are the Indiana Academic Standards?

The Academic Standards are designed to help educators, parents, students, and community members understand what students need to know and be able to do at each grade level, and within each content strand, in order to exit high school college and career ready. The Indiana Academic Standards for English/Language Arts demonstrate what students should know and be able to do in the areas of Reading, Writing, Speaking and Listening, and Media Literacy. The Indiana Academic Standards for Mathematics demonstrate what students should know and be able to do in the areas of K-8 Mathematics; Algebra I, II, and Geometry; and higher-level high school Mathematics courses. The Indiana Academic Standards for Content Area Literacy (History/Social Studies and Science/Technical Subjects) indicate ways in which students should be able to incorporate literacy skills into various content areas at the 6-12 grade levels.

### **What are the Indiana Academic Standards NOT?**

#### 1). *The standards are not curriculum.*

While the standards may be used as the basis for curriculum, ***the Indiana Academic Standards are not a curriculum***. Therefore, identifying the sequence of instruction at each grade—what will be taught and for how long—requires concerted effort and attention at the district and school levels. While the standards may have examples embedded, and resource materials may include guidelines and suggestions, the standards do not prescribe any particular curriculum. Curricular tools, including textbooks, are selected by the district/school and adopted through the local school board.

#### 2). *The standards are not instructional practices.*

While the standards demonstrate what Hoosier students should know and be able to do in order to be prepared for college and careers, the standards are not instructional practices. The educators and subject matter experts that worked on the standards have taken care to ensure that the standards are free from embedded pedagogy and instructional practices. ***The standards do not define how teachers should teach***. The standards must be complemented by well-developed, aligned, and appropriate curricular materials, as well as robust and effective instructional practices.

#### 3). *The standards do not necessarily address students who are far below or far above grade-level.*

The standards are designed to show what the average Hoosier student should know and be able to do in order to be prepared for college and career. However, some students may be far below grade level or in need of special education, and other students may be far above grade level. The standards do not provide differentiation or intervention methods necessary to support and meet the needs of these students. It is up to the teacher, school, and district to determine the best and most effective mechanisms of standards delivery for these students.

#### 4). *The standards do not cover all aspects of what is necessary for college and career readiness.*

While the standards cover what have been identified as essential skills for Hoosier students to be ready for college and careers, the standards are not—and cannot be—an exhaustive list of what students need in order to be ready for life after high school. Students, especially younger students, require a wide range of physical, social, and emotional supports in order to be prepared for the rigors of each educational progression (elementary grades to middle grades; middle grades to high school; and high school to college or career).

## II. Acknowledgements

The Indiana Academic Standards could not have been developed without the time, dedication, and expertise of Indiana's K-12 teachers, higher education professors, and representatives of Indiana business and industry. Additionally, the members of the public, including parents, community members, and policymakers who took time to provide public comments, whether through the online comment tool or in person at the various public hearings, have played a key role in contributing to the Indiana Academic Standards.

The Indiana Department of Education and Indiana State Board of Education would like to thank Ms. Sujie Shin of the Center on Standards and Assessment Implementation for providing expert facilitation throughout the process and acting in an advisory capacity. The Department and Board would also like to thank the individuals and organizations who provided national expert reviews of the draft standards.

We wish to specially acknowledge the members of the Technical Teams, Advisory Teams, Evaluation Teams, and College and Career Ready Panels who dedicated hundreds of hours to the review, evaluation, synthesis, rewriting, and creation of standards designed to produce Hoosier students who are ready for college and careers.



## 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                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <b>PS.1: Make sense of problems and persevere in solving them.</b>            | 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.                                                                                                                                                    |
| <b>PS.2: Reason abstractly and quantitatively.</b>                            | 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.                                                                                                                                                                                                                                                                                                                   |
| <b>PS.3: Construct viable arguments and critique the reasoning of others.</b> | 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. |



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| <b>PS.4: Model with mathematics.</b>                                | 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.                 |
| <b>PS.5: Use appropriate tools strategically.</b>                   | 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. |
| <b>PS.6: Attend to precision.</b>                                   | 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.                                                                                                                                                                                                                                           |
| <b>PS.7: Look for and make use of structure.</b>                    | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>PS.8: Look for and express regularity in repeated reasoning.</b> | 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 3**

*The Mathematics standards for grade 3 are supplemented by the Process Standards for Mathematics.*

The Mathematics standards for grade 3 are made up of 5 strands: Number Sense; Computation; Algebraic Thinking; Geometry; Measurement; and Data Analysis. The skills listed in each strand indicate what students in grade 3 should know and be able to do in Mathematics.

### **NUMBER SENSE**

| <b>GRADE 3</b> |                                                                                                                                                                                                                                                                               |
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| <b>3.NS.1:</b> | Read and write whole numbers up to 10,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 10,000.                                                                                                           |
| <b>3.NS.2:</b> | Compare two whole numbers up to 10,000 using $>$ , $=$ , and $<$ symbols.                                                                                                                                                                                                     |
| <b>3.NS.3:</b> | Understand a fraction, $1/b$ , as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction, $a/b$ , as the quantity formed by $a$ parts of size $1/b$ . [ <i>In grade 3, limit denominators of fractions to 2, 3, 4, 6, 8.</i> ] |
| <b>3.NS.4:</b> | Represent a fraction, $1/b$ , on a number line by defining the interval from 0 to 1 as the whole, and partitioning it into $b$ equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line. |
| <b>3.NS.5:</b> | Represent a fraction, $a/b$ , on a number line by marking off lengths $1/b$ from 0. Recognize that the resulting interval has size $a/b$ , and that its endpoint locates the number $a/b$ on the number line.                                                                 |
| <b>3.NS.6:</b> | Understand two fractions as equivalent (equal) if they are the same size, based on the same whole or the same point on a number line.                                                                                                                                         |
| <b>3.NS.7:</b> | Recognize and generate simple equivalent fractions (e.g., $1/2 = 2/4$ , $4/6 = 2/3$ ). Explain why the fractions are equivalent (e.g., by using a visual fraction model).                                                                                                     |
| <b>3.NS.8:</b> | Compare two fractions with the same numerator or the same denominator by reasoning about their size based on the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions (e.g., by using a visual fraction model).    |
| <b>3.NS.9:</b> | Use place value understanding to round 2- and 3-digit whole numbers to the nearest 10 or 100.                                                                                                                                                                                 |

## COMPUTATION

| GRADE 3                                                                                                                                                                                                                                                                            |
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| 3.C.1: Add and subtract whole numbers fluently within 1000.                                                                                                                                                                                                                        |
| 3.C.2: Represent the concept of multiplication of whole numbers with the following models: equal-sized groups, arrays, area models, and equal "jumps" on a number line. Understand the properties of 0 and 1 in multiplication.                                                    |
| 3.C.3: Represent the concept of division of whole numbers with the following models: partitioning, sharing, and an inverse of multiplication. Understand the properties of 0 and 1 in division.                                                                                    |
| 3.C.4: Interpret whole-number quotients of whole numbers (e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each). |
| 3.C.5: Multiply and divide within 100 using strategies, such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ), or properties of operations.                                                             |
| 3.C.6: Demonstrate fluency with multiplication facts and corresponding division facts of 0 to 10.                                                                                                                                                                                  |

## ALGEBRAIC THINKING

| GRADE 3                                                                                                                                                                                                                                                                         |
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| 3.AT.1: Solve real-world problems involving addition and subtraction of whole numbers within 1000 (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                                                        |
| 3.AT.2: Solve real-world problems involving whole number multiplication and division within 100 in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). |
| 3.AT.3: Solve two-step real-world problems using the four operations of addition, subtraction, multiplication and division (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                               |
| 3.AT.4: Interpret a multiplication equation as equal groups (e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each). Represent verbal statements of equal groups as multiplication equations.                                               |
| 3.AT.5: Determine the unknown whole number in a multiplication or division equation relating three whole numbers.                                                                                                                                                               |
| 3.AT.6: Create, extend, and give an appropriate rule for number patterns using multiplication within 1000.                                                                                                                                                                      |



## GEOMETRY

| GRADE 3                                                                                                                                                                                                                                                                                                                                                                                          |
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| 3.G.1: Identify and describe the following: cube, sphere, prism, pyramid, cone, and cylinder.                                                                                                                                                                                                                                                                                                    |
| 3.G.2: Understand that shapes (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize and draw rhombuses, rectangles, and squares as examples of quadrilaterals. Recognize and draw examples of quadrilaterals that do not belong to any of these subcategories. |
| 3.G.3: Identify, describe and draw points, lines and line segments using appropriate tools (e.g., ruler, straightedge, and technology), and use these terms when describing two-dimensional shapes.                                                                                                                                                                                              |
| 3.G.4: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole ( $\frac{1}{2}$ , $\frac{1}{3}$ , $\frac{1}{4}$ , $\frac{1}{6}$ , $\frac{1}{8}$ ).                                                                                                                                                                                            |

## MEASUREMENT

| GRADE 3                                                                                                                                                                                                                                                                                                                                                                                        |
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| 3.M.1: Estimate and measure the mass of objects in grams (g) and kilograms (kg) and the volume of objects in quarts (qt), gallons (gal), and liters (l). Add, subtract, multiply, or divide to solve one-step real-world problems involving masses or volumes that are given in the same units (e.g., by using drawings, such as a beaker with a measurement scale, to represent the problem). |
| 3.M.2: Choose and use appropriate units and tools to estimate and measure length, weight, and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.                                                                                                                                                                 |
| 3.M.3: Tell and write time to the nearest minute from analog clocks, using a.m. and p.m., and measure time intervals in minutes. Solve real-world problems involving addition and subtraction of time intervals in minutes.                                                                                                                                                                    |
| 3.M.4: Find the value of any collection of coins and bills. Write amounts less than a dollar using the ¢ symbol and write larger amounts using the \$ symbol in the form of dollars and cents (e.g., \$4.59). Solve real-world problems to determine whether there is enough money to make a purchase.                                                                                         |
| 3.M.5: Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters.                                                                               |
| 3.M.6: Multiply side lengths to find areas of rectangles with whole-number side lengths to solve real-world problems and other mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.                                                                                                                                                      |
| 3.M.7: Find perimeters of polygons given the side lengths or by finding an unknown side length.                                                                                                                                                                                                                                                                                                |

## DATA ANALYSIS

### GRADE 3

**3.DA.1:** Create scaled picture graphs, scaled bar graphs, and frequency tables to represent a data set—including data collected through observations, surveys, and experiments—with several categories. Solve one- and two-step “how many more” and “how many less” problems regarding the data and make predictions based on the data.

**3.DA.2:** Generate measurement data by measuring lengths with rulers to the nearest quarter of an inch. Display the data by making a line plot, where the horizontal scale is marked off in appropriate units, such as whole numbers, halves, or quarters.



# Indiana Department of Education



## Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

| Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                               | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Differences From Previous Standards                                                                                                              |
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|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Process Standards                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                  |
| MA.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?" 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. | 1.6.1: Choose the approach, materials, and strategies to use in solving problems.<br><br>1.6.2: Choose the approach, materials, and strategies to use in solving problems.<br><br>2.6.1: Choose the approach, materials, and strategies to use in solving problems. | 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 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. | IAS 2014 removes criteria involving a graphing calculator and does not distinguish between younger and older students.                           |
|                                                                               | 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.                                                                                                                                  | 1.6.5: Understand and use connections between two problems.<br><br>2.6.5: Understand and use connections between two problems.                                                                                                                                      | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | IAS 2014 is similar to common core, both expand upon IAS 2000 by having the student decontextualize problems and develop quantitative reasoning. |





## Indiana Department of Education



### Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

|                                                                                     | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                         | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Differences From Previous Standards                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MA.PS.3:</b><br>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. 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. | K.6.3: Explain the reasoning used with concrete objects and pictures.<br><br>1.6.3: Explain the reasoning used and justify the procedures selected in solving a problem.                                      | 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 2014 is similar to common core, both expand upon IAS 2000 by having students construct arguments, use counterexamples, and critique others arguments. IAS 2014 does not distinguish between younger and older students. IAS 2014 requires students to understand the meaning of quantities instead of merely knowing how to compute quantities. |
| <b>MA.PS.4:</b> 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.                                                                                                                                                                                                                                                                                                                                                                                            | K.6.2: Use tools such as objects or drawings to model problems.<br><br>1.6.2: Use tools such as objects or drawings to model problems.<br><br>2.6.2: Use tools such as objects or drawings to model problems. | 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 2014 has removed examples and does not distinguish between younger and older students.                                                                                                                                                                                                                                                          |





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### Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

|                                               | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Indiana Academic Mathematics Standards<br>Adopted 2000                                                                                                                                                                                                                                                                  | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Differences From Previous Standards                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA.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. 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. | K.6.2: Use tools such as objects or drawings to model problems.<br>1.6.2: Use tools such as objects or drawings to model problems.<br>2.6.2: Use tools such as objects or drawings to model problems.                                                                                                                   | 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 2014 does not distinguish between younger and older students. Both IAS 2014 and CCSS expand upon IAS 2000 by having students consider more than just graphing. IAS 2014 requires students to apply their problem solving strategies to everyday life situations, and students are required to draw conclusions and interpret results based on data found from models. |
| MA.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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | K.6.4: Make precise calculations and check the validity of the results in the context of the problem.<br>1.6.4: Make precise calculations and check the validity of the results in the context of the problem.<br>2.6.4: Make precise calculations and check the validity of the results in the context of the problem. | 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 2014 does not distinguish between younger and older students.                                                                                                                                                                                                                                                                                                         |



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## Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

|                                                                 | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014                                                                                                                                                                                                                                                                                                                                            | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                                                               | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Differences From Previous Standards                                                                                                                                                                                                   |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA.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.                          |                                                                                                                                                                                                                                                                                                     | 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 $7 \times 8$ equals the well remembered $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$ , older students can see the 14 as $2 \times 7$ and the $9$ as $2 + 7$ . They recognize the significance of an odding line in a geometric figure and can use 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 $y$ . | IAS 2014 has removed examples and does not distinguish between younger and older students. Both IAS 2014 and CCSS expand upon IAS 2000 by having students discern patterns, structure, geometric figures, and composition of objects. |
| MA.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. |                                                                                                                                                                                                                                                                                                     | 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 details. They continually evaluate the reasonableness of their intermediate results.                                                                                                                | IAS 2014 has removed examples and does not distinguish between younger and older students.                                                                                                                                            |
| <b>Number Sense</b>                                             |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                       |
| MA.3.NS.1:                                                      | Read and write whole numbers up to 10,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 10,000.                                                                                                                                                                                                                                                      | 3.1.1: Count, read, and write whole numbers up to 1,000.<br>3.1.3: Use words, models, and expanded form to represent numbers up to 1,000.                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | IAS 2014 goes to 10,000.                                                                                                                                                                                                              |
| MA.3.NS.2:                                                      | Compare two whole numbers up to 10,000 using $>$ , $=$ , and $<$ symbols.                                                                                                                                                                                                                                                                                                                                                | 3.1.5: Compare whole numbers up to 1,000 and arrange them in numerical order.                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                       |
| MA.3.NS.3:                                                      | Understand a fraction, $a/b$ , as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction, $a/b$ , as the quantity formed by $a$ parts of size $1/b$ . (In grade 3, limit denominators of fractions to 2, 3, 4, 5, 8.)                                                                                                                                                     | 2.1.8: Recognize fractions as parts of a whole or parts of a group (up to 12 parts).<br>3.1.6: Understand a fraction, $a/b$ , as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction, $a/b$ , as the quantity formed by $a$ parts of size $1/b$ . | 3.NF.1: Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction $a/b$ as the quantity formed by $a$ parts of size $1/b$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | IAS 2014 and CCSS introduce the $a$ and $b$ notation of fractions. IAS 2014 also limits the denominators provided in 3rd grade.                                                                                                       |
| MA.3.NS.4:                                                      | Represent a fraction, $a/b$ , on a number line by defining the interval from 0 to 1 as the whole, and partitioning it into $b$ equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.                                                                                                                                            |                                                                                                                                                                                                                                                                                                     | 3.NF.2.a: Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into $b$ equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                       |
| MA.3.NS.5:                                                      | Represent a fraction, $a/b$ , on a number line by marking off lengths $1/b$ from 0. Recognize that the resulting interval has size $a/b$ , and that its endpoint locates the number $a/b$ on the number line.                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                     | 3.NF.2.b: Represent a fraction $a/b$ on a number line diagram by marking off $a$ lengths $1/b$ from 0. Recognize that the resulting interval has size $a/b$ and that its endpoint locates the number $a/b$ on the number line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                       |
| MA.3.NS.6:                                                      | Understand two fractions as equivalent (equal) if they are the same size, based on the same whole or the same point on a number line.                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                     | 3.NF.3.a: Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                       |





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Indiana Academic Standards for Mathematics – Third Grade  
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|                           | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted 2014                                                                                                                                                                                                     | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                                                                                                                                                      | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Differences From Previous Standards                                                                            |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| MA.3.NS.7:                | Recognize and generate simple equivalent fractions (e.g., $1/2 = 2/4$ , $4/5 = 2/3$ ). Explain why the fractions are equivalent (e.g., by using a visual fraction model).                                                                                                   | 3.1.8: Show equivalent fractions using equal parts.<br><br>2.1.9: Recognize, name, and compare the unit fractions: $1/2$ , $1/3$ , $1/4$ , $1/5$ , $1/6$ , $1/8$ , $1/10$ , and $1/12$ .<br><br>3.1.10: Given a pair of fractions, decide which is larger or smaller by using objects or pictures.<br><br>3.1.8: Round numbers less than 1,000 to the nearest ten and the nearest hundred. | 3.NF.3a: Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$ , $4/5 = 2/3$ . Explain why the fractions are equivalent, e.g., by using a visual fraction model.<br><br>3.NF.3b: Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole.<br><br>Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions, e.g., by using a visual fraction model.<br><br>3.NBT.1: Use place value understanding to round whole numbers to the nearest 10 or 100. | IAS 2014 and CCSS expect students to be able to explain equivalent fractions.                                  |
| MA.3.NS.8:                | Use place value understanding to round 2- and 3-digit whole numbers to the nearest 10 or 100.                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |
| MA.3.NS.9:                | Add and subtract whole numbers fluently within 1000.                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |
| MA.3.C.1:                 | Represent the concept of multiplication of whole numbers with the following models: equal-sized groups, arrays, area models, and equal "jumps" on a number line. Understand the properties of 0 and 1 in multiplication.                                                    | 3.2.1: Add and subtract whole numbers up to 1,000 with or without regrouping, using relevant properties of the number system.<br><br>3.2.2: Represent the concept of multiplication as repeated addition.                                                                                                                                                                                  | 3.NBT.2: Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.<br><br>3.OA.1: Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each.                                                                                                                                                                                                                                                                                                            | IAS 2014 removes stipulations on how to add or subtract within 1000                                            |
| MA.3.C.2:                 | Represent the concept of division of whole numbers with the following models: partitioning, sharing, and an inverse of multiplication. Understand the properties of 0 and 1 in division.                                                                                    | 3.2.3: Represent the concept of division as repeated subtraction, equal sharing, and forming equal groups.<br><br>4.2.7: Understand the special properties of 0 and 1 in multiplication and division.                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IAS 2014 is more specific and includes concepts: models.                                                       |
| MA.3.C.3:                 | Interpret whole-number quotients of whole numbers (e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each). |                                                                                                                                                                                                                                                                                                                                                                                            | 3.OA.2: Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                |
| MA.3.C.4:                 | Multiply and divide within 100 using strategies, such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ), or properties of operations.                                                             | 3.2.4: Know and use the inverse relationship between multiplication and division facts, such as $6 \times 7 = 42$ , $42 \div 7 = 6$ , $7 \times 6 = 42$ , $42 \div 6 = 7$ .                                                                                                                                                                                                                | 3.OA.5: Apply properties of operations as strategies to multiply and divide.<br><br>3.OA.6: Understand division as an unknown-factor problem.<br><br>3.NBT.3: Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., $9 \times 80$ , $5 \times 60$ ) using strategies based on place value and properties of operations.                                                                                                                                                                                                                                                                                                    | IAS 2014 expects students to know strategies for multiplication and division not just memorizing facts tables. |
| MA.3.C.5:                 | Demonstrate fluency with multiplication facts and corresponding division facts of 0 to 10.                                                                                                                                                                                  | 3.2.5: Show mastery of multiplication facts for 2, 5, and 10.                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |
| MA.3.C.6:                 |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |
| <b>Algebraic Thinking</b> |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |
| MA.3.AT.1:                | Solve real-world problems involving addition and subtraction of whole numbers within 1000 (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                                                            | 3.3.2: Solve problems involving numeric equations.                                                                                                                                                                                                                                                                                                                                         | 3.OA.3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.                                                                                                                                                                                                                                                                                                                                                                                           | IAS 2014 is more specific about the problems students should be able to solve.                                 |
| MA.3.AT.2:                | Solve real-world problems involving whole number multiplication and division within 100 in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).     | 3.3.3: Solve problems involving numeric equations.                                                                                                                                                                                                                                                                                                                                         | 3.OA.8: Solve two-step word problems using the four operations. 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 2014 and CCSS is more specific about the problems students should be able to solve.                        |
| MA.3.AT.3:                | Interpret a multiplication equation as equal groups (e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each). Represent verbal statements of equal groups as multiplication equations.                                                   | 3.3.2: Solve problems involving numeric equations.                                                                                                                                                                                                                                                                                                                                         | 3.OA.1: Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | IAS 2014 and CCSS is more specific about the problems students should be able to solve.                        |
| MA.3.AT.4:                |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |





# Indiana Department of Education



## Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

|            | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014                                                                                                                                                                                                                                                                                                             | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                                             | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                         | Differences From Previous Standards                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA.3.AT.5: | Determine the unknown whole number in a multiplication or division equation relating three whole numbers.                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                   | 3.OA.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers.                                                                                                                                                                                                                                                                                     |                                                                                                                                                                     |
| MA.3.AT.6: | Create, extend, and give an appropriate rule for number patterns using multiplication within 1000.                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                   | 3.OA.9: Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.                                                                                                                                                                                                                                             |                                                                                                                                                                     |
|            |                                                                                                                                                                                                                                                                                                                                                                                           | <b>Geometry</b>                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |
| MA.3.G.1:  | Identify and describe the following: cube, sphere, prism, pyramid, cone, and cylinder.                                                                                                                                                                                                                                                                                                    | 3.4.3: Identify, describe, and classify: cube, sphere, prism, pyramid, cone, and cylinder.                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |
|            | Understand that shapes (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize and draw rhombuses, rectangles, and squares as examples of quadrilaterals. Recognize and draw examples of quadrilaterals that do not belong to any of these subcategories. | 3.4.1: Identify quadrilaterals as four-sided shapes.<br>3.4.10: Recognize geometric shapes and their properties in the environment and specify their locations                                                                                                                    | 3.G.1: Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. | IAS 2014 and CCSS define more shapes to learn and for students to identify common attributes.                                                                       |
| MA.3.G.2:  | Identify, describe and draw points, lines and line segments using appropriate tools (e.g., ruler, protractor, and technology), and use these terms when describing two-dimensional shapes.                                                                                                                                                                                                | 3.4.6: Use the terms point, line, and line segment in describing two-dimensional shapes.                                                                                                                                                                                          | 4.G.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.                                                                                                                                                                                                                                       | IAS 2014 and CCSS intend for students to use a variety of tools for drawing.                                                                                        |
| MA.3.G.3:  | Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole ( $\frac{1}{2}$ , $\frac{1}{3}$ , $\frac{1}{4}$ , $\frac{1}{6}$ , $\frac{1}{8}$ ).                                                                                                                                                                                            | 3.4.7: Draw line segments and lines.                                                                                                                                                                                                                                              | 3.G.2: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.                                                                                                                                                                                                                                                                                   |                                                                                                                                                                     |
|            |                                                                                                                                                                                                                                                                                                                                                                                           | <b>Measurement</b>                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |
|            | Estimate and measure the mass of objects in grams (g) and kilograms (kg) and the volume of objects in quarts (qt), gallons (gal), and liters (l). Add, subtract, multiply, or divide to solve one-step real-world problems involving masses or volumes that are given in the same units (e.g., by using drawings such as a beaker with a measurement scale to represent the problem).     | 3.5.6: Estimate and measure capacity using quarts, gallons, and liters.<br>3.5.7: Estimate and measure weight using pounds and kilograms.                                                                                                                                         | 3.MD.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.                                   | IAS 2014 expects students to be able to perform measurement problems using addition, subtraction, multiplication, and division and use diverse tools for measuring. |
| MA.3.M.1:  | Choose and use appropriate units and tools to estimate and measure length, weight, and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.                                                                                                                                                                   | 2.5.3: Decide which unit of length is most appropriate in a given situation.<br>2.5.8: Estimate temperature. Read a thermometer in Celsius and Fahrenheit.<br>3.5.1: Measure line segments to the nearest half-inch.<br>3.5.8: Compare temperatures in Celsius and Fahrenheit.    |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |
| MA.3.M.2:  | Tell and write time to the nearest minute from analog clocks, using a.m. and p.m., and measure time intervals in minutes. Solve real-world problems involving addition and subtraction of time intervals in minutes.                                                                                                                                                                      | 3.5.9: Tell time to the nearest minute and find how much time has elapsed.                                                                                                                                                                                                        | 3.MD.1: Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.                                                                                                                                                             | IAS 2014 expects students to solve real world problems.                                                                                                             |
| MA.3.M.3:  | Find the value of any collection of coins and bills. Write amounts less than a dollar using the \$ symbol and write larger amounts using the \$ symbol in the form of dollars and cents (e.g., \$4.59). Solve real-world problems to determine whether there is enough money to make a purchase.                                                                                          | 3.5.10: Find the value of any collection of coins and bills. Write amounts less than a dollar using the \$ symbol and write larger amounts in decimal notation using the \$ symbol.<br>3.5.11: Use play or real money to decide whether there is enough money to make a purchase. |                                                                                                                                                                                                                                                                                                                                                                                                       | IAS 2014 expects students to solve real world problems.                                                                                                             |
| MA.3.M.4:  |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                     |





# Indiana Department of Education



## Indiana Academic Standards for Mathematics – Third Grade Adopted April 2014 – Standards Correlation Guide Document 5-28-2014

|               | Indiana Academic Standard for<br>Third Grade Mathematics – Adopted April 2014                                                                                                                                                                                                                                                  | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                                                                                                                                  | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Differences From Previous Standards                                                                         |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| MA.3.M.5:     | Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters.                      | 3.5.4: Estimate or find the area of shapes by covering them with squares.<br><br>4.5.6: Understand that rectangles with the same area can have different perimeters and that rectangles with the same perimeter can have different areas.                                                                                                                              | 3.MD.5a: A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.<br><br>3.MD.5b: A plane figure which can be covered without gaps or overlaps by $n$ unit squares is said to have an area of $n$ square units.<br><br>3.MD.6: Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).<br><br>3.MD.7a: Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.<br><br>3.MD.7b: Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. | IAS 2014 expects students to solve real world problems but does not specifically mention appropriate units. |
| MA.3.M.6:     | Find perimeters of polygons given the side lengths or by finding an unknown side length.                                                                                                                                                                                                                                       | 4.5.4: Know and use formulas for finding the areas of rectangles and squares.<br><br>4.5.5: Estimate and calculate the area of rectangular shapes using appropriate units, such as square centimeter ( $\text{cm}^2$ ), square meter ( $\text{m}^2$ ), square inch ( $\text{in}^2$ ), or square yard ( $\text{yd}^2$ ).<br><br>3.5.3: Find the perimeter of a polygon. | 3.MD.8: Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                             |
| MA.3.M.7:     |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
| Data Analysis |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
| MA.3.DA.1:    | Create scaled picture graphs, scaled bar graphs, and frequency tables to represent a data set—including data collected through observations, surveys, and experiments—with several categories. Solve one- and two-step "how many more" and "how many less" problems regarding the data and make predictions based on the data. |                                                                                                                                                                                                                                                                                                                                                                        | 3.MD.3: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.<br><br>Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | IAS 2014 defines data collection techniques and expects students to create data representations.            |
| MA.3.DA.2:    | Generate measurement data by measuring lengths with rulers to the nearest quarter of an inch. Display the data by making a line plot, where the horizontal scale is marked off in appropriate units, such as whole numbers, halves, or quarters.                                                                               |                                                                                                                                                                                                                                                                                                                                                                        | 3.MD.4: Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                             |
| Unaligned     |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | Indiana Academic Mathematics Standard<br>Adopted 2000                                                                                                                                                                                                                                                                                                                  | Common Core State Standard<br>for Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.1.2: Identify and interpret place value in whole numbers up to 1,000.                                                                                                                                                                                                                                                                                                | 3.MD.7c: Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths $a$ and $b = c$ is the sum of $a \times b$ and $a \times c$ . Use area models to represent the distributive property in mathematical reasoning.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.1.4: Identify any number up to 1,000 in various combinations of hundreds, tens, and ones.                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.1.7: Identify odd and even numbers up to 1,000 and describe their characteristics.                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.1.9: Use the correct names for numerators and denominators.                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.3.1: Represent relationships of quantities in the form of a numeric expression or equation.                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.3.3: Choose appropriate symbols for operations and relations to make a number sentence true.                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |
|               |                                                                                                                                                                                                                                                                                                                                | 3.3.6: Solve simple problems involving a functional relationship between two quantities.                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                             |



This Teacher Resource Guide has been developed to provide supporting materials to help educators successfully implement the Indiana Academic Standards for Third 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

This resource document is a living document and will be frequently updated.

Please send any suggested links and report broken links to:

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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.

The links compiled and posted in this Resource Guide have been provided by the Department of Education and other sources. The DOE has not attempted to evaluate any posted materials. They are offered as samples for your reference only and are not intended to represent the best or only approach to any particular issue. The DOE does not control or guarantee the accuracy, relevance, timeliness, or completeness of information contained on a linked website; does not endorse the views expressed or services offered by the sponsor of a linked website; and cannot authorize the use of copyrighted materials contained in linked websites. Users must request such authorization from the sponsor of the linked website.

#### **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>

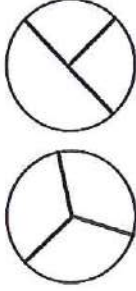
<https://www.istemnetwork.org/index.cfm>

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



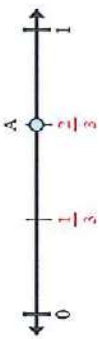
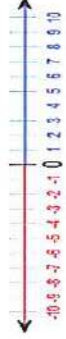
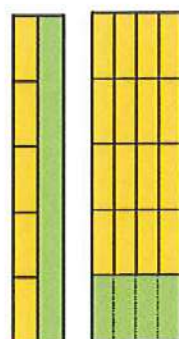


Indiana Academic Standards for Mathematics – Third Grade  
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|            | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                        | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Specific Third Grade Electronic<br>Resource for the Standard                                                                      |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| MA.3.NS.1: | Read and write whole numbers up to 10,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 10,000.                                                                                                  | <b>Number Sense</b><br><b>Word form</b> - a number written in words;<br><b>Models</b> - a picture representation of the number;<br><b>Standard form</b> - a number written in a way that shows only its digits;<br><b>Expanded form</b> - a number written as the sum of the values of its digits;<br><b>Whole numbers</b> - any number such as 0, 1, 2, 3, and so on<br><b>Standard form</b> - writing numbers showing only digits<br><b>Expanded form</b> - the numbers written as the sum of the values of each of its digits<br><b>Equivalent</b> - two or more sets of numbers that show the same amount<br><b>Equivalent form</b> - a number represented in a way that has the same value. | Create riddles such as,<br>"I have 5 tens, 12 ones and 3 hundreds. What number am I?"<br>"I Have Who Has" games<br><br>Example: 1,247<br>Word form - one thousand, two hundred, forty-seven<br>Standard form - 1,247<br>Expanded form - $1000 + 200 + 40 + 7$<br>Equivalent form - 12 hundreds, 4 tens, 7 ones or 124 tens, 7 ones                                                                                                                                                                                                                                                                                                                                                         | <a href="http://www.ixl.com/math/grade-3/write-numbers-in-words">http://www.ixl.com/math/grade-3/write-numbers-in-words</a>       |
| MA.3.NS.2: | Compare two whole numbers up to 10,000 using $>$ , $=$ , and $<$ symbols.                                                                                                                                                                                            | <b>Compare</b> - to decide if one number is greater than or less than, or equal to another number.<br>$>$ - greater than<br>$<$ - less than<br>$=$ - equal to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | To compare numbers one must look at the place value of all the digits within each number. For example, to compare 157 and 151, the number 157 has 1 hundred, 5 tens, and 7 ones and the number 151 has 1 hundred, 5 tens, and 1 one. Therefore, $157 > 151$ . Students must have a complete understanding of the place value chart in order to compare numbers properly.<br><br>Students play a variation on the card game "War" making the largest possible number from five dealt cards and then comparing their numbers using the signs $<$ , $>$ , and $=$ printed on index cards.                                                                                                     | <a href="http://www.ixl.com/math/grade-3/compare-numbers">http://www.ixl.com/math/grade-3/compare-numbers</a>                     |
| MA.3.NS.3: | Understand a fraction, $1/b$ , as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction, $a/b$ , as the quantity formed by $a$ parts of size $1/b$ . [In grade 3, limit denominators of fractions to 2, 3, 4, 5, 8.] | <b>Fraction</b> - a symbol, such as $1/2$ or $2/3$ , that names equal parts of a whole. The numerator tells how many equal parts are being described and is the number above the fraction bar. The denominator indicates the total number of equal parts into which the whole has been divided. It is the number below the fraction bar.<br><b>Equal</b> - being of the same value<br><b>Quantity</b> - amount of something<br><b>Partitioned</b> - divided                                                                                                                                                                                                                                      | Students need to understand that a fraction is composed of many equal pieces called unit fractions. Unit fractions have a numerator of 1. For example, the fraction $5/6$ is composed of 5 $1/6$ pieces. Students also need to recognize figures that have been divided into fractional parts and those which have not. The figure on the left is an example of thirds but the one on the right does not show thirds. However, a student might indicate that the figure on the right has one part which is $1/2$ and two parts showing $1/4$ . One might say that the two sides are equivalent.<br><br> | <a href="https://www.illustrativemathematics.org/illustrations/833">https://www.illustrativemathematics.org/illustrations/833</a> |



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|            | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                                                         | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                     | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Specific Third Grade Electronic<br>Resource for the Standard                                                                      |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| MA.3.NS.4: | Represent a fraction, $\frac{1}{b}$ , on a number line by defining the interval from 0 to 1 as the whole, and partitioning it into $b$ equal parts; Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line. | <b>Number line</b> - a line that shows numbers in order using a scale; a diagram represents numbers as points on a line<br><b>Interval</b> - space between two points<br><b>Endpoint</b> - the last point on a segment or ray | In the picture below, the whole is defined from 0 - 1. It has been divided into 3 equal parts or thirds. The fraction $\frac{1}{3}$ is the space between 0 - $\frac{1}{3}$ . Students will often count the tick marks and think that it shows fourths rather than thirds. A great way to introduce fractions is through measurement activities using a ruler and relating it to a number line.<br><br>benchmarks for a half, a quarter, three quarters etc.<br> | <a href="https://www.illustrativemathematics.org/illustrations/168">https://www.illustrativemathematics.org/illustrations/168</a> |
| MA.3.NS.5: | Represent a fraction, $\frac{a}{b}$ , on a number line by marking off lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ , and that its endpoint locates the number $\frac{a}{b}$ on the number line.                                                         |                                                                                                                                                                                                                               | The picture above shows both the unit fraction and other fractions too. The fraction $\frac{2}{3}$ is represented from 0 - $\frac{2}{3}$ or $\frac{2}{3}$ of the way from 0 to 1.<br>Give each student a fraction to create by taking units from a 10-inch strip of paper. Label each representation appropriately (e.g., one-third, two-eighths). Ask groups of students to place the paper strip fractions in order from smallest to largest.                                                                                                                                                                                   |                                                                                                                                   |
| MA.3.NS.6: | Understand two fractions as equivalent (equal) if they are the same size, based on the same whole or the same point on a number line.                                                                                                                                                                 | <b>Equivalent</b> - an equivalent fraction has an equal value or area. It does not have to be the same shape to be equivalent.                                                                                                | Using a fraction stick chart make a poster showing equivalents for a half using 4, 6, 8, 10, and 12 in the denominator.<br>The figures below show equivalent fractions because $\frac{1}{2} = \frac{5}{10}$ and $\frac{1}{5} = \frac{4}{20}$ . Students need to have opportunities to find equivalent fractions using grid paper that has been cut into the same size wholes. Students need to understand that fractions are equivalent if the area is the same. They do not have to be the same shape.<br>                                    | <a href="https://www.illustrativemathematics.org/illustrations/871">https://www.illustrativemathematics.org/illustrations/871</a> |



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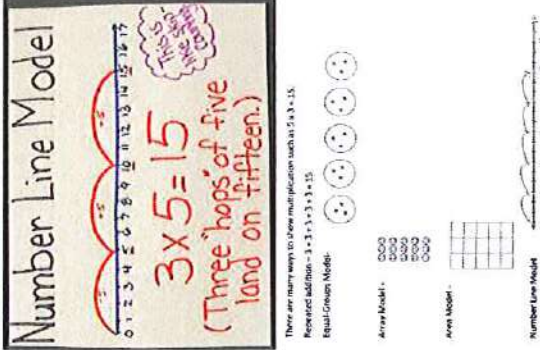
|            | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                            | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                 | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                                            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA.3.NS.7: | Recognize and generate simple equivalent fractions (e.g., $\frac{1}{2} = \frac{2}{4}$ , $\frac{4}{5} = \frac{2}{3}$ ). Explain why the fractions are equivalent (e.g., by using a visual fraction model).                | <b>Equivalent fractions</b> -fractions that name the same part of a whole, same part of a set, or same location on a number line.                                                                                                                                                                                                                                                                                                                                                                                                                                      | See the figures above.<br><br>Given a set of fraction bars, students find equivalent fractions. Ask students to divide each equally-sized object into different fractional portions (e.g., quarters, halves, eighths). Have students put the objects side-by-side to find fractions that are equivalent such as two-fourths and one-half. Discuss how two different-sized objects will have different-sized fractional parts. | <a href="https://www.ixl.com/math/grade-3/equivalent-fractions-choose-the-equivalent-fraction">https://www.ixl.com/math/grade-3/equivalent-fractions-choose-the-equivalent-fraction</a> |
| MA.3.C.2:  | Represent the concept of multiplication of whole numbers with the following models: equal-sized groups, arrays, area models, and equal "jumps" on a number line. Understand the properties of 0 and 1 in multiplication. | <b>Multiplication</b> - a mathematical operation that gives the total number when you join equal groups. Factors are the numbers being multiplied. The product is the answer to a multiplication problem.<br><b>Identify Property</b> - when you multiply a number and 1, the number does not change.<br><b>Zero Property</b> - when you multiply a number and 0, the product equals 0.<br><b>Equal-sized groups</b> - groups of the same quantity<br><b>arrays</b> -a way of displaying objects in rows and columns<br><b>Area models</b> - models showing area cubes |                                                                                                                                                                                                                                                                                                                                             | <a href="https://www.ixl.com/math/grade-3/reliable-addition-and-multiplication">https://www.ixl.com/math/grade-3/reliable-addition-and-multiplication</a>                               |

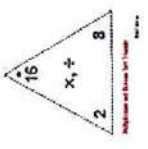
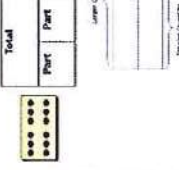




Figure 1 illustrates the process of the proposed algorithm. The figure is divided into three main sections: **Input**, **Processing**, and **Output**.  
**Input:** Shows a set of 10 red circles arranged in two rows of five. Below them is the text "Input: 10 red circles".  
**Processing:** Shows a 5x5 grid of red circles. Below it is the text "Processing: 5x5 grid of red circles".  
**Output:** Shows three groups of red circles. The first group has 3 circles, the second has 4 circles, and the third has 3 circles. Below them is the text "Output: 3, 4, 3".



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|            | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                           | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                                                                                    | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                     | Specific Third Grade Electronic<br>Resource for the Standard                                                                                  |
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| MA.3.C.6:  | Demonstrate fluency with multiplication facts and corresponding division facts of 0 to 10.                                                                                                                                                                              | Fluency - "Computational fluency refers to having efficient and accurate methods for computing. Students exhibit computational fluency when they demonstrate flexibility in the computational methods they choose, understand and can explain these methods, and produce accurate answers efficiently." NCTM Principles and Standards for School Mathematics | Example: $4 \times 8 = 32$ ; $8 \times 4 = 32$ ; $32 \div 4 = 8$ ; $32 \div 8 = 4$<br>                                                                                                                                                                                                                                                           | <a href="https://www.ixl.com/math/grade-2/multiplication-tables-up-to-10">https://www.ixl.com/math/grade-2/multiplication-tables-up-to-10</a> |
| MA.3.AT.1: | Solve real-world problems involving addition and subtraction of whole numbers within 1000 (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                                                        | Algebraic Thinking<br>Real-world problems - problems with context relatable to real-world events                                                                                                                                                                                                                                                             | Example: The 3rd and 4th grade students are going on a field trip to the museum. If there are 423 students going altogether and 157 are 3rd graders, how many students are 4th graders?<br>                                                                                                                                                      | <a href="https://www.illustrativemathematics.org/illustrations/1315">https://www.illustrativemathematics.org/illustrations/1315</a>           |
| MA.3.AT.2: | Solve real-world problems involving whole number multiplication and division within 100 in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). |                                                                                                                                                                                                                                                                                                                                                              | Example: Grandma bought 48 flowers which she wanted to put into 6 vases. How many flowers would go in each vase?<br>Example: Jerry bought 9 packages of cookies. Each package contained 10 cookies. How many cookies did he buy in all?                                                                                                                                                                                           | <a href="https://www.illustrativemathematics.org/illustrations/262">https://www.illustrativemathematics.org/illustrations/262</a>             |
| MA.3.AT.3: | Solve two-step real-world problems using the four operations of addition, subtraction, multiplication and division (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                               | Two-step problems - problems in which one must first solve one problem. Then one must use the answer from the first problem in order to determine the final solution.<br>Equation - a statement that two mathematical expressions are equal                                                                                                                  | Example: Sydney found 231 rocks last week and 137 this week. If she gave 53 rocks to her friends, how many rocks does she have in her collection.<br>Example: Eric worked 5 hours each day. He wants to work for 30 hours for the week. If he has worked 4 days, how many more hours does he need to work to reach his goal?<br>Students should be encouraged to visualize what is happening in the problem in order to solve it. | <a href="https://www.illustrativemathematics.org/illustrations/1301">https://www.illustrativemathematics.org/illustrations/1301</a>           |
| MA.3.AT.4: | Interpret a multiplication equation as equal groups (e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each).<br>Represent verbal statements of equal groups as multiplication equations.                                            | Represent verbal statements of equal groups - relates to understanding word problems as multiplication equations.                                                                                                                                                                                                                                            | Example: Jeff purchased 5 packages of donuts. Each package contained 4 donuts. How many donuts did Jeff purchase? 6 groups of $4 = 6 \times 4 = 24$ .                                                                                                                                                                                                                                                                             | <a href="https://www.ixl.com/math/grade-3/multiplication-sentences">https://www.ixl.com/math/grade-3/multiplication-sentences</a>             |
| MA.3.AT.5: | Determine the unknown whole number in a multiplication or division equation relating three whole numbers.                                                                                                                                                               | Unknown whole number - must make the relationship between the three numbers true.<br>Equation - a statement that two mathematical expressions are equal                                                                                                                                                                                                      | Example: $24 = ? \times 6$ ; $? \times 6 = 24$ or $9 = ? \div 3$ ; $9 = ? \div 3$ . It is important for students to be able to determine what is unknown based on the relationship between the numbers. The unknown number should be placed in different positions.                                                                                                                                                               |                                                                                                                                               |





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|                 | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                                                                                                                                             | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                            |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|----|---|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MA.3.AT.6:      | Create, extend, and give an appropriate rule for number patterns using multiplication within 1000.                                                                                                                                                                                                                                                                                        | Rule is a consistent mathematical relationship between two numbers.<br>Number patterns - elements are arranged so that what comes next can be predicted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <table border="1"> <tr> <td>3</td><td>5</td><td>7</td><td>10</td><td>15</td></tr> <tr> <td>6</td><td>10</td><td>14</td><td>20</td><td>30</td></tr> </table> <p>The rule for this table is <math>\times 2</math>. Students should understand that the relationship is from the top number to the bottom number.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3                                                                                                                                                                       | 5 | 7 | 10 | 15 | 6 | 10 | 14 | 20 | 30 | <a href="http://www.ixl.com/math/grade-3/multiplication-patterns-over-increasing-place-values">http://www.ixl.com/math/grade-3/multiplication-patterns-over-increasing-place-values</a> |
| 3               | 5                                                                                                                                                                                                                                                                                                                                                                                         | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 15                                                                                                                                                                      |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
| 6               | 10                                                                                                                                                                                                                                                                                                                                                                                        | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 30                                                                                                                                                                      |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
| <b>Geometry</b> |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                         |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
| MA.3.G.1:       | Identify and describe the following: cube, sphere, prism, pyramid, cone, and cylinder.                                                                                                                                                                                                                                                                                                    | <p><b>Cube</b> - a three-dimensional geometrical solid with six square faces (faces - the flat surface of a dimensional object)</p> <p><b>Sphere</b> - a round geometric solid having every point on its surface at an equal distance from its center.</p> <p><b>Prism</b> - A solid object that has two identical ends and all flat sides</p> <p><b>Pyramid</b> - a three-dimensional solid with a polygon as its base and triangular faces that meet at a vertex.</p> <p><b>Cone</b> - A three-dimensional solid with one curved surface and one flat, circular surface. The pointed end of a cone is its apex.</p> <p><b>Cylinder</b> - A three-dimensional solid with two circular bases that are opposite and parallel to each other.</p> | <p>Students should be encouraged to find these solids in their own environments. They should be given the opportunity to study the attributes of all of these solids including faces, edges, and vertices and to compare and contrast them.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="http://www.ixl.com/math/grade-3/identify-planar-and-solid-shapes">http://www.ixl.com/math/grade-3/identify-planar-and-solid-shapes</a>                         |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
| MA.3.G.2:       | Understand that shapes (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize and draw rhombuses, rectangles, and squares as examples of quadrilaterals. Recognize and draw examples of quadrilaterals that do not belong to any of these subcategories. | <p><b>Attributes</b> - characteristics or features</p> <p><b>Rhombus</b> - a parallelogram with all four sides of equal length</p> <p><b>Rectangles</b> - a quadrilateral with four right angles and opposite sides being equal in length.</p> <p><b>Squares</b> - a quadrilateral with all four sides of equal length</p> <p><b>Quadrilaterals</b> - any four sided polygon</p>                                                                                                                                                                                                                                                                                                                                                               | <p>Students should be able to sort and classify polygons according to the number of sides and the types of angles that they have. In addition, students should be able to identify figures that are not polygons such as those with curved sides or those that are not closed. They need to have many opportunities to compare and contrast different shapes according to their attributes. For example, a square is a special kind of quadrilateral that is a rectangle, but not all rectangles are squares.</p> <p>Have students create a vocabulary book containing geometric terms and definitions, students then find pictures within magazines and newspapers. For each term, students should write the definition and a drawing of the term in addition to the magazine picture.</p> | <a href="http://www.ixl.com/math/grade-3/which-2-dimensional-shape-is-being-described">http://www.ixl.com/math/grade-3/which-2-dimensional-shape-is-being-described</a> |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |
| MA.3.G.3:       | Identify, describe and draw points, lines and line segments using appropriate tools (e.g., ruler, straightedge, and technology), and use these terms when describing two-dimensional shapes.                                                                                                                                                                                              | <p><b>Point</b> - is an exact position in space that has no height, length, or width. A line is a set of points that continue on forever in two opposite directions. A line segment is a part of a line with two endpoints.</p> <p><b>Line</b> - a straight collection of points extending in opposite directions without end.</p> <p><b>Line segment</b> - A part of a line with two distinct endpoints. It has a starting point and stopping point.</p>                                                                                                                                                                                                                                                                                      | <p>Students must understand that a true line cannot be measured because it goes on forever in two directions. A line segment, however, can be measured because it is a specific part of a line. Students should also be able to identify parallel lines, intersecting lines, and perpendicular lines.</p> <p>Have students find points, right angles, lines and line segments both in the classroom and in the environment.</p>                                                                                                                                                                                                                                                                                                                                                             | <a href="https://www.illustrativemathematics.org/illustrations/2263">https://www.illustrativemathematics.org/illustrations/2263</a>                                     |   |   |    |    |   |    |    |    |    |                                                                                                                                                                                         |



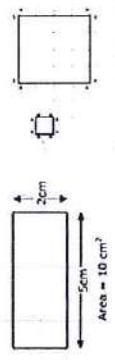


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|           | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                                                                                                                                           | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                                                                                                                  |
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| MA.3.G.4: | Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole ( $\frac{1}{2}$ , $\frac{1}{3}$ , $\frac{1}{4}$ , $\frac{1}{5}$ , $\frac{1}{8}$ ).                                                                                                                                                                                          | Unit fraction - is a fraction with a numerator of 1. Unit fractions help to define the whole because one knows the size of the equal parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Pattern blocks are great manipulatives to use to work with unit fractions. For example, if the yellow hexagon is the whole, $\frac{1}{2}$ would be represented by the red trapezoid, $\frac{1}{3}$ would be represented by the blue rhombus, and $\frac{1}{6}$ would be represented by the green triangle. If the whole was comprised of two yellow hexagons, the red trapezoid would represent $\frac{1}{4}$ , the blue rhombus would show $\frac{1}{6}$ , and the green triangle would be $\frac{1}{12}$ . | <a href="https://www.illustrativemathematics.org/illustrations/1502">https://www.illustrativemathematics.org/illustrations/1502</a>                                                                                                                           |
| MA.3.M.1: | Estimate and measure the mass of objects in grams (g) and kilograms (kg) and the volume of objects in quarts (qt), gallons (gal), and liters (l). Add, subtract, multiply, or divide to solve one-step real-world problems involving masses or volumes that are given in the same units (e.g., by using drawings, such as a beaker with a measurement scale, to represent the problem). | <b>Measurement</b><br><b>Mass</b> - is a measure of how much stuff is in an object. An object's mass will remain the same no matter where it is. The weight of an object depends on its mass and the amount of gravitational force being exerted on it.<br><b>Volume</b> - is the three-dimensional space occupied by something. Capacity of the volume of fluid a container can hold when full. The standard unit of measurement in the metric system for length is the meter, for capacity is the liter, and for mass is the gram. The standard units of measurement in the customary system for length are the inch, foot, yard, and mile; for capacity they are the ounce, cup, pint, and gallon; and for weight they are the ounce, pound, and ton. | Example: Identify 5 things that have a mass of about 1 gram, 5 grams, 10 grams, 1 kilogram.<br>Example: If Joan has 3 gallons of milk and there are 4 quarts in each gallon, how many quarts of milk does she have in all? Example: Tom left the water running for 20 minutes. For every minute that the water runs, he could fill up 8 gallon containers. How many gallons could he fill in 20 minutes?                                                                                                     | <a href="https://learnzillion.com/lessons?utf8=%26%3A%3D&amp;filter%5Bsubject%5D=math&amp;query=3,MD,2&amp;commit=Search+lessons">https://learnzillion.com/lessons?utf8=%26%3A%3D&amp;filter%5Bsubject%5D=math&amp;query=3,MD,2&amp;commit=Search+lessons</a> |
| MA.3.M.2: | Choose and use appropriate units and tools to estimate and measure length, weight, and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.                                                                                                                                                                 | <b>Unit of Measurement</b> - includes inches/feet/yards, ounces/pounds, or cups/pints/quarts/gallons in the customary system of measurement. In the metric system, centimeters/meters/kilometers, grams/kilograms, and milliliters/liters/kiloliters are used.<br><b>Tools</b> - may include rulers, yardsticks or metersticks, balance or scales, beakers, graduated cylinders, and thermometers.<br><b>Weight</b> - the measure of the heaviness of an object                                                                                                                                                                                                                                                                                          | Example: How much would a glass hold - 2 cups or 2 gallons? Example: Which tool would you use to measure the length of a classroom - a ruler or a yardstick?                                                                                                                                                                                                                                                                                                                                                 | <a href="http://www.ixl.com/math/grade-3/which-metric-unit-is-appropriate">http://www.ixl.com/math/grade-3/which-metric-unit-is-appropriate</a>                                                                                                               |

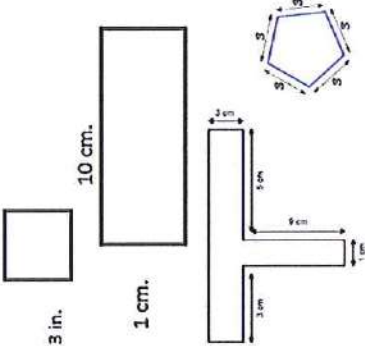


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|           | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                                                             | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                          | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                                                                                                   |
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| MA.3.M.3: | Tell and write time to the nearest minute from analog clocks, using a.m. and p.m., and measure time intervals in minutes. Solve real-world problems involving addition and subtraction of time intervals in minutes.                                                                                      | <b>Analog clock</b> - Includes an hour hand (short) and a minute hand (long) to represent the time.                                                                                                                                | In order to read an analog clock, students must understand the movement of the hands on the clock and that the hands do not move at the same speed. It is also important for students to observe and comprehend the fractional parts of the clock. In addition, they need to know that the : symbol separates the whole hours from the minutes or a fraction of an hour. Students should be encouraged to solve elapsed time problems in multiple ways.                                                                                                                                                                                                                                                                                                                                                                                                                           | <a href="http://www.ixl.com/math/grade-3/read-clocks-and-write-times">http://www.ixl.com/math/grade-3/read-clocks-and-write-times</a>                                                                                                          |
| MA.3.M.4: | Find the value of any collection of coins and bills. Write amounts less than a dollar using the \$ symbol and write larger amounts using the \$ symbol in the form of dollars and cents (e.g., \$4.55). Solve real-world problems to determine whether there is enough money to make a purchase.          |                                                                                                                                                                                                                                    | For students to truly understand money, they must have a complete understanding of the fractional part of our place value system. For example, 1 dime is 1/10 of a dollar and 1 penny is 1/100 of a dollar. In the example \$4.59, there are 4 whole dollars, 5 dimes or 5/10 of a dollar and 9 pennies or 9/100 of a dollar. Typically, students erroneously believe that the hundredths place should come right after the decimal followed by the tenths place. However, they should consider which coin, the dime or the penny, has more value and relate it back to their knowledge of fractions.                                                                                                                                                                                                                                                                             | <a href="http://www.ixl.com/math/grade-3/purchases-do-you-have-enough-money-up-to-10-dollars">http://www.ixl.com/math/grade-3/purchases-do-you-have-enough-money-up-to-10-dollars</a>                                                          |
| MA.3.M.5: | Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters. | <b>Area</b> - Is the number of square units needed to cover a region inside a figure. A square unit is a square with sides that are 1 unit long.<br><b>Perimeter</b> - the distance around the boundary of a 2-dimensional figure. | Students need to understand that an area is defined by its perimeter and that a perimeter is defined by the area of the figure. These two concepts are very much related. Typically, students have a hard time understanding that the perimeter is a linear measurement and that area is a two-dimensional measurement. One might start a unit on area and perimeter by measuring a piece of yarn. Then tie the ends together and ask the students to think about whether or not the string is the same length or if it is shorter. After, have the students manipulate the piece of string to make a long and narrow figure and then change it to make shorter and wider shape. In this case, the perimeter has stayed the same, but the area has changed. When working with area, a teacher might use square tiles that the students can manipulate to determine the perimeter. | <a href="http://www.ixl.com/math/grade-3/area-of-figures-made-of-unit-squares">http://www.ixl.com/math/grade-3/area-of-figures-made-of-unit-squares</a><br> |



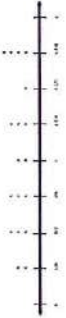
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|           | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                       | Highlighted Vocabulary Words<br>from the Standard Defined                                      | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                     | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                |
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| MA.3.M.6: | Multiply side lengths to find areas of rectangles with whole-number side lengths to solve real-world problems and other mathematical problems involving shapes, and represent whole-number products as rectangular areas in mathematical reasoning. | <b>Area</b> - the measurement of square units of the interior region of a 2-dimensional figure | Students should use their knowledge of geometric shapes to solve this problem. For younger students, it is best to show shapes which have the number of rows and columns indicated.<br><br>                                                                      | <a href="http://www.ixl.com/math/grade-3/area-of-rectangles">http://www.ixl.com/math/grade-3/area-of-rectangles</a>                                         |
| MA.3.M.7: | Find perimeters of polygons given the side lengths or by finding an unknown side length.                                                                                                                                                            | <b>Polygon</b> - is a closed shape with straight edges.                                        | Students should use their knowledge of geometric shapes to solve this problem. For example, they should know that one attribute of a square is that it has 4 equal sides. In addition, for a rectangle, they should know that opposite sides are equal.<br><br> | <a href="http://www.ixl.com/math/grade-3/perimeter-find-the-missing-side-length">http://www.ixl.com/math/grade-3/perimeter-find-the-missing-side-length</a> |





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|            | Indiana Academic Standard for Mathematics<br>Third Grade – Adopted April 2014                                                                                                                                                                                                                                                  | Highlighted Vocabulary Words<br>from the Standard Defined                                                                                                                                                                                                                                     | Specific Third Grade Example for the Standard                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Specific Third Grade Electronic<br>Resource for the Standard                                                                                                                                                                                                                 |
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| MA.3.DA.1: | Create scaled picture graphs, scaled bar graphs, and frequency tables to represent a data set—including data collected through observations, surveys, and experiments—with several categories. Solve one- and two-step “how many more” and “how many less” problems regarding the data and make predictions based on the data. | <p><b>Data Analysis</b></p> <p><b>Scaled Picture Graph</b>- a graph that uses symbols to represent data.</p> <p><b>Scaled Bar Graph</b>- a graph that uses rectangular bars to show numbers or measurements.</p> <p><b>Frequency Table</b>- a way of organizing data in columns and rows.</p> | <p>Students should be encouraged to conduct their own surveys and to track the data using a tally chart. It is critical to take sample size into consideration because it does impact the outcomes of the data. For example, one might compare and contrast the data between two different classes of students or between grade-levels of students. The resulting data would impact the subsequent decisions that were made. For example, if the owner of an ice cream store made business decisions based on survey given, he should take into consideration the sample size or the number of people surveyed. Students need to have an opportunity to compare and contrast results from a survey and to represent the data in multiple ways such as a bar graph or pictograph.</p> | <p><a href="http://www.ixl.com/math/grade-3/create-pictographs">http://www.ixl.com/math/grade-3/create-pictographs</a></p> <p><a href="http://www.ixl.com/math/grade-3/create-bar-graphs">http://www.ixl.com/math/grade-3/create-bar-graphs</a></p>                          |
| MA.3.DA.2: | Generate measurement data by measuring lengths with rulers to the nearest quarter of an inch. Display the data by making a line plot, where the horizontal scale is marked off in appropriate units, such as whole numbers, halves, or quarters.                                                                               | <p><b>Line Plot</b> - a sketch of data in which check marks, X's, or other symbols above a labeled line show the frequency of each value</p>                                                                                                                                                  | <p>Any type a data can be recorded on a line plot. An example of a line plot is shown below.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p><a href="https://learnzillion.com/lessons/7418-%E2%9C%93%93&amp;filters%5Bsubject%5D=math&amp;query=4.MD.4&amp;commit=Search+lessons">https://learnzillion.com/lessons/7418-%E2%9C%93%93&amp;filters%5Bsubject%5D=math&amp;query=4.MD.4&amp;commit=Search+lessons</a></p> |

| Number Sense                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | Fifth Grade                                                                                                                                                                                                                                                                       |  |
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| Third Grade                                                                                                                                                                                                                                                                           | Fourth Grade                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                                                                                                                                   |  |
| 3.NS.1: Read and write whole numbers up to 10,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 10,000.                                                                                                           | 4.NS.1: Read and write whole numbers up to 1,000,000. Use words, models, standard form and expanded form to represent and show equivalent forms of whole numbers up to 1,000,000.                                                                                                                                                                                                                                                        |  | 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.                 |  |
| 3.NS.2: Compare two whole numbers up to 10,000 using $>$ , $=$ , and $<$ symbols.                                                                                                                                                                                                     | 4.NS.2: Compare two whole numbers up to 1,000,000 using $>$ , $=$ , and $<$ symbols.                                                                                                                                                                                                                                                                                                                                                     |  | 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. |  |
| 3.NS.3: Understand a fraction, $1/b$ , as the quantity formed by 1 part when a whole is partitioned into $b$ equal parts; understand a fraction, $a/b$ , as the quantity formed by $a$ parts of size $1/b$ . [In grade 3, limit denominators of fractions to 2, 3, 4, 5, 8.]          | 4.NS.3: Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. Name and write mixed numbers using objects or pictures. Name and write mixed numbers as improper fractions using objects or pictures.                                                                                                                                                                                           |  | 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.                                                                                                                           |  |
| 3.NS.4: Represent a fraction, $1/b$ , on a number line by defining the interval from 0 to 1 as the whole, and partitioning it into $b$ equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line. | 4.NS.4: 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. [In grade 4, limit denominators of fractions to 2, 3, 4, 5, 6, 8, 10, 25, 100.]                         |  |                                                                                                                                                                                                                                                                                   |  |
| 3.NS.5: Represent a fraction, $a/b$ , on a number line by marking off lengths $1/b$ from 0. Recognize that the resulting interval has size $a/b$ , and that its endpoint locates the number $a/b$ on the number line.                                                                 | 4.NS.5: Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators, or by comparing to a benchmark, such as $0$ , $1/2$ , and $1$ ). Recognize 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). |  | 5.NS.1: Use a number line to compare and order fractions, mixed numbers, and decimals to thousandths. Write the results using $>$ , $=$ , and $<$ symbols.                                                                                                                        |  |
| 3.NS.6: Understand two fractions as equivalent (equal) if they are the same size, based on the same whole or the same point on a number line.                                                                                                                                         | 4.NS.6: Compare two decimals by reasoning about their size based on the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions (e.g., by using a visual model).                                                                                                                                                                                                                 |  |                                                                                                                                                                                                                                                                                   |  |
| 3.NS.7: Recognize and generate simple equivalent fractions (e.g., $1/2 = 2/4$ , $4/6 = 2/3$ ). Explain why the fractions are equivalent (e.g., by using a visual fraction model).                                                                                                     | 4.NS.7: Compare two decimals to hundredths by reasoning about their size based on the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions (e.g., by using a visual model).                                                                                                                                                                                                   |  | 5.NS.5: Use place value understanding to round decimal numbers up to thousandths to any given place value.                                                                                                                                                                        |  |
| 3.NS.8: Compare two fractions with the same numerator or the same denominator by reasoning about their size based on the same whole. Record the results of comparisons with the symbols $>$ , $=$ , or $<$ , and justify the conclusions (e.g., by using a visual fraction model).    | 4.NS.8: 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.                                                                                                                                                                                            |  | 5.NS.6: Understand, interpret, and model percents as part of a hundred (e.g., by using pictures, diagrams, and other visual models).                                                                                                                                              |  |
| 3.NS.9: Use place value understanding to round 2- and 3-digit whole numbers to the nearest 10 or 100.                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |                                                                                                                                                                                                                                                                                   |  |



| Computation                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Fifth Grade |
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| Third Grade                                                                                                                                                                                                                                                                        | Fourth Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| 3.C.1: Add and subtract whole numbers fluently within 1000.                                                                                                                                                                                                                        | 4.C.1: Add and subtract multi-digit whole numbers fluently using a standard algorithmic approach.                                                                                                                                                                                                                                                                                                                                                                                          | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| 3.C.2: Represent the concept of multiplication of whole numbers with the following models: equal-sized groups, arrays, area models, and equal "jumps" on a number line. Understand the properties of 0 and 1 in multiplication.                                                    | 4.C.7: Show how the order in which two numbers are multiplied (commutative property) and how numbers are grouped in multiplication (associative property) will not change the product. Use these properties to show that numbers can be multiplied in any order. Understand and use the distributive property.                                                                                                                                                                             | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |
| 3.C.3: Represent the concept of division of whole numbers with the following models: partitioning, sharing, and an inverse of multiplication. Understand the properties of 0 and 1 in division.                                                                                    | 4.C.3: 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. Describe the strategy and explain the reasoning.                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| 3.C.4: Interpret whole-number quotients of whole numbers (e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each). | 4.C.2: 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. Describe the strategy and explain the reasoning.                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| 3.C.5: Multiply and divide within 100 using strategies, such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ), or properties of operations.                                                             | 4.C.4: Multiply fluently within 100.                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.C.1: Multiply multi-digit whole numbers fluently using a standard algorithmic approach.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |
| 3.C.6: Demonstrate fluency with multiplication facts and corresponding division facts of 0 to 10.                                                                                                                                                                                  | 4.C.5: Add and subtract fractions with common denominators. Decompose a fraction into a sum of fractions with common denominators. Understand addition and subtraction of fractions as combining and separating parts referring to the same whole.<br><br>4.C.6: Add and subtract mixed numbers with common 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). | 5.C.4: Add and subtract fractions with unlike denominators, including mixed numbers.<br><br>5.C.5: Use visual fraction models and numbers to multiply a fraction by a fraction or a whole number.<br><br>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.<br><br>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.<br><br>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.<br><br>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. |             |



| Algebraic Thinking                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                    |  | Fifth Grade                                                                                                                                                                                                                                                                                                                                                   |
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| Third Grade                                                                                                                                                                                                                                                                     | Fourth Grade                                                                                                                                                                                                                                                                                                                       |  |                                                                                                                                                                                                                                                                                                                                                               |
| 3.AT.1: Solve real-world problems involving addition and subtraction of whole numbers within 1000 (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                                                        | 4.AT.1: Solve real-world problems involving addition and subtraction of multi-digit whole numbers (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                                                                                                           |  |                                                                                                                                                                                                                                                                                                                                                               |
| 3.AT.2: Solve real-world problems involving whole number multiplication and division within 100 in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem). | 4.AT.2: Recognize and apply the relationships between addition and multiplication, between subtraction and division, and the inverse relationship between multiplication and division to solve real-world and other mathematical problems.                                                                                         |  |                                                                                                                                                                                                                                                                                                                                                               |
| 3.AT.3: Solve two-step real-world problems using the four operations of addition, subtraction, multiplication and division (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).                                               | 4.AT.4: Solve real-world problems with whole numbers 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. [In grade 4, division problems should not include a remainder.] |  | 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.                                                                                                   |
| 3.AT.4: Interpret a multiplication equation as equal groups (e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each). Represent verbal statements of equal groups as multiplication equations.                                               | 4.AT.3: Interpret a multiplication equation as a comparison (e.g., interpret $35 = 5 \times 7$ 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.                                                                   |  |                                                                                                                                                                                                                                                                                                                                                               |
| 3.AT.5: Determine the unknown whole number in a multiplication or division equation relating three whole numbers.                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                    |  |                                                                                                                                                                                                                                                                                                                                                               |
| 3.AT.6: Create, extend, and give an appropriate rule for number patterns using multiplication within 1000.                                                                                                                                                                      | 4.AT.6: Understand that an equation, such as $y = 3x + 5$ , is a rule to describe a relationship between two variables and can be used to find a second number when a first number is given. Generate a number pattern that follows a given rule.                                                                                  |  | 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.                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                 | 4.AT.5: Solve real-world problems involving addition and subtraction of fractions referring to the same whole and having common denominators (e.g., by using visual fraction models and equations to represent the problem).                                                                                                       |  | 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. |
|                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |  | 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).                                                                                                                                                                              |
|                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |  | 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).                                                                                                                             |
|                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |  | 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).                                                                                                                   |
|                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |  | 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).                                              |
|                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                    |  | 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.                                                                                                                                                       |

| Geometry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Third Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Fourth Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Fifth Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>3.G.1: Identify and describe the following: cube, sphere, prism, pyramid, cone, and cylinder.</p> <p>3.G.2: Understand that shapes (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize and draw rhombuses, rectangles, and squares as examples of quadrilaterals. Recognize and draw examples of quadrilaterals that do not belong to any of these subcategories.</p> <p>3.G.3: Identify, describe and draw points, lines and line segments using appropriate tools (e.g., ruler, straightedge, and technology), and use these terms when describing two-dimensional shapes.</p> <p>3.G.4: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole (<math>\frac{1}{2}</math>, <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{6}</math>, <math>\frac{1}{8}</math>).</p> | <p>4.G.5: Classify triangles and quadrilaterals based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles (right, acute, obtuse).</p> <p>4.G.1: Identify, describe, and draw parallelograms, rhombuses, and trapezoids using appropriate tools (e.g., ruler, straightedge and technology).</p> <p>4.G.3: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint.</p> <p>4.G.4: Identify, describe, and draw rays, angles (right, acute, obtuse), and perpendicular and parallel lines using appropriate tools (e.g., ruler, straightedge and technology). Identify these in two-dimensional figures.</p> <p>4.G.2: Recognize and draw lines of symmetry in two-dimensional figures. Identify figures that have lines of symmetry.</p> | <p>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.</p> <p>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.</p> |



| Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Fifth Grade |
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| Third Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Fourth Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |
| <p>3.M.1: Estimate and measure the mass of objects in grams (g) and kilograms (kg) and the volume of objects in quarts (qt), gallons (gal), and liters (l). Add, subtract, multiply, or divide to solve one-step real-world problems involving masses or volumes that are given in the same units (e.g., by using drawings, such as a beaker with a measurement scale, to represent the problem).</p> <p>3.M.2: Choose and use appropriate units and tools to estimate and measure length, weight, and temperature. Estimate and measure length to a quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit.</p> <p>3.M.3: Tell and write time to the nearest minute from analog clocks, using a.m. and p.m., and measure time intervals in minutes. Solve real-world problems involving addition and subtraction of time intervals in minutes.</p> <p>3.M.4: Find the value of any collection of coins and bills. Write amounts less than a dollar using the \$ symbol and write larger amounts using the \$ symbol in the form of dollars and cents (e.g., \$4.59). Solve real-world problems to determine whether there is enough money to make a purchase.</p> <p>3.M.5: Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths. Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters.</p> <p>3.M.6: Multiply side lengths to find areas of rectangles with whole-number side lengths to solve real-world problems and other mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.</p> <p>3.M.7: Find perimeters of polygons given the side lengths or by finding an unknown side length.</p> | <p>4.M.2: Know relative sizes of measurement units within one system of units, including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Express measurements in a larger unit in terms of a smaller unit within a single system of measurement. Record measurement equivalents in a two-column table.</p> <p>4.M.3: Use the four operations (addition, subtraction, multiplication and division) to solve real-world problems involving distances, intervals of time, volumes, masses of objects, and money. Include addition and subtraction problems involving simple fractions and problems that require expressing measurements given in a larger unit in terms of a smaller unit.</p> <p>4.M.1: Measure length to the nearest quarter-inch, eighth-inch, and millimeter.</p>                                                                                                                                                                                                                                                                                                    | <p>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>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
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| Data Analysis (and Statistics in Gr.5)                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Third Grade                                                                                                                                                                                                                                                                                                                                   | Fourth Grade                                                                                                                                                                                                                                                                       | Fifth Grade                                                                                                                                                                                                                                                                                                                                                    |
| <p>3.DA.1: Create scaled picture graphs, scaled bar graphs, and frequency tables to represent a data set—including data collected through observations, surveys, and experiments—with several categories. Solve one- and two-step “how many more” and “how many less” problems regarding the data and make predictions based on the data.</p> | <p>4.DA.1: Formulate questions that can be addressed with data. Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (including frequency tables), line plots, and bar graphs.</p>                                                | <p>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> |
| <p>3.DA.2: Generate measurement data by measuring lengths with rulers to the nearest quarter of an inch. Display the data by making a line plot, where the horizontal scale is marked off in appropriate units, such as whole numbers, halves, or quarters.</p>                                                                               | <p>4.DA.2: Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Solve problems involving addition and subtraction of fractions by using data displayed in line plots.</p> |                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                               | <p>4.DA.3: Interpret data displayed in a circle graph.</p>                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                    | <p>5.DS.2: Understand and use measures of center (mean and median) and frequency (mode) to describe a data set.</p>                                                                                                                                                                                                                                            |

## 2014-15 Sequencing Map for Math

Circle the Grade Level:    3       4       5

Begin with the list of standards for your grade level and cut the individual standards into strips. Working with your grade level team, organize the standards forming a sequence throughout the school year. Make notes if a standard will be repeated or when only parts of the standard will be taught.

[illegible]



[illegible]

# Make sense of problems and persevere in solving them



**When presented with a problem, I can make a plan, carry out my plan, and evaluate its success.**

## BEFORE...

**EXPLAIN** the problem to myself.

- Have I solved a problem like this before?

**ORGANIZE** information...

- What is the question I need to answer?
- What is given?
- What is not given?
- What are the relationships between known and unknown quantities?
- What tools will I use?
- What prior knowledge do I have to help me?

## DURING...

**PERSEVERE**

**MONITOR** my work

**CHANGE** my plan if it isn't working out

**ASK** myself, "Does this make sense?"

## AFTER...

**CHECK**

- Is my answer correct?
- How do my representations connect to my algorithms?

**EVALUATE**

- What worked?
- What didn't work?
- What other strategies were used?
- How was my solution similar to or different from my classmates'?



# Reason abstractly and quantitatively



*I can use reasoning habits to help me contextualize and decontextualize problems.*

## CONTEXTUALIZE

I can take numbers and put them in a real-world context.

For example, if given

$$3 \times 2.5 = 7.5$$

I can create a context:

*I walked 2.5 miles per day for 3 days. I walked a total of 7.5 miles.*

## DECONTEXTUALIZE

I can take numbers out of context and work mathematically with them.

For example, if given

*'I walked 2.5 miles per day for 3 days.*

*How far did I walk?'*

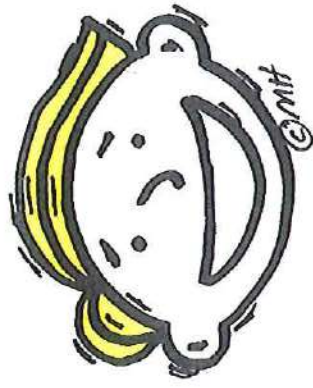
I can write and solve

$$3 \times 2.5 = 7.5$$

*Reasoning Habits include 1) creating an understandable representation of the problem solved, 2) considering the units involved, 3) attending to the meaning of quantities, and 4) using properties to help solve problems.*



# Construct viable arguments and critique the reasoning of others



*I can make conjectures and critique the mathematical thinking of others.*

I can construct, justify, and communicate arguments by...

- ◆ considering context
- ◆ using examples and non-examples
- ◆ using objects, drawings, diagrams and actions

I can critique the reasoning of others by...

- ◆ listening
- ◆ comparing arguments
- ◆ identifying flawed logic
- ◆ asking questions to clarify or improve arguments



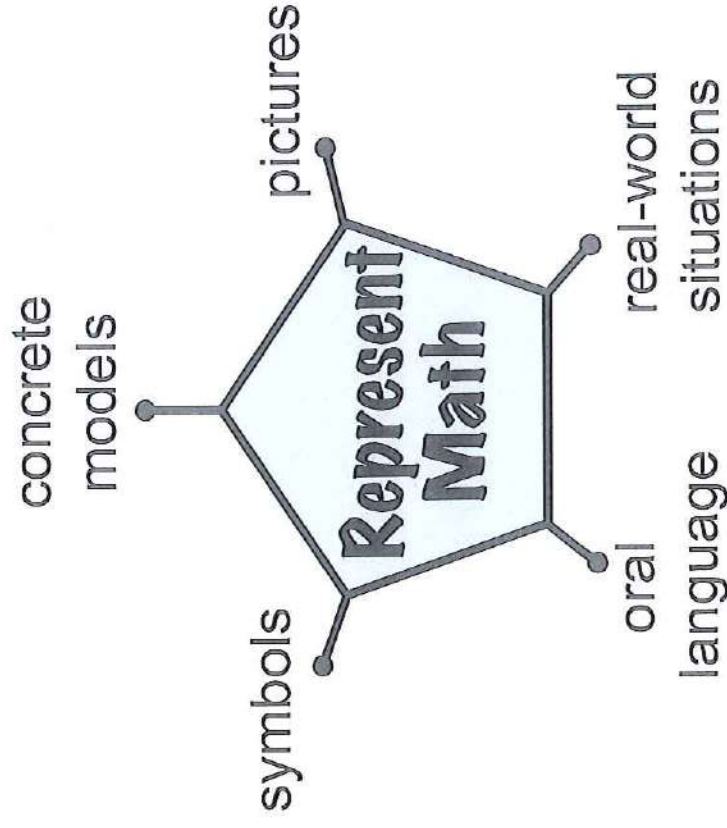
# Model with mathematics



***I can recognize math in everyday life and use math I know to solve everyday problems.***

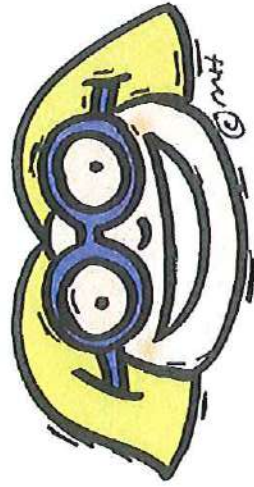
**I can...**

- ◆ make assumptions and estimate to make complex problems easier
- ◆ identify important quantities and use tools to show their relationships
- ◆ evaluate my answer and make changes if needed



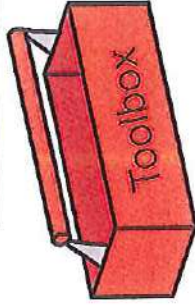


# Use appropriate tools strategically

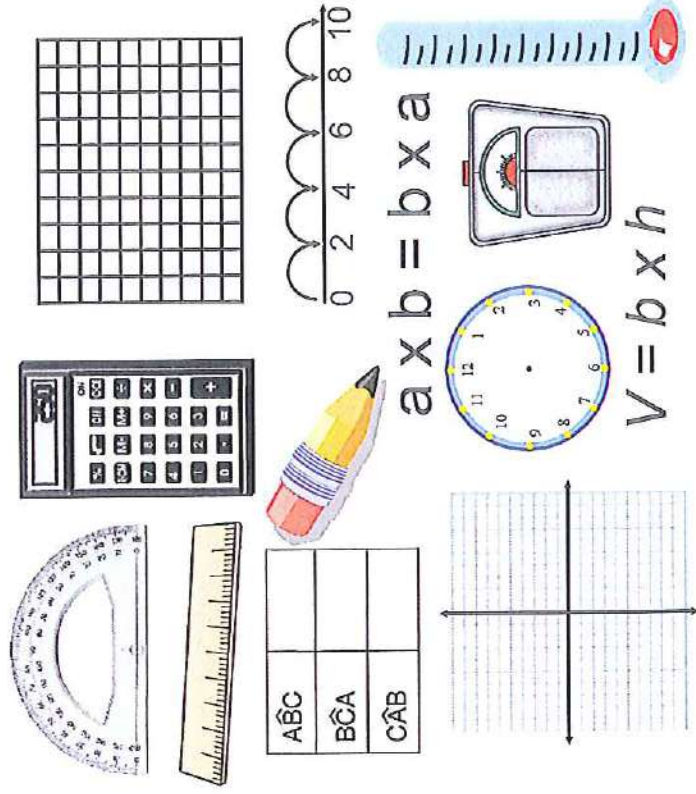


*I know when to use certain tools to help me explore and deepen my math understanding.*

I have a math toolbox.

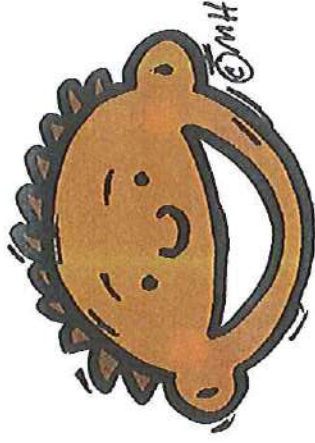


- ◆ I know HOW to use math tools.
- ◆ I know WHEN to use math tools.
- ◆ I can reason: "Did the tool I used give me an answer that makes sense?"





# Attend to precision



*I can use precision when solving problems and communicating my ideas.*

## Problem Solving

- ◆ I can calculate accurately.
- ◆ I can calculate efficiently.
- ◆ My answer matches what the problem asked me to do – *estimate* or find an *exact answer*.

## Communicating

- ◆ I can **SPEAK**, **READ**, **WRITE**, and **LISTEN** mathematically.
- ◆ I can correctly use...
  - math symbols
  - math vocabulary
  - units of measure

# Look for and make use of structure



*I can see and understand how numbers and spaces are organized and put together as parts and wholes.*

## Numbers

For Example:

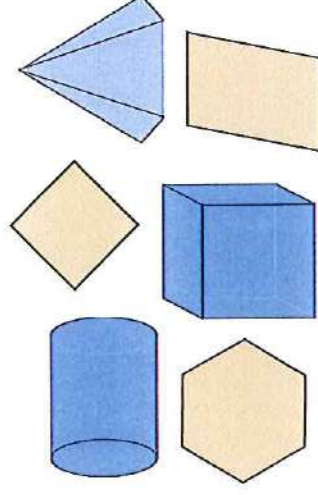
- ◆ Base 10 structure
- ◆ operations and properties
- ◆ terms, coefficients, exponents

|        |     |         |                            |
|--------|-----|---------|----------------------------|
| 10 + 3 |     | 13 x 15 |                            |
| 10     | 100 | 30      | $(10 + 3) \times (10 + 5)$ |
| +      |     |         | $100 + 30 + 50 + 15$       |
| 5      | 50  | 15      | 195                        |

## Spaces

For Example:

- ◆ dimension
- ◆ location
- ◆ attributes
- ◆ transformation





# Look for and express regularity in repeated reasoning



*I can notice when calculations are repeated. Then, I can find more efficient methods and short cuts.*

For example:  $25 \div 11$

$$\begin{array}{r} 2.\overline{27}27 \\ 11 \overline{) 25.0000} \\ \underline{-22} \phantom{0000} \end{array}$$

I am repeating  
this calculation.  
The quotient is a  
repeating decimal.

$$\begin{array}{r} 30 \\ \underline{-22} \phantom{00} \\ 80 \\ \underline{-77} \phantom{00} \\ 30 \\ \underline{-22} \phantom{00} \\ 80 \\ \underline{-77} \phantom{00} \\ 30 \end{array}$$

FIGURE 1.2 The characteristics of mathematical tasks at each of the four levels of cognitive demand (Stein & Smith, 1998).

## THE TASK ANALYSIS GUIDE

### *Memorization Task*

- Involve reproducing previously learned facts, rules, formulae, or definitions to memory.
- Cannot be solved using procedures because a procedure does not exist or because the time frame in which the task is being completed is too short to use procedure.
- Are not ambiguous—such tasks involve exact reproduction of previously seen material and what is to be reproduced is clearly and directly stated.
- Have no connection to the concepts or meaning that underlie the facts, rules, formulae, or definitions being learned or reproduced.

### *Procedures with Connections Tasks*

- Focus students' attention on the use of procedures for the purpose of developing deeper levels of understanding of mathematical concepts and ideas.
- Suggest pathways to follow (explicitly or implicitly) that are broad general procedures that have close connections to underlying conceptual ideas as opposed to narrow algorithms that are opaque with respect to underlying concepts.
- Usually are represented in multiple ways (e.g., visual diagrams, manipulatives, symbols, problem situations). Require some degree of cognitive effort. Although general procedures may be followed, they cannot be followed mindlessly. Students need to engage with the conceptual ideas that underlie the procedures in order to successfully complete the task and develop understanding.

### *Procedures without Connections Tasks*

- Are algorithmic. Use of the procedure is either specifically called for or its use is evident based on prior instruction, experience, or placement of the task.
- Require limited cognitive demand for successful completion. There is little ambiguity about what needs to be done and how to do it.
- Have no connection to the concepts or meaning that underlie the procedure being used.
- Are focused on producing correct answers rather than developing mathematical understanding.
- Require no explanations, or explanations that focus solely on describing the procedure that was used.

### *Doing Mathematics Tasks*

- Require complex and nonalgorithmic thinking (i.e., there is not a predictable, well-rehearsed approach or pathway explicitly suggested by the task, task instructions, or worked-out example).
- Require students to explore and understand the nature of mathematical concepts, processes, or relationships.
- Demand self-monitoring or self-regulation of one's own cognitive processes.
- Require students to access relevant knowledge and experiences and make appropriate use of them in working through the task.
- Require students to analyze the task and actively examine task constraints that may limit possible solution strategies and solutions.
- Require considerable cognitive effort and may involve some level of anxiety for the student due to unpredictable nature of the solution process required.



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# What's All This Talk about Rigor?

By NCTM President Linda M. Gojak

NCTM *Summing Up*, February 5, 2013

Recently, I had a conversation with a group of math coaches who are working with elementary teachers on implementation of the Common Core Standards for Mathematics. The discussion turned to a description of rigor in the classroom. The coaches commented that many of their teachers were confused by exactly what was meant by teaching and learning with rigor. The coaches weren't sure how to respond.

## Rigor in the Common Core State Standards

The word "rigor" is widely used in policy discussions, but it's rarely understood or defined, and often it merely passes as code for "better." It is interesting that the term "rigor" does not appear in the Common Core State Standards for Mathematics, although it is certainly implied. "Rigor" appears multiple times in the U.S. Department of Education's paper, ["A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act,"](#) as well as its recent document, ["ESEA Flexibility"](#)—both of which include a call for rigorous academic content standards.

## Rigor in Instruction

The coaches and I began our work of exploring the notion of rigor with an online search of the word "rigor." The thesaurus led us to a list of synonyms, including "affliction," "inflexibility," "difficulty," "severity," "rigidity," "suffering," and "traditionalism"—none of which describe characteristics of rigorous mathematics instruction. No wonder the teachers were confused! However, two additional words included in the list—"thoroughness" and "tenacity"—provided avenues for some serious thought about what "rigor" implies. We generated the following chart, which led to an interesting discussion with the classroom teachers. There are certainly other characteristics that can be added to the list.

| Learning experiences that involve rigor ...                            | Experiences that do not involve rigor ...                                                         |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| challenge students                                                     | are more "difficult," with no purpose (for example, adding 7ths and 15ths without a real context) |
| require effort and tenacity by students                                | require minimal effort                                                                            |
| focus on quality (rich tasks)                                          | focus on quantity (more pages to do)                                                              |
| include entry points and extensions for all students                   | are offered only to gifted students                                                               |
| are not always tidy, and can have multiple paths to possible solutions | are scripted, with a neat path to a solution                                                      |
| provide connections among mathematical ideas                           | do not connect to other mathematical ideas                                                        |
| contain rich mathematics that is relevant to students                  | contain routine procedures with little relevance                                                  |
| develop strategic and flexible thinking                                | follow a rote procedure                                                                           |
| encourage reasoning and sense making                                   | require memorization of rules and procedures without understanding                                |
| expect students to be actively involved in their own learning          | often involve teachers doing the work while students watch                                        |



### **Rigor Involves Everyone**

Rigor involves all partners in teaching and learning. Teachers must consider rigor in planning lessons, tasks, and assignments. Rigorous lessons build on and extend prior knowledge. They encourage productive struggling. Although the objective of a lesson should be clear in the teacher's mind, the lesson should not focus on one correct path to a solution or even one correct answer. A rigorous lesson embraces the messiness of a good mathematics task and the deep learning that it has the potential to achieve.

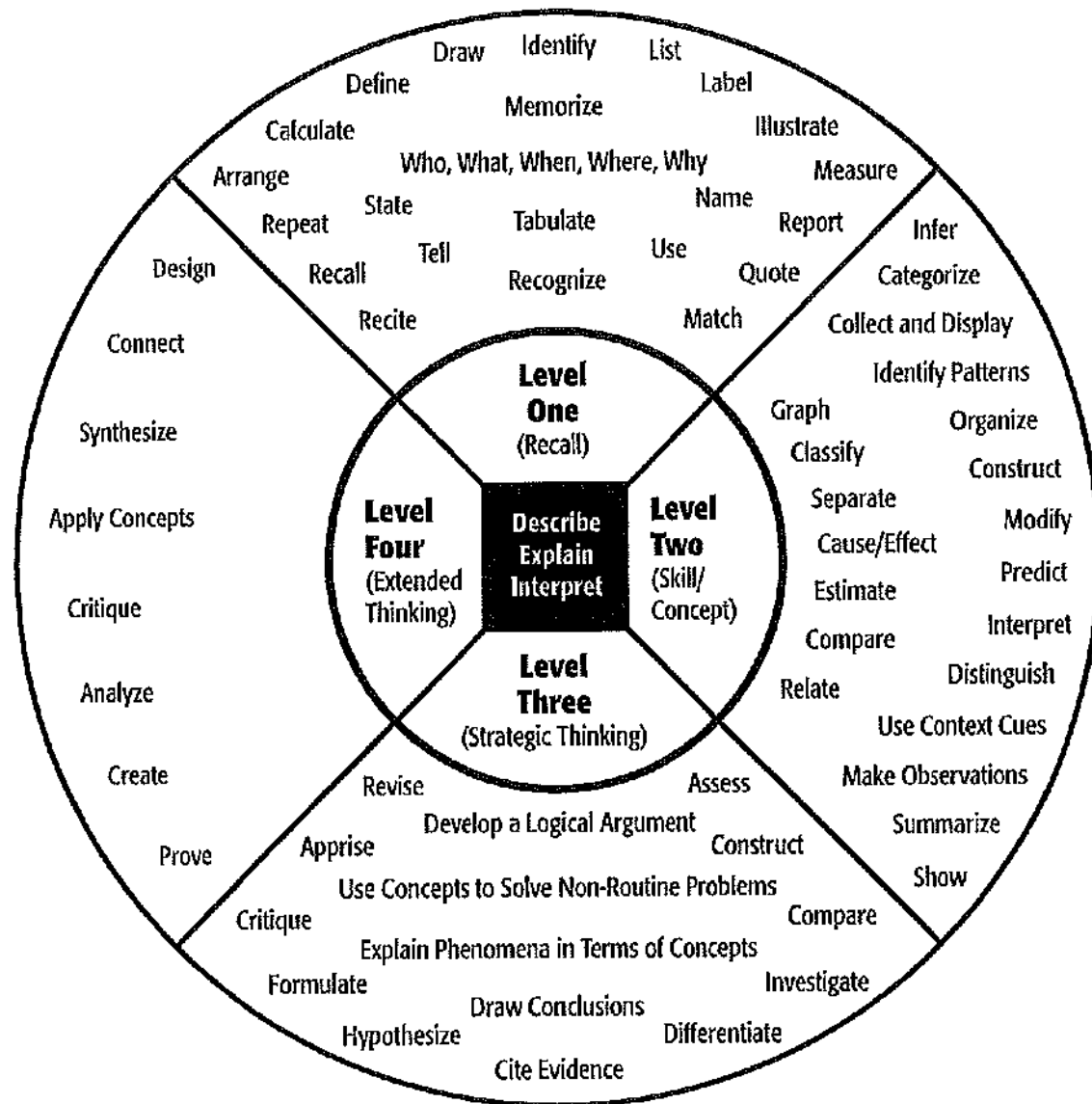
Students who are successful in a rigorous learning environment take responsibility for their learning. They learn to reflect on their thinking. They persist in solving a problem when the path to solution is not immediately obvious. They recognize when they are not on the correct path and need to switch directions during the solution process. Students must learn to ask productive questions rather than expecting to be shown how to proceed. (And, teachers must answer those questions with just enough information to move students forward while preserving the challenge of the task!

Rigorous teaching and learning require rigorous formative assessment throughout a unit so the teacher knows what the student has learned and can plan additional activities, or adjust them, to address student needs. Students also have a role in formative assessment—they must approach tasks with tenacity and ask clarifying questions when they are unsure how to proceed. All assessments must include opportunities for students to demonstrate the processes and practices in their approach to doing mathematics. Good formative assessment can be incorporated into daily instruction and prepare students for the summative assessments that take place at certain points throughout the unit of study.

### **Moving toward Rigor**

How can we support classroom teachers and pre-service teachers (pre-K–16) in working toward greater rigor in mathematics instruction? Professional development experiences that model rigor through the use of rich tasks, rich discourse, and good questions allow teachers to experience rigorous instruction. When selecting tasks, teachers must be sure that mathematical ideas are explicit and the connections are clear. The days of a few word problems at the end of multiple skill exercises in the textbook are over! Concepts must be introduced and explored in contexts that are interesting and motivating for students. Tasks must provide entry points for all students, offer them well-defined opportunities to make connections to other mathematics, and include both opportunities and expectations for them to develop deeper understanding. The focus and coherence of the Common Core State Standards lead the way to rigorous instruction. It is time for us to begin the journey.

# Depth of Knowledge (DOK) Levels



| Level One Activities                                                                                     | Level Two Activities                                          | Level Three Activities                                                                                | Level Four Activities                                                                                                                               |
|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Recall elements and details of story structure, such as sequence of events, character, plot and setting. | Identify and summarize the major events in a narrative.       | Support ideas with details and examples.                                                              | Conduct a project that requires specifying a problem, designing and conducting an experiment, analyzing its data, and reporting results/ solutions. |
| Conduct basic mathematical calculations.                                                                 | Use context cues to identify the meaning of unfamiliar words. | Use voice appropriate to the purpose and audience.                                                    | Apply mathematical model to illuminate a problem or situation.                                                                                      |
| Label locations on a map.                                                                                | Solve routine multiple-step problems.                         | Identify research questions and design investigations for a scientific problem.                       | Analyze and synthesize information from multiple sources.                                                                                           |
| Represent in words or diagrams a scientific concept or relationship.                                     | Describe the cause/effect of a particular event.              | Develop a scientific model for a complex situation.                                                   | Describe and illustrate how common themes are found across texts from different cultures.                                                           |
| Perform routine procedures like measuring length or using punctuation marks correctly.                   | Identify patterns in events or behavior.                      | Determine the author's purpose and describe how it affects the interpretation of a reading selection. | Design a mathematical model to inform and solve a practical or abstract situation.                                                                  |
| Describe the features of a place or people.                                                              | Formulate a routine problem given data and conditions.        | Apply a concept in other contexts.                                                                    |                                                                                                                                                     |
|                                                                                                          | Organize, represent and interpret data.                       |                                                                                                       |                                                                                                                                                     |



## Activity Two – Creating a Task

### Grades 3-4-5

Being able to create and/or edit a task to increase its rigor will be important as we transition to College and Career Ready assessments. Now that you've spent some time "unpacking" the standards, choose ONE standard from each strand and create a task. Work with your grade level team (one task for the entire team) using your task analysis guide and teacher resources. Write your task for each strand on the chart paper provided. You may also record them here for future reference.

Number Sense: Standard \_\_\_\_\_

Computation: Standard \_\_\_\_\_

**Algebraic Thinking: Standard \_\_\_\_\_**

**Geometry: Standard \_\_\_\_\_**



**Measurement: Standard \_\_\_\_\_**

**Data Analysis: Standard \_\_\_\_\_**