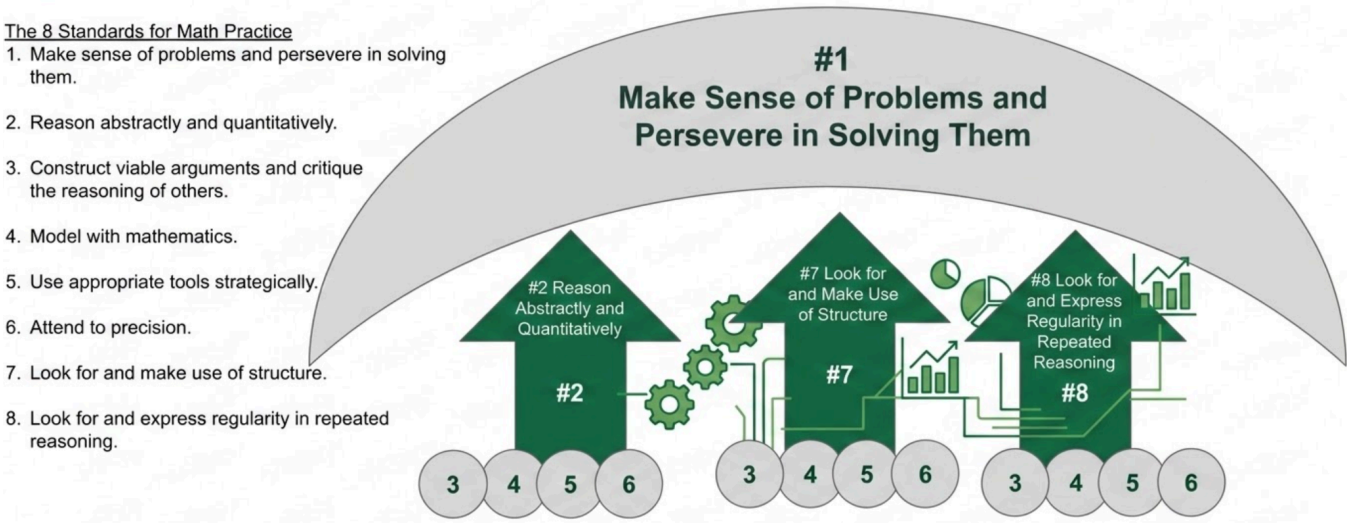
Mathematics Department Program Review

May 2026



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May 2026

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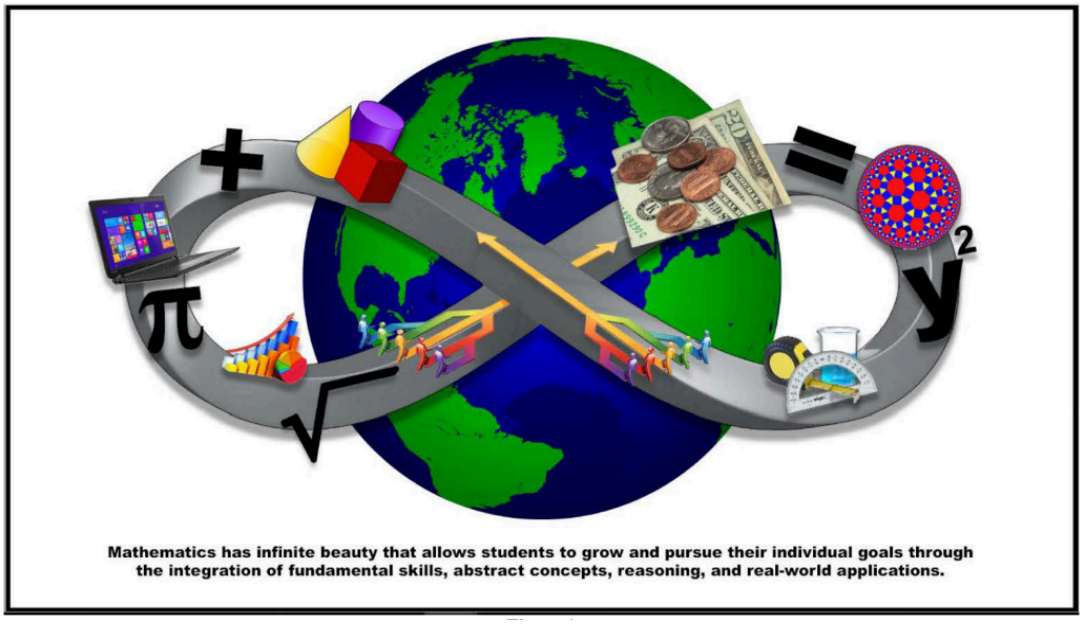
Overview:

During the 2017-2018 school year, members of the Pine-Richland K-12 Mathematics Department conducted an In-Depth Program Review. The findings and recommendations from the 2017-2018 study were shared with the school board and community in the spring of 2018. Implementation of the recommendations began in the fall of 2018.

One of the essential recommendations from 2018 was the development of the department's vision and philosophy (Figure 1). Integrated into the vision and philosophy is the concept of mathematics helping students pursue their individual goals. Each of the recommendations from the 2018 review was linked to program improvements aimed at improving students' understanding of the benefits of skill development, abstract reasoning, and real-world application.

The teachers worked in grade-span and vertical teams during the 2025-2026 review. The horizontal and vertical team research and discussions led to specific grade-span action steps. As a result, each overarching recommendation will be followed by grade-span-specific findings.



Vision and philosophy originally adopted in 2018, which has been revised through this new process.

Mini-Review Process:

Currently, all departments have completed an In-Depth Program Review. The district is now completing a cycle of "mini" reviews. This systematic approach to program improvement is embedded in the Teaching & Learning category of the PRSD Strategic Plan. These educational programs reflect the educational experience of Pine-Richland students. Figure 2 below describes the steps used to conduct this review.

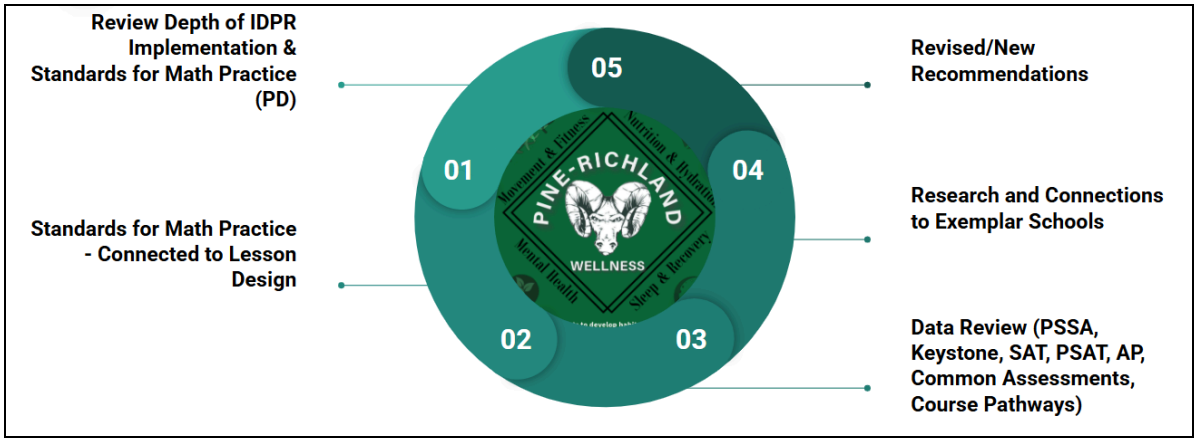


Figure 2

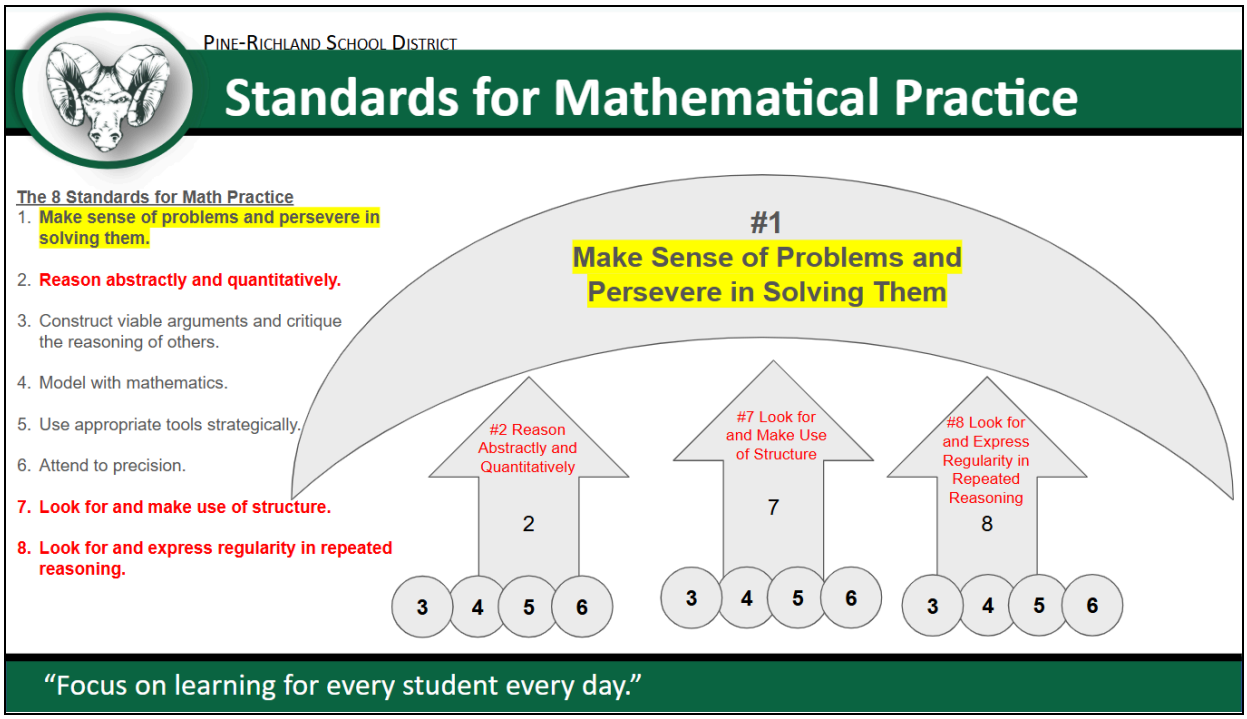
All secondary mathematics teachers participated along with K-6 department chairs, math teachers, and administrators.. The **first phase** of the review was designed to understand how the **Standards for Mathematical Practice (SMP)** can integrate into every K-12 mathematics lesson. The committee engaged in professional development exercises and then worked to implement the practices into their instruction between each committee meeting. Each grade span analyzed every goal to determine the depth of implementation. **Phase two** of the process included the review and analysis of data points connected to the district's K-12 Mathematics program (e.g., PSSA, Keystone, AP Exams, etc.) and an evaluation of the implementation of the 2017-2018 In-Depth Program Review recommendations.. The **third and fourth phases** of the mini-review included conducting high-level research on K-12 Mathematics Education topics and interviewing a few selected Pennsylvania school districts to identify other emerging trends. **Finally**, the committee reviewed the findings from each phase of the process to identify updated recommendations that will guide the department in making continuous refinements and improvements in the coming years.

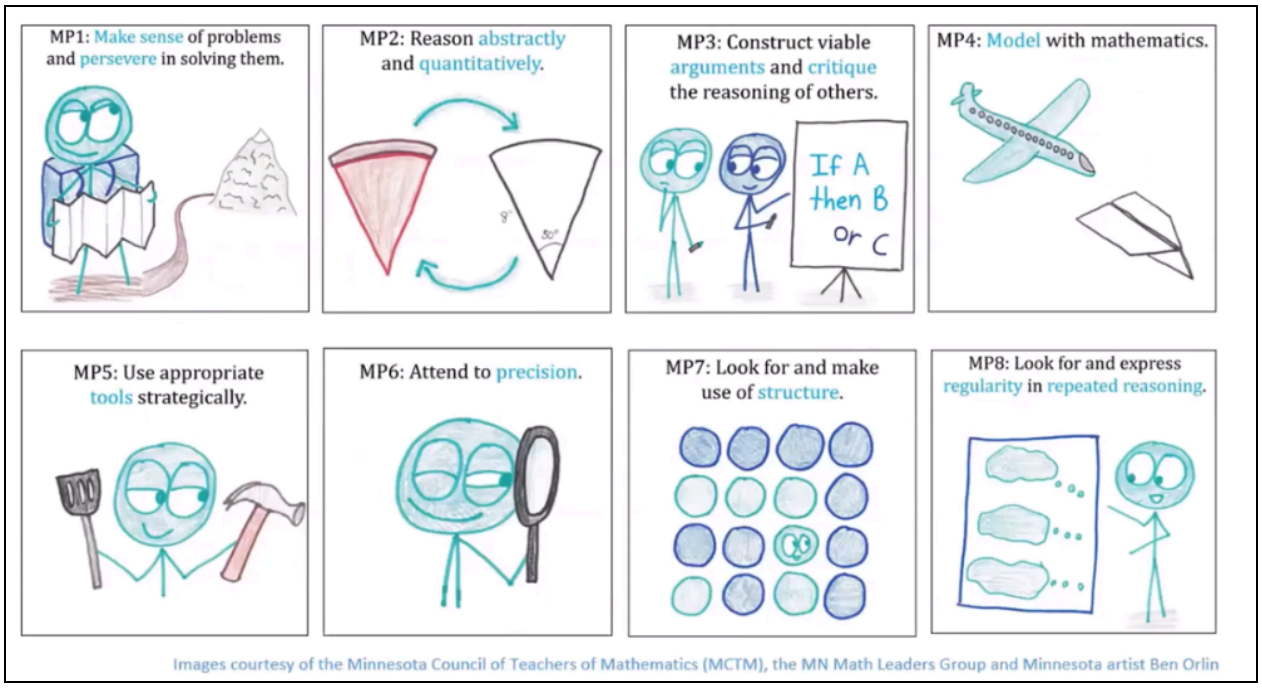
Research and Recommendation Focus Areas:

Six key areas of focus were identified: 1) Vision; 2) Instructional Practices; 3) Curriculum Improvements; 4) Assessment Updates; 5) Math Pathway Considerations, and 6) Learning Resources. In the pages below, each of these focus areas includes one or more recommendations for the department to implement beginning in the 2026 - 2027 school year. To best understand this report, it is

beneficial to take a few minutes to understand the Standards for Mathematical Practice.

Standards for Mathematical Practice (Referenced Throughout the Study)





Recommendation Overview

Recommendation Bucket #1 - Vision

Recommendation Bucket #2 - Instruction

Recommendation Bucket #3 - Curriculum

Recommendation Bucket #4 - Assessments

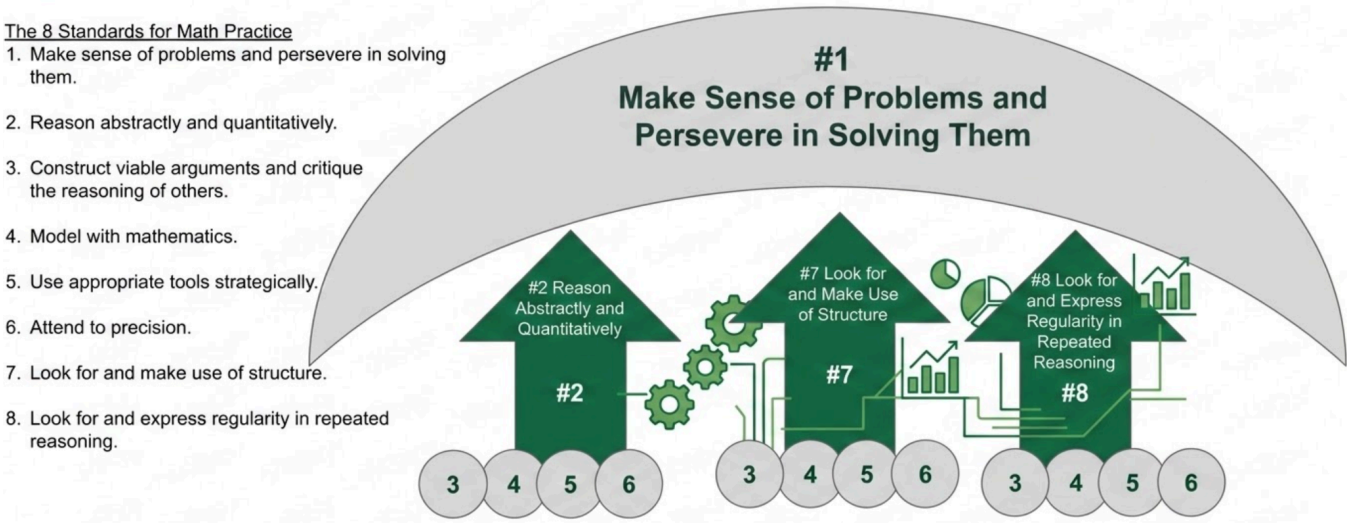
Recommendation Bucket #5 - Math Pathways

Recommendation Bucket #6 - Resources

Recommendations

Recommendation Bucket #1 - Vision

Expand the vision statement to include a focus on the 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] and real-world practical application, by leveraging high-cognitive-demand math tasks.



FINDINGS:

Internal Analysis

1. The existing vision, image, and statement demonstrate how mathematics is part of every aspect of the world (PRSD Mathematics Committee, 2026).
2. The Standards for Mathematical Practice should be integrated into the PRSD Mathematics Vision and Philosophy (PRSD Mathematics Committee, 2026).
3. Daily instruction needs to reflect a mastery of the standards. Standard 1 should be prioritized as the foundation, reinforced by Standards 2, 7, and 8, and further enriched by the application of Standards 3–6 (PRSD Mathematics Committee, 2026).
4. In comparison to the state average and top decile benchmark, PRSD students are performing at high levels on the PSSA and Keystone Exams.
    - PRSD students performed in the top decile in all twelve PSSA tested areas (met/exceeded target achievement across grade levels and content areas).

- PRSD students performed in the top decile in all three Keystone Exam tested areas (consistent with prior years).
- PRSD students met or exceeded the PVAAS growth standard in eight of ten PSSA tested areas (increase from 2024 results; reflects inability to include the 2 science areas based on baseline test year without reported results in grades 5 and 8).
- PRSD students met or exceeded the PVAAS growth standard in all three Keystone Exam tested areas (PRSD Academic Achievement and Growth Report, 2025).

External Analysis

1. "To be prepared, students must learn how to make sense of unfamiliar problem situations and persevere through their solutions. This will include being able to choose - and often learning how to use - appropriate tools to bring to bear on the problem, to work and communicate clearly with others to solve it, and to convince themselves and others that their approaches are sound and their results are correct. Said simply, our students need to be able to think and reason mathematically" (Kelemanik & Lucenta, 2022).
2. "For students to develop as math thinkers, they need regular opportunities to make sense of and grapple with meaty math problems, time to think, and collaborative structures within which to work (National Council of Teachers of Mathematics, 2014)" (Kelemanik & Lucenta, 2022).
3. "Helping our students develop into powerful math thinkers means fighting the impulse to step in and rescue them as soon as they start to struggle. It means sending the message to students that mathematical thinking takes time and multiple passes to develop. Rather than providing hints and suggesting strategies so that students know the correct set of calculations to perform to get the answer, we must instead get into the habit of providing processing time and structures students can leverage to keep thinking productively about the task at hand. Our motivation to jump in quickly and lessen student struggle is well intentioned when we want to keep students from disengaging or getting frustrated or to ensure their problem-solving experience is a positive one. However, every time we do, we rob students of the opportunity to think and reason, and we send another subtle message that they are not capable of doing math themselves. Getting stuck is part of the thinking process and a necessary condition for developing perseverance" (Kelemanik & Lucenta, 2022).
4. "Tasks that prompt mathematical thinking are finding their way into mathematics classrooms. For example, teachers and curriculum developers alike are making liberal use of high-cognitive-demand activities like Christopher Danielson's Which One Doesn't Belong?, Dan Meyers' Three-Act Math tasks, Fawn Nguyen's Visual Patterns, NCTM's Notice and Wonder, as well as old favorites like sorting activities and worked examples. The predictable design of these activities is a great jumping-off point for creating a reasoning routine. In fact, we created the Decide and Defend reasoning routine to leverage the influx of worked examples in recent curricula. Creating a predictable flow and set of designs for interaction around a type of task you use regularly in your teaching is a great way to repurpose something you're already using" (Kelemanik & Lucenta, 2022).
5. Kelemanik & Lucenta (2022) created a " six-step process to create a reasoning routine" which can be embedded into the curriculum. "The process is cyclical, and the routine evolves and develops with increased clarity and purpose. The six-step process is summarized....: (1) Articulate the thinking goal for the routine. Ask yourself what habits or practices students will develop by engaging in the routine over time; (2) Construct the flow of the routine. Lay out the steps or chunks of the routine. Ask yourself what processes students could engage in that will position them to think in the ways reflected by the goal you identified in step 1; (3) Build in designs for interaction between and among students and the mathematics

throughout the flow of the routine. Ask yourself where you will build the essential strategies to ensure that you keep the focus on the thinking, step out of the middle, and support productive struggle; (4) Develop materials. Find and/or create math tasks to sit at the center of the routine. Ask yourself whether the task invites the kind of mathematical thinking that is the goal of the routine. Create student-facing materials to support student engagement and teacher facilitation. Ask yourself what students will need to see and when they will need to see it. Will having a student handout increase or decrease student mathematical thinking and discourse?; (5) Test and reflect. Test-drive the routine multiple times with different tasks and groups of students to work out the kinks and reflect on its impact on students. Ask yourself whether all students were engaged and thinking mathematically; and (6) Revise and refine. Revise and refine the flow, designs for interaction, materials - maybe even the purpose - based on data from the test-drivers. When implementation of your draft routine doesn't go as planned, ask yourself, 'Is this a design or materials issue, or will the issue work itself out once the students and I are familiar with the routine?'"

6. "The eight standards for mathematical practice … beautifully summarize the ways mathematicians work...The math practices provide untapped opportunities for students to engage in rich mathematical reasoning" (Kelemanic, Grace, et al., 2016).
7. "If we are to prepare our students for the increasingly complex and rapidly changing world they will inherit, we must teach them to think and reason mathematically. This is our greatest teaching challenge - not because students can't learn to think mathematically, but because we struggle to teach in ways that privilege thinking and provide support for struggling students. To do so often means breaking some of our more deeply rooted teaching habits. But if we want to change how students think about math, we need to change those habits," (Kelemaik & Lucenta, 2022).
8. "Increased focus on mathematics teaching and students' mathematical understanding and abilities to use and apply math are needed to reverse policies that have significantly dampened gains in mathematics" ("Legislative Priorities", 2026).
9. "To promote mathematical literacy for all students, we must shift from the mindset of "Can you do math?" to "Can you use mathematics to understand, question, and shape the world?" (NCTM President, 2026).
10. "Prioritize sense-making over procedures by incorporating problem-based and inquiry-driven learning into the mathematics curriculum" (NCTM President, 2026).
11. "Engage students in quantitative argumentation where students use math to justify their claims and critique the claims of others" (NCTM President, 2026).
12. "When students are empowered to make sense of mathematics, apply it to real contexts, and use it to question and justify claims, they move beyond procedures to purposeful understanding" (NCTM President, 2026).
13. "Five Principles of Instruction That Promote Mathematics: 1) High cognitive demand, 2) Multimodal learning, 3) A language-rich environment, 4) Building on students' learning strengths, 5) Growth mindset" (Kelemanik et al. [Page 13], 2016).
14. The district prioritizes an inquiry-based approach and has established "Qualities of Highly Effective Math Instruction" as its guiding principles (Radnor SD, 2026).

Recommendation Bucket #2 - Instruction

All Grades

Use instructional routines and high-cognitive-demand tasks in the math classroom that explicitly embed the standards for mathematical practice to foster mathematical thinking, sense-making, math discourse, productive struggle, and reasoning.

Create a culture of sense-making that reinforces and focuses class time on mathematical thinking, multiple solution strategies and learning modes (visual, auditory, kinesthetic, and tactile), and use of mathematical academic vocabulary, as opposed to a culture of "quick answer getting", so that all students can see themselves as successful mathematicians who can engage with new or novel math scenarios.

Use the classroom to support all Standards for Mathematical Practice (e.g., tools, anchor charts, flexible furniture set-up, visual displays, "ask yourself questions", annotation examples, sentence frames/starters, "Four Rs chart - repeat, rephrase reword, record").

Ensure that math tasks used in class have a "low floor" and "high ceiling" to appeal to learners across the spectrum of readiness and needs, where the task can be simplified or enriched to scaffold their thinking and yield success.

Leverage instructional routines that follow the sequence designed by Kelemanik, et al (2016): "(1) articulation of a math practice goal; (2) individual think time; (3) partner work; (4) full-group discussion of idea; (5) final math practice reflection; (6) access through multiple modalities and multiple representations; and (7) liberal use of math practice-focused prompts".

Grades K-3

Intentional planning for instructional time to differentiate instruction and permit flexible grouping across classrooms during Tier 1 class time and RAM time (if applicable).

Identify best practices through MTSS to support kids needing Tier 2 or 3 intervention within core time, recognizing the pull on RAM between reading and math interventions with consideration for the transition back from Tier 3 to Tier 2 with enough support.

Focus on a balance of fluency and rigor emphasizing systematic vocabulary instruction to help all students navigate "word-heavy" math.

Grades 4-6

Intentional planning for instructional time to differentiate instruction and permit flexible grouping across

classrooms during Tier 1 class time and RAM time within the biome.

Identify best practices through MTSS to support kids needing Tier 2 or 3 intervention within core time, recognizing the pull on RAM between reading and math interventions with consideration for the transition back from Tier 3 to Tier 2 with enough support.

Focus on a balance of fluency and rigor emphasizing systematic vocabulary instruction to help all students navigate "word-heavy" math.

Grades 7-8

Intentional planning for Academic Support within the team and department guided by assessment analysis (unit, common, benchmark, and diagnostic assessments).

Grades 9-12

Adjust lessons to include more opportunities for students to engage in **sustained mathematical reasoning and discourse** which require students to explore and to understand the nature of mathematical concepts, processes, or relationships.

FINDINGS:

Internal Analysis

1. Each math classroom will display a grade-level appropriate visual representation of the SMPs (PRSD Mathematics Committee, 2026).
2. Each math classroom teacher will refine their lessons to develop students' problem-solving and reasoning skills with standards of math practice in mind (PRSD Mathematics Committee, 2026).
3. Continue to work on understanding and implementing Standards of Math Practice (PRSD Mathematics Committee, 2026).
4. Daily instruction needs to reflect a mastery of the standards. Standard 1 should be prioritized as the foundation, reinforced by Standards 2, 7, and 8, and further enriched by the application of Standards 3–6 (PRSD Mathematics Committee, 2026).

External Analysis

1. "If we are to prepare our students for the increasingly complex and rapidly changing world they will inherit, we must teach them to think and reason mathematically. This is our greatest teaching challenge - not because students can't learn to think mathematically, but because we struggle to teach in ways that privilege thinking and provide support for struggling students. To do so often means breaking some of our more deeply rooted teaching habits. But if we want to change how students think about math, we need to change those habits," (Kelemanik & Lucenta, 2022).
2. "Research tells us that providing students with a steady diet of high-demand tasks leads to greater learning

gains (Stein, Grover, and Hennigsen, 1996; Stein et al, 2009). Doing so regularly positions students to develop math thinking practices. This thinking and reasoning takes time. You cannot reason fast. You must read and reread the problem, pause to interpret its meaning, consider what might be mathematically important in the situation, clarify the question you are answering, question the assumptions you are making, represent the problem situation, consider possible approaches, and choose one that has promise. All of this happens before actively executing your problem-solving plan, maintaining oversight, and convincing yourself of the validity of your solution. All of this should be done in collaboration with others. Working collaboratively allows for the consideration of more perspectives, more processing space, and more opportunities to communicate your thinking, critique another's mathematical reasoning, and construct mathematical arguments," (Kelemanik & Lucenta, 2022).

3. "We need to spend more class time focusing on the thinking instead of the answers if our students are to become powerful math thinkers. We are not saying that arriving at a correct answer is not important; rather, we are saying that spending copious amounts of class time sharing answers and walking through calculations step by step will not help students learn to think and reason. To develop math thinking, we need to focus attention and classroom conversation where the thinking lives; namely, in what you pay attention to, the questions you ask yourself, and the subsequent actions you take," (Kelemanik & Lucenta, 2022).
4. Kelemanik, et al. (2016) shared that the Standards for Mathematical practice are organized into lead and supporting actors as shown in the “umbrella” version of the SMPs, where the lead actors are practices 1, 2, 7 and 8. The supporting actors are practices 3, 4, 5, and 6. The ultimate goal is for students to “Make sense of problems and to persevere in solving them” (SMP 1). They are able to do this by: (SMP2) reasoning abstractly and quantitatively; (SMP 7) looking for and making use of structure; and (SMP 8) looking for and expressing regularity in repeated reasoning. SMP 3,4, 5, and 6 are the supportive tools that can be used while engaging in practices 2, 7, and 8 in order to “make sense” (SMP 1).
5. There are, “"**Five Principles of Instruction That Promote Mathematics**: (1) High cognitive demand; (2) Multimodal learning; (3) A language-rich environment; (4) Building on students' learning strengths; and (5) Growth mindset" (Kelemanik, et al. 2016).
6. **High Cognitive Demand:** "The math practices live not in the final answer a student gets for a math problem, but in the thinking and reasoning a student uses to arrive at a solution, so students need mathematics tasks that encourage them to think and reason" (e.g., high cognitive demand).... "For example, consider the difference of asking students to find the mean of the data set {9, 10, 8, 4, 6, 2} (low cognitive demand) or instead to find two different sets of six data points that both have a mean of 6.5 (moderate cognitive demand). The cognitive demand of this task can be raised further by asking students to determine the validity of the following line of reasoning: McKenna knows that the average age of all of the large dogs at the Doggie Daycare center is 6.2 years and the average age of all of the small dogs at the center is 8.8 years. She says that she can quickly determine the average age of all dogs by finding the mean of 6.2 and 8.8 (i.e., 7.5) (high cognitive demand). These kinds of tasks provide students with an opportunity to think and reason mathematically. If students are not given high-demand problem situations with which to grapple, they will not have... the opportunity to use the math practices" (Kelemanik, et al, 2016).
7. **Multimodal Learning Experiences:** "All students can benefit from the capacity to explore and communicate mathematics using a range of modalities -- visual, auditory, kinesthetic, and tactile. For example, to look for and express regularity in repeated reasoning, students must learn to identify the repetition in a problem situation. This mathematical repetition can be felt tangibly or seen concretely as

students move manipulatives or build with chips. It can be heard when students listen to each other describe their calculations or the process of a problem situation. Students can also draw on multiple modalities when they reason abstractly and quantitatively. Students learn to tease out relationships between important quantities in problem situations, they can act out the problem context (**concrete**), represent important qualities and relationships in the context in a diagram (r**epresentational**), and connect the numbers, words, and visual to an algebraic expression or equation (**abstract**), providing entry points to a range of math learners" (Kelemanik, et al., 2016).

8. **Language Rich Environments:** "Language-rich mathematics classrooms are essential environments in which to develop mathematical understanding and practices. Phil Daro (2012) talks about how knowledge, cognition, and language are all threads of a single fabric of learning that develop together and progressively, and as ideas and relationships become more complex, so does language. Students begin sense making by verbalizing their thoughts in their own language, however incomplete or imprecise, and then moving toward more mathematical ways of communicating their ideas. In the process, not only does the language get more precise, but the mathematical ideas do as well. Providing opportunities through instructional techniques such as think-pair-share and turn-and-talks is not only critical to student sense making, it is essential to developing two of the math practices - construct *viable arguments and critique the reasoning of others* and *attend to precision*. Therefore students need multiple and varied experiences communicating mathematical thinking to themselves, each other, and an external audience" (Kelemanik, et al., 2016).
9. **Building on Learning Strengths: "**Particularly in mathematics, where the emphasis can so often be on correct answers, it is easy to focus almost exclusively on students' learning weaknesses, on correcting their deficits. However, effective instruction that promotes the math practices includes mathematical experiences that build on a student's learning strengths and use those strengths to address common student learning weaknesses....Therefore, it is at least as important to pay attention to what a student *can* do as to what a student *cannot* do. To build on students' learning strengths, to help them develop the math practices, it is essential to get to know students as learners -- not only the content they already know, but also how they learn and think best"..."The eight mathematical practice standards illustrate habits of mathematical thinking that are broad and varied and that collectively describe a powerful suite of interrelated problem-solving capacities. This range of capacities invites multiple entry points into problem solving and therefore provides many opportunities to find a point of strength for a student to build from there" (Kelemanik, et al., 2016).
10. **Growth Mindset: "**Effective instruction, that promotes the math practices, fosters in students the ability to see mathematics as interconnected and sensible, and therefore doable with effort. When our focus shifts from a problem's answer to the various solution strategies and the thinking that leads to those strategies, students begin to see that mathematics not only makes sense but is learnable" (Kelemanik, et al., 2016).
11. **Students with learning disabilities or language needs:** "When language is a challenge, a default instructional approach is to show and have the student replicate. Although this approach may be effective for building skills, it falls short when the goal is to build conceptual understanding and language production. It does not allow for math practice development. Teachers of students with learning disabilities often support their students by providing them with explicit step-by-step problem-specific instruction. Research shows that this type of intervention leads to increased mastery of particular skills and procedures (Gersten et al, 2008). However, if this approach makes up the bulk of student learning experiences, students risk viewing mathematics as a series of unrelated topics, rules, and procedures with each new lesson bringing a new silo of information. Instruction in which the teacher does the thinking by

creating and choosing the problem-solving tools and in which the student does the calculating can result in students becoming dependent on the teacher to suggest the right tool for the job, putting the teacher in the role of GPS, telling the students what to do at every turn. Instead, teachers who are in the role of the compass, pointing the student in a fruitful problem-solving direction and reorienting as necessary can begin to foster the math practices in their students" (Kelemanik, et al., 2016).

12. "These math practices, that may have seemed daunting, or appeared as a barrier for those students who struggle in different ways with mathematics learning, actually provide a much-needed opportunity for all students to excel. To turn that opportunity into a practical reality, we have designed instructional routines based on the five guiding principles to develop and support students' use of these practices. Each routine is designed to emphasize the interconnectedness of mathematics and to provide a structure that helps students learn how to intentionally reason along a different avenue of mathematical thinking. As such, these routines are not problem-specific, they are "thinking-specific"; directions to students within the routines help keep the focus on different avenues of thinking. These instructional routines and strategies have been successfully implemented repeatedly in our work in a range of mathematics classrooms over the past six years" (Kelemanik, et al., 2016).
13. "Now, imagine a routine focused not on classroom management procedures, but on ways of thinking mathematically when faced with an unfamiliar problem. Like the management of routines, these "mathematical thinking routines" also have a predictable set of actions that students learn and then practice repeatedly until they are second nature....instructional routines are situated in the learning opportunity itself, providing students with a predictable frame for engaging with the content" (Kelemanik, et al., 2016).
14. “Our instructional routines provide access to the mathematical practices in three key ways: (1) They allow for a greater focus on learning; (2) They help students and teachers build crucial mathematical thinking habits; and (3) They provide a wider range of learners with access to the development and use of the math practices" (Kelemanik, et al., 2016).
15. "Rather than being a barrier to those who 'can't', in particular English Learners and students with learning disabilities, the practices actually provide access and opportunity for all students to engage successfully with mathematics" (Kelemanik, et al., 2016).
16. **Driving Analogy:** "When people are first learning to drive, they fare faced with a million small details to attend to: when and how to adjust mirrors, how to operate headlights, how to operate wipers, how to operate the radio or music, finding money for tolls at an upcoming toll booth -- and all this on top of the crucial skills of steering, accelerating, braking, and paying attention to the movements of other drivers around them. As drivers become more familiar with their vehicle and the act of driving, many of these small, repeated actions become automatic and require little attention or thought, allowing drivers to focus most of their attention (we hope!) on their own movement and the movement of other drivers around them. Instructional routines serve the same function: they make more predictable the design and flow of the learning experience: "What is it that I'm supposed to be doing?", "What question will I be asked next?", or "How will things work today in the lesson?" The predictable structure lets students pay less attention to those questions and more attention to the way in which they and their classmates are thinking about a particular math task" …."For you as the teacher, the routines keep the flow of the mathematics instruction deliberately predictable so that, as you gain familiarity with them, you can better attend to the most unpredictable elements of your mathematics instruction: how your students are making sense of the mathematics"...."The growing predictability and familiarity of each routine help students build a growing repertoire of tools for tackling unfamiliar problems and build their confidence in being able to do the

mathematics....The routines help students work through their thinking, while still leaving room for students' individual thought processes to emerge" (Kelemanik, et al., 2016).

17. **Core Elements of the Instructional Routines:** "All the routines in this book are constructed out of seven core elements that embody the guiding principles introduced at the end of Chapter 1. These elements keep the target math practice front and center in the instructional routine and provide access for special populations. These elements are: (1) articulation of a math practice goal; (2) individual think time; (3) partner work; (4) full-group discussion of idea; (5) final math practice reflection; (6) access through multiple modalities and multiple representations; and (7) liberal use of math practice-focused prompts" (Kelemanik, et al., 2016).
18. "The first five core elements speak to the flow of the routine. Each routine begins with a clear statement of a math practice goal. Throughout the middle steps of each routine, students are given individual think time, they are asked to work with a partner, and their thinking is shared in the full group. The routine ends with students reflecting on what they have learned about the featured mathematical practice. The last two core elements (6, 7) can be best thought of as threads woven throughout the routine to keep focus on the math practice and ensure access to the thinking for all students. You could do any of the initial five elements in a math class without ever touching on the math practices or in a way that would leave some students behind. The final two elements bind the structure together to give the routines their impact" (Kelemanik, et al., 2016).
19. **When Math Practice Reflection is Done Well: "**All five of our guiding principles come together in the end-of-routine math practice reflection as students do the cognitively demanding work (1) of thinking about their thinking. This multimodal (2), language-based (3) activity that places attention on learning to think mathematically helps students work from their learning strengths (4) to see mathematics as sensible and, more importantly, doable with effort (5)" (Kelemanik, et al., 2016).
20. **Four Essential Instructional Strategies: (1) Ask-yourself questions**: These questions embody the type of mathematical reasoning inherent in a particular math practice. Initially they are asked of students by the teacher, but eventually they are intended to become internalized by students as a part of the way they think about a problem.; (2) **Annotation**: Teachers, and eventually students, annotate different representations in students' work to highlight a noticing related to or an important aspect of a particular avenue of thinking. Annotation also provides access by helping students connect math talk and gestures to visual representations.; (3) **Sentence Frames/Starters**: These writing/speaking prompts are tailored in the routines to help teachers and students focus attention on a math practice and provide support for language access and production.; (4) **The Four Rs- Repeat, Rephrase, Reword, Record**: There are key times in the routines when the teacher prompts students to repeat something they heard, then to rephrase it. The teacher often asks a different student to reword what was just said, then finally the teacher records it for the class" (Kelemanik, et al., 2016).
21. "Recording simply refers to the documentation of important ideas that arise as a part of the partner and whole-class discussions. Recording plays a vital role as a support for language…productive, interpretive, and collaborative language. Recording also plays an important role as a memory support. Research suggests that students effectively learn language when it's introduced as students need it, to support and develop their communication. This means…recording keywords and phrases as the need arises during the routine…The options for rephrase and reword provide opportunities for you to help students refine their communication and incorporate any mathematical or academic language you want them to learn" [precision!!] (Kelemanik, et al., 2016).
22. "Math practices provide untapped opportunities for students to engage in rich mathematical reasoning."

(Kelemanik et al. [Page 2], 2016).

23. Teachers emphasize problem-solving, group work, and discussing mathematical approaches (Radnor SD, 2026).
24. Number Talks are used consistently at the primary level (Radnor SD, 2026).
25. "One way to orient students to the thinking is to have them **first notice** what might be mathematically important about the problem and/or context and then share some of their noticings in the full group. This will help develop their mathematician's eye...Whether highlighting noticing or posing questions mathematicians often ask themselves, the goal is the same: **to get students to pause and make sense and to become aware of and articulate their thinking**" (Kelemanik & Lucenta, 2022).
26. "Discussing solutions provides another opportunity to focus on thinking. Instead of having students state their answer and show what they did, shift the focus and have students start by sharing what they noticed or knew and how that helped them to approach the problem. This will likely feel unnatural to students who have spent years sharing and checking answers. It will require explicitly prompting students to share their thinking, and you will likely have to remind them again when they begin with an answer... [and prompt them with] the sentence frame 'We noticed ____ so we ____.' "(Kelemanik & Lucenta, 2022).
27. "Teaching mathematical thinking requires us to step out of the middle and orient students to each other, so they can consider and collaborate around their mathematical ideas. Stepping out of the middle shifts the mathematical authority in the room. Instead of the teacher being the conduit of all math knowledge, students take on the responsibility of co-constructing their math understandings. Practically speaking, it means transforming teacher-student interactions into student-student interactions. When the teacher steps out of the middle, students work together to make sense of mathematics, solve problems, and convince themselves of the correctness of their work. When these collaborative work structures are set, the teacher's role shifts and they listen in on student conversations, select and sequence ideas to bring to the full group, and pose questions for students to chew on together. In this way new roles form -- students become increasingly responsible for the mathematical thinking and teachers become increasingly responsive to their students' mathematical thinking" (Kelemanik & Lucenta, 2022).
28. Hybrid approach using enVision Math: a balance of traditional skill-building and applied problem solving (Peter's Township SD, 2026)
29. Instructional practices vary by level but generally move away from traditional lecture-style formats (Radnor SD, 2026).
30. Teachers structure classes around discussion rather than lecture. Teachers prioritize proper mathematical language and partner work. Teachers intentionally pause at least once a week to provide individualized feedback on errors (Peters Township SD, 2026).
31. They moved from "I do, we do, you do" to a **"You do, we do, then teacher example"** approach. Students grapple with contextualized math first to "discover" concepts like slope (Quaker Valley SD, 2026).
32. They utilize Vertical Non-Permanent Surfaces (VNPS) and collaborative groups to increase student engagement and time-to-task (Quaker Valley SD, 2026).
33. Each math classroom should display a grade-level appropriate visual representation of the SMPs. (Minnesota Council of Teachers (Van der werf)).
34. Planning and preparation involves understanding the curriculum and knowing the students in order to adapt to meet their individual needs. (Danielson Framework)
35. The design of the space optimizes learning and development and is appropriately adjusted to align to goals and activities. (Danielson Framework 2E)
36. The critical distinction between experiences in which students are compliant and those in which they

are engaged is that in the latter, students are developing their understanding through rich learning experiences, collaboration and teamwork, and thinking and reflection. (Danielson)

37. “Teachers who used more math vocabulary had students who scored higher on math tests, according to a team of data scientists and education researchers from Harvard University, Stanford University and the University of Maryland” (Barshay, 2026)
38. “The focus is on a balance of fluency and rigor. They emphasize on the Standards for Mathematical Practice (SMP) and use systematic vocabulary instruction to help all students, especially a high ESL population, navigate "word-heavy" math. (Fox Chapel SD, 2026)
39. Shift from performance-only mindset to student growth. (Peters Township SD, 2026)
40. Focuses on "Problem-Based Interactive Learning" followed by "Visual Learning" strategies. This approach is designed to help students make meaningful connections through visual/verbal "bridges" in every lesson. (Peters Twp SD, 2026).

Recommendation Bucket #3 - Curriculum

All Grades

Modify the structure of Unit Based Curriculum to integrate the Standards for Mathematical Practice (SMP) into units of study, with columns added to the written curriculum to designate which of the 8 SMP are being emphasized in each unit.

Create and link high-cognitive-demand mathematical tasks into each unit as common elements of the curricular framework for a given unit and course.

Use historical trends in student performance and data analysis to highlight those areas of need within the unit-based curriculum (e.g., AAGR and STAR).

Grades 9-12

Review and refine the Geometry curriculum to ensure it effectively supports student preparation for Algebra 2 while providing targeted reinforcement for those who need to retake the Algebra Keystone Exam.

FINDINGS:

Internal Analysis

1. Continue to "tweak" our pacing to keep up with the changes in state exams (PRSD Mathematics Committee, 2026).
2. Curriculum is strongly tied to our High Stakes end-of-course assessments (PSSAs, Keystone Exams, Advanced Placement, and College in High School) (PRSD Mathematics Committee, 2026).
3. Findings from the Academic Achievement and Growth Report help to underscore the strengths and weaknesses per grade level and content area. Specific to math, there are skills we focus on each year based on trends in the data over time to ensure that our students are prepared and able to meet the grade level expectations (Academic Achievement and Growth Report, 2024-2025).

External Analysis

1. "Tasks that prompt mathematical thinking are finding their way into mathematics classrooms. For example, teachers and curriculum developers alike are making liberal use of high-cognitive-demand activities like Christopher Danielson's Which One Doesn't Belong?, Dan Meyers' Three-Act Math tasks, Fawn Nguyen's Visual Patterns, NCTM's Notice and Wonder, as well as old favorites like sorting activities and worked examples. The predictable design of these activities is a great jumping-off point for creating a reasoning routine. In fact, we created the Decide and Defend reasoning routine to leverage the influx of worked examples in recent curricula. Creating a predictable flow and set of designs for interaction around a type of task you use regularly in your teaching is a great way to repurpose something

you're already using" (Kelemanik & Lucenta, 2022).

2. Kelemanik & Lucenta (2022) created a "six-step process to create a reasoning routine" which can be embedded into the curriculum. "The process is cyclical, and the routine evolves and develops with increased clarity and purpose. The six-step process is summarized....: (1) Articulate the thinking goal for the routine. Ask yourself what habits or practices students will develop by engaging in the routine over time; (2) Construct the flow of the routine. Lay out the steps or chunks of the routine. Ask yourself what processes students could engage in that will position them to think in the ways reflected by the goal you identified in step 1; (3) Build in designs for interaction between and among students and the mathematics throughout the flow of the routine. Ask yourself where you will build the essential strategies to ensure that you keep the focus on the thinking, step out of the middle, and support productive struggle; (4) Develop materials. Find and/or create math tasks to sit at the center of the routine. Ask yourself whether the task invites the kind of mathematical thinking that is the goal of the routine. Create student-facing materials to support student engagement and teacher facilitation. Ask yourself what students will need to see and when they will need to see it. Will having a student handout increase or decrease student mathematical thinking and discourse?; (5) Test and reflect. Test-drive the routine multiple times with different tasks and groups of students to work out the kinks and reflect on its impact on students. Ask yourself whether all students were engaged and thinking mathematically; and (6) Revise and refine. Revise and refine the flow, designs for interaction, materials - maybe even the purpose - based on data from the test-drivers. When implementation of your draft routine doesn't go as planned, ask yourself, 'Is this a design or materials issue, or will the issue work itself out once the students and I are familiar with the routine?'"
3. The district recently consolidated academic levels, eliminating the lowest-level tracks to increase rigor. They offer **Algebra 1A and 1B** (a two-year spread) for approximately 20% of students, though this has received mixed reviews (Radnor SD, 2026).
4. Department-wide analysis informs curriculum adjustments (Peters Township SD, 2026).
5. Identified specific transition challenge: Academic Geometry → Algebra II (Peters Township SD, 2026).
6. PSAT results are analyzed question-by-question to adjust curriculum (Peters Township SD, 2026).
7. Secondary honors teachers deliberately shadow AP courses to ensure vertical alignment and prerequisite skill-building for AP Calculus AB/BC (Peters Township SD, 2026).
8. "Teachers prepare experiences that are grounded in deep understanding of the content, aligned with appropriate standards, designed to engage students in important work, and planned or adapted with the goals, strengths, needs, and lives of each student in mind." (Danielson Group-The Framework for Teaching)
9. The high school features a unique **"Geometry with Algebra Topics" (GWAT)** course. This blended model was created after an audit showed students were "racing" to Geometry without mastering Algebra I. It slows the pace to ensure Keystone mastery (Quaker Valley SD, 2026).
10. "As the instructional routine becomes second nature, its steps will fade into the background and the mathematical thinking and reasoning will come to the fore." (Kelemanik et al. [Page 176], 2016)
11. High-quality curricula a) are coherent, b) attend to mathematics content and practices, c) balance opportunities for students to develop conceptual understanding and procedural fluency, and d) provide windows and mirrors that reflect a range of students' identities (NCTM - Position statement on OER in Mathematics Education, 2025).

Recommendation Bucket #4 - Assessments

All Grades

Further integrate common, benchmark, and classroom-based assessments (e.g., unit, pre-assessments, Midterm/Final Exams, Firefly, and STAR) to guide instructional decisions (e.g., flexible grouping, pacing, extension, and re-teaching).

Use assessment data, including students' progress in the development of their thinking through the Standards for Mathematical Practice in the student attributes rubric (through grade 7), for individualized goal setting and instructional planning.

Build in opportunities for student feedback in alignment with the Standards for Math Practice using the student attribute rubrics regularly throughout the school year and include them in the Student Information System as common assessments for identification of strengths, opportunities, and trends across various levels of analysis.

Grades K-3

Common assessments at each grade level, including consideration for pre-assessments as recommended in the Gifted and/or Highly Achieving IDPR, and use of classroom-based assessments to guide grouping for the classroom and RAM time for differentiated learning opportunities based on students' needs.

Analyze test results as a team to ensure alignment among classrooms to maximize best practices and leverage all team members to differentiate across classrooms with flexible grouping.

Grades 4-6

Common Assessments at each grade level with selected use of preassessments with some student groups where appropriate (e.g., compacted/extended).

Grades 7-12

Clarify department-wide grading expectations (Academic, Honors, AP) that clearly define the weighting of classwork, homework, and assessments to ensure consistency and transparency (syllabus).

Integrate classroom assessment data into pathway and course recommendations (in place of or in addition to, grade averages).

FINDINGS:

Internal Analysis

1. In comparison to the state average and top decile benchmark, PRSD students are performing at high levels on the PSSA, Keystone Exams, and AP Exams.
    - PRSD students performed in the top decile in all twelve PSSA-tested areas (met/exceeded target achievement across grade levels and content areas).
    - PRSD students performed in the top decile in all three Keystone Exam-tested areas (consistent with prior years).
    - PRSD students met or exceeded the PVAAS growth standard in eight of ten PSSA-tested areas (increase from 2024 results; reflects inability to include the 2 science areas based on baseline test year without reported results in grades 5 and 8).
    - PRSD students met or exceeded the PVAAS growth standard in all three Keystone Exam-tested areas (PRSD Academic Achievement and Growth Report, 2025).
    - The number of different students taking one or more AP exams increased. A total of 1,303 exams were taken by these students (this is well above the historical numbers) and 84% of the scores were a 3 or greater.
2. Pine-Richland School District's (1) Special Education and Multi-Tiered System of Support (2022) and (2) Gifted and/or Highly Achieving In-Depth Program Review Recommendations (2019) both reinforce preassessments, data-driven instruction and interventions, and opportunities to support needs across the continuum based on their achievement and growth data and evidenced needs.
3. For both the PSSA and Keystone Exams, PRSD students in special education with an IEP performed at levels much higher than the state proficiency average of special education students, and in some cases, more akin to the general population's proficiency average (PRSD Academic Achievement and Growth Report, 2025).
4. For both the PSSA and Keystone Exams, PRSD students who are economically disadvantaged exceeded the scores of state proficiency average of all tested students in all tests (PRSD Academic Achievement and Growth Report, 2025).
5. For both the PSSA and Keystone Exams, PRSD students performed at generally consistent levels across gender, with some performance differences noted for subgroups based on ethnicity, economically disadvantaged, and special education (PRSD Academic Achievement and Growth Report, 2025).
    - Female PRSD student and male PRSD student performance is generally consistent with some areas of discrepancy focus (e.g., ELA PSSA and Keystone Literature and Biology Exams).
    - Given the small number of students in some groups, performance is generally consistent with some focus on differences at the individual student level/subgroup (e.g., ELL and ethnic diversity).
6. As one example, in the 3rd-grade Math PSSA, the 2025 cohort of students demonstrated relative achievement strengths in the following areas:
    a. Measurement and Data (M3.D-M.3): Find the areas of plane figures, requiring students to measure by counting unit squares (85%), reflects performance 1.6 percentage points higher than the past year's cohort, and reflects the highest achievement in this category in the past 6 years (previous highest was 83.4% in 2024).

   b. Operations and Algebraic Thinking (M3.B-O.2): Understand properties of multiplication and the relationships between multiplication and division based on data showed a significant strength in achievement and growth with students scoring overall 82% achievement, increasing from 66% in 2023, and being the highest achievement level in the past 6 years.
7. In the same 3rd grade Math PSSA, opportunities identified for the 2025 cohort of students and based on trends over time include the following:
   a. Measurement and Data (M3.D-M.4) Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures with application toward real-world problem-solving continued to decline (57.1%), with an average score of .6 and a max score of 1 point.
   b. Geometry (M3.C-G): Reason with shapes and their attributes and analyzing the characteristics of polygons with students scoring 61.1%, the lowest score across 6 years of data which ranged between 61.4% and 77.3% (2019), maximum points between 7 and 8.
   c. Numbers and Operations in Base Ten (M3.A-T): Use place-value understanding and properties of operations to perform multi-digit arithmetic with students scoring 63.7%, the lowest score across 6 years of data which ranged between 69.1% and 80.5% (2019), maximum points, again, between 7 and 8.
8. Regular meetings held discussing data and common assessments. Key Math is used as an exit criteria for Tier 3 Math intervention in 8th grade. Grades 7-8 currently have consistency across courses/teachers (PRSD Committee 2026).
9. By the end of grade 11, 80.4% of Pine-Richland students reached proficiency on the Algebra I exam. This is an increase from the previous junior class. Opportunities exist to improve supplemental instruction options for students/families and to increase the percentage of students reaching proficiency at the end of their Algebra course (PRSD Academic Achievement and Growth Report, 2025).
10. In the SAT, 2025 Pine-Richland graduates performed better than students across the state and globally (PRSD Academic Achievement and Growth Report, 2025).
11. For Advanced Placement results in Calculus AB, Calculus BC, and Statistics, PRSD students demonstrate a beneficial trend in performance over the past five years and high levels of achievement on the five-point scale (PRSD Academic Achievement and Growth Report, 2025).
12. Utilize data from curricular-based pre- and post-assessments and universal screeners to drive differentiation in the general education classroom through compaction, enrichment, and/or acceleration. (Gifted and/or Highly Achieving In-Depth Program Review, 2019)
13. A universal screener STAR (K-8) provides comprehensive, computer-adaptive assessments (up to 2 grade levels above and below) to measure student achievement, growth, and mastery. (PRSD, 2026).
14. Perception that some High School course grades are based solely on a few high-stakes assessments.
15. Determine if across one subject (lab, regular, honors) Depth of Knowledge (DoK) questioning techniques are appropriate for each level (PRSD Mathematics Committee, 2026).
16. Teachers are aligned per course with standard grading percentages and syllabi across courses, while allowing individual teachers to have flexibility in their daily teaching methods (PRSD Mathematics Committee, 2026).

External Analysis

1. Firefly questions are aligned to PA Core Standards to reflect and measure the same student knowledge and skills measured on the end of year (PSSA) and end of course (Keystone Exams) assessments (PDE, 2026).
2. All chapter/unit tests are common across teachers. Assessment data is compared and analyzed collectively. Department meetings focus both on curriculum and instructional practices (Peters Township SD, 2026).
3. Growth is emphasized over raw proficiency. Firefly and other assessments provide data to monitor improvement. Common assessments ensure consistency across teachers (Peters Township SD, 2026).
4. Elementary chairs closely monitor data to identify gaps and align mini-lessons specifically to Assessment Anchors and eligible content (Fox Chapel SD, 2026).
5. The district recently shifted from CDT to Firefly to focus on measuring student growth and to acclimate students to online testing formats (Peters Township SD, 2026).
6. A universal screener STAR (K-8) provides comprehensive, computer-adaptive assessments (up to 2 grade levels above and below) to measure student achievement, growth, and mastery. (Quaker Valley SD and Radnor SD, 2026).

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Recommendation Bucket #5 Math Pathways

Grades K-3
Provide opportunities in the core block for appropriate differentiation to meet students' needs with reinforcement of learning and enrichment within Current, Compact & Extended, or Accelerated, as well as pull-out interventions or enrichment during RAM Time.

Intentionally schedule co-teaching in Grade 3 to support data-based intervention within Tier 1, Current math class as needed.

Grades 4-6
Within the MTSS system, ensure time for math intervention with qualifying students, given the priority currently given to ELA support (Tier 2 or Tier 3).

Grades 7-8
Review math matrix data to determine other data points to consider in making course recommendations that more tightly align to course-level requirements. This may include pathway modifications.

Grades 9-12
Conduct a comprehensive review and refine the high school mathematics pathways (Grades 9-12) to ensure alignment with student needs.

- Upper pathway options (e.g., Linear Algebra, CHS Pre Calculus);
- Assess the impact of the current lab course design and instructional model (Algebra I, Geometry, and Algebra II);
- Identify needs for lower pathway options for non-Algebra and non-Algebra 2 students; and
- Refine the current pathway and/or courses for students in vocational programs (e.g., Math in the Workplace).

FINDINGS:

Internal Analysis

1. Historic analysis shows that there are students on the current track that do not pass the Keystone Exam (PRSD Mathematics Committee, 2026).
2. Prior to previous IDPR, more emphasis is now placed upon PVAAS data. (PRSD Mathematics Committee, 2026).
3. In comparison to the state average and top decile benchmark, PRSD students are performing at high levels on the PSSA and Keystone Exams.
    - PRSD students performed in the top decile in all twelve PSSA tested areas (met/exceeded target achievement across grade levels and content areas).
    - PRSD students performed in the top decile in all three Keystone Exam tested areas (consistent with prior years).

- PRSD students met or exceeded the PVAAS growth standard in eight of ten PSSA tested areas (increase from 2024 results; reflects inability to include the 2 science areas based on baseline test year without reported results in grades 5 and 8).
- PRSD students met or exceeded the PVAAS growth standard in all three Keystone Exam tested areas (PRSD Academic Achievement and Growth Report, 2025).

4. For both the PSSA and Keystone Exams, PRSD students in special education with an IEP performed at levels much higher than the state proficiency average of special education students, and in some cases more akin to the general population's proficiency average (PRSD Academic Achievement and Growth Report, 2025).
5. For both the PSSA and Keystone Exams, PRSD students who are economically disadvantaged exceeded the scores of state proficiency average of all tested students in all tests (PRSD Academic Achievement and Growth Report, 2025).
6. For both the PSSA and Keystone Exams, PRSD students performed at generally consistent levels across gender with some performance differences noted for subgroups based on ethnicity, economically disadvantaged, and special education (PRSD Academic Achievement and Growth Report, 2025).
    - Female PRSD student and male PRSD student performance is generally consistent with some areas of discrepancy focus (e.g., ELA PSSA and Keystone Literature and Biology Exams).
    - Given the small number of students in some groups, performance is generally consistent with some focus on differences at the individual student level/subgroup (e.g., ELL and ethnic diversity).
7. We have 10 groups of students with moderate to significant evidence of exceeding the growth standard (Math in Grades 5-8 and Algebra; ELA in Grades 4, 7, 8, and Literature; Biology). 11 of 13 student groups met the growth standard. Growth of students within the 2025 cohort for Math Grade 4 and ELA Grade 6 needs to be improved, as we want students to meet or exceed the growth standard annually and there is evidence that this did not occur with regard to holding their relative position over time with growth predictions (PRSD Academic Achievement and Growth Report, 2025).
8. Consider the criteria for algebra and the number of students ready for algebra in grade 8 based on the number of below proficient students enrolled in algebra current (PRSD Mathematics Committee, 2026).
9. Develop a process similar to the high school for families that disagree with math course recommendation (PRSD Mathematics Committee, 2026).
10. Students who attend Beattie but are also recommended for Algebra 2 with Lab have a difficult time scheduling the lab section; however, when they take Algebra 2 without lab they struggle. (PRSD Mathematics Committee, 2026).
11. There is a growing population of students who exhaust our honors/advanced course options by their junior year. (PRSD Mathematics Committee, 2026).
12. There are some students who have taken Concepts of Math several times but are still not ready for Algebra 1. However, the Applied Math course is not taught by a certified math teacher and does not count as a “third” math course (and NCAA is a factor as well). (PRSD Mathematics Committee, 2026)

External Analysis

1. The goal is to develop a school schedule that meets students' needs, rather than needing students to fit into an existing schedule. (PaDept of Ed, Using PVAAS to Inform Student Schedules, 2026).
2. The PVAAS Projection Summary Report provides highly reliable probabilities at a system (LEA/ district) or school level, showing students' likelihood of reaching indicated benchmarks in a future PSSA, Keystone, AP exam, as well as PSAT, SAT and ACT exam. Using that data, along with other data, can more effectively inform school schedule changes and/or revisions to best meet the needs of students. (PaDept of Ed, Using PVAAS to Inform Student Schedules, 2026).
3. Placement processes for 5th–8th grade involve STAR scores and unit tests. Students wishing to skip a level must score **90% or higher** on an "Evidence of Mastery" test (Radnor SD, 2026).
4. The district offers a blended Geometry/Algebra class with the Keystone exam at the end to ensure bridge-building between concepts (Fox Chapel SD, 2026).
5. A unique "Lunch and Learn" model and a Math Center within a modified block allow for daily support and reteaching without interfering with other scheduled courses (Radnor SD, 2026).
6. A distinctive feature of Peters Township Middle School is the "Math Lab" program. These are 41-minute periods at the end of the school day where students can receive one-on-one or small-group support from certified math teachers to reinforce skills or prepare for assessments (Peters SD, 2026).

Recommendation Bucket #6 - Resources

All Grades
Establish and implement dedicated professional development to ensure all mathematics teachers are proficient in utilizing the digital platforms and online instructional resources associated with purchased texts, including existing supplemental programs (e.g., Freckle, Amplify, ALEKS).

Grades K-5
Evaluate and purchase rigorous curricular resources during the 2026-2027 resource review for K-5 mathematics that aligns with both the PA standards and fosters the Standards for Mathematical Practice, intentionally.

FINDINGS:

Internal Analysis

1. Current resource license (McGraw-Hill My Math, 2018) is expiring at the end of the 2026-27 school year. (IDPR Lite, 2026).
2. Resources such as ALEKS, IXL, and Khan Academy have been integrated into instruction, as well as STAR360 and FireFly testing data being used to guide instruction and identify students that need additional help during Academic Support
3. (IDPR Lite, 2026).

External Analysis

1. "The kind of change needed to transform math-doing classrooms into math thinking classrooms is not easy. It requires changing teaching habits, some of which are deeply rooted after years and years of teaching. Not only can working with colleagues and coaches offer more ideas and perspectives, it can help you create a supportive learning environment that will hold you up when the work gets hard, urge you on when the progress slows, and celebrate your professional development milestones" (Kelemanik & Lucenta, 2022; Van Der Werf, 2024).
2. "Leveraging routines for reasoning in professional learning settings with your colleagues allows you to jump right into the complexities of teaching mathematics together. When working with a common reasoning routine that holds so many components steady, you and your colleagues can immerse yourselves in mathematical content, students' conceptual development, and the teaching practices that will ensure all students develop as powerful math thinkers" (Kelemanik & Lucenta, 2022).
3. "We encourage you to use a department meeting, grade-level meeting, common planning time, or professional learning community time to rehearse your teaching practice with colleagues. You can start by engaging them in one or more of the mini rehearsing activities described previously that support the development of annotation, sentence frames and starters, or turn-and-talks. For example, you can practice annotating in the moment with colleagues playing the student role (i.e.. sharing and rephrasing student thinking) while the rest of you practice annotating in real time. Share and discuss your annotations, then switch roles. If you are working on a common reasoning routine with colleagues, rehearse the routine together. You might start by walking through the full routine and rehearsing the instructions and transitions simply to get used to the flow of the routine, then move to focusing on a specific essential

strategy or shift" (Kelemanik & Lucenta, 2022; Van Der Werf, 2024).

4. Leaders must ensure the consistent use of High-Quality Instructional Materials (HQIM), ensuring every student, regardless of their classroom, has access to rigorous, grade-level content rather than simplified versions (Harmon, Crystal. "Solving for America's Math Crisis." TNTP Blog, 25 Feb. 2025).
5. Program strengths for EnVision math was that it “Embedded remediation supports” but also “Built confidence while maintaining rigor. (Peter’s Township SD, 2026).
6. A major point of pride is their extensive onboarding for new teachers. This includes coaching in program philosophy and goals, not just logistics, ensuring walk-through consistency. (Fox Chapel SD, 2026).
7. Elementary math specialists/department chairs provide heavy instructional leadership and SMP-focused coaching. (Fox Chapel SD, 2026).
8. The program is heavily supported by a K-8 Math Coach and a High School Math Coach who lead PD, co-plan units, and create assessments (Quaker Valley SD, 2026).
9. Provide immediate, supportive feedback to students to address any misunderstandings. If students are not able to explain their understanding of key mathematical concepts or do not execute procedures correctly, provide them with immediate feedback. When students solve problems, encourage them to articulate their thinking so that you can identify their strengths. Ask probing questions to identify any misconceptions and build on their strengths to correct those misunderstandings. Structure questions in such a way as to help students self-identify where their thinking went wrong. It might be helpful for students to use representations to help them articulate what they are thinking. Correcting misunderstandings early can prevent the confusion from becoming an enduring problem. (Assisting Students Struggling with Mathematics, Institute of Education Science, Department of Education)
10. “We found that when school teams got to know each student and supported them individually, then students had a clear path to improvement and the confidence” (Harmon, Crystal. "Solving for America's Math Crisis." TNTP Blog, 25 Feb. 2025).
11. Leaders emphasized that the math coach, who also serves as the department chair, is the biggest driver of their program’s success. The coach works closely with teachers, delivers professional development, provides interventions, and helps facilitate collaboration by giving teachers. They also focus on using teacher prep time to observe one another’s classrooms along with added time to debrief. (Quaker Valley SD, 2026).

Tentative Timeline [Bucket Alignment]

2026-2027

1. K-12 Deepen integration of Standards for Math Practice (Syllabi and Lesson Plans) [Vision, Instruction]
2. K-5 Resource Evaluation [Instruction, Resources]
3. Math Matrix Revisions - Secondary [Assessments, Math Pathways]
4. Lower Pathway Development - PRHS [Curriculum, Assessments, Vision, Math Pathways]

2027-2028

1. K-12 Deepen integration of Standards for Math Practice (Standards for Mathematical Practice and Math Tasks Embedded in UBC Classroom Design, Assessments) [Vision, Instruction, Curriculum]
2. K-5 Resource Implementation [Resources, Instruction, Vision]
3. Upper Pathway Development - PRHS [Curriculum, Assessments, Math Pathways]
4. Math Matrix Update Integration [Assessments, Math Pathways]
5. Tailored professional development based current or new resources to support instruction and assessment analysis [Instruction, Assessments, Resources]

2028-2029

1. K-12 Deepen integration of Standards for Math Practice (Instructional Focus, Differentiation Supervision) [Vision, Instruction, Curriculum]
2. K-12 Common Assessment Updates Integration [Assessments, Instruction, Curriculum]
3. K-5 MTSS [Assessments, Instruction]
4. Course Offering Updates Implementation Year [Assessments, Curriculum, Resources, Math Pathways]
5. Continue tailored professional development based current or new resources to support instruction and assessment analysis [Instruction, Assessments, Resources]

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