



The Purpose of Mathematics:

The purpose of mathematics instruction is for students to develop the knowledge, skills, and understanding that they will need to solve the world's problems of the future through access to STEM fields or the use of rational thought in whatever job or career students wish to pursue. We are all mathematicians who are capable of knowing, doing, and enjoying math. Too often, though, math classes have become a gatekeeper, where only some students are seen as capable, and the teacher is the sole authority, promoting absolute answers. Though procedural understanding and fluency are important, we strive to create a math community where students grapple with rigorous and meaningful problems and engage in productive discourse with their peers that allow them to construct deep conceptual understanding which naturally leads to the development of those necessary procedures. We know that problem-solving means making mistakes and persevering through them, asking questions, and taking time to find and study patterns. Engaging students in a mathematics community of belonging requires shifts in teaching and learning described below.

Guiding Principles:

- ❑ **Agency and Empowerment:** All students enjoy math, and see themselves as mathematicians. *(from math as a gatekeeper, to math as an agent of agency and empowerment)*
- ❑ **Constructing Knowledge:** PPS students will learn through explaining their reasoning, building on each other's ideas, and discussing multiple ways to solve a problem. *(from teacher as holder of knowledge to students building knowledge together)*
- ❑ **Productive Struggle:** PPS students will engage and persevere at points of difficulty, challenge, or error. *(from passive learning to productive struggle)*
- ❑ **Grade-Level Access:** PPS students will be successful in mathematics if they consistently have access to grade-level content that includes procedural fluency, conceptual understanding, and application of math concepts. *(from some students having access to all students having access)*

Practices (pedagogical or structural 'look fors'):

- ❑ **Teachers** will use equitable facilitation, including shared norms and engagement strategies, to create a math classroom community where all students are empowered in developing their own understanding of grade level mathematics and feel they belong.
- ❑ **Teachers** will pose questions to LAUNCH the activity, lesson or unit, then give students space to play with and EXPLORE the mathematics individually and with peers, and SYNTHESIZE student learning through whole class discourse.
- ❑ **Teachers** will demonstrate the belief that all students can and will learn by calling on a variety of students throughout the classroom (e.g. uses a consistent approach to include students, monitors who has been called on, intentionally includes English language learners and students with disabilities).
- ❑ **Teachers** will use math language routines and other discourse strategies to deeply understand student thinking, record student thinking so others can respond, and adjust instruction based on student thinking.
- ❑ **Teachers** will be deliberately less helpful and give students time, space, and agency to struggle productively.
- ❑ **Teachers** will facilitate construction of conceptual understanding first, then meaningfully engage students in building procedural fluency.
- ❑ **Schools and teachers** will ensure all students have access to problem-based units focused on the major work of the grade (CCSS) that ensure students are prepared for the next grade's rigor, and ultimately prepared and empowered by graduation to access credit-bearing courses and STEM tracks if they so choose.
- ❑ **Students** will learn with their peers in grade-level classes or courses and participate throughout every math activity, lesson, and unit.

- ❑ **Students** will work to make their thinking visible so that others can clearly understand their work.
- ❑ **Students** will coherently respond to teacher questions by fully explaining their reasoning (e.g., uses a second sentence) without being prompted by the teacher or another student.
- ❑ **Students** will be curious and ask questions to themselves and others.
- ❑ **Students** will play with math ideas, make mistakes, and keep trying.
- ❑ **Students** will argue with ideas to further deepen their math understanding, and develop language skills.
- ❑ **Students** will ask each other for help when they are confused or stuck, and will listen and help each other think through problems, without giving away solutions.

Resources:

- [IM Implementation Tool K-5](#)
- [IM Implementation Tool 6-12](#)
- [5 X 8 SERP Card](#)
- [NCTM Principles to Actions](#)
- [TRU Framework \(Teaching for Robust Understanding\)](#)
- [CCSS Math Practices](#)
- [Christopher Danielson \(ask, play, argue, connect\)](#)
- [San Francisco Unified](#)
- [Math in Context: The Pedagogy of Liberation](#)
- [Building Thinking Classrooms in Mathematics, Grades K-12](#)
- [Alex Lawrence's Blog Post: Try it Twice](#)