**Iowa Core Math Shift 1 of 6: Focus**

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| **Description of Shift** | **Rationale for Shift** | | **Assessment Aligned to Shift** |
| The math standards require big shifts in how math is being taught, practiced, and assessed in the U.S. But where do we start? It starts with Focus. Focus on the critical areas to develop deep conceptual understanding and procedural fluency. Remember that we only get opportunities to support the other big math shifts of coherence and rigor when we first “focus.  **Focus allows each student to think, practice and integrate each new idea into a growing knowledge structure:**  The overwhelming focus of the Standards in early grades is arithmetic along with the components of measurement that support it. That includes the concepts underlying arithmetic, the skills of arithmetic computation, and the ability to apply arithmetic to solve problems and put arithmetic to engaging uses. Arithmetic in the K–5 standards is an important life skill, as well as a thinking subject and a rehearsal for algebra in the middle grades.  Focus remains important through the middle and high school grades in order to prepare students for college, career and citizenship; surveys suggest that postsecondary instructors value greater mastery of prerequisites over shallow exposure to a wide array of topics with dubious relevance to postsecondary work.  In summary: Focus is - Teachers significantly narrow and deepen the scope of how time and energy is spent in the math classroom. They so do in order to focus deeply on only the concepts that are prioritized in the standards.  *Note: Schools must stay loyal to shift 1 for the other shifts to support the common core intent.* | “This shift is important because, as educators, we are often asked to cover a wide range of concepts in each grade level or course. Teaching fewer concepts means educators will have time to be more intentional about both building deeper conceptual understanding in their students and developing a variety of algorithms that students can use with dexterity as they approach any mathematical situation or problem. When our students develop deeper understandings and greater procedural fluency, they are better able to apply those understandings and skills to other contexts, both mathematical and real-world.”  *Chicago Public Schools Math Frameworks 2012-13* | | Instead of randomly sampling a mile-wide array of topics, assessments will have a strong focus where the standards focus. This will reinforce the concept of “going deep” rather than simply "covering topics."  “Teaching less, learning more” can seem like hard medicine for an educational system addicted to coverage. But remember that the goal of focus is to make good on the ambitious promise the states have made to their students by adopting the standards: greater achievement at the college- and career-ready level, greater depth of understanding of mathematics, and a rich classroom environment in which reasoning, sense-making, applications, and a range of mathematical practices all thrive. None of this is realistic in a mile-wide, inch-deep world.  *Publishers Criteria for Math* |
| **Resources for Implementation** | | | |
| * Use MISIC ELA/Math Core leadership 11/13-14/12 workshop materials (at <http://misiciowa.org/> are a vast set of vetted resources for implementing the six shifts in math) with staff. Use as is or adapt. For adaptive example from Webster City MS go to \_\_\_\_.   Step 1: Explore focus in the math common core   * Use this 3 minute video to hear an overview of shift 1 of 6 and the importance of shift 1 to CCSS success. Internalize the message that if you do not focus the other shifts cannot happen. <http://www.youtube.com/watch?v=2rje1NOgHWs> * Listen to video and download an accompanying worksheet at this link to understand math shift 1. Go to <http://engageny.org/resource/common-core-in-mathematics-shift-1-focus> * Listen to the first third of this math instructional shift video from ASCD about focus. Go to <http://www.ascd.org/professional-development/webinars/sandra-alberti-webinar.aspx> and go down to math portion of the web page to access video. Rest of video explains shifts 2 and 3 of 3 shifts rather than the 6. * Use the 1.5 – 3 hour (your choice) on-line webinar on instructional leadership and the common core at <http://www.achievethecore.org/steal-these-tools/professional-development-modules> to understand the role of the administrator in implementing the core. Scroll down to math PD modules.   Step 2: Explore the critical areas in the common core math standards   * Use the following sources as model/guides for pacing out the critical focus areas of the math core:   + Georgia K-5, 6-8, 9-12 Mathematics Overview Student Editions at <https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx>   + Chicago Public Schools at <http://www.cps.edu/Spotlight/Pages/spotlight329.aspx>   + PARCC HS traditional or integrated model math curriculum for HS classes at <http://www.parcconline.org/mcf/mathematics/parcc-model-content-frameworks-browser>   + CCSS Math Appendix A presents a traditional and an integrated approach to the math standards at <http://ed.sc.gov/agency/programs-services/190/documents/Mathematics_Appendix_A.pdf> * Use Standards Insight to deconstruct the knowledge, skills and understandings in the math standards   Step 3: Raise the level of awareness of the new math standards with your students and parents   * Use student friendly language in describing the standards. Go to these site for examples: <http://www.sbusd.org/site/Default.aspx?PageID=282> and <http://www.ode.state.or.us/teachlearn/subjects/mathematics/standards/mathccssposters.pdf> and <http://www.ode.state.or.us/wma/teachlearn/commoncore/mathematicalpractices.pdf> * Use the brochures developed by National PTA to show parents the critical areas of the math core by grade. Go to <http://pta.org/content.cfm?ItemNumber=2909> Brochure available in Spanish or English and in 2 page or 4 page length. | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum. * Work with groups of math teachers to determine what content to prioritize most deeply (spend 75% of the time on that content) and what content can be removed (or decrease attention).   + Support grade 3-5 teachers with the fraction focus * Determine the areas of intensive focus (fluency), determine where to re-think and link (apply to core understandings), sampling (expose students, but not at the same depth). * Give teachers enough time, with a focused body of material, to build their own depth of knowledge to make informed decisions about the core yet time cannot become a crutch. * Help teachers understand formative and summative assessments used in classrooms should reflect the focus areas and major work of each grade. * Let staff know you understand that it will take time to drop concepts and to lengthen critical focus areas with depth lessons. Use your best encouragement skills. * Review the buildings technical capacity. Up-to-date Internet connectivity, hardware, software, and broadband capacity are all crucial to implementing and assessing the new standards * During walk-throughs or classroom visits: 1) support the depth of knowledge needed in the focus areas pay attention to how the teacher connects student thinking to the mathematical ideas of the lesson by paying attention to what the students are actually saying and doing in order to understand the ideas they are grappling with. Ask what kinds of ideas do you think the students have about \_\_, 2) look for teacher selected text(s) and resources for instruction that support the standards to be taught and assessed, and 4) look for content that supports the priority standards for that grade level. * Include prior knowledge and misconceptions in lesson and unit design processes * Engage teachers in meaningful discussions about inquiry, mathematical thinking, and how best to support its development. Ask how can you help? * Inform parents of the critical areas of math * Update all stakeholders on moving to the critical areas per grade * Lead building team in planning/ implementing a plan to move to the focus of each grade | | | |
| **Implications for Elementary Teachers** | | **Implications for Secondary Teachers** | |
| * Understand the CCSS math intentional focus on algebraic thinking beginning in Kindergarten and progressing upward * Understand the CCSS math intentional focus on fractions beginning in grade 3 * Always implement the math core mathematical practices when teaching any standard. * Build knowledge, fluency and understanding of why and how we do certain math concepts. * Align formative/summative assessments used in classrooms with the focus areas and major work of each grade. * Choose instructional materials that embodies the standards will be essential for giving teachers and students the tools they need to build a strong mathematical foundation and succeed on the coming aligned exams.   + Think about how the concepts connects to one another   + *To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*   + Many lessons in textbook curricular programs will need to be eliminated or modified (or even created) in the interim to meet the shift of Focus intended by the CCSS * Consciously make decisions that narrow the scope of content in each grade so that students more deeply experience what remains and is intended in the core. Use the “Power of the Eraser” to greatly reduce the amount of material covered. In any single grade, students and teachers should spend the large majority of their time, approximately three-quarters, on the major work of each grade.   + The overwhelming focus of the Standards in the early grades (K-5) is arithmetic along with the components of measurement that support it. This includes the Domains of Operations and Algebraic Thinking, Number and Operations in Base Ten, and Numbers and Operations- Fractions. | | * Always implement the mathematical practices when teaching any standard. * Build knowledge, fluency and understanding of why and how we do certain math concepts. * Formative/summative assessments used in classrooms should reflect the focus areas and major work of each grade. * Choose instructional material that embodies the standards will be essential for giving teachers and students the tools they need to build a strong mathematical foundation and succeed on the coming aligned exams.   + Think about how the concepts connects to one another   + *To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*   + Many lessons in textbook curricular programs will need to be eliminated or modified or even created in the interim to meet the shift of Focus intended by the CCSS. * Consciously make decisions that narrow the scope of content in each grade so that students more deeply experience what remains and is intended in the core. Use the “Power of the Eraser” to greatly reduce the amount of material covered. In any single grade, students and teachers should spend the large majority of their time, approximately three-quarters, on the major work of each grade.   + The focus in middle school are the Domains of Ratios and Proportional Reasoning and Expressions and Equations. | |
| **Implications for Students** | | **Implications for K-12 Parent(s)** | |
| * Engage in lessons that ask for understanding as well as processes so they will be able to transfer mathematical skills and understanding across concepts and grades. * Engage in lessons with fewer concepts but more thinking. | | * Know and support what the priority work is for their children for their grade level.   + Attend local school board meetings to stay informed about the transition to the critical areas in math. * Spend time with their child on priority work. * Ask teacher about child’s progress on priority work.   + Engage school staff to identify impact of this change on students. | |
| **Implementation Challenges** | | **Possible Next Steps** | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and understanding the common core college- and career ready perspective in the standards | | * If using a curricular program time will need to be spent upgrading the units/lessons in regards to the shift of Focus mandated by the math core. Compare current practice with some of the model pacing guides written for the CCSS. What needs to go? Where does the time get added? * Develop a plan for gradually increasing time for major work of each K-12 grade.   + Gradually increase number of problem solving and conceptual development lessons. * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math. * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items   + Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | |

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**Iowa Core Math Shift 2 of 6: Coherence (Skills Within and Across Grades)**

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| **Description of Shift** | | **Rationale for Shift** | **Assessment Aligned to Shift** |
| “Coherence is about making math make sense. Mathematics is not a list of disconnected tricks or mnemonics. It is an elegant subject in which powerful knowledge results from reasoning with a small number of principles such as place value and properties of operations. The standards define progressions of learning that leverage these principles as they build knowledge over the grades.”  *Delaware Math Shifts Guide*  “The Common Core State Standards in mathematics were built on progressions: narrative documents describing the progression of a topic across a number of grade levels, informed both by research on children’s cognitive development and by the logical structure of mathematics.”  *http://math.arizona.edu/~ime/progressions/)*  In summary: Coherence is …”Mathematics teachers who maintain coherence and continuity of the learning progressions both (1) understand the foundation of the mathematics that led to what they are currently teaching and (2) inform their lessons with an understanding of the mathematics their students will encounter next.“  Chicago PS Math Framework, 2012, p. 13 | | “It is extremely important for mathematics educators to carefully connect the learning within and across grades so that students can build new understandings on solid foundations. With a clear understanding of the connections between what comes before and after a particular point in the progression, teachers can address any missing prerequisite understanding or skills (revealed by assessment) and determine the next steps to move students forward from that point.”  *Chicago PS Math Framework, 2012, p. 13* | Assessments will reflect the progression of content and concepts as depicted in the standards across grade levels. |
| **Resources for Implementation Steps** | | | |
| Step 1: Explore coherence and progressions in the math core   * Read an author of the math common core talk about the structure (coherence and progressions) of the standards at <http://commoncoretools.me/2012/02/16/the-structure-is-the-standards/> * Listen to a 2 minute video from common core math author speak about shift 1 and 2 at <http://www.youtube.com/watch?v=gNug277I95Q> * Listen to 2 minute video from common core math author speak about math progressions at <http://www.youtube.com/watch?v=a-P9KQdhE0U> * Listen to 4 minute video from common core math author speak about the important of coherence at <http://www.youtube.com/watch?v=83Ieur9qy5k> * Listen to a 3 minute video from common core math author speak about progressions from the student perspective at <http://www.youtube.com/watch?v=L0wXHkiWj_A&list=PLD7F4C7DE7CB3D2E6&index=11&feature=plpp_video> * Listen to a 32 minute video of common core authors talking about math shifts 2-6 at <http://engageny.org/resource/common-core-in-mathematics-shifts-2-6> Site also includes a worksheet for following along as you listen to the video.   Step 2: Examine specific content progressions to understand key content progression within the math core:   * View video on whole numbers to fractions in grades 3-6 to see a progression at <http://www.youtube.com/watch?v=w7h64xjN-PM&list=PLD7F4C7DE7CB3D2E6&index=7&feature=plpp_video> * View video on operations and algebraic thinking (a key progression) at <http://www.youtube.com/watch?v=HMMe8_4s9KE&list=PLD7F4C7DE7CB3D2E6&index=8&feature=plpp_video> * View grades 3-8 PARCC model math content framework at <http://www.parcconline.org/mcf/mathematics/parcc-model-content-frameworks-browser> The framework provides examples of key advances from previous grade; fluency expectations or examples of culminating standards; examples of major within-grade dependencies; examples of opportunities for connections among standards, clusters, or domains; examples of opportunities for in-depth focus; examples of opportunities for connecting content and practices; and content emphases by cluster * View high school math course progressions at <http://www.youtube.com/watch?v=mohX5srSuL0&list=PLD7F4C7DE7CB3D2E6&index=9&feature=plpp_video>   Step 3a: Analyze how content progressions within the domains across grades:   * Use math common core author, Jason Zimba’s Wiring Diagram at <http://dl.dropbox.com/u/11459286/ccssmgraph.pdf> to understand the connections through the grade levels * Use the Illustrative Mathematics website at <http://www.illustrativemathematics.org/> to understand the K-8 standards coherence, progressions * Go to the following link at the Delaware DE and scroll down to learning progressions and look at how progressions are organized by grade at <http://www.doe.k12.de.us/infosuites/staff/ci/content_areas/math.shtml> These progressions are organized around the know, understand and do format and can be very helpful in organizing unit planning conversations at any grade   Step 3b: IN HS begin looking at how content should be organized in a three year course to address the common core math   * Look at Appendix a in the math core at <http://www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf>   Step 4: Evaluate lesson and math units:   * Use the Tri-State Quality Review Math Rubric at <http://engageny.org/sites/default/files/resource/attachments/tri-state-math-rubric_0.pdf> to look at alignment of instructional materials to the CCSS math * Use the K-8 Publisher’s Criteria for the CCSS math standards to evaluate instructional materials at <http://www.corestandards.org/assets/Math_Publishers_Criteria_K-8_Summer%202012_FINAL.pdf>   Step 5: Explore the synergy of information available to support your staff in the common core math:   * Visit Tulare County Office of Education math quick links web site for dozens of links to the math domains. Go to <http://commoncore.tcoe.org/Math/QuickLinks/Home> | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum. * Ensure that teachers of the same content across grade levels have PD time for discussing and planning to ensure for coherence/threads of main ideas   + Provide time to study the vertical progressions that exits in the Domains     - What comes before and after each grade? * Notice evidence of coherence during walk-throughs and class visits:   + Look for coherence in unit and lesson plans   + Look for major topics linked within grades   + Look for transfer of knowledge and skills across concepts and within domains   + Look for concepts/skills deepening over time within and across grades   + Look for learning progressions to monitor progress, provide scaffolding and extend learning   + Look for alignment of cluster and domain learning targets and assessment | | | |
| **Implications for Elementary Teachers** | **Implications for Secondary Teachers** | | |
| * Connect the learning across grades so that students can build new understanding onto foundations built in previous grades   + Understand that the most important connections and progressions are vertical in nature: the links from one grade to the next allow students to progress in their mathematical education   + Understand that each standard is not a new event but an extension of previous learning * Think deeply about what the grade math focus is and the ways in which the focus areas of a grade connect to the way it was taught the year before and the years after   + Ask:     - What must students know when they arrive?   What will students know when they leave the grade? | * Connect the learning across grades so that students can build new understanding onto foundations built in previous grades   + Understand that the most important connections and progressions are vertical in nature: the links from one grade to the next allow students to progress in their mathematical education   + Understand that each standard is not a new event but an extension of previous learning * Think deeply about what the grade math focus is and the ways in which the focus areas of a grade connect to the way it was taught the year before and the years after   + Ask:     - What must students know when they arrive?     - What will students know when they leave the grade? | | |
| **Implications for Students** | **Implications for K-12 Parent(s)** | | |
| * Learns knowledge from year to year in a coherent learning progression | * Be aware if what your child struggled with last year and know that will affect learning this year * Advocate for your child and ensure that support is given for “gap” skills, i.e. negative numbers, fractions, etc. | | |
| **Implementation Challenges** | **Possible Next Steps** | | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and understanding the common core college- and career ready perspective in the standards | * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math. * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items   + Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | | |

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**Iowa Core Math Shift 3 of 6: Rigor Supported by Fluency (Speed and Accuracy)**

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| **Description of Shift** | **Rationale for Shift** | | **Assessment Aligned to Shift** |
| Fluency is the quick mathematical content; what you should quickly know. It should be recalled very quickly. It allows students to get to application much faster and get to deeper understanding. We need to create contests in our schools around these fluencies. This can be a fun project. Deeper understanding is a result of fluency. Students are able to articulate their mathematical reasoning, they are able to access their answers through a couple of different vantage points; it’s not just getting to yes; it’s not just getting the answer but knowing why. Students and teachers need to have a very deep understanding of the priority math concepts in order to manipulate them, articulate them, and come at them from different directions.  In summary: Fluency is – Students are expected to have speed and accuracy with simple calculations; teachers structure class time and/or homework time for students to memorize, through repetition, core functions such as arithmetic operations so that they are more able to understand and manipulate more complex concepts.  *Note: shifts 3, 4, 5, and 6 require equal intensity in time, activities, and resources.* | Fluency is not meant to come at the expense of understanding but is an outcome of a progression of learning and sufficient thoughtful practice. It is important to provide the conceptual building blocks that develop understanding in tandem with skills along the way to fluency.  Fluency is developed through making sense of mathematical ideas over time and developing thinking strategies until they can become easily useful and applicable.  *Note this is not memorization absent understanding.* | | It will be assumed that students possess the required fluencies as articulated through grade 8; as such, students will not be allowed to use calculators on summative assessments in grades 3-5. Students will be allowed to use four-function calculators with a square root key or scientific calculators on summative assessments in grade 6 and scientific calculators in grades 7-8.  PARCC |
| **Resources for Implementation** | | | |
| Step 1: Explore fluency in the math core   * Listen to a 2 minute video from to two common core math authors talk about fluency at <http://www.youtube.com/watch?v=ZFUAV00bTwA&list=PLD7F4C7DE7CB3D2E6&index=13&feature=plpp_video> * Listen to a 4 minute video from a common core math author talk about key changes in the math standards at <http://www.youtube.com/watch?v=BNP5MdDDFPY&list=PLD7F4C7DE7CB3D2E6&index=2&feature=plpp_video> * Listen to 60 minute video from common core math authors review shift 1 and 2 and also speak to shift 3-6 the rigor shifts. <http://vimeo.com/44524812>   Step 2: Engage parents in supporting the CCSS for math instruction by doing aligned activities at home   * Share the PTA Parent Guides or the Great City Schools Parent Roadmaps with parents in Spanish and English. Guides can be downloaded at <http://pta.org/parents/content.cfm?ItemNumber=2583> (PTA guides) and <http://www.cgcs.org/site/Default.aspx?PageID=244> (Great City Schools Roadmaps)   + Share the Khan Academy on-line math videos with parents as a way of supporting math instruction at home. Go to <https://www.khanacademy.org/>   + Share the NCTM student portal with parents at <http://figurethis.org/index.html>   + Share the federal website about helping with math brochure at <http://www2.ed.gov/parents/academic/help/hyc.html>   Step 3: Engage students in supporting the CCSS math instruction by doing aligned activities at home at math centers   * Show students the following sites for use at home: <http://www.xpmath.com/> and <http://www.ixl.com/standards/common-core/math> * Use teacher aligned on-line web resources with NWEA Measure for Academic Progress (MAP) RIT scores by going to <http://www.sowashco.k12.mn.us/ro/pages/studentlinks/map/> and <http://belleplaine.k12.mn.us/se3bin/clientgenie.cgi?schoolname=school357&statusFlag=goGenie&geniesite=133&myButton=g5plugin&db=g133_b545> | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum * Develop a math PD plan that supports rigor * Notice evidence of fluency during walk-throughs and class visits:   + Look for efficiency and accuracy without aids   + Look for judicious use of technology that does not impede fluency   + Look for the study algorithms for insights into structure of mathematics (organization, patterns, predictability)   + Look for flexible application of procedures to solve problems | | | |
| **Implications for Elementary Teachers** | | **Implications for Secondary Teachers** | |
| * Push students to know basic skills at a greater level of fluency * Focus on the listed fluencies by grade level * Create high quality problem sets | | * Push students to know basic skills at a greater level of fluency * Focus on the listed fluencies by grade level * Create high quality problem sets | |
| **Implications for Students** | | **Implications for K-12 Parent(s)** | |
| * Spend time practicing skills with intensity | | * Push children at home to know/memorize basic math facts (do not expect facts to be learned just at school. Support at home) * Know all of the fluencies your child should have and prioritize learning of the ones they don’t | |
| **Implementation Challenges** | | **Possible Next Steps** | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and U\understanding the common core college- and career ready perspective in the standards | | * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math. * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items   + Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | |

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**Iowa Core Math Shift 4 of 6: Rigor Supported by Deep Understanding (Know it/Do it!)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description of Shift** | | **Rationale for Shift** | **Assessment Aligned to Shift** |
| The Common Core is built on the assumption that only through deep conceptual understanding can students build their math skills over time and arrive at college- and career-readiness by the time they leave high school. The assumption here is that students who have deep conceptual understanding can:   1. Find “answers” through a number of different routes 2. Articulate their mathematical reasoning 3. Be fluent in the necessary baseline functions in math, so that they are able to spend their thinking and processing time unpacking mathematical facts and make meaning out of them. 4. Rely on their teachers’ deep conceptual understanding and intimacy with the math concepts   “Teachers should focus on the critical areas through careful planning of what to teach and when. They should consider carefully whether or not students should achieve mastery of the standard or concept, not presuming it will be taught next year. Teaching to fewer standards gives teachers more time to engage students in rigorous mathematical tasks, providing them the opportunity to both explore the concepts and construct the requisite depth of understanding. This time also allows for students to work in small groups, engage in hands-on exploration, identify patterns and analyze data, while thinking, speaking, and writing critically about their learning. Through these rigorous lessons, students will gain deep conceptual understandings and procedural fluency.”  Chicago PS Mathematics Framework, 2012, p 12  In summary: Deep Understanding – Students deeply understand and can operate easily within a math concept before moving on. They learn more than trick to get the answer right. They learn the math. They can apply the math. They can write about the math. They can speak about their understanding.  *Note: shifts 3, 4, 5, and 6 require equal intensity in time, activities, and resources.* | | “This shift is important because, as educators, we are often asked to cover a wide range of concepts in each grade level or course. Teaching fewer concepts means educators will have time to be more intentional about both building deeper conceptual understanding in their students and developing a variety of algorithms that students can use with dexterity as they approach any mathematical situation or problem. When our students develop deeper understandings and greater procedural fluency, they are better able to apply those understandings and skills to other contexts, both mathematical and real-world.”  Chicago PS Math Framework 2012, p. 11 | Each standard will be assessed from multiple perspectives, while not veering from the primary target of measurement for the standard. |
| **Resources for Implementation** | | | |
| Step 1: Explore the standards for mathematical practice which describe student outcomes that deepen mathematical conceptual understanding   * View the Phil Daro video (CCSS math author) and listen to him discuss conceptual understanding versus answer getting at <http://vimeo.com/30924981> * View a 4 minute video by a common core math author talk about the important of mathematical practices at <http://www.youtube.com/watch?v=m1rxkW8ucAI&list=PLD7F4C7DE7CB3D2E6&index=5&feature=plpp_video> * View a 1 minute video by a common core math author talking about why the practices matter when making instructional decisions at <http://www.youtube.com/watch?v=9pKcO9E4Flw&list=PLD7F4C7DE7CB3D2E6&index=6&feature=plpp_video> * Use the K-8 or HS modules 1-4 on practices developed by the Northwest Regional Lab with staff. Go to <http://www.ode.state.or.us/search/page/?id=3406> * Visit the Mathematics Assessment Project. This project is working to design and develop well-engineered assessment tools to support U.S. schools in implementing the Common Core State Standards for Mathematics (CCSS). <http://map.mathshell.org/materials/index.php>   Step 2: Watch math instruction that reflects the practices   * Visit The Teaching Channel and view some of the 45 videos modeling how to teach various topics (topic and grade listed in descriptions): <https://www.teachingchannel.org/videos?default=1> * Visit Inside Mathematics. This site features classroom examples of innovative teaching methods and insights into student learning, tools for mathematics instruction that teachers can use immediately, and video tours of the ideas and materials on the site. <http://www.insidemathematics.org/index.php/common-core-standards> * Compare current questioning with math practice question exemplars from Kansas Flipbooks at <http://katm.org>   Step 3: Join an on-line community learning about the math common core at <http://mathlanding.org/> and <http://www.smartbrief.com/nctm/index.jsp?campaign=launch>  Step 4: Begin using vocabulary terms with the CCSS math in the classroom   * Consider some of these vocabulary resources at <http://www.broward.k12.fl.us/studentsupport/ese/PDF/MathWordWall.pdf> and <http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx> * Enrich your lesson with on-line resources such as virtual manipulatives at <http://nlvm.usu.edu/en/nav/vlibrary.html> and tech problem of the day at <http://mathforum.org/tpow/> | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum * Allow teachers to spend time developing their own content knowledge * Provide meaningful professional development on what student mastery and proficiency really should look like at every grade level by analyzing exemplar student work   + Support response to intervention (RTI) in your building   + Support teacher understanding of Hess’ Cognitive Rigor matrix with math examples. Refer to 1/22/12 MISIC ICN handout. * Notice evidence of deep understanding during walk-throughs and class visits:   + Look for students writing and speaking with teacher and other students about their math understanding   + Look for students using precise and accurate mathematics, academic language, terminology, and concrete or abstract representations   + Look for students justifying statements or rules   + Look for teachers giving students enough time to make sense of the math | | | |
| **Implications for Elementary Teachers** | **Implications for Secondary Teachers** | | |
| * Ask what mastery/proficiency really looks like and means at each grade * Plan for progressions of levels of understanding * Spend class time on the depth of the understanding   + Teach more than “how to get the answer” and instead support students’ ability to access concepts from a number of perspectives so that students are able to see mathematics as more than a set of mnemonics or discrete operations.   Become flexible and comfortable in own depth of content knowledge | * Ask what mastery/proficiency really looks like and means at each grade * Plan for progressions of levels of understanding * Spend class time on the depth of the understanding   + Teach more than “how to get the answer” and instead support students’ ability to access concepts from a number of perspectives so that students are able to see mathematics as more than a set of mnemonics or discrete operations. * Become flexible and comfortable in own depth of content knowledge | | |
| **Implications for Students** | **Implications for K-12 Parent(s)** | | |
| * Show in multiple ways mastery at a deep level   + Understand why the math works   + Make the math work   + Talk about why the math works * Use mathematical practices to demonstrate understanding of different material and concepts   + Prove how the math works and understand why | * Notice whether your child really knows why the answer is what it is * Advocate for the time your child needs to learn key math * Provide time for your child to work hard with math at home * Get smarter in the math your child needs to know | | |
| **Implementation Challenges** | **Possible Next Steps** | | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and understanding the common core college- and career ready perspective in the standards | * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math. * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items     - Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | | |

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**Iowa Core Math Shift 5 of 6: Rigor Supported by Application (Real World)**

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| **Description of Shift** | **Rationale for Shift** | | **Assessment Aligned to Shift** |
| The Common Core demands that all students engage in real world application of math concepts. Through applications, teachers teach and measure students’ ability to determine which math is appropriate and how their reasoning should be used to solve complex problems. In college and career, students will need to solve math problems on a regular basis without being prompted to do so.  In summary: Application is – Students are expected to use math and chose the appropriate concept for application even though they are not prompted to do so.  *Note: shifts 3, 4, 5, and 6 require equal intensity in time, activities, and resources.* | “This is the “why we learn math” piece, right? We learn it so we can apply it in situations that require mathematical knowledge. There are requirements for application all the way throughout the grades in the CCSS. …   But again, we can’t just focus solely on application—we need also to give students opportunities to gain deep insight into the mathematical concepts they are using and also develop fluency with the procedures that will be applied in these situations. The problem-solving aspect of application is what’s at stake here—if we attempt this with a lack of conceptual knowledge and procedural fluency, the problem just becomes three times harder.  At the same time, we don’t want to save all the application for the end of the learning progression. Application can be motivational and interesting, and there is a need for students at all levels to connect the mathematics they are learning to the world around them.”  *New Mexico CCSS Math PPT* | | Students will be expected to know grade-level mathematical content with fluency and to know which mathematical concepts to employ to solve real-world mathematics problems. |
| **Resources for Implementation** | | | |
| * Explore application with these resources * Use a one minute video to learn about how the common core math authors designed with college and career readiness in mind while talking about an example from grade 6-8 on ratio and proportion at <http://www.youtube.com/watch?v=WO7Ld6Tp7qs&list=PLD7F4C7DE7CB3D2E6&index=14&feature=plpp_video> * Read about why employer’s support the practices at <http://www.p21.org/storage/documents/FINAL_REPORT_PDF09-29-06.pdf> and <http://www.lkl.ac.uk/research/technomaths/skills2002/Maths-Skills-Workplace-Final-Report.pdf> | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum * Support science/career/tech teachers in supporting the math and literacy common core * Create a culture of math application across the school * Notice evidence of deep application during walk-throughs and class visits:   + Look for student confidence to use math in everyday life   + Look for students exploring math with tasks and reflecting on their thinking   + Look for students practicing and receiving teacher feedback prior to independent practice | | | |
| **Implications for Elementary Teachers** | | **Implications for Secondary Teachers** | |
| * Apply math in science and career/tech courses   + Understand the relationship of the K-12 math standard impact on the K-12 Next Generation Science Standards * Provide students with real world experiences and opportunities to apply what they have learned * Apply a wide variety of instructional strategies when teaching math so students can apply math   + Move from a didactic-only instruction | | * Apply math in science and career/tech courses   + Understand the relationship of the K-12 math standard impact on the K-12 Next Generation Science Standards   + Understand the relationship of the math standard impact on the high school Common Career Technical Core * Apply math in math courses * Provide students with real world experiences and opportunities to apply what they have learned * Apply a wide variety of instructional strategies when teaching math so students can apply math   + Move from a didactic-only instruction | |
| **Implications for Students** | | **Implications for K-12 Parent(s)** | |
| * Apply math in other content areas and relevant situations * Choose the right math concept to solve a problem when not necessarily prompted to do so | | * Ask your child to do the math that comes up in your daily life | |
| **Implementation Challenges** | | **Possible Next Steps** | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and understanding the common core college- and career ready perspective in the standards | | * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math. * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items     - Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | |

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**Iowa Core Math Shift 6 of 6: Rigor Supported by Dual Intensity (Think Fast and Solve Problems)**

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| **Description of Shift** | **Rationale for Shift** | | **Assessment Aligned to Shift** |
| This is an end to the false dichotomy of the “math wars.” It is really about dual intensity; the need to be able to practice and do the application. Both things are critical.  “Students are practicing and understanding. There is more than a balance between these two things in the classroom-both are occurring with intensity. Teachers create opportunities for students to participate in “drills” and make use of those skills through extended application of mathematics concepts. The amount of time and energy spent practicing and understanding learning environments is driven by specific mathematical concept and , therefore, varies throughout the school year. “  *Achieve.org action brief on Implementing the CCSS, 2013, p. 7*  *Note: shifts 3, 4, 5, and 6 require equal intensity in time, activities, and resources.* | “Teachers create opportunities for students to participate in application of procedural and conceptual knowledge through extended application of math concepts. The amount of time and energy spent practicing and understanding learning environments is driven by the specific mathematical concept and therefore, varies throughout the given school year.”  *New Mexico CCSS Math PPT* | | Students will be expected to know grade-level mathematical content with fluency and to know which mathematical concepts to employ to solve real-world mathematics problems. |
| **Resources for Implementation** | | | |
| * Explore balanced emphasis in the common core math standards * Listen to a common core author speak about the balance of skills and understanding in this 1 minute video at <http://www.youtube.com/watch?v=5dUQtIXoptY&list=PLD7F4C7DE7CB3D2E6&index=17&feature=plpp_video> | | | |
| **Implications for Administrators** | | | |
| * Use whatever resources are available from DE, AEA, and MISIC in providing tools for staff to upgrade their curriculum * Provide enough time for teachers to focus and spend time on both fluency and application of concepts/ideas * Support PD efforts that show teachers how to students will use modeling and making/critiquing arguments in the math standards * Communicate to teachers and parents that researchers like Lauren Resnick (<http://www.lrdc.pitt.edu/people/person-detail.asp?Dir_id=9>) and Carol Dweck (https://www.stanford.edu/dept/psychology/cgi-bin/drupalm/cdweck ) have shown that work and effort create ability. (Mathematics success is not different than success in any other subject. It takes work and effort.)   + Make use of the MISIC MAP student goal setting materials developed by Nancy Lockett on the MISIC website under 2/12 ICN handouts | | | |
| **Implications for Elementary Teachers** | | **Implications for Secondary Teachers** | |
| * Find the dual intensity between understanding and practice within different periods of different units * Supportive of both fluency and practice in daily instructional decisions, as well as the range of application | | * Find the dual intensity between understanding and practice within different periods of different units * Supportive of both fluency and practice in daily instructional decisions, as well as the range of application | |
| **Implications for Students** | | **Implications for K-12 Parent(s)** | |
| * Practice math skills with an intensity that results in fluency * Practice math concepts with an intensity that forces application in novel situations | | * Notice if your child is “smart” at speed or solving problems and what side they need to get better at   + Make sure your child is practicing the math facts s/he struggles with   + Make sure your child is thinking about math in real life | |
| **Implementation Challenges** | | **Possible Next Steps** | |
| * Translating the core into classroom practice   + Commercial instructional materials have not adapted to the publisher’s criteria for the Math common core; so districts and educators must adapt what they have until they do. * Getting started with the common core and developing a transition plan * Confusion of what will the public accountability assessments look like in a common core environment in Iowa and nation * Understanding the organization and intent of the common core standards * Appreciating that the common core is like a building code, not about checking off coverage. The curriculum is the building itself that is more than the code. You want to avoid a coverage mentality that puts knowledge and skills in isolated rooms. * Coming to grip with the notion in Iowa that we teach to state math standards not local * Appreciating the synergy of the common core increases the staying power of the standards   + Accessing and filtering all of the materials being shared across the 46 states * Appreciating and understanding the common core college- and career ready perspective in the standards | | * Structure planning time for grade level/content areas to use curriculum exemplars as a guide for planning their own units * Develop or adopt a student work protocol at the end of units for teachers to analyze student work samples and compare how student learning and performance looked different with a common core math unit   + Ask, What do students know?   + Ask, What can students do? * Begin considering if current math instructional practices align to the expectations of the new math core * Begin by analyzing available student mathematics achievement data, including student grades. Keep in mind that mathematics skills are cumulative. Students earning marginal grades in mathematics courses will predictably struggle in future mathematics courses.   + Include analysis of student assessment data focused at the cluster level as well as the standard level as organized by the common core math * Analyze data on student mathematics participation including:   + Students repeating secondary math courses   + Number and percentage of students who successfully complete a ACT defined HS 3-yr. mathematics sequence   + Number and percentage of students enrolled in math and science courses as well as the scores on the AP exams   + Use the data to inform course-taking policies * Develop a common core PD plan and implement it   + Focus on the Standards for Mathematical Practice in concert with the Standards for Mathematical Content   + Discuss current math mindsets with the school leadership team   + Consider the needs of individual teachers and as needed, incorporate into, professional growth plans for individual teachers   + Use teacher professional learning communities to integrate professional learning into expectations, the school culture, and classroom instruction.   + Create short-term wins in PD plans to maintain motivation     - Take risks and ask for support     - Support each other       * Ask, what can we do to get stronger in teaching?       * Ask, how am I learning the content on a deeper level as a professional?   + Establish at least three but not more than five areas of total focus   + Investigate web-based PD coupled with face-to-face * Develop a math assessment system and implement it   + Develop an assessment system that has formative, interim, and summative assessments that goes beyond multiple-choice     - Place greater emphasis on performance-based tasks and computer-enhanced text items     - Develop common formative and summative assessments that embed academic vocabulary, focus on math application and demonstration of conceptual understanding in both short and longer tasks | |

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