# FISHTANK MATH GUIDING PRINCIPLES

The goals of the Fishtank Math program are intrinsically tied to our mission of providing students with the skills and knowledge they will need to succeed in college and beyond. Research shows that success in mathematics directly impacts students' college graduation rates and future earnings. As stated in a brief on equity in math by Achieve, Inc.,"Taking advanced math [in high school] has a greater influence on whether students will graduate from college than any other factor—including family background" ("Advanced Math: Closing the Equity Gap").

We seek to inspire our students to pursue advanced math courses, and we provide them with the foundations they will need to be successful in these courses. Most importantly, we strive to help all students believe they are mathematicians and can be "good at math."

Our math curriculum is designed around several core beliefs about how to best achieve our ambitious goals. These beliefs drive the decisions we make about what to teach and how to teach it.

## CONTENT-RICH TASKS

**We believe that students learn best when asked to solve standards-aligned problems that spark their curiosity, require them to make novel connections between concepts, and may offer more than one avenue to the solution.**

Therefore, we strive to include math tasks that meet a variety of criteria:

- Accessible to all students, yet still offer opportunities to utilize challenging, grade-level mathematics
- Require both concrete problem-solving skills and abstract thinking
- Include both practical application problems and purely mathematical problems
- Make explicit connections to mathematical concepts explored within and across grade levels
- Include procedural, conceptual, and application problems in a variety of structures that incorporate foundational skills at different rigor levels

## PRACTICE AND FEEDBACK

**We believe that practice and feedback are essential to developing students' conceptual understanding and fluency.**

We aim to ensure students  have adequate opportunities to practice grade-level work in order to develop automaticity with concepts and fluency with procedures. At the same time, we believe that frequent feedback serves to ensure that students are thinking deeply about strategy, process,

and outcomes. Students should see mistakes as opportunities for learning, and teachers should provide feedback to ensure that errors are analyzed, understood conceptually, and corrected.

## PRODUCTIVE STRUGGLE

**We believe that students develop essential strategies for tackling complex problems, and build non-cognitive skills such as perseverance and resilience, through productive struggle.**

Productive struggle happens when students are asked to use multiple familiar concepts and procedures in unfamiliar applications, and the process for solving problems is not immediately apparent. Productive struggle can occur, and should occur, in multiple settings: whole class, peer-to-peer, and individual practice. Through instruction and high-quality tasks, students can develop a toolbox of strategies, such as annotating and drawing diagrams, to understand and attack complex problems. Through discussion, evaluation, and revision of problem-solving strategies and processes, students build interest, comfort, and confidence in mathematics.

## PROCEDURAL FLUENCY COMBINED WITH CONCEPTUAL UNDERSTANDING

**We believe that knowing "how" to solve a problem is not enough; students must also know "why" mathematical procedures and concepts exist.**

We believe that students must be led to see formulas and procedures not as magic wands for "doing math", but as generalizations resulting from repeated processes that are derived from and have conceptual underpinnings. We believe that when a teacher provides students with a new mathematical process or definition, the next question should always be some variant of, "Why does this make sense?", or "How does this apply to an example?"

## COMMUNICATING MATHEMATICAL UNDERSTANDING

**We believe that the process of communicating their mathematical thinking helps students solidify their learning and helps teachers assess student understanding.**

We believe students should be regularly provided with opportunities to communicate their ideas, strategies, challenges, and results (with correct and precise vocabulary) through oral discussion, sharing of mathematical work, written explanations, annotating diagrams, and modeling with equations and other representations. We believe that when students have the opportunity to listen to and evaluate the mathematical thinking of others, then they are able to refine and strengthen their own ideas.

# RESOURCES REFERENCED IN THE CREATION OF FISHTANK MATH


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