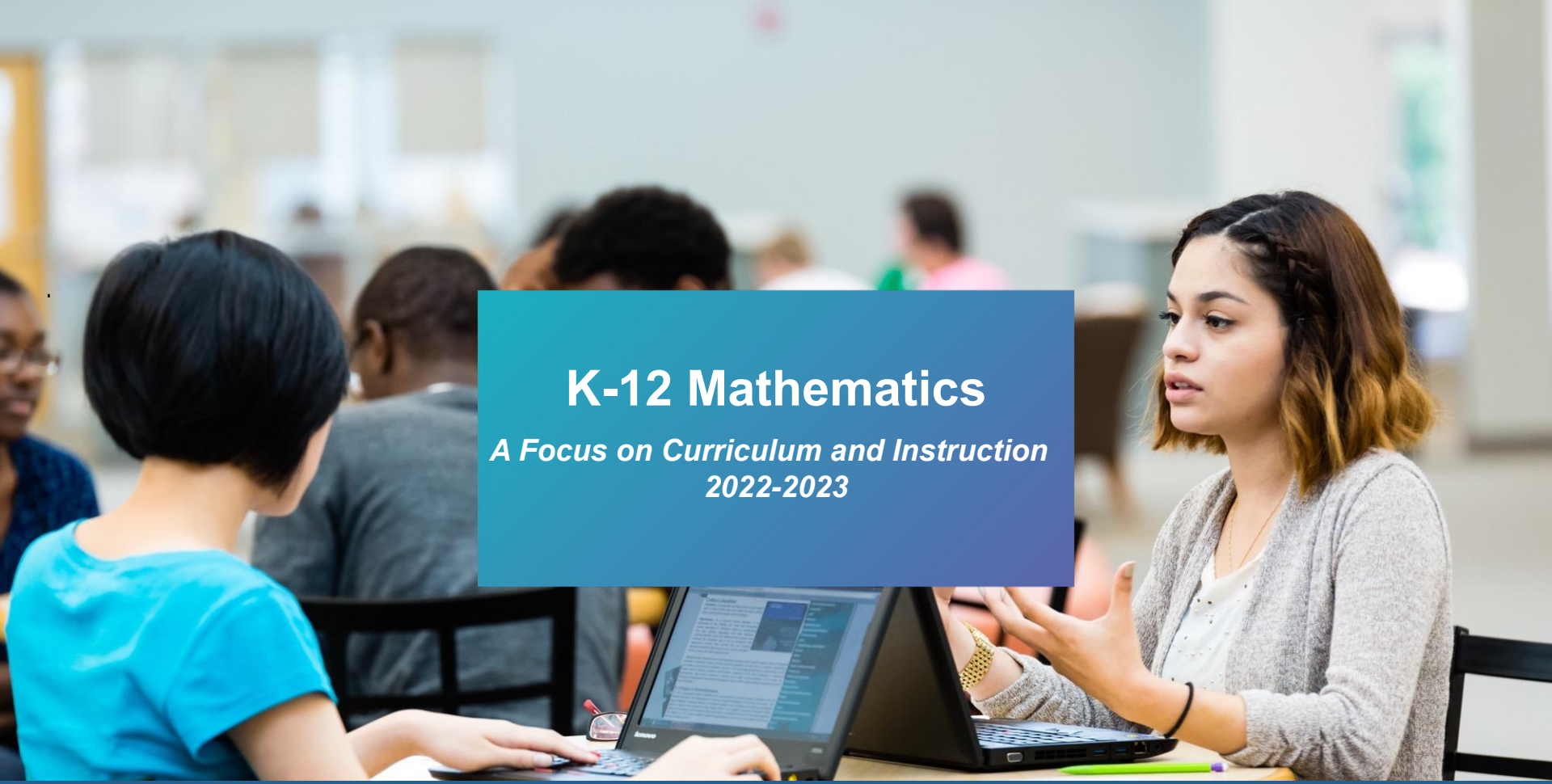


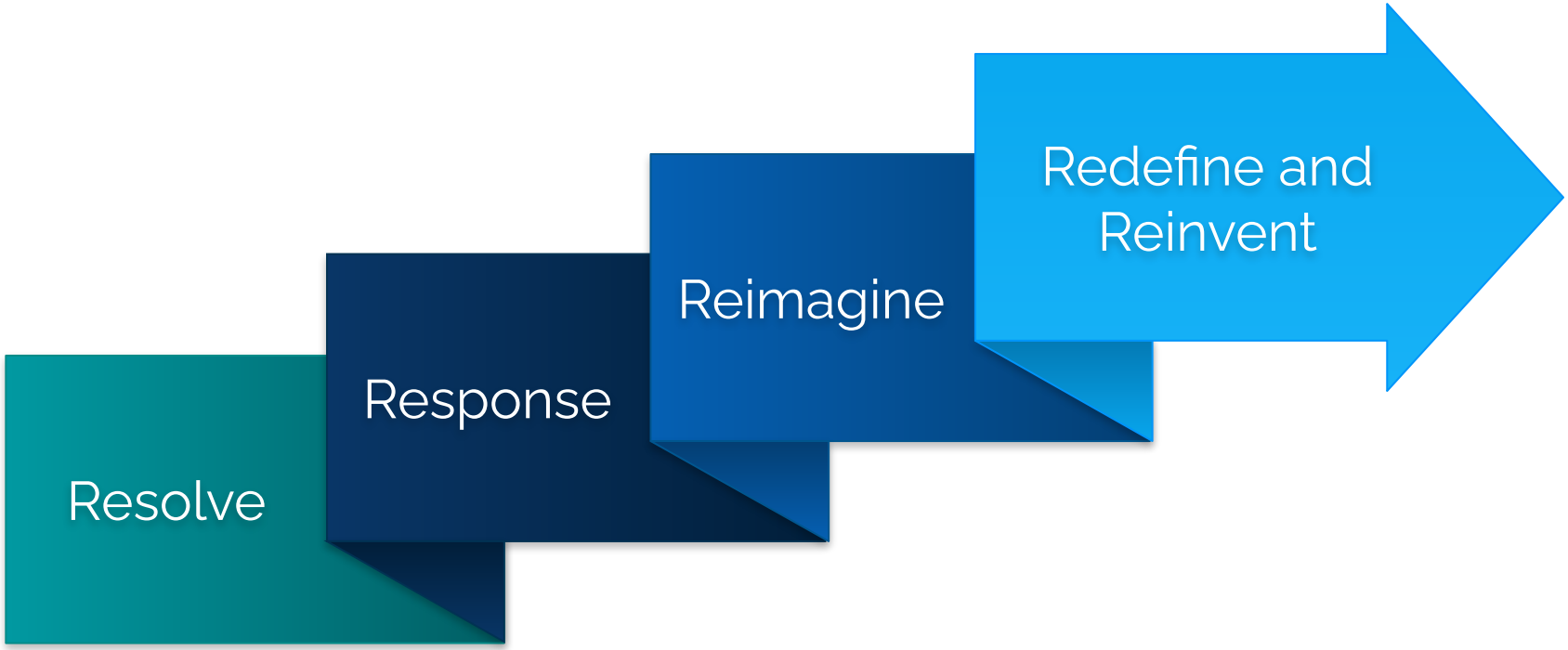
K-12 Mathematics

A Focus on Curriculum and Instruction
2022-2023

Intended Outcomes:

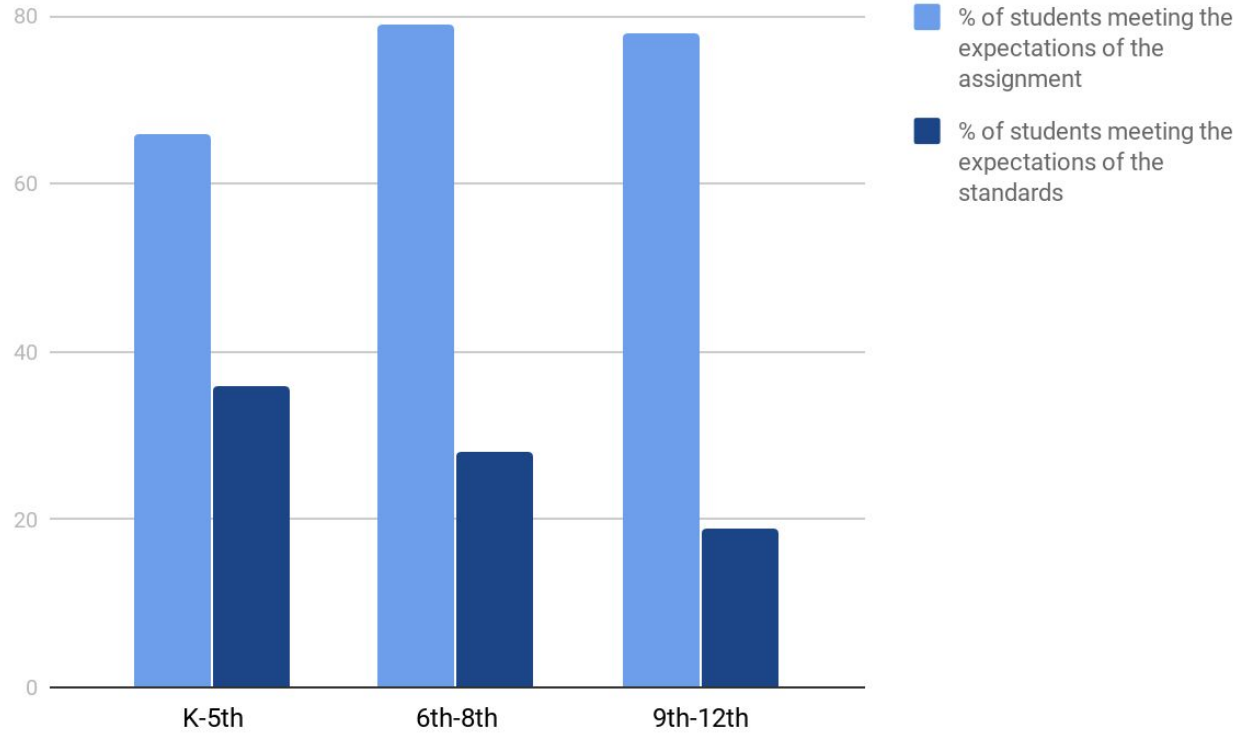
- Review of Mathematics instructional resources since 2015-2016
- Review of Mathematics instruction during the Pandemic
- Specific Mathematics supports for the 22-23 school year
- Next Steps

Transitioning from Response to Recovery



Adapted from *Fisher, D., Frey, N., Smith, D. B., & Hattie, J. (2021)*

TNTP - Curriculum Audit



Adoption Timeline

2015-16 School Year

- TNTP Curriculum Audit

2016-17 School Year

- High School Math curriculum procurement process resulting in adoption of the Mathematics Vision Project (MVP) curriculum

2017-18 School Year

- MVP implementation in Math 1
- Middle School Math procurement process resulting in adoption of Open up Resources (OUR) curriculum

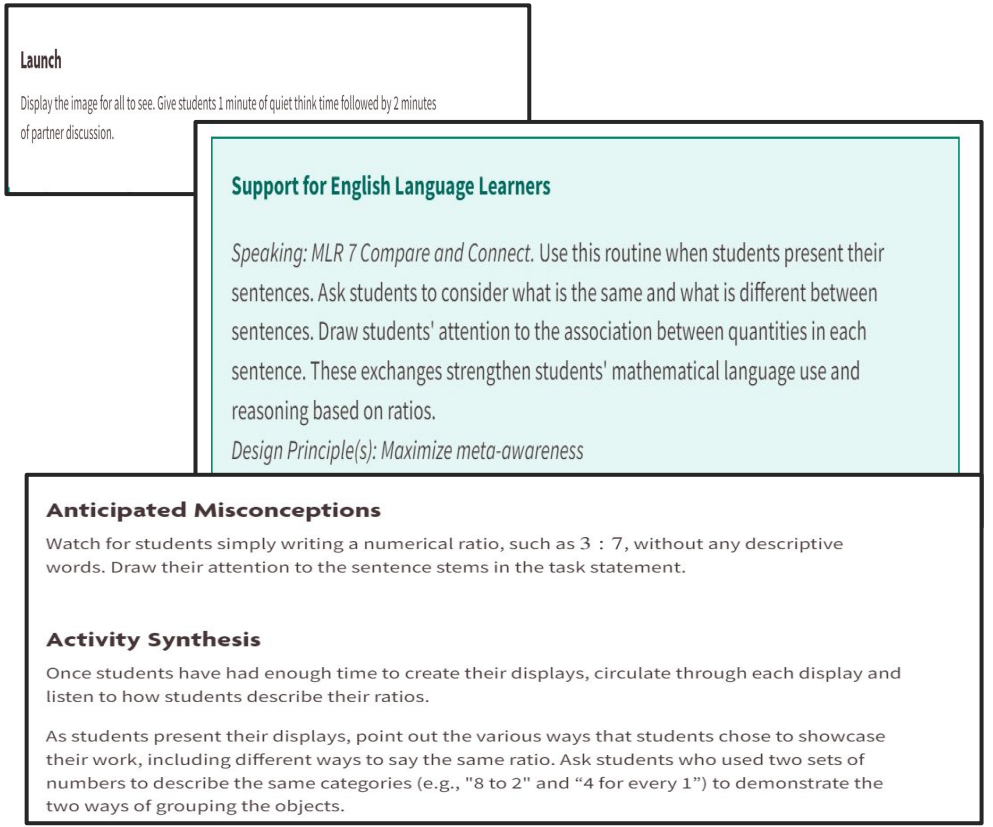
Adoption Timeline

2018-19 School Year

- MVP implementation in Math 2 and Math 3 (optional)
- Full Implementation of Open Up Resources (OUR) in grades 6, 7, 8
- MGT Consulting Group reviewed Mathematics Vision Project

2019-2020 School Year

- **Moved to all Electronic Teacher Editions for OUR and MVP**
  - Launch
  - Scaffolds and Supports
  - Student Misconceptions
  - Possible Responses *(answers)*
  - Activity and Lesson Synthesis
  - Are You Ready for More? *(Enrichment)*



Start of Pandemic: *Spring 2020*

- Remote Learning Packets
- Virtual PLT support
- Remote Learning Trainings
  - Resources
  - Technology

Pandemic: *2020-2021*

- Vertical Bridge Resources/Gap Lessons
- Digital Resources/Lessons that aligned with district curriculum
- Canvas Blueprint Courses for Students
- Virtual PLT support
- All K-8 students receive access to DreamBox Learning

Response to the Pandemic: *2021-2022*

- Summer Learning Lessons *(Spring 2021)*
- Vertical Alignment Maps
- Pre-Unit Formative Assessments
- Scaffolds and Supports Documents

John Pritchett
High School Math Teacher

Athens Drive High School

K-12 Mathematics
2022-2023

WCPSS Core Beliefs

#1
Every student is uniquely capable and deserves to be challenged and engaged in relevant, rigorous, and meaningful learning each day.

#2
Every student is expected to learn, grow, and succeed while we will eliminate the ability to predict achievement based on socioeconomic status, race, and ethnicity.

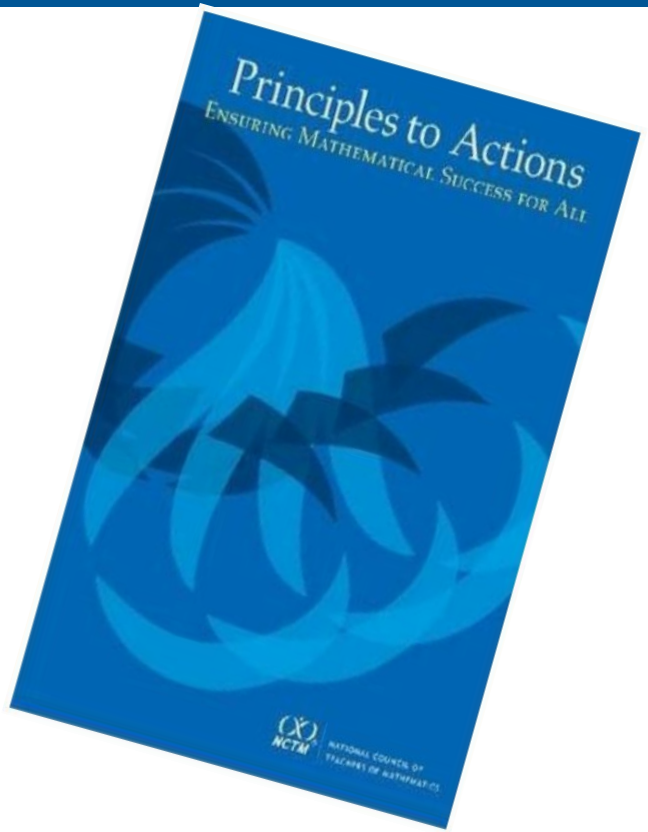
#3
Well-supported, highly effective, and dedicated principals, teachers, and staff are essential to success for all students.

K-12 Mathematics

Six Guiding Principles from *Principles To Actions*

Teaching and Learning

An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically.



Highly Impactful Math Classroom

- High Quality Instructional Resources
- Highly Effective Teaching Practices
- PLCs that Review Data and Participate in Collaborative Planning Time

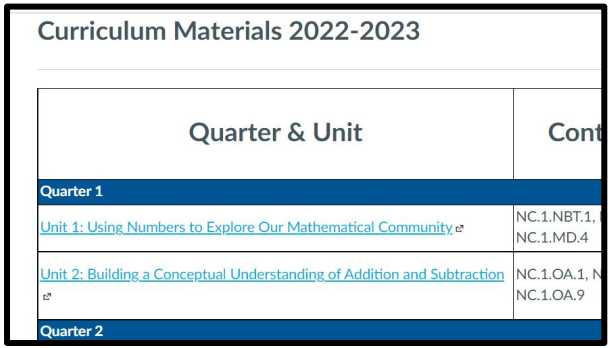
What makes a highly impactful math classroom for a student?

High Quality Instructional Resources

- Challenging mathematical tasks
- Aligned to grade-level standards
- Focus on problem solving and real-world learning opportunities
- Balance of conceptual understanding, procedural skills and fluency, and application
- Balanced Assessment System - K-8 Multi-Tiered System of Support

OPEN-UP resources™

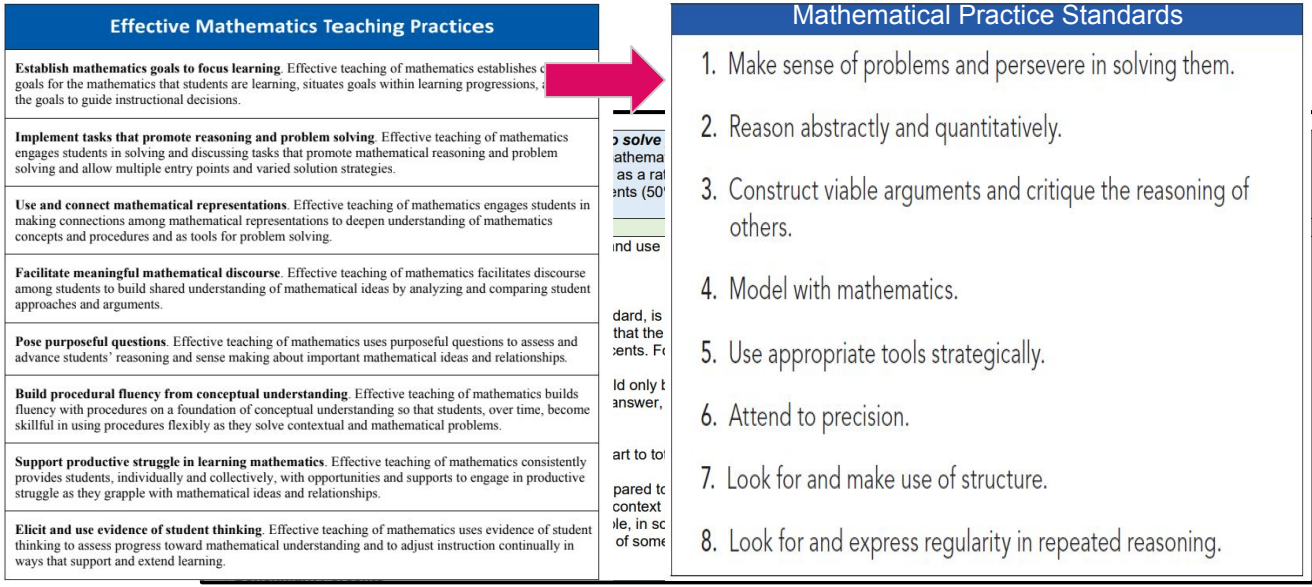
mathematics vision project



What makes a highly impactful math classroom for a student?

Highly Effective Instructional Practices

These Eight Effective Teaching Practices provide a framework for the consistent components that should be evident in mathematics lessons and classrooms.



Effective Mathematics Teaching Practices

Establish mathematics goals to focus learning. Effective teaching of mathematics establishes c goals for the mathematics that students are learning, situates goals within learning progressions, a the goals to guide instructional decisions.

Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Facilitate meaningful mathematical discourse. Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.

Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Mathematical Practice Standards

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

What makes a highly impactful math classroom for a student?

Actions Developed by Students

Discourse

- Student to student
- Explaining mathematical thinking with a variety of representations

Collaborative engagement

- Whole group, small groups, pairs, etc.
- Critical thinking and problem solving
- Purposeful questioning
- Applying mathematics

What makes a highly impactful math classroom for a student?

PLCs that Review Data and Participate in Collaborative Planning Time

- Common, Collaborative Planning Time
- Formative Assessments
- Common Unit Assessments
- Data-Based Problem Solving

Energizing K-12 Mathematics: *2022-2023*

Overview

- School Visits at all levels
- Core Instructional Supports
- PLC/School Support
- Professional Learning Opportunities
- Math Enrichment Grant

School Visits

- Structured protocol to visit classrooms and reflect on implementation of ***Curriculum and Instruction***

- Math Classroom Look Fors for Instructional Leaders

What is happening in Elementary Mathematics?

Energizing K-12 Mathematics: *2022-2023*

Focus on 3rd and 4th Grade Math

- Additional Resources/ Instructional Supports around Fractions
- Support for 3rd and 4th grade PLCs
- Targeted professional learning for 3rd and 4th grade teachers

PL Opportunities to Support Core Instruction in Elementary School

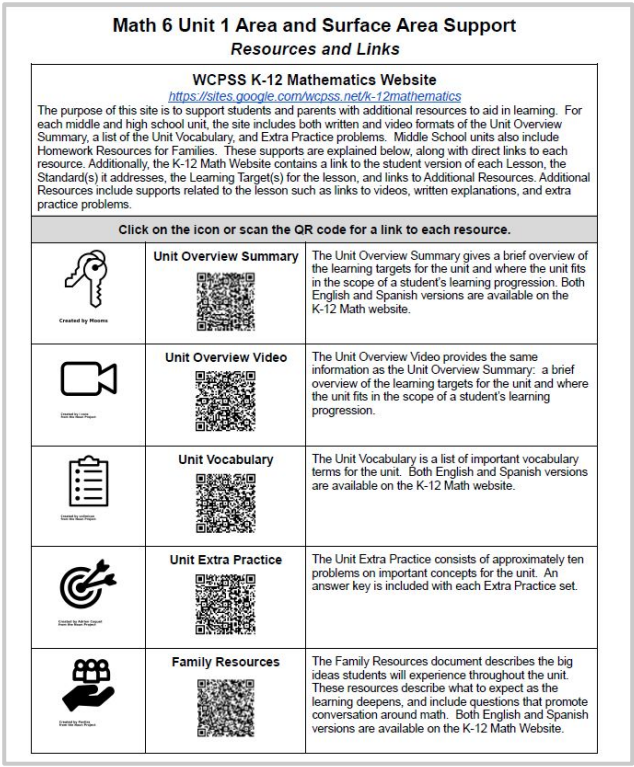
Progressions and Fluency
K-2 Training
PLC and School Support for 3rd and 4th Grade on Fractions

What is happening in Secondary Mathematics?

Supporting Core Instruction

Resources Pages with links in Student Workbooks for OUR and MVP

- K-12 Math Website
- Unit Overview Summary
- Unit Overview Video
- Unit Vocabulary
- Family Resources *(MS Only)*



Math 6 Unit 1 Area and Surface Area Support

Resources and Links

WCPSS K-12 Mathematics Website

https://sites.google.com/wcpss.net/k-12mathematics

The purpose of this site is to support students and parents with additional resources to aid in learning. For each middle and high school unit, the site includes both written and video formats of the Unit Overview Summary, a list of the Unit Vocabulary, and Extra Practice problems. Middle School units also include Homework Resources for Families. These supports are explained below, along with direct links to each resource. Additionally, the K-12 Math Website contains a link to the student version of each Lesson, the Standard(s) it addresses, the Learning Target(s) for the lesson, and links to Additional Resources. Additional Resources include supports related to the lesson such as links to videos, written explanations, and extra practice problems.

Click on the icon or scan the QR code for a link to each resource.

	Unit Overview Summary	The Unit Overview Summary gives a brief overview of the learning targets for the unit and where the unit fits in the scope of a student's learning progression. Both English and Spanish versions are available on the K-12 Math website.
	Unit Overview Video	The Unit Overview Video provides the same information as the Unit Overview Summary: a brief overview of the learning targets for the unit and where the unit fits in the scope of a student's learning progression.
	Unit Vocabulary	The Unit Vocabulary is a list of important vocabulary terms for the unit. Both English and Spanish versions are available on the K-12 Math website.
	Unit Extra Practice	The Unit Extra Practice consists of approximately ten problems on important concepts for the unit. An answer key is included with each Extra Practice set.
	Family Resources	The Family Resources document describes the big ideas students will experience throughout the unit. These resources describe what to expect as the learning deepens, and include questions that promote conversation around math. Both English and Spanish versions are available on the K-12 Math Website.

Energizing K-12 Mathematics: *2022-2023*

Supporting Core Instruction - Explicit Instruction Resources

Additional way to solidify understanding, based on exit ticket/cool-down data

Cool Downs

Math 6 Unit 1 - Area and Surface Area		
Lesson & Cool Down	**Support Level**	**Notes**
Lesson 1 Cool Down What is Area?	More Chances	The purpose of this cool-down is to check how students are thinking about area after engaging in the activities. While the task prompts students to reflect on the work in this lesson, ideas about area from students' prior work in grades 3–5 may also emerge. Knowing the range of student thinking will help to inform the next day's lesson.Students will have more opportunities to understand the mathematical ideas in this cool-down, so there is no need to slow down or add additional work to the next lessons. Instead, use the results of this Cool-down to provide guidance for what to look for and emphasize over the next several lessons to support students in advancing their current understanding.
Lesson 2 Cool Down Tangram Rectangle	More Chances	Students will have more opportunities to understand the mathematical ideas in this cool-down, so there is no need to slow down or add additional work to the next lessons. Instead, use the results of this Cool-down to provide guidance for what to look for and emphasize over the next several lessons to support students in advancing their current understanding.
Lesson 3 Cool Down Maritime Flag	More Chances	This task does not explicitly ask students to state area units because one purpose of the task is to assess if students understand what units are appropriate given the information presented.Students will have more opportunities to understand the mathematical ideas in this cool-down, so there is no need to slow down or add additional work to the next lessons. Instead, use the results of this Cool-down to provide guidance for what to look for and emphasize over the next several lessons to support students in advancing their current understanding.
Lesson 4 Cool Down How Would You Find the Area?	More Chances	This activity sets the stage for the next lesson, which formalizes how to find the area of any parallelogram. Notice the strategies students are currently using to help make connections to the algebraic expression $b \times h$ that they will see in the next lesson. Students will have more opportunities to understand the mathematical ideas in this cool-down, so there is no need to slow down or add additional work to the next lessons. Instead, use the results of this Cool-down to provide guidance for what to look for and emphasize over the next several lessons to support students in advancing their current understanding.
Lesson 5 Cool Down Parallelograms S and T	Points to Emphasize	If students struggle with finding the area of parallelogram in the Cool-down, plan to revisit parallelograms when opportunities arise over the next several lessons. For example, in Activity 2 of Lesson 6, students practice and reason about finding the area of parallelograms.
Lesson 6 Cool Down One More Parallelogram	Points to Emphasize	If students struggle finding the area of a parallelogram without a grid to count from in the Cool-down, plan to find the area of a parallelogram when opportunities arise over the next several lessons.
Lesson 7 Cool Down A Tale of Two Triangles	Press Pause	If students struggle with this Cool-down, and possibly previous related Cool-downs, working with the area of parallelograms and triangles, make time to revisit the work of Unit 1. ***Explicit Instruction*** *- Area of a Parallelogram*

Open Up

Lesson	Standard(s) Assessed	Exit Ticket and Teacher Notes
Lesson 8: Form Follows Function Solidify Understanding	Focus Standard **NC.M1.F-LE.1**	**Exit Ticket:** What is the best form of a linear or exponential function to use when modeling the following situations? Explain why you chose the form that you selected. a. LaTisha is training for a long-distance run. Each Saturday, she does a longer run than the training runs during the week. At the end of week 1, she runs 3 miles. Each week after that, she adds 0.5 miles to her long run. Model the length of her long run at w weeks. b. As LaTisha is running, her heart rate increases. After she has been running 3 minutes, her heart rate is 93 beats/minute. After 7 minutes, her heart rate is 122 beats/minute. Model LaTisha's heart rate at m minutes. c. Once she gets started, LaTisha runs at a constant speed. After 4 minutes, she has gone 0.5 miles. Model the distance that LaTisha runs in t minutes. **Teacher Notes:** Students should be demonstrating the ability to identify the rate of change or change factor and the initial value, even if it is not at $x=0$ or $x=1$. They should then be flexible in selecting a form for writing an equation. If the results of the exit ticket show that students need additional support on these ideas, these problems should be discussed in the next lesson. **Explicit Instruction Resource:** Model a given situation with a linear function. Explain why a particular form of a linear equation is selected. Answer Key
Lesson 9: I Can See-Can't You? Solidify Understanding	Focus Standard **NC.M1.F-IF.6**	**Exit Ticket:** Find the average rate of the change of: $f(c)=2(3^x)$ over the interval [-1,2]. **Teacher Notes:** The problem gives feedback on whether students understand the formula and can make the calculations for average rate of change. To get the best assessment of their understanding of the formula, allow the use of calculators so that possible errors with fractions don't skew the results. Look to see that students are applying the formula correctly. If results show common difficulties, spend a few minutes going over the problem and reviewing the key ideas of average rate of change before starting the next lesson. **Explicit Instruction Resource:** Calculate the average rate of change of a function over a specified interval. Answer Key

Open Up (MVP)

Emily Hooks
8th Grade Math Teacher

West Cary Middle School

Energizing K-12 Mathematics: *2022-2023*

PL Opportunities to Support Core Instruction

OUR *(tentative)*	MVP *(tentative)*
Summer Support prior to PL Days	Curriculum Resource Spotlight Sessions
OUR New Hire (Asynchronous) and Check-Ins (F2F)	MVP New Hire (Asynchronous) and Check-Ins (F2F)
Experience the OUR Classroom (F2F)	Experience the MVP Classroom (F2F)
OUR Curriculum Resource Overview (F2F)	MVP Curriculum Resource Overview (F2F)
Data-Based Problem Solving - Mid & End of Unit Assessments	Math 1 Support (F2F) Fall and Spring
STAR & DreamBox Support	
OUR Fall Reboot/ OUR Spring Triangulating the Data	

Looking Ahead…

PRC 189 Math Enrichment Grant Program

Goal 1: Build Capacity for instructional decision making in prerequisite skills for supplemental instruction

Goal 2: Provide high quality instructional resources for supplemental and intensive support.

Goal 3: Provide summer math transition institute/camp for rising 6th and 9th grade students (Summer 2023 and Summer 2024)

Next Steps

- Monitor implementation of curriculum
- Support high quality instruction and the effective teaching practices
- Gather feedback from teachers, students and parents to make further enhancements or adjustments.