Process for Kansas Mathematics Standards Implementation

In this section, a process was developed to help administrators and teachers through an effective mathematic standards implementation.

1. **Review the Framework for Kansas Mathematics Standards Implementation**
2. **Review and study the Essential Components for Kansas Mathematics Standards Implementation**
3. **Contact Melissa Fast mfast@ksde.org to get a copy of the Content & Confidence Surveys – Mathematics and the Diagnostic Assessment to Effective Mathematics Standards Implementation.**
4. **Have teachers complete the Content & Confidence Survey – Mathematics**
   a. Verify the professional learning opportunities your teachers have had during the school year and in the summer months. What was the content of the events and who provided the training?
5. **Complete the Diagnostic Assessment to Effective Mathematics Standards Implementation using the data from the Content & Confidence Survey – Mathematics**
Framework for Kansas Mathematics Standards Implementation

Implementation of the 2017 Kansas Mathematics Standards is complex and requires many components to be effective in developing mathematics learning for all students. The Instructional Core, by Richard Elmore provides a great framework for how to intervene in the instructional process in order to best improve student learning and achievement. Ultimately, the effective implementation of the mathematics standards is demonstrated in improved student learning and achievement, made possible through this framework.

THE INSTRUCTIONAL CORE

Engaging students in the learning process

STUDENT
Expectations & Engagement

TASK
What Students are Actually Doing

TEACHER
Knowledge & Skill

CONTENT
Rigor & Relevance

Improving teachers’ instructional practice

Providing academically challenging content

Improved student achievement
Elmore poses **seven principles** for improvement of student learning. In principle one, the instructional core, he argues there are only three ways to improve student learning at scale:

1. You can raise the level of the **content** that students are taught. (Content Standards and Curriculum)
2. You can increase the skill and knowledge that **teachers** bring to the teaching of that content. (Content Knowledge and Pedagogy)
3. And you can increase the level of **students’ active learning** of the content. (Expectations and Engagement)

The instructional core helps us identify where we are trying to improve. If you change one, you have to change them all. Alter the skill and knowledge of the teacher and you stay in a low-level curriculum, you have tensions between what teachers can do and what the content is capable of doing. If you alter the content without changing the skill and knowledge of teachers, you are asking teachers to teach to a level they cannot – they do not have the skill and knowledge to teach to. If you do either one of those things without changing the role of the student in the instructional process, the likelihood that students will ever take control of their learning is pretty remote. Schools do not improve through political and managerial incantation; they improve through the complex and demanding work of teaching and learning. (City, et al 2016)

In its simplest terms, the instructional core is composed of the teacher and the student in the presence of content. It is the relationship between the teacher, the student, and the content – not the qualities of any one of them by themselves – that determines the nature of instructional practice, and each corner has its own particular role and resources to bring to the instructional process. **Because of this mutually dependent relationship it is impossible to fully implement the 2017 Kansas Mathematics Standards without also examining the role of the teacher and student in this process.**

**Essential Components for Kansas Mathematics Standards Implementation**

This section was designed to help schools understand the essential components needed in order to have a strong mathematics program. Districts should always look for ways to better meet the needs of their students and propel them into becoming successful in any academic career or professional path that they choose. All of the components mentioned in this document are necessary to achieve an effective school mathematics program.

This section outlines questions a school should ask themselves as they reflect on the effectiveness of their math program and where they are in their implementation of the 2017 Mathematics Standards. These questions are linked to the framework provided to help provide further clarity to the process. Links to Kansas resources are provided to help a district grow in these areas and ultimately develop a math program that promises success in mathematics for every student.

Districts should start with **PART 1** and work their way through the entire document. The questions are written in a progressive order therefore it is important that the questions are responded to in the order they are presented. Please make sure you are providing answers to each of the questions listed. This will provide clarity as to what rating you should give your school/district on the diagnostic.
OUTLINE

PART 1 – 2017 Kansas Mathematics Standards & Learning Progressions for Mathematics

1. Teachers have a deep understanding of the mathematical knowledge that they are expected to teach and a clear view of how student learning of that mathematics develops and progresses across grades.
   a. Comprehensive understanding of the 2017 Kansas Mathematics Standards AND the Standards for Mathematical Practice is evident.
      • What activities, training, professional learning, etc. have your teachers had around the 2017 Kansas Mathematics content standards?
      • What activities, training, professional learning, etc. have your teachers had around the standards for mathematical practice?
      • Who provided the training to your teachers?
      • Do your teachers understand the major areas of emphasis for each grade level found in the Focus Level Documents?
      • Do your teachers understand the major areas of coherence for each grade level found in the Coherence Documents:
      • How confident do your teachers feel in achieving the expectations outlined in the standards? (Have your teachers complete the Content & Confidence Survey – Mathematics.)
      • Are there particular domains or clusters that your teachers tend to struggle more with? If yes, what areas specifically? (Refer to the results of the Content & Confidence Survey – Mathematics.)
   b. Teachers purposefully study the learning progressions for mathematics
      • What activities, training, professional learning, etc. have your teachers had around the learning progressions for mathematics?
      • Who provided the training to your teachers?

PART 2 – Effective Mathematics Teaching Practices, Special Populations, & Growth Mindset

2. There is a solid framework for strengthening the teaching of mathematics.
   a. Teachers understand the Effective Mathematics Teaching Practices found in the 2017 Kansas Mathematics Standards
      • Do your teachers establish mathematics goals to focus learning? If yes, please provide an example/explanation.
      • Do your teachers implement tasks that promote reasoning and problem solving? If yes, please provide an example/explanation.
      • Do your teachers use and connect mathematical representations? If yes, please provide an example/explanation.
      • Do your teachers facilitate meaningful mathematical discourse? If yes, please provide an example/explanation.
      • Do your teachers pose purposeful questions? If yes, please provide an example/explanation.
      • Do your teachers build procedural fluency from conceptual understanding? If yes, please provide an example/explanation.
      • Do your teachers support productive struggle in learning mathematics? If yes, please provide an example/explanation.
      • Do your teachers elicit and use evidence of student thinking to assess progress? If yes, please provide an example/explanation.
   b. Who is providing the mathematics instruction to your special populations?
      • English Learner students?
      • Special Education students?
      • At-Risk students?
   c. Who is providing the mathematics intervention to your special populations?
• English Learner students?
• Special Education students?
• At-Risk Students?

d. How does your school develop a growth mindset in mathematics for both teachers and students?
  • What training have your teachers had in the area of growth mindset?
  • Who provided the training to your teachers?
  • How do your grading and reporting practices support a growth mindset and value mistakes?

**PART 3 – Curriculum Adoption & Mapping Process**

3. Our school/district utilizes curriculum resources and instructional guides that adhere to the focus, coherence, and rigor of the standards
   a. curriculum/resources alignment
      • Have you done an analysis of your curriculum as outlined in the [Kansas Instructional Curriculum/Resource Adoption Process Guide](#) to determine any gaps in its alignment with the current standards? If yes, if possible attached a copy of the documentation used.
      • Did you use the Focus Level Documents during this process?
      • Did you use the Coherence Documents during this process?
      • Did you use Appendix A during this process? (High school only.)
      • How are the student standards for mathematical practice present in the curriculum?
      • Is it student-centered? Who is doing the math? Or is the teacher just showing the students “how” to do the work?
      • How does your curriculum/resources provide opportunities for all students in all Depth of Knowledge (DOK) levels 1-4?
   b. Our teachers utilize curriculum map/pacing guide alignment
      • Have you done an analysis of your curriculum map/pacing guide to determine any gaps in its alignment with the [2017 Kansas Mathematics Standards](#)?
        o How much instructional time are you allowing for mathematics instruction?
        o How much instructional time are you allowing for mathematics intervention?
      • Have you analyzed the coherence of your curriculum map/pacing guide across and between grades and/or courses?
   c. What is your district policy on acceleration in mathematics?
      • What is the purpose of accelerating a student in mathematics?
      • When can a student be accelerated?
      • How is it determined if a student should be accelerated?
      • How does your district assure that the student being accelerated receives all the grade level standards content?
PART 1 – 2017 Kansas Mathematics Standards & Learning Progressions for Mathematics

1. Teachers have a deep understanding of the mathematical knowledge that they are expected to teach and a clear view of how student learning of that mathematics develops and progresses across grades.
   a. Comprehensive understanding of the 2017 Kansas Mathematics Standards AND the Standards for Mathematical Practice is evident.

This goes beyond familiarity with the 2017 Kansas Mathematics Standards. There needs to be a deep understanding of the content and meaning of the standards. Teachers must have the time to collaborate and discuss the standards both vertically and horizontally in order to assure the rigor and coherence is maintained. In an excellent mathematics program, educators hold themselves and their colleagues accountable for the mathematical success of each student and for their personal and collective professional growth toward effective teaching and learning of mathematics. The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. A great resource to reference with teachers is the Standards for Mathematical Practice with Guiding Questions with provides a summary of the mathematical practices along with questions teachers can employ to help engage their students in these practices.

The Kansas Mathematics Flip Books are a great resource for teachers. Teachers need a reliable starting place that contains information and examples related to the Kansas standards. This project attempts to pull together, in one document some of the most valuable resources that help develop the intent, understanding and implementation of the 2017 Kansas Mathematics Standards. These documents provide a starting point for teachers and administrators to begin discussions and exploration into the standards and is by no means meant to be the only resource to support implementation of the 2017 Kansas Mathematics Standards.

- What activities, training, professional learning, etc. have your teachers had around the 2017 Kansas Mathematics content standards?
- What activities, training, professional learning, etc. have your teachers had around the standards for mathematical practice?
- Who provided the training to your teachers?

Effective professional development will enable educators to develop the necessary content knowledge and skills to address the ever-growing challenges we face with students. Student learning of mathematics "depends fundamentally on what happens inside the classroom as teachers and learners interact over the curriculum." For more information as to why professional development is essential for educators please read Why Professional Development Matters by Learning Forward. Ongoing professional development is key to a successful mathematics program. Equally important is the outlook teachers have on these events. Are they attending to learn and positively impact their classroom? Or are they simply going for the PDC points? What follow through is there on positively impacting mathematics with what they have learned? It has to go beyond the steps to get PDC points.

Below are links to professional development opportunities provided by the Kansas State Department of Education:
   o Regional Math Training events
   o KSDE District Training Requests
In order to evaluate what professional development your teachers have received as well as areas of needed support, it is recommended that you utilize the **Content & Confidence Survey – Mathematics**. This survey can be obtained by contacting Melissa Fast mfast@ksde.org once you have completed reading this document.

• **Do your teachers understand the major areas of emphasis for each grade level found in the Focus Level Documents?**

Not all standards should have equal priority. At every level in mathematics there are intricate, challenging, and necessary concepts that serve as prerequisites for the next level’s intricate, challenging, and necessary concepts. In order to help each student achieve success after high school both in the workforce and college we need to give them enough time to succeed in these major areas. The 2017 Kansas Math Standards were built out of the mathematics learning progressions, so priorities were chosen with an eye to the arc of big ideas in the Standards. A plan of instructional focus that respects the learning progressions in the Standards will strike a balance between the path to gaining math understanding and the endpoint of having acquired it.

By using the Grade Level Focus (GLF) documents to inform your instructional practice there should be an approximate 70-20-10 breakdown of time across the three levels, Major, Additional, and Supporting. These numbers are not hard numbers and will fluctuate given the material contained in the various clusters at each grade level. There are times that the content within the Major clusters for a grade level call for more than 70% of the instructional time. Likewise, there are times where there is very little material in the Supporting clusters thus calling for less than 10% of the instructional time. With this in mind the rough 70-20-10 picture, 70 as a lower boundary while 10 is an upper bound.

It is important to note that while the three levels are mutually exclusive in the sense that each cluster belongs to one and only one level, in classroom implementation, the levels can work together to support the priorities of the grade. For example, teachers can view the Additional and Supporting levels in relation to the Major level by pulling the lower-priority material into a lesson that is centrally about more important ideas or topics; e.g., pictographs in Grade 3 could be positioned in direct support of multiplication and two-step word problems.

• **Do your teachers understand the major areas of coherence for each grade level found in the Coherence Documents?**

Mathematics standards are not isolated concepts. They relate to one another both within and across grades. There are three essential considerations that must be made when planning instructional units in mathematics; focus, coherence, and rigor. The FOCUS documents provide a detailed description on where to place our emphasis (focus). This focus will help students gain strong foundations, including a conceptual understanding of concepts, a high degree of procedural skill and fluency, and the ability to apply the math they know to solve problems inside and outside the classroom.

The Critical Areas for COHERENCE documents provide K-8 grade level guidance to help lead to coherence within and across grade levels. Each grade level narrative discusses the major emphasis clusters, as well as those essential foundational areas for coherence from grade to
grade to help assist teachers in their instructional planning. **These documents are also linked within the Standards document itself on each individual Overview Page for grades K - 8.**

The 2017 Kansas Math Standards provide the necessary RIGOR. To help students meet the standards, educators will need to pursue, with equal intensity, three aspects of rigor in the major work of each grade: conceptual understanding, procedural skills and fluency, and application.

- *How confident do your teachers feel in achieving the expectations outlined in the standards?*

Refer to the results of the Content & Confidence Survey – Mathematics.

- *Are there particular domains or clusters that your teachers tend to struggle more with?*

Refer to the results of the Content & Confidence Survey – Mathematics.

**b. Teachers purposefully study the learning progressions for mathematics.**

The 2017 Kansas Mathematics Standards 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. The progressions explain why standards are sequenced the way they are, point out cognitive difficulties and pedagogical solutions, and give more detail on particularly knotty areas of the mathematics. They would be useful in teacher preparation and professional development, organizing curriculum, and writing textbooks. Progressions documents also provide a transmission mechanism between mathematics education research and standards.

- *What activities, training, professional learning, etc. have your teachers had around the learning progressions for mathematics?*

Refer to the results of the Content & Confidence Survey – Mathematics.

- *Who provided the training to your teachers?*

Refer to the results of the Content & Confidence Survey – Mathematics.
PART 2 – TEACHER & STUDENT

2. **There is a solid framework for strengthening the teaching of mathematics.**
   
a. **Teachers understand the Effective Mathematics Teaching Practices found in the 2017 Kansas Mathematics Standards (not the same thing as the student math practices found in the standards)**

   The eight Effective Mathematics Teaching Practices (https://community.ksde.org/Default.aspx?tabid=5276 page 8) should be the foundation for mathematics instruction and learning. This framework was informed by over twenty years of research and presented in *Principles to Actions* by the National Council of Teachers of Mathematics (NCTM). If teachers are guided by this framework, they can move “toward improved instructional practice” and support “one another in becoming skilled at teaching in ways that matter for ensuring successful mathematics learning for all students” (NCTM, 2014, p. 12).

   - **Do your teachers establish mathematics goals to focus learning?**

     Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

     Learning goals should:
     - Clearly state what students are to learn and understand about mathematics as the result of instruction
     - Be situated within learning progressions
     - Frame the decisions that teachers make during a lesson

   - **Do your teachers implement tasks that promote reasoning and problem solving?**

     Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

     Mathematical tasks should:
     - Allow students to explore mathematical ideas or use procedures in ways that are connected to understanding concepts
     - Build on students’ current understanding and experiences
     - Have multiple entry points
     - Allow for varied solution strategies
• Do your teachers use and connect mathematical representations?

Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Different representations should:
- Be introduced, discussed, and connected
- Be used to focus students’ attention on the structure of mathematical ideas by examining essential features
- Support students’ ability to justify and explain their reasoning
- Move from concrete and lastly connect to abstract

• Do your teachers facilitate meaningful mathematical discourse?

Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Mathematical discourse should:
- Build on and honor students’ thinking
- Let students share ideas, clarify understandings, and develop convincing arguments
- Engage students in analyzing and comparing student approaches
- Advance the math learning of the whole class

• Do your teachers pose purposeful questions?

Effective teaching of mathematics uses purposeful questions to assess and advance students’ reasoning and sense making about important mathematical ideas and relationships

Effective questions should:
- Reveal students’ current understandings
- Encourage students to explain, elaborate, or clarify their thinking
- Make the targeted mathematical ideas more visible and accessible for student examination and discussion
Do your teachers build procedural fluency from conceptual understanding?

Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Effective teaching of mathematics:
- Builds on a foundation of conceptual understanding
- Results in generalized methods for solving problems
- Enables students to flexibly choose among methods to solve contextual and mathematical problems

Do your teachers support productive struggle in learning mathematics?

Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Productive struggle should:
- Be considered essential to learning mathematics with understanding
- Develop students’ capacity to persevere in the face of challenge
- Help students realize that they are capable of doing well in mathematics with effort

Do your teachers elicit and use evidence of student thinking to assess progress?

Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Evidence should:
- Provide a window into students’ thinking
- Help the teacher determine the extent to which students are reaching the math learning goals
- Be used to make instructional decisions during the lesson and to prepare for subsequent lessons

Resources to explore related to the Effective Mathematics Teaching Practices:
- Effective Mathematics Teaching Practices
- Look-Fors in a Math Classroom

Consider using the Teaching Practices Observation Protocol, for goal setting, learning walks, and evidence gathering. Finally, create professional development around data collected.
b. Who is providing the mathematics instruction to your special populations?
   - English Learner students?
   - Special Education students?
   - At-Risk students?

c. Who is providing the mathematics intervention to your special populations?
   - English Learner students?
   - Special Education students?
   - At-Risk students?

An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically. (PTA, 2014) Research shows that effective teachers are the most important factor contributing to student learning and ultimately their achievement. Although curricula, reduced class size, district funding, family and community involvement all contribute to school improvement and student achievement, the most influential factor is an effective, knowledgeable teacher. Developing teacher content knowledge and bridging it with effective teaching practices has the greatest impact on student understanding. “Knowledge” goes beyond being able to “do the math” – it’s about the connections teachers know and understand in mathematics in order to help students make mathematical connections as well. (PTA, 2014)

An excellent mathematics program requires that all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the support and resources needed to maximize their learning potential. (PTA, 2014) It is essential that all mathematics instruction should be taught by qualified/certified teachers and that ALL students are taught by qualified teachers. Effective teachers exhibit certain skills and qualifications to ensure that all students routinely have opportunities to experience high-quality mathematics instruction, learn challenging mathematics content, and receive the support necessary to be successful. These include verbal ability, coursework in pedagogy, knowledge of special-needs students, teacher certification, and content knowledge of the specific subjects to be taught. Personal traits such as a positive and caring attitude, fairness and respect for students, enthusiasm, dedication and reflective teaching contribute to these teachers’ effectiveness in the classroom. Just as important are classroom organization and classroom management skills. Instructional planning, allocating time for academics, keeping students engaged, using appropriate instructional strategies, correctly sequencing instruction, questioning strategies, monitoring learning and differentiating learning for individual students are all important characteristics of an effective teacher. (PTA, 2014)


d. How does your school develop a growth mindset in mathematics for both teachers and students?
   - What training have your teachers had in the area of growth mindset?
   - Who provided the training to your teachers?

Math educators not only need to embrace their content, but the research available about the power of mindset. Our society’s acceptance of the attitude “I’m just not good at math,” needs to be changed! Our students’ ability to think and reason mathematically is key to their success.
The work of Carol Dweck on Growth Mindset impacts our view of students and teachers and how they learn mathematics. Dweck describes a Fixed Mindset as a belief that a person’s qualities, such as intelligence, talent and abilities, are carved in stone from birth. She describes a Growth Mindset as a belief that a person’s qualities can be grown and changed with time and effort. If, as educators, we can approach our students and content with the Growth Mindset in the forefront, we help our students harness the power that lies within their brain. Educators need to look at things like failure, mistakes, high level tasks, and struggle not as a hindrance to learning but rather as an opportunity for improvement.

Jo Boaler’s work expands our thoughts on Growth Mindset to include the power of mistakes and struggle, the need for flexible thinking within mathematics, the importance of rich mathematical tasks, the teacher’s use of praise and the power of our words, and the need for students to speak about their mathematical ideas. As math educators, we need to embrace the power of cultivating a growth mindset in our students as well as ourselves. We can no longer accept the thought that “I will just never be a math person.” Research has proven to us that all students can learn mathematics at a high level. We, as teachers, hold much power and responsibility in helping our students embrace their growth potential!

Resources to explore related to Growth Mindset:
  o  [Growth Mindset in Mathematics](#)
  o  [Student Success Skills](#)

- **How do your grading and reporting practices support a growth mindset and value mistakes?**

  Consider requesting training on Learning Oriented Instructional and Grading Practices through the [KSDE District Training Requests](#).
3. **Our school/district utilizes curriculum resources and instructional guides that adhere to the focus, coherence, and rigor of the standards**

   a. **curriculum/resources alignment**

   - *Have you done an analysis of your curriculum as outlined in the Kansas Instructional Curriculum/Resource Adoption Process Guide to determine any gaps in its alignment with the current standards?*

Why is there a Curriculum/Resource Adoption Process?

Kansas teachers and administrators need to feel confident that they are choosing mathematics resources that will positively impact their students’ achievement.

Curriculum and other instructional resources play a significant role in the mathematics that is taught and learned. Educators will remember from education courses the various types of curricula explained by research. The types described by Glatthorn, Boschee, Whitehead, & Boschee (2012) are the recommended curriculum, written curriculum, supported curriculum, taught curriculum, tested curriculum, and learned curriculum. When researching and analyzing curriculum keep in mind the outcomes expected for your school or district and how the different types impact what students actually learn.

It is difficult to separate curriculum from the instructional practices employed by teachers when analyzing effectiveness. A quality curriculum should be provided to educators but quality professional development that is continuous and focused must also be provided (National Research Council, 2001). Educators should be aware of the interplay between the curriculum adopted and the instruction provided.

Once a curriculum is provided to educators, a purposeful and thoughtful plan must be utilized when implementing the units and the individual lessons. This does not mean that the curriculum is adhered to without thought toward the needs of the students that are in the classrooms. Educators need to understand those educational needs and make informed modification and adaptations within the curriculum as necessary, without losing sight of the end goal in mathematics. Maintaining rigor is essential!

As a group of committed mathematics educators, we believe that all students can learn mathematics at high levels and that all students deserve a robust, rigorous, and appropriate education. Mathematics education is constantly evolving, and as a result, mathematics resources continually evolve. We recognize that mathematics resources are an investment for your school and our children, so we are providing this document as a guide for your resource adoption process. We hope this document will assist in focusing on important mathematics for students now and in the future.
Sites to assist you in your review process:
  o EdReports: [https://www.edreports.org/compare](https://www.edreports.org/compare)
    Independent nonprofit designed to review instructional materials.
    The What Works Clearinghouse (WWC) reviews the existing research on different programs, products, practices, and policies in education.
  o Evidence for ESSA: [https://www.evidenceforessa.org/programs/math/elementary](https://www.evidenceforessa.org/programs/math/elementary)
    Website created to identify programs and practices that meet the ESSA evidence standards.

• Did you use the Focus Level Documents during this process?

Refer to information provided in PART I of this document.

• Did you use the Coherence Documents during this process?

Refer to information provided in PART I of this document.

• Did you use Appendix A during this process? (High school only.)

The 2017 Kansas Mathematics Standards are organized by grade level in Grades K–8. At the high school level, the standards are organized by conceptual category (number and quantity, algebra, functions, geometry, modeling and probability and statistics), showing the body of knowledge students should learn in each category to be a successful high school graduate in Kansas, and to be prepared to study more advanced mathematics. As schools consider how to implement the high school standards, an important consideration is how the standards might be organized into courses that provide a strong foundation for post-secondary success. To address this need, the Kansas Department of Education in partnership with members of the 2017 Mathematics Standards Committee have developed a Traditional Course Pathway in Mathematics based on the 2017 Kansas Mathematics Standards.

In considering this document, there are four things important to note:
  o The courses are models, not mandates. They illustrate possible approaches to organizing the content of the 2017 Kansas Mathematics Standards into coherent and rigorous courses that lead to post-secondary success. Districts and schools are not expected to adopt these courses as is; rather, they are encouraged to use this document as a starting point for developing their own.
- All standards are found in the traditional pathway. The (+) standards are included to increase coherence but are not necessarily expected to be addressed on high stakes assessments. They should be limited to honors versions of the class or as extensions for those students who are ready for the content.
- The course descriptions delineate the mathematics standards to be covered in a course; they are not prescriptions for curriculum or pedagogy. Additional work will be needed to create coherent instructional programs that help students achieve these standards.
- While courses are given names for organizational purposes, districts and schools are encouraged to carefully consider the content in each course and use names that they feel are most appropriate.

- **How are the student standards for mathematical practice present in the curriculum?**

Refer to information provided in PART I of this document.

- **Is it student-centered? Who is doing the math? Or is the teacher just showing the students “how” to do the work?**
- **How does your curriculum/resources provide opportunities for all students in all Depth of Knowledge (DOK) levels 1-4?**

An excellent mathematics program includes a curriculum that develops important mathematics along coherent learning progressions and develops connections among areas of mathematical study and between mathematics and the real world. (PTA, 2014) With the adoption of rigorous standards, we must evaluate our student’s experiences with mathematics. Rigor is not more or difficult math problems; rather, it is about how deeply students must think about mathematics. Increasing the Depth of Knowledge required for a student means looking at mathematics through a different lens, promoting mathematical thinking rather than the final answer or result. We must understand that DOK is not about the difficulty of the objective, rather, it is about the intended outcome or the complexity of the mental processing that must occur in order to get to the intended outcome. Consider the example of adding 4 + 4. This is easy. Students can do this by rote. It is a DOK 1.

Increasing the difficulty of the problem by asking a student to add 4,678 + 7,530 does not increase the complexity. To solve this problem requires a child to recall the sequence of steps. The level of cognitive difficulty is still a DOK 1. It is still recall. Knowing the rules of adding larger numbers - increasing the difficulty of the addition problem - does not affect the intended outcome. We still want the student to be able to add, just larger numbers.

Resources to explore related to DOK:

- KSDE DOK Webpage
- Task Analysis Guide - Cognitive Demand
b. Our teachers utilize curriculum map/pacing guide alignment

• Have you done an analysis of your curriculum map/pacing guide to determine any gaps in its alignment with the 2017 Kansas Mathematics Standards?
  
  o How much instructional time are you allowing for mathematics instruction?
  
  o How much instructional time are you allowing for mathematics intervention?

There is much less published research about the components and time needed for effective math instruction compared to that which exists for reading. Two publications that provide some suggestions about the content required for effective math instruction include the 2001 National Research Council Study Adding It Up: Helping Learning Mathematics (Kilpatrick, Swafford, & Findell), as well as the 2008 National Math Advisory Panel (NMAP) report. Adding it Up found that there are five strands of mathematics proficiency that students need to learn:

  ▪ Adaptive Reasoning
  ▪ Strategic Competence
  ▪ Conceptual Understanding
  ▪ Productive Disposition
  ▪ Procedural Fluency

The NMAP report provided more details about how to teach mathematics effectively. In particular, this report found that neither teacher-directed nor student-initiated instruction was adequate by itself. Instead, students need a combination of both these instructional methods and frequent opportunities to practice their math skills in order to become truly proficient. Brown-Chidsey and Bickford (2016) compiled available data about math instruction recommendations and suggested that allocating 60 minutes per day in grades K through 5 and 70 minutes per day in grades 6 through 12 appears to be a good starting point. Although details about how best to organize daily math lessons would benefit from additional research, using a combination of whole-class, small-group, and individual methods such as recommended for reading appears to be a good starting point.

• Have you analyzed the coherence of your curriculum map/pacing guide across and between grades and/or courses?

Refer to information provided in PART 1 on the Coherence Documents.

Standards relate to one another, both within and across grades. The Coherence Map illustrates the coherent structure that is fundamental to implementation of the mathematics standards. The Coherence Map builds student understanding by linking together concepts within and across grades. Helps teachers identify gaps in a student's knowledge by tracing a standard back through its logical pre-requisites. Provides teachers a way to visualize and understand how supporting standards relate to the major work of the grade.
c. **What is your district policy on acceleration in mathematics?**

- **What is the purpose of accelerating a student in mathematics?**
- **When can a student be accelerated?**
- **How is it determined if a student should be accelerated?**
- **How does your district assure that the student being accelerated receives all the grade level standards content?**

The landscape in K-12 mathematics has changed with the advent of new standards, new expectations and new research. This necessitates a response by educators to ensure that students are receiving a complete and viable curriculum, while allowing for options to meet the needs of all students. The importance of uncompromised K-8 mathematics cannot be overlooked, and the idea that acceleration calls for skipping standards must be eliminated. All college and career decisions have a basis in K-8 mathematics understanding. Schools and districts must review current mathematics acceleration practices to prevent gaps in learning. Furthermore, districts must ensure access to all concepts and skills within the 2017 Kansas Mathematics Standards in order to provide a solid mathematics foundation for all students.

Resources to explore related to Acceleration:

- [KSDE Acceleration Resources](#)
References


