

# The Pursuit of Numbers

## *Benchmark's Math Curriculum Empowers Students to Take Charge of Learning*

By Jessica Siso

Along with Benchmark's strong reputation for being an outstanding language arts-based school, the unique nature of our math department is another feature that takes Benchmark from ordinary to extraordinary for students with learning differences. Individualized instruction is a hallmark of Benchmark's math program and utilizes the same approach to learning that characterizes instruction in the language arts classroom.

But what makes the Benchmark math program so special? We can point to a variety of distinct aspects including: its strong research-based curriculum; its knowledgeable, experienced, and adaptive faculty; its ability to meet the individual needs of students; and its capacity to offer students the opportunity for self-reflection and understanding of their own learning styles. What follows provides a closer look at these aspects of math instruction at Benchmark to better understand how they help to empower our students to take charge of their learning.

### ***It's a Research-Based Program***

The math program at Benchmark is based on research from the National Council of Teachers of Mathematics (NCTM) and uses the Pennsylvania Common Core and the Mathematical Practices of the Common Core to guide content and metacognitive instruction. Following these guidelines, the lower school students focus on operations and algebraic thinking, numbers and operations in base 10, measurement and data, and geometry, while middle school students focus on ratio and proportional relationships, number systems, expressions and equations, geometry, statistics, and probability.

To maintain consistency among subjects, the metacognitive strategies that students are taught in math are similar to the strategies taught in language arts. Just as in language arts class, "...in math class, students are coached to access background knowledge and use it to help them understand new content," said Head Math Teacher Janice Sands. "They are consistently encouraged to monitor for understanding when visualizing problems and explaining how they solved a problem." Encouraging students to look for and use patterns enables them to understand the concepts or "big

ideas" in math (e.g., equivalency, numbers, and patterns) and how mathematical concepts are connected.

Teachers use a variety of resources to help prepare daily lessons that incorporate the big ideas, the content standards, and the metacognitive strategies. These resources include, among others, videos from Kahn Academy, Virtual Nerd, LearnZillion, games, and activities found in resource materials from NCTM, as well as the new textbook series published by McGraw-Hill.

"We are able to teach concepts using methods that best fit each student's needs," Head Math Teacher Phil Ruth said. "I love that there is not just one book or resource that is followed. We often change the order of the lessons [from the order in a textbook] to have the concepts make better sense to our students."

"Our conceptually-based curriculum allows the freedom to tailor instruction to meet the needs of each class," agreed Head Math Teacher Amy Cuthbertson.

Math instruction at Benchmark is far from students opening a textbook and working through the problems on the page. "Each teacher takes the content to be taught and finds a way to present that material that will engage students and will meet each student's needs," noted Sands. From looking at multiple strategies in order to solve problems to comparing/contrasting problem solutions to make decisions about which method is best for them, students are actively engaged in the learning of mathematics at Benchmark.





## *We Have Knowledgeable, Experienced, and Adaptive Faculty*

The Benchmark math faculty not only has the skills and knowledge to teach students about measurement, geometry, and probability, but also benefits from more than 75 years of collective experience teaching mathematics “the Benchmark way” to inform their methods.

“Most of our math teachers have had experience in our Language Arts program,” said Rosanne Crowe, Head of the Math Department. “This experience is instrumental in supporting students with language-based difficulties in mathematics since success in mathematics requires more than a command of computational processes. Many math skills depend on verbal and written language skills, and our teachers provide the appropriate support for students with challenges in processing oral directions, decoding written directions, comprehending word problems, reading or writing equations, or explaining their problem-solving process in words.”

Benchmark math teachers possess the skills to empower students to take charge of their learning because of their experience teaching students who learn differently. “Our math teachers encourage their students to think critically, and be creative, persistent, flexible, and reflective learners,” Crowe said. “These fundamental skills are important because they help students succeed not only in school, but in a world that is developing and changing so rapidly.”

In addition, virtually all Benchmark math teachers teach both lower and middle school students, allowing them to be knowledgeable about the depth and breadth of the content to be taught at each grade level and the development of the content across grade levels. “This enables our teachers to understand the best order for teaching content for the best learning to take place (building on prior knowledge) within a grade,” Crowe added.

Head math teachers also have the opportunity to act as mentors to the middle school students, encouraging

the creation of long-standing and meaningful relationships with students. “Since you remain with the same group of students throughout their entire middle school years, it’s really rewarding to see them grow and progress over time,” Ruth said.

## *Instruction Meets the Individual Needs of Students*

Another distinctive feature of Benchmark math instruction is that the teachers are skilled in ways to adapt instruction to meet the diverse needs of their students. They do this by:

- **Regrouping students for math based on their strengths and challenges.** “This means we are meeting students where they are, so that students are engaged and everyone feels successful,” Head Math Teacher Melissa Savage said. “This grouping structure continues throughout students’ time at Benchmark, so they consistently get the support they need at their individual math level.”
- **Encouraging multiple approaches to solving problems.** “It’s about helping students grasp a concept in a way that their brain allows them to understand best,” Ruth said.
- **Incorporating collaborative group work/discussions and putting an emphasis on ‘math proof.’** “This allows our students to work on expressing themselves verbally but also facilitates the emphasis on gaining a true understanding of why we follow the processes we do and how we get to an answer,” Savage said.
- **The use of a variety of hands-on tools (digital and non-digital) to help students grasp concepts and make mathematical connections.** “Research shows that tactile learning helps students who learn best visually grasp concepts. Students are presented with a number of strategies to help them find the ones that will ‘stick’ for them,” Ruth said.
- **The use of Basic Fact Math Menus.** By using Basic Fact Math Menus (a variety of online and hands-on activities to help support fluency of basic math facts) teachers can individualize activities for students based on their approach to learning. “It is an engaging way to allow students to increase fact fluency, has the ‘buy-in’ of giving students a choice in how they practice, allows for repetition and retention, serves as a building block for more difficult concepts, and is a way for parents to get involved in their child’s learning,” Savage said.

The strategies put in place to help meet the individual



needs of students would not work, however, without the support of teachers who are undeniably passionate about helping their students become confident and successful. “It’s rewarding that I can really meet students where they are and allow them to have more ‘a-ha’ moments,” Savage said. “Unlike other schools, at Benchmark there is not the pressure to move on to another lesson just to get to a certain point in the curriculum. We can really make sure our students understand a concept before moving on, and that really helps them to succeed.”

Ruth agreed. “As teachers, we work together to collaborate and let each other know about certain students’ strengths and weaknesses so that we can be sure we are meeting each child’s needs,” he said. “It’s great being able to have the time to focus on the students truly mastering a concept before I move on.”

### ***We Offer Opportunities for Students to Self-Reflect on their Learning Process***

It has been said that Albert Einstein defined insanity as “doing the same thing over and over again, but expecting different results.” In the Benchmark Math Department, this ‘insanity’ is circumvented by students being given the opportunity for self-reflection in a number of ways:

- **Project/Test Reflections.** Opportunities for self-reflection are given after formal assessments or projects in math so that the students can think about what went well for them, what aspects of the task were difficult for them, how they prepared for the task, and what they will do differently the next time they are presented with a similar task.
- **Self-Assessments.** These are used on an ongoing basis to help students understand how their own learning style affects how they learn math. “Just as

learning style can affect a student’s success in reading, it also affects their progress and success in math,” Cuthbertson said.

- **Performance-Based Assessments.** These are used—particularly in the lower school—as a way for teachers to assess the level of understanding students have of new concepts. “After a new topic is covered in class, and multiple strategies are taught for how to approach or think about problems, students are given the opportunity to show what they know by using larger problem solving situations,” Cuthbertson said. “These problem-solving situations require students to use the tools and strategies they know to explain why their method for solving the problem works.”

The use of self-reflection tools to realize what does not work for an individual is the only sure-fire way to find out what does work. “Our math classrooms explicitly teach strategies for problem solving and strategies to promote number sense. Ultimately, students who are persistent, reflective, and strategic will be successful in math,” Cuthbertson said.

### ***What’s New? What’s Next?***

Though the math department has seen student success with the teaching styles already in place, the idea of being stagnant is never on the minds of the faculty. Recent changes have included:

- Participating in the global “Hour of Code” event and incorporating coding into the curriculum to build a foundation of computer science skills and strengthen problem-solving skills, logical reasoning, and creativity
- Adapting the teaching schedule to allow middle school students to have math instruction in the morning and thereby receive more math support during Mentor Group
- The introductions of after-school Robotics and Genius Clubs—both of which focus on inquiry-based learning and problem solving
- The annual celebration of Family Math Night, which promotes stronger school/family bonds and encourages family involvement for student success

In addition to these ongoing changes, Crowe said that the department’s future plans include researching project-based learning activities and exploring ways to incorporate these activities into the mathematics curriculum. “Project-based-learning creates opportunities for students to investigate meaningful questions that require them to plan, think critically, and evaluate solutions to real world problems.” 

