

BACKGROUND OF PROGRAMMING IN BHM SCHOOLS

Buffalo Community Middle School

Mathematics courses are required for all students in Grade 6, Grade 7, and Grade 8. These courses include instruction and assessment on Minnesota's Math standards. Instruction is focused on conceptual math problems, application of learning, and higher level thinking.

Mathematics courses available at BCMS are:

- Grade 6: Math 6, Quest Math 6
- Grade 7: Math 7, Quest Algebra 7
- Grade 8: Math 8 Algebra, Quest Geometry 8

Buffalo High School

Students are required to earn 3 credits of mathematics for graduation. Each 2 trimester course is worth 1 credit. For the majority of students, mathematics instruction at the high school begins with an Intermediate Algebra course which is differentiated for various readiness levels through layers of support. BHS strives to provide students with a self-directed and relevant learning path. There are also a variety of elective courses that students may choose upon the completion of Intermediate Algebra, Geometry, and Algebra 2 courses. These include a variety of opportunities for students to connect, collaborate, and communicate, as well as a chance to earn college credit in CIS (College in the Schools) courses or AP courses as well.

BHS Elective Math Courses:

Algebra 3 with Trig
CIS College Algebra
Pre-Calculus
Trigonometry
Advanced Placement (AP) Calculus A/B
Advanced Placement (AP) Calculus B/C
Statistics
CIS Statistics
Intro to Computer Programming

AP Computer Science Life Skills

Mathematics classes at BHS are designed to meet the needs of the 21st century learner. This includes teaching higher order thinking, analytical reasoning skills, collaboration, communication skills, and inquiry.

Current resources for students in mathematics high school courses include Chromebooks, whole class texts, and digital access to programming.

Past Curriculum Adoption:

During the last curriculum adoption in the spring of 2010, the district selected IMPACT Math as the district's core curriculum for the middle school program math, and the Prentice Hall Algebra, Geometry, and Higher Algebra series for the high school math program.

Because of the length of time between the last adoption and the proposed adoption, refreshed curriculum resources are necessary to support student achievement. Additionally, student needs brought up within that timeline continue to display a need for students to have updated and current curriculum.

Minnesota state standards implementation is also in the process of changing since the last adoption. The revised math standards are set to be implemented in the 2027-2028 school year.

PROGRAM STANDARDS

Mathematics Standards

From the MDE Website: “The *Minnesota K-12 Academic Standards in Mathematics* are grounded in the belief that all students can and should be mathematically proficient. All students need to learn important mathematical concepts, skills, and relationships with understanding. The standards describe a connected body of mathematical knowledge students learn through the processes of problem solving, reasoning and proof, communication, connections, and representation. The standards are grouped by strands: 1) Number and Operation; 2) Algebra; 3) Geometry and Measurement; and 4) Data Analysis and Probability.

[Current standards] were revised in 2007, with full implementation by the 2010-11 school year. Though the math standards were scheduled to be reviewed again during the 2015-16 school year, the review was postponed. As passed in the spring 2015 first legislative session, according to Chapter 3, H.F. 1, the math standards review was postponed until 2021-22.”

According to the Minnesota Department of Education, in accordance with Minnesota Statutes, “Minnesota’s academic standards are reviewed and revised on a 10-year cycle. During 2021-2022, the department facilitated a review of the Minnesota K-12 Academic Standards in Mathematics. The

standards are being revised for Minnesota public schools, by Minnesotans. The Minnesota K-12 Academic Standards for Mathematics review and revision was being conducted by a committee that includes members with varying perspectives and backgrounds from across Minnesota. Minnesota Statutes outline who must be represented on the committee, including parents, currently licensed and in classroom teachers, licensed school administrators, school board members, post-secondary institution faculty teaching core subjects, and business community members.

It is still early in the statutory rulemaking phase of the standards review and revision process. There are multiple opportunities throughout this phase for the public to make comments and provide feedback on the proposed standards language and for changes to be considered and made to the initial proposed standards draft.

The next step of the statutory rulemaking process is that MDE will review the public comments submitted to the Office of Administrative Hearings (OAH) during the 60-day statutory public comment period. Next, MDE will draft the Statement of Need and Reasonableness (SONAR), which has traditionally taken 14-17 months. The full statutory rulemaking process can take up to 24 months.

The statutory rulemaking process for the Minnesota K-12 Academic Standards in Mathematics is not complete until the Notice of Adoption is published in the State Register. Each content area includes an implementation date in the adopted rule. If adopted, the proposed K-12 academic standards in mathematics will be implemented in the 2027-28 school year.”

PROGRAM VISION STATEMENT

Secondary (grades 6 - 12) math teachers developed the following vision and mission statement to guide their exploration of instructional resources and their long-term impact on student learning.

At BHM Schools, we believe that a strong mathematical foundation promotes use of a growth mindset to persevere through and develop personal independence. Teachers will provide progression of concrete, representational, and abstract modeling to support student growth k-12. In addition, teachers will promote student agency through personalization and self-reflection of critical reasoning.

Children have innate mathematical abilities that need to be fostered through a variety of mathematical experiences. At BHM students will...

- See themselves as doers of math through carefully facilitated discussions.
- Have opportunities to persevere through solving a variety of math problems.
- Collaborate and justify their mathematical thinking by showing flexibility in strategies and making connections.
- Build conceptual understanding and procedural knowledge through large group, small group, and individual support and instruction.

SUMMARY OF PROCESS FOR REVIEW OF INSTRUCTIONAL RESOURCES

An extended exploration, implementation, and analysis of current practices and curriculum revealed that

the comprehensive curriculum used until now, while striving to make a positive impact, was not making the intended impact on student scores and engagement.

As part of the ongoing improvement process, the secondary math department has researched, reviewed, and piloted a variety of resources, strategies, and practices that are intended to improve learning, increase engagement, and lead to success in college and careers. This process has included:

- Forming and participating in professional learning communities to analyze data, discuss current practices, and make improvements to move all students forward.
- Designing learning experiences and assessments that emphasize critical thinking, inquiry, creative problem solving, and communication.
- Researching area school district practices and content delivery.
- Creating and reviewing a thorough inventory of current materials and the way that they are used.
- Researching several math curriculum options on the market that would match the state standards.
- Piloting the use of multiple new materials and strategies.
- Selection of materials based on the District [Core Resource Adoption Checklist](#)

In addition, the secondary math department educators have integrated collaborative strategies presenting software and learning management systems, and digital tools to enhance student learning. This process revealed that current technology resources are lacking; however, teachers collaborated and learned to maximize the use of digital tools and plan to fill in the gaps with the goal of providing an equitable learning experience for all students. Finding ways to get technology into the hands of students to increase engagement and fidelity in instruction led teachers to explore ways to implement tools to assist students in a sustainable way.

Starting in 2021-2022, a wide net was cast to find potential curriculum resources that would support an ever changing landscape in mathematics in secondary buildings. After filtering through initial resources, gathered by word of mouth, research into text and digital resources, five were chosen to look at more closely. The five were: ALEKS, eMATHInstruction, enVision, Illustrative Mathematics, Reveal, and Savvas. During the initial review, it was determined that all resources could cover the resources needed to meet the needs of the 6 - 12 pilot.

Each pilot began with basic professional development provided by a company representative. Teachers used each program with their 6 - 12 students for varying amounts of time. Based on research and their vision statement, along with the district core adoption checklist, teachers utilized their PLC's, data collection, department conversations, and the checklist to discuss the benefits and challenges of each program. The team recommends the following programs:

Grades 6 - 8

Grades sixth through eighth took time to pilot three separate resources: Reveal Math, Illustrative Math (Imagine Learning), and enVision Math. While each resource has the ability to cover the content at each grade level based on Minnesota, the [BHM Core Resource Adoption Checklist](#) was used to assist in identifying the strengths and challenges within each resource.

All three resources provided opportunities for complex critical thinking in multiple ways. Each resource also made connections and had relevance for students in making meaning of mathematics. The resources provided personalized learning choice and voice as well as promoting opportunities for student learning through intellectual engagement and productive struggle.

enVisionMATH stood apart from the other two resources in the way of providing assessments that support student growth and learning. The resource also is aligned with state standards in Minnesota, assisting educators in their planning and instruction. In connection and relevance, enVision stood out from the other two resources by providing introductory and closing material for each grade level. There are multiple resources and options to choose from within enVision including assessment (formative and summative), homework, differentiation, and enrichment.

One of the key components of enVision is MathXL, which is an embedded digital aspect of the curriculum that students can access to support their learning. This digital component allows for further differentiation and emphasis on rigor at the student's current instructional level.

The middle school team also noted the fact that there is potential to build scope and sequence at a site level as well as with the high school level. There are multiple areas where there are options for intervention, enrichment, and language translations.

Intermediate Algebra - eMATHinstruction (N-Gen) with ALEKS

ALEKS is a learning assessment system that has been used by over 25 million students for Math, Chemistry, Statistics, and Accounting. After quickly and accurately determining each student's precise knowledge of a subject, ALEKS helps the student work on the topics they are ready to learn. The content and software are unique and proprietary; they have been developed together and work in unison. ALEKS digital content provides comprehensive course coverage.

N-Gen offers the ability to keep the rigor of the course high, but ALEKS allows for individualized skill development and an opportunity to fill in the gaps for students who are struggling. Additionally, ALEKS will allow higher-level students to continue to develop and progress in their skills as well. This combination of resources will make the course unique and feel different from the 8th grade math course.

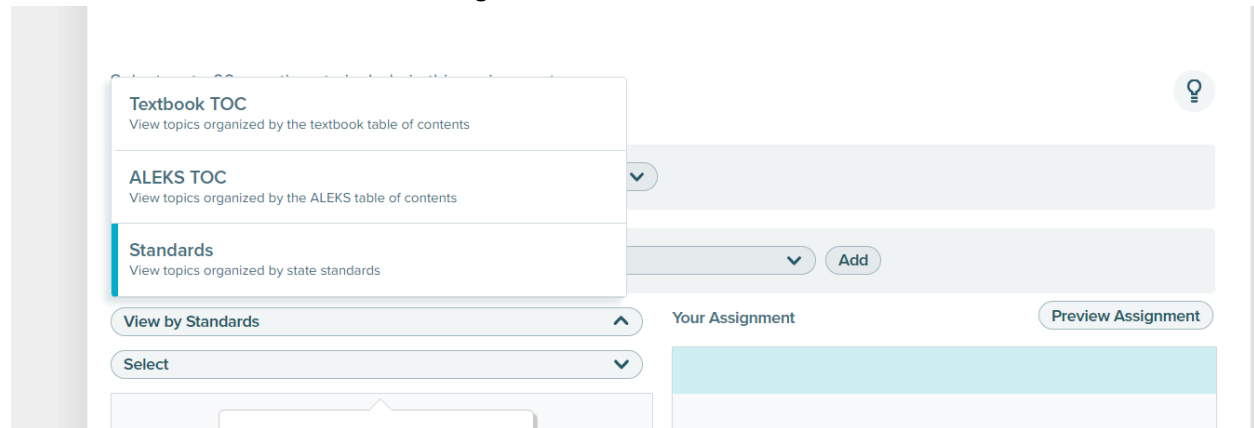
eMATHinstruction with ALEKS aligns with Minnesota State Standards along with offering all resources in Spanish such as notes, practice and ALEKS. This resource provides opportunities for complex critical thinking in meaningful and purposeful ways through applications and mathematical modeling. High quality WICOR (writing, inquiry, collaboration, organization and reading) instructional practices are evident in eMATHinstruction through note taking and practice that require writing out explanations and reasoning. It can promote opportunities for student learning through intellectual engagement and physical movement by providing alternate approaches to problem-solving and asking students to make connections to prior skills. This resource also includes opportunities for personalized learning through the online ALEKS program. ALEKS also gives students initial feedback, extra examples and explanations while allowing room for teaching to different learning styles.

In mathematics, a multi tiered systems of support (MTSS) is a real time systemic intervention continuous improvement framework in which data-based problem solving and decision making is practiced across all levels of the education system for supporting students.

Within the math department, there are courses designed to support students in both intermediate algebra and geometry. Within courses, pre teaching and reteaching take place to support students who are currently enrolled in either course. A focus on AVID strategies related to WICOR (Writing-Inquiry-Collaboration-Organization-Reading) is also implemented with social emotional learning with reflections, goal setting, and support beyond academic work.

Within the Intermediate Algebra course, ALEKS was piloted and found to be an individualized learning plan to meet the needs of each student. Students take an initial knowledge assessment to determine their current mathematical ability, creating content that caters to their individual needs. Within the MTSS course it was determined that ALEKS should be implemented to be the main resource for the remediation course. Students are able to have a personalized approach to their learning, supporting their overall growth and application of mathematics. This supports closing the gap between students enrolled in the general courses.

ALEKS allows a lookup of Minnesota State Standards in mathematics aligning with problems and sections outlined in the standard coverage.



Geometry & Algebra 2- EnVision (Savvas)

A pilot of both the EnVision and Reveal textbooks brought great insights into current curriculum, and a recommendation of implementation moving forward. Both textbooks cover the necessary content to meet student needs in preparing for future math courses and also cover Minnesota Math Standards. Both have digital access where students can access textbooks online and be able to complete online assignments with immediate feedback and helpful tools. In the end, enVision is the best fit to meet the needs of all students moving forward.

The enVision series has the ability to map standards from the Minnesota math standards and content

while the Reveal series mostly aligned with current Minnesota standards, but was not integrated into the program. enVision has projects that meet AVID WICOR instructional practices to assist in tying into the district-wide goal of providing AVID strategies to all students. Each unit and lesson provides students with learning targets and essential questions that will help set clear expectations for all.

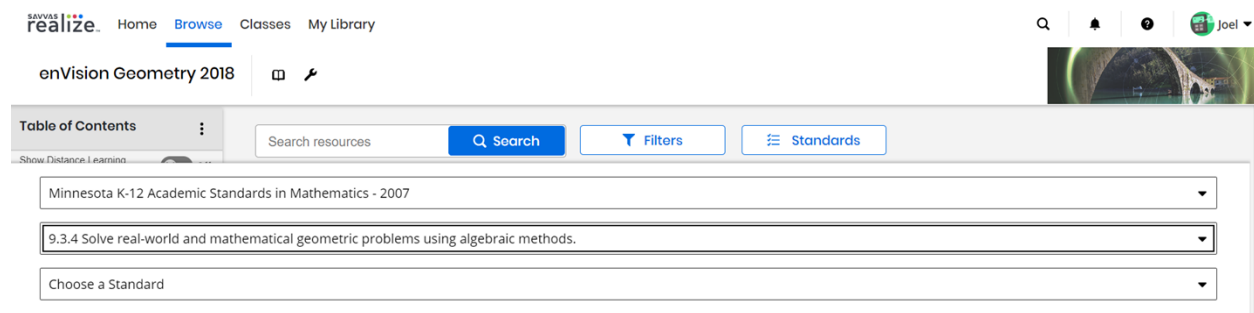
As for the diversity of the material, enVision curriculum supports a large number of ELL students with access to their native language by providing the text in multiple languages. Student choice is provided, at times, through multiple types of assessments and some projects in various units. The digital component also allows for implementation of technology into the classroom, develops and strengthens mathematical skills, and allows flexibility in future endeavors.

One of the key points of emphasis in choosing the enVision textbook was to provide students opportunities with more rigor involved in the curriculum. The enVision curriculum provides critical thinking opportunities throughout each lesson, and in assessment. There are many problems that are relevant to real-world applications and current topics that teenagers can associate with as well. enVision offers a more rigorous course with even more resources to utilize when needed, such as tutorial videos for struggling students and enrichment options for students needing to be challenged, and multiple ways to assess students' understanding.

The overall piloting process has allowed a deeper dive into both curriculums, and the outcome is that EnVision truly meets the needs of every student. It is the curriculum that best fits the needs of students for the foreseeable future, and maps directly with Minnesota State Standards.

Examples of Minnesota State Standards

The 2018 enVision Textbooks and digital content currently have the 2007 Minnesota standards aligned with the curriculum. The 2021 Minnesota Math Standards will not be implemented into the new 2024 enVision online program until the 2021 Minnesota Math Standards have been approved.



The screenshot shows the user interface for the enVision Geometry 2018 digital content. At the top, there is a navigation bar with "Home", "Browse", "Classes", and "My Library". Below this, the page title is "enVision Geometry 2018". A search bar is present with a "Search" button, and there are "Filters" and "Standards" buttons. A dropdown menu is open, showing "Minnesota K-12 Academic Standards in Mathematics - 2007" selected. Below this, a specific standard is highlighted: "9.3.4 Solve real-world and mathematical geometric problems using algebraic methods." At the bottom of the dropdown, there is a "Choose a Standard" option.

Statistics

After researching a few different resources, the math department chose the curriculum *Stats in Your World* to pilot. The program has both a textbook and an online program called MyMathLab. The team found the online resources to be very beneficial for the students and the teacher. MyMathLab provides students instant feedback on assignments, lesson videos, tutorials and the online textbook. With access to

MyMathLab, students will also have access to Statcrunch, a statistical software to analyze data. For the teacher, the online access provides powerpoint presentations, student data collection activities, as well as formative and summative assessments.

RECOMMENDATIONS

The 6 - 12 math teachers recommend the following materials for curriculum adoption:

Grades 6 - 8:

enVision grade 6

enVision Accelerated grade 7

enVision grade 8

Intermediate Algebra: emathinstruction + ALEKS digital access

Geometry: enVision Geometry

Algebra 2: enVision Algebra 2

Statistics: Stats in Your World

These programs accommodate different learning and teaching styles, allowing for student mastery as well as teacher fidelity and autonomy. Lessons have digital and hard copy extensions and resources to provide additional learning opportunities for both intervention and enrichment. The programs focus on a “making meaning” approach, providing applicable real-world content for students to utilize outside the walls of the classroom.

The digital access and resources provides a necessary flexibility and a vast array of resources that will support the implementation of updated state standards.

The team sees many benefits of the pending adoption. Instructional materials embedded in each instructional resource will allow a more targeted approach to meeting standards and the needs of students. Updated digital access to materials creates a more sustainable approach in a post-pandemic climate. These digital resources, coupled with text and paper resources, will allow a more targeted approach to meeting standards and differentiating. Students will be utilizing a curriculum that is regularly updated (via online tools) and that closely aligns with state standards.

A challenge the math department foresees is the current pacing guide. As it is written, the pacing guide will need to be monitored and adjusted to meet students where they are. The vision is to provide a more rigorous curriculum for students that can be differentiated to meet the needs of students in all levels. The current curriculum used in the math department was purchased over ten years ago and does not include digital components. The publisher / website associated with the high school resources no longer exists.

FINANCIAL IMPLICATIONS

Detailed information on the financial impact is here: [Math CAP Resource Spreadsheet](#)

Grade 6 - 8:	\$152,250
Geometry:	\$ 43,635
Algebra 2:	\$ 43,779
Stats:	\$ 15,998
MathXL subscriptions:	\$ 19,600
ALEKS subscriptions	\$ 10,481
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	\$285,743

EVALUATION

Evaluation of the curriculum adoption will be monitored in several ways. Some of the anticipated desired outcomes include:

- Increased common lesson plans, units, and expectations as measured by each site level among core course mathematics staff.
- Common assessments and pacing based on PLC teams
- More common language and common experiences over the coming years as evaluated by teaching staff
- End of the year evaluation by mathematics teachers on use by students and self-ranking of how the curriculum supports their mission and vision.

NEXT STEPS

- Timeline for purchase
 - After July 1, 2023.
- Professional Development needs or Preparation for Use
 - Summer Curriculum Writing Planning Time
 - Spring / Fall Professional Development
 - Implementation CIP days (1 per quarter / trimester during 2023-2024 school year)
 - Elective course adoption for 2024-2025 school year
 - AP Calculus
 - Life skills
 - Pre-Calculus
 - Trigonometry