



## FISHTANK PLUS MATH 3RD-8TH GRADE

### ABOUT FISHTANK LEARNING

Fishtank Learning provides teachers with the curriculum resources they need to engage, challenge, and inspire their students. Through our easy-to-navigate curriculum site, [www.fishtanklearning.org](http://www.fishtanklearning.org), teachers can access comprehensive instructional materials for English Language Arts grades K-12 (Fishtank ELA) and for Mathematics grades 3-11 (Fishtank Math). Fishtank Learning offers both an OER curriculum solution and an enhanced curriculum solution called Fishtank Plus for schools seeking expanded resources that guide and support implementation.

### RESEARCH-BASED APPROACH TO MATH CURRICULUM

The goal of Fishtank Math is to provide 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. Fishtank Math seeks to inspire students to pursue advanced math courses while providing the foundations they will need to be successful in these courses. Fishtank Math is designed around the following core beliefs and research on teaching mathematics.

#### Content-Rich Tasks

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.<sup>1,2</sup> Therefore, Fishtank Math includes tasks that:

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

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<sup>1</sup> Hiebert, James. *Making Sense: Teaching and Learning Mathematics with Understanding*. Heinemann, 1998.

<sup>2</sup> Stein, Mary Kay, and Suzanne Lane. "Instructional Tasks and the Development of Student Capacity to Think and Reason: An Analysis of the Relationship between Teaching and Learning in a Reform Mathematics Project." *Educational Research and Evaluation*, vol. 2, no. 1, 1996, pp. 50-80.

## Practice and Feedback

Practice and feedback are essential to developing students' conceptual understanding and fluency. Frequent feedback ensures that students are thinking deeply about strategy, process, and outcomes.<sup>3,4</sup> Fishtank Math is designed to offer students many opportunities to practice grade-level work and guides teachers on analyzing errors and helping clarify conceptual misunderstandings. Our goal is that teachers and students see mistakes as opportunities for learning.

## Productive Struggle

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.<sup>5,6</sup> In Fishtank Math, we provide high-quality tasks to ensure productive struggle can occur, whether in whole class, peer-to-peer, or individual practice. Over time, students develop a toolbox of strategies to understand and attack complex problems and build interest, comfort, and confidence in mathematics.

## Procedural Fluency Combined with Conceptual Understanding

Knowing “how” to solve a problem is not enough; students must also know “why” mathematical procedures and concepts exist. 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.<sup>2,7</sup> Throughout Fishtank Math, students learn both the “how” and the “why.” When introduced to a new mathematical process or definition, students are always asked some variant of, “Why does this make sense?”

## Communicating Mathematical Understanding

The process of communicating mathematical thinking helps students solidify their learning and helps teachers assess student understanding. When students have the opportunity to listen to and evaluate the mathematical thinking of others, they are able to refine and

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<sup>3</sup> *Principles and Standards for School Mathematics*. National Council of Teachers of Mathematics, 2008.

<sup>4</sup> Cohen, David K., and Deborah Loewenberg Ball. “Instruction, Capacity, and Improvement.” *CPRE Publications*, 1999.

<sup>5</sup> Bay-Williams, Jennifer. “Influences on Student Outcomes: Teachers’ Classroom Practices.” *Teaching and Learning Mathematics: Translating Research for Elementary School Teachers*, by Diana V. Lambdin, National Council of Teachers of Mathematics, 2011.

<sup>6</sup> Hiebert, James, and Douglas Grouw. “The Effects of Classroom Mathematics Teaching on Students’ Learning.” *Second Handbook of Research on Mathematics Teaching and Learning*, by Frank K. Lester, Information Age Publishing, 2007, pp. 371–404.

<sup>7</sup> National Research Council. *Adding It Up: Helping Children Learn Mathematics*. National Academy Press, 2001.

strengthen their own ideas.<sup>8,9</sup> In Fishtank Math students are regularly asked 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.

## FEATURES OF FISHTANK MATH CURRICULUM

The Fishtank Math curriculum is designed to be taught over the course of a single school year. Each grade-level course includes seven or eight units of study with 10-25 lessons in each unit. For each course, teachers can access a **course summary** which explains the reasoning behind the ordering of the units, a **standards map** which indicates how the grade-level standards are covered across the units, a  **pacing guide** which provides a high-level view of how units can be scheduled throughout the year, and a **course materials list**.

At the unit level, a **unit summary** describes the main focus of the unit along with connections to prior and future work. Teachers are able to access the **expanded assessment package** for the unit (described below), the **vocabulary glossary**, and the **unit launch** on-demand PD module (also described below). In addition, each unit page includes a navigable **lesson map** which provides a high-level overview of the objectives and standards as they are organized in the unit. Lastly, teachers can clearly see the grade-level **standards** covered, as well as a list of foundational standards that connect and relate to the content in the unit.

Each unit in grades 4-8 includes an embedded Unit Launch. In these on-demand, multimedia learning modules, participants dive into content standards, examine assessment items, investigate the big ideas of the unit, and look at foundational and future content connections. Unit Launches are intended to be completed before the start of instruction of each unit. Participants can explore these modules individually or as part of a professional learning community.

Each Fishtank Math lesson includes components that work together to support teachers in making a rich lesson plan that fits the needs of their students. These components include:

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<sup>8</sup> Chapin, Suzanne H., et al. *Classroom Discussions Using Math Talk to Help Students Learn: Grades K-6*. Math Solutions, 2009.

<sup>9</sup> Hoffman, Brittany L., Breyfogle, M. Lynn, & Dressler, Jason A. "The Power of Incorrect Answers." *Mathematics Teaching in the Middle School*, 15(4), 232-238.

- A **lesson objective**, which is an appropriately sized learning goal for students that connects to at least one standard or cluster in the unit;
- A list of **standards** that are the focus of the lesson as well as any foundational standards that students need to recall in order to be successful with the content of the lesson;
- **Criteria for Success**, which are smaller learning goals that students must demonstrate or understand in order to achieve the objective;
- **Tips for Teachers**, which include suggestions to support teachers' understanding and implementation of the lesson, such as suggestions on pacing, guidance on potential misconceptions students may have with the content, and other important notes;
- Two to three **Anchor Problems** to guide students in making sense of the mathematics of the lesson as outlined in the Criteria for Success and lesson objective;
- A set of **guiding questions** for each Anchor Problem, which teachers can use to scaffold or extend the problem based on student needs;
- A **Problem Set**, a worksheet of carefully selected practice problems aligned to the lesson objective, which can be used for independent practice in class or as homework; and
- A **Target Task**, a problem or set of problems aligned to the lesson objective, along with a sample mastery response, that can be used as an indicator of student understanding.

Teachers are also able to easily turn Anchor Problems, Problem Sets, and Target Tasks into customized student handouts using the Student Handout Editor. These handouts can be assigned to students via Google Classroom.

In addition to the resources above, each unit in Grades 3-5 is accompanied by **fluency activities** and **daily word problems** that strengthen and maintain students' procedural skill and fluency as well as their application skills. Fluency activities and daily word problems are also housed in a dynamic library that teachers can search by standard.

The Teacher Tool Library includes a variety of resources to support implementation of Fishtank Math, including for example, Preparing to Teach Fishtank Math and Strategies to Support Academic Discourse. A resource for supporting English Learners includes Scaffolds for English Learners and Oral Language Protocols, among others. A resource for supporting students in special populations includes a protocol planning tool that corresponds to a list of suggested strategies, modifications, and accommodations, organized by areas of cognitive functioning.

## **FISHTANK ASSESSMENT TOOLKIT**

Each unit in the Fishtank Plus math curriculum contains myriad opportunities for teachers to monitor students' progress and assess students' proficiency.

### **Pre-Unit Assessments**

The pre-unit assessment is designed to provide teachers with information about students' prior knowledge or preparedness to access new ideas related to concepts and skills in the upcoming unit. A teacher guide describes how each problem relates to grade-level content, shares suggestions on where in the unit to address any concepts or skills if needed, and links to related prior grade-level lessons for further resources.

### **Pre-Unit Student Self-Assessment**

A pre-unit student self-assessment gives students an opportunity to reflect on their familiarity with content from prior grade levels and identify for themselves areas where they may benefit from additional review or instruction to prepare for new content.

### **Mid-Unit Assessment**

The mid-unit assessment assesses students on content covered in approximately the first half of the unit, which provides the opportunity to collect and respond to data on students' understanding of the unit's content while they are currently engaged in the unit.

### **Post-Unit Assessment**

The post-unit assessment is designed to assess students' full range of understanding of content covered throughout the whole unit. It is accompanied by a post-unit assessment analysis, which provides a deeper look into the problems on the post-unit assessment.

### **Post-Unit Student Self-Assessment**

The post-unit student self-assessment provides students with an opportunity to monitor their own progress and reflect on what they've learned in a unit.