

## Overview of Our Mathematics Program

The mathematics program at the Battery Park City School is based on the Common Core standards in math. It emphasizes development of mathematical literacy, deep understanding of mathematical concepts, an ability to communicate effectively about mathematics, and the skills to solve problems using mathematics. We achieve these goals by providing balanced instruction in mathematical thinking and problem solving.

In grades K-1 we use a combination of [TERC Investigations](#) and [Contexts for Learning](#) to provide a mathematics program that is aligned with the Common Core State Standards. Additionally, children engage in math centers/games that reinforce key math skills and concepts.

In grades 2-5, we use [EnVision Math](#), [Contexts for Learning](#), and rich mathematical problems to create a program that provides a strong balance between developing an understanding of process and content in mathematics and is aligned with the Common Core State Standards.

In grades 6-8, we use [Connected Math](#) (CMP3) as the foundation of our math curriculum. Our teachers utilize a range of rich, contextualized problems to supplement the curriculum in order to meet the needs of the range of learners in our school. Most middle school students participate in a standards-based math programs. Some students participate in an accelerated program starting in sixth grade so that they are ready for Algebra 1 in eighth grade.

We use assessments to plan for differentiated instruction throughout the year including pre-assessments, interviews, conferences and more traditional tests especially in grades 3-8. This helps teachers to differentiate their instruction. Teachers keep anecdotal notes throughout each unit and across the year and use this information to capitalize on students strengths and push their thinking to the next level.

### Some math goals:

- Support students in developing a sense of mathematics and learning so that they can be mathematical thinkers.
- Focus on computational fluency: being flexible, accurate and efficient; with whole numbers with the broader goal of developing strong number sense
- Emphasize reasoning about mathematical ideas through conversation and writing
- Problem solve and use mathematics to understand our world through real-life problem solving opportunities

### Common Core Standards

We believe that mathematical literacy is essential for a child's future. Developing mathematical proficiency requires a balance and connection between conceptual understanding and procedural and computational fluency. The Common Core Standards in Mathematics help us to achieve this goal. There are two types of standards in mathematics: mathematical practices that are applicable across the grades K-12 and content and skills that are organized sequentially by grade band. These grade level content standards are organized into domains and are described in the [linked table](#).

The [mathematical practices](#) emphasize the critical thinking, mathematical reasoning, and habits of mind that support students in solving problems with meaning and understanding. They allow students to understand other people's thinking about math and to participate in mathematical conversations and experiences whether it is participating effectively in a math class, using math to solve a real world problem or to critically read data that is presented in the news. Key habits include perseverance, reasoning, modeling, and precision.

**My child has her facts memorized. What do you mean that she is “not fluent?”**

Research indicates that those who “memorization as their primary strategy [in solving math problems] are the lowest-achieving students in the world.” ([Boaler, Jo. 2015. \*What’s Math Got to Do With It.\*](#))

Emphasizing rapid recall is often detrimental to students mathematics learning. It can lead to heightened math anxiety and/or reinforce a fixed mindset view of one’s mathematical abilities. We acknowledge that students benefit from having a strong number sense and expect students to develop efficient recall of math facts. However, people with number sense are those that can use numbers flexibly. This means that students can use what they know at a given point in time to solve another problem without relying on abstract memory. For example, they may use the distributive and associative properties to solve multi-digit multiplication problems in their heads and use mathematical reasoning/estimation to determine the reasonableness of the answer. Thus, we want to help students have benchmark numbers memorized for quick recall, but they don’t need to memorize all their facts. There is more information on the standards document that indicates what and when students should have “fluency” in specific sets of facts. Here is [a link to an article](#) that explains some of the research behind these instructional decisions.

### **Why is my child not learning the algorithms right from the start?**

Many times, we want our children to calculate arithmetic problems like we learned when we were students. For example, we want them to add and subtract using “stacking” or divide multidigit numbers using a bracket. Research in cognition and mathematics learning has helped us determine that in order to develop number sense, students need to explore mathematical ideas through a number of different experiences and models before learning algorithms. As indicated on the standards document linked above, students are still expected to learn the traditional algorithm. Only we now teach these formulas later. This approach is an integral part of the Common Core Learning Standards in Mathematics.

### **Homework**

Often, for homework, students are asked to show their work in multiple ways. Teachers do this to help students with their mathematical reasoning, justify answers through representations (diagrams, models, manipulatives), develop flexible use of numbers (break numbers apart and then put them back together, use landmark numbers, etc. to help calculate mentally) and to build fluency and flexibility in number sense, and to have a means to double check their work. We want students to identify the best, most elegant and efficient strategy to solve a particular problem.

Homework that is assigned is intended to reinforce concepts learned at school. If your child is struggling, below are some questions you can ask to help your child think through their homework challenges.\* If your child continues to struggle, please have him/her write a quick note to the teacher explaining the situation (you can help your child write this note.) The teacher will then know to review the concepts with the child and other children who may have struggled similarly.

1. What is the question asking you?
2. How did you get that answer? (Ask this whether the answer is right or wrong.)
3. Can you share your method with me?
4. Can you try a different way of solving this?
5. What does addition/probability/ratio/etc. mean?
6. In what other situation could we use this?
7. Would this method work with different numbers?
8. What is important about this work?

\*from Boaler, Jo. *What’s Math Got to do With It?*

**Resources for parents** about the approach to mathematics

[Common Core Standards in Math](#)

[Family Guide to Math](#) published by the National Council of Teachers of Math.

[Development of Computational Fluency](#) an article by a professor of math education, Susan Jo Russell.

[www.youcubed.org](http://www.youcubed.org) A resource for parents, teachers, and students on mathematics.

[Common Core math progressions](#). A complex guide to the big ideas in each of the standards domains.

[Parents' guide to the Common Core](#). A document from NY State about the Common Core for parents.

[Common Core Family Guides](#). Published by Washington State and the Common Core, these overviews provide information about what your child will be expected to do in each grade k-8.

[Don't Let Maths Muddle You](#). An article on how parents can help their children with mathematics.

### **Resources for families that may help with homework**

[Motion Math](#). You need to pay for the apps (mostly for ipad and iphone, a few android based games) on this website. However, they come highly recommended as tools for developing concepts and visualization.

[Buzz Math](#). This is a subscription based site for middle school math practice.

[DragonBox Math](#) A program that teaches foundational algebraic thinking skills.

[Wuzzit Trouble](#). An app that helps develop number flexibility by using addition, subtraction, factors, multiplication, and other mathematical concepts.

[Refraction](#) focuses on teaching fractions and discovering optimal learning pathways for math education.

[Math Breakers](#). This app helps the development of number sense conceptually through a fantasy game.

[A New York Times review of math apps.](#)

### **Old fashioned games that build math skills:**

[Muggins math board](#) games and manipulatives for building math thinking skills.

SET is a card game for problem solving and critical thinking.

[Thinkfun](#) is a company that designs engaging and thought provoking games.

Mancala. A problem solving and strategy game from Africa.

Monopoly.

Tic, Tac, Toe