KANSAS STATE DEPARTMENT OF EDUCATION

VISION FOR QUALITY INSTRUCTION

Mathematics

Introduction

The Kansas State Department of Education (KSDE) believes that all Kansas students deserve consistent access to Quality Instruction in Mathematics that engages them in meaningful learning experiences, both individually and collaboratively, to foster mathematical reasoning and understanding. **To that end, Kansas' learners should have consistent access to strong mathematics instruction and high-quality instructional materials aligned to the Kansas Mathematics Standards.**

The vision articulated below is based on eight **Effective Mathematics Teaching Practices** (National Council of Teachers of Mathematics) as well as eight **Standards for Mathematical Practice**. Together, these practices (also enumerated in the Kansas standards) guide the way mathematics is taught and learned.

Mathematics Teaching Practices
1. Establish mathematics goals to focus learning. 2. Implement tasks that promote reasoning and problem solving. 3. Use and connect mathematical representations. 4. Facilitate meaningful mathematical discourse. 5. Pose purposeful questions. 6. Build procedural fluency from conceptual understanding. 7. Support productive struggle in learning mathematics. 8. Elicit and use evidence of student thinking.

Standards for Mathematical Practice
1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

All Kansas learners deserve mathematics instruction characterized by:

- **Focus and Coherence:** *Students* experience focused and intentional math instruction rather than covering extensive content at a surface level. *Teachers* articulate clear goals for learning that are situated within learning progressions and build coherently on the foundations from prior grades. They target the major work of the grade as described in the standards, drawing on supporting standards to deepen students' engagement with the lesson's focus.
- **Mathematical Rigor:** There are three components of rigor in mathematics that are *equally important* for student mastery:
    1. **Conceptual Understanding:** *Students* make connections among mathematical representations to deepen their understanding of key concepts. They access and use concepts and procedures as tools

for problem-solving, including tackling novel problems with multiple solutions. *Teachers* engage students in making these broader connections through strategically planned questions and tasks. They approach math instruction through a conceptual lens rather than merely a set of discrete procedures and formulas, balancing explicit and inquiry-based instruction so that students are not using procedures they do not understand.

2. **Procedural Fluency:** *Students* are able to apply procedures increasingly efficiently, flexibly, and accurately over time. With support, they are able to connect concepts to procedures, understanding *why* a procedure makes sense (or doesn't) and as a result are able to transfer procedures to different contexts. *Teachers* provide opportunities for students to practice core functions so that they are prepared to readily and flexibly access them to explore more complex concepts and novel problems.
3. **Application:** *Students* discuss and solve tasks that have multiple entry points and solutions and promote reasoning and problem-solving. They make sense of increasingly complex problems and explain or justify their solutions using precise language. *Teachers* consistently implement tasks that feature word problems relevant to students' lives beyond the classroom and/or illustrate real-world scenarios. Where appropriate, they encourage students to identify a solution strategy from among many rather than only applying a singular strategy.

- **Productive Struggle:** *Students* use mathematical practices to persevere through difficulty. They use available tools strategically to help them solve problems, engage in meaningful mathematical discourse and critique the reasoning of others to deepen understanding of mathematical ideas. *Teachers* pose purposeful questions to help students discern patterns and evaluate their reasoning rather than doing that thinking for them. They create safe and supportive spaces where students feel comfortable taking intellectual risks. They use evidence of student thinking to gauge proficiency and continually adjust instruction to support and extend learning.

Sources:

- National Council of Teachers of Mathematics. Principles into Actions. https://www.nctm.org/uploadedFiles/Standards_and_Positions/PtAExecutiveSummary.pdf
- National Council of Teachers of Mathematics. Procedural Fluency: Reasoning and Decision-Making, Not Rote Application of Procedures Position. https://www.nctm.org/Standards-and-Positions/Position-Statements/Procedural-Fluency-in-Mathematics/
- Student Achievement Partners. Shifts at a Glance: College- and Career-Ready Shifts in Mathematics. https://achievethecore.org/content/upload/Mathematics%20SAP_ShiftsAtAGlance_02.pdf

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