Math Milestones

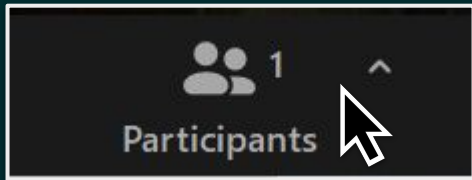## The math of your grade on a single page

Welcome! Share in the chat:
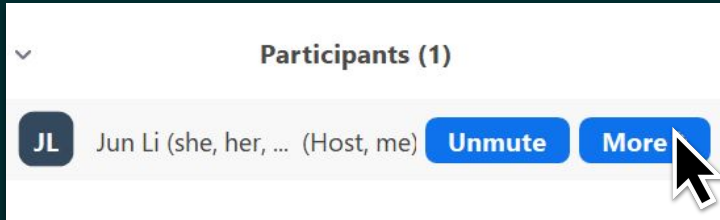- Name, Role/Title, Location
- What are you hoping to learn about today?

STUDENT
ACHIEVEMENT
PARTNERS

Math
Milestones

Change your Zoom name to the GRADE-LEVEL you would like to participate in breakouts today.

1

Participants 1

K 1 2 3 4 5 6 7 8

2

Participants (1)

JL Jun Li (she, her, ... (Host, me) **Unmute** **More**

3

Participants (1)

JL Jun Li (she, her, ... (Host, me)

Add Profile Picture

Rename

4

Rename ✕

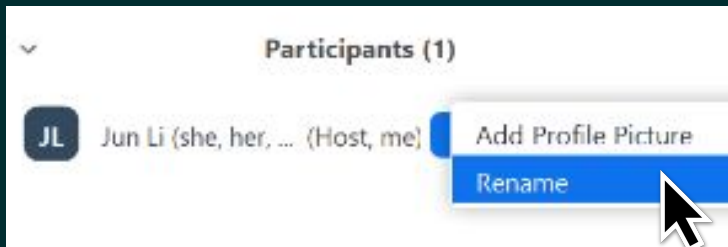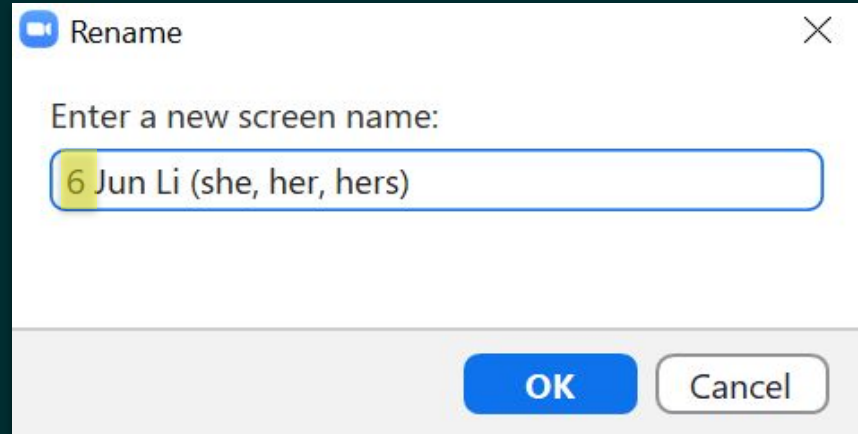Enter a new screen name:

6 Jun Li (she, her, hers)

OK Cancel

About Student Achievement Partners

At SAP we design actions based on evidence that substantially improve student achievement.

We design and share evidence-based literacy and mathematics guidance and resources that center students, particularly those who experience racial, cultural, or linguistic inequities. We do this because we believe that education can be reimagined and redesigned to eradicate inequity. Achieving this vision requires the perspectives of many, so we work in partnership with content experts, policy makers, and educators to design practical tools and resources that support teachers and students.

Your Hosts Tonight from the Math Milestones Team

Sandra Alberti

Harold Asturias

Phil Daro

Jun Li

John Staley

Webinar Agenda

- The Purpose of Math Milestones
- Explore a Math Milestones Grid
- What they are/aren't
- Tour of the Resources
- Opportunities for Engagement

What problem are we trying to solve?

- As a teacher, I want to
  - know what's most important to teach at this grade level.
  - know what assets student bring from prior years that I can build on while teaching grade level math this year.
  - have a clear picture of how to help students with unfinished learning.
- How do I think about grade-level math while also considering language supports and opportunities to build identity and agency in my students?
- Change "answer getting" habits to "learning by making sense" habits.

NOT summative assessment; designed to prompt rich and revealing discussion

Standards need example Tasks

Milestones complement Standards. Standards should set targets, priorities…help us see what's more important and less. But they seem like a list of topics to cover. Yet 'covering' is the disease, not the cure. We need examples.

Tasks prompt us to think about students "doing" the mathematics…students as they learn.

Milestones puts the most important mathematics of the grade level on a single page as a grid of tasks. The richness is in the students' thinking which becomes the topic worth talking about.

Milestones lift student thinking out of dependency on the implicit scaffolds of the lessons

When students work on problems in their curriculum, their work is heavily scaffolded by the lesson and unit in which they are immersed. If it is a lesson on 'division', they assume they are going to divide without even having to read the problem. They assume each problem is like the last.

What students learn inside their curriculum is *heavily dependent on the lesson's implicit scaffolds.* Too often, the learning doesn't transfer or connect to a coherent system of knowledge: mathematics. In other situations it is uncertain, easily confused; it fades. Deep learning means the student can *transfer and connect new knowledge to old.*

Milestones transcend the implicit scaffolds of a curriculum and *lift student thinking into the grade level mathematics itself.* Milestones give you a lens to see student thinking, using their mathematics in most important kinds of problems of the grade level.

Our Theory of Action

WHAT

If we use the Math Milestones to...

- Engage students in learning grade-level, relevant, and meaningful mathematics.
- Build students' sense of self belief as critical thinkers and doers of mathematics.
- Make intentional and effective decisions about prioritizing learning.
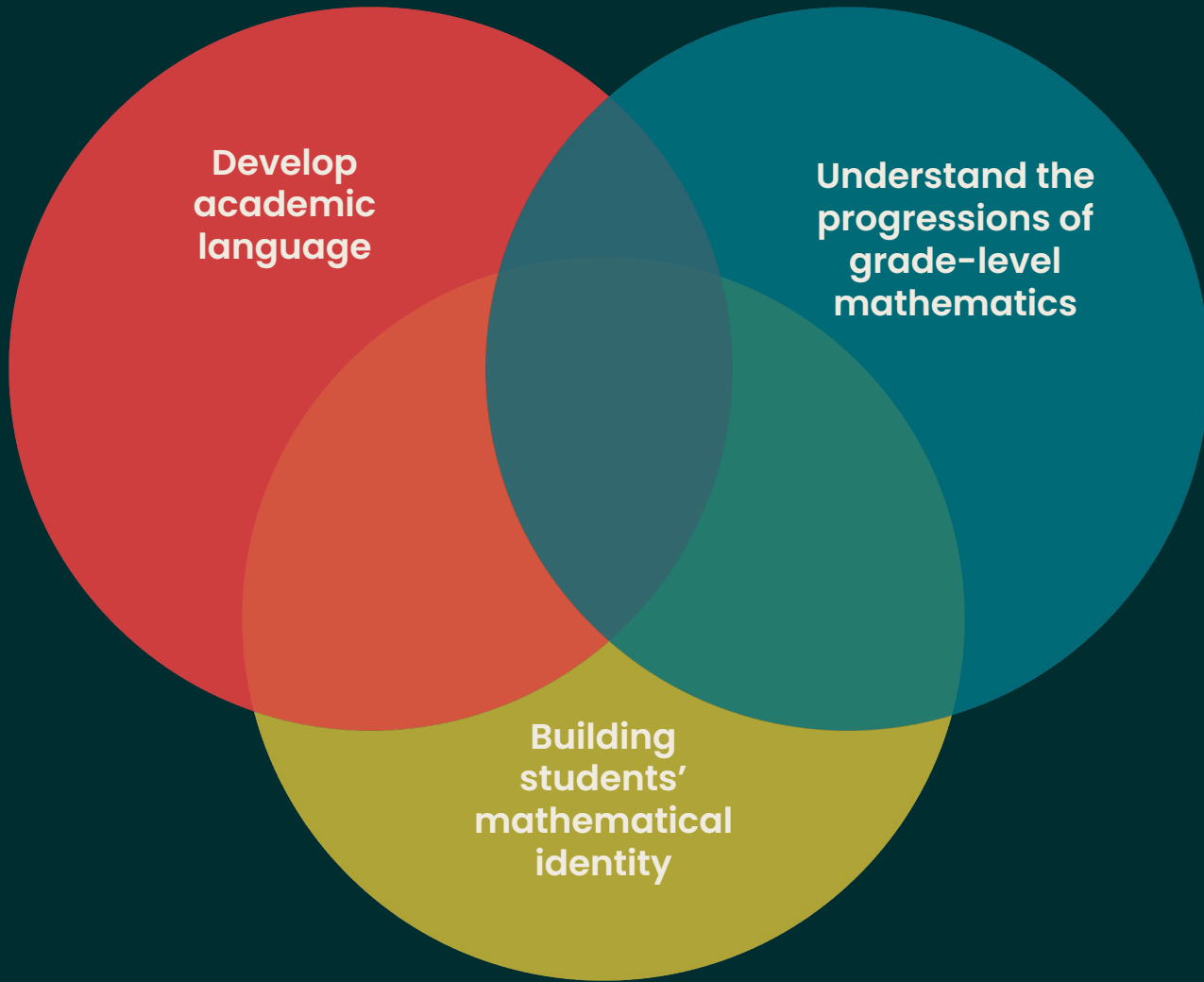- Discover student assets and use them to teach grade-level mathematics.

HOW

We will be better able to create opportunities for students to...

- Develop a habit of reasoning about relevant. grade-level math.
- Learn to use language for academic purposes.
- Develop a sense of belonging and a strong math identity.

students will...

WHY

- **Experience** academic success,
- **Understand** their own and others' culture,
- **Develop** a social consciousness, and
- **Thrive** in a world of constant change.

Develop academic language

Understand the progressions of grade-level mathematics

Building students' mathematical identity

What are the Math Milestones?

Coherent K–8 Progressions

Looking at the grid for your grade level

👤 **READ**—don't solve—as many of the tasks on your grade-level grid. [5 min]

👤 **CHOOSE** one task and solve it. [5 min]

👥 **DISCUSS** with your small group. Capture key ideas on the padlet. [5 min]

How do you envision using Math Milestones in your role?

What are Math Milestones?

Math Milestones Are	Math Milestones Are Not
Visualization of grade level mathematics	Curriculum Map • Scope and Sequence • Check list
Cognitively demanding Low floor - high ceiling tasks Entry point for student thinking Asset identifier	Assessment • Summative • Pre/Post Test • Placement • "Gap" identifier

Tour of the Resources

Grids, Teacher Notes, Student Handouts, and Interview Protocol

HOW TO NAVIGATE THE SITE

Math Milestones™

Home   Team

The math of your grade on a single page
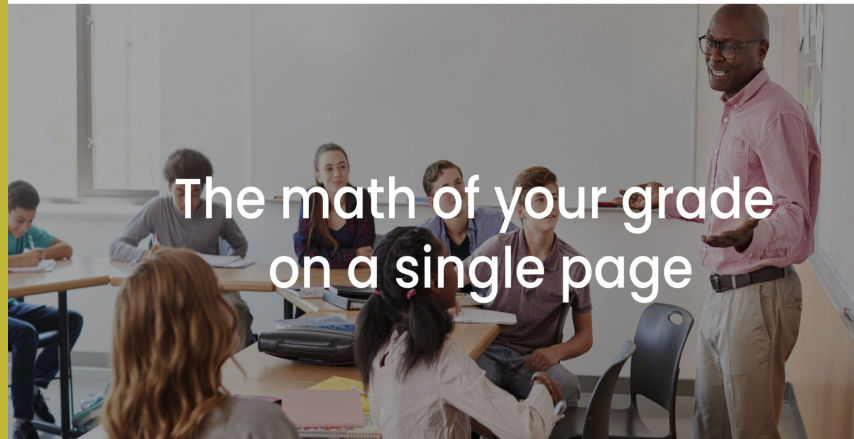
Math Milestones — Grade 5

5:1 A school needed 240 four-packs of juice boxes for a field trip. However, the school accidentally bought 240 six-packs of juice boxes. How many extra juice boxes did the school buy?

5:2 After a hurricane, the 12 residents of a nursing home didn't have any clean water to drink. Their neighbors donated 40 gallons of bottled water, which would provide ____ gallons for each resident.

5:3 A neighborhood garden will have 6 wooden planting boxes. Every box will have the same shape (see diagram). Soil can be bought by the truckload; a truckload is 54 ft³ of soil. How many truckloads of soil will fill all of the boxes?

108 in
12 in
48 in
Planting Box
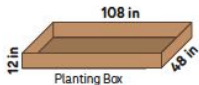
5:4
(1) Circle T for true or F for false.
(a) 9 thousandths + 5 hundredths
> 3 hundredths + 2 tenths   T   F
(b) 92 hundredths + 4 thousandths
> 0.924   T   F
(c) 0.456 < 0.5   T   F

(2) Write each number in the requested form.
(a) 7 thousandths + 5 tenths = _____ (decimal)
(b) 0.1 tenths = _____ (decimal)
(c) $\frac{2}{100} + \frac{5}{1000}$ = _____ (decimal)
= _____ (fraction in lowest terms)

5:5 Write the requested values.

$4087 \times 53 = ?$ 　 $\frac{1}{10} \div 10 = ?$ 　 $0.4 \times 0.9 = ?$
$246 \times 914 = ?$ 　 $\frac{7}{8} \times \frac{5}{3} = ?$ 　 $0.75 \div 0.01 = ?$
$9744 \div 12 = ?$ 　 $8 \times ? = 73$ 　 $0.63 \div 0.3 = ?$
$1461 \div 6 = ?$ 　 $3 \div \frac{1}{8} = ?$ 　 $0.86 + 0.4 = ?$
$4 - (8 - 4) = ?$ 　 $\frac{1}{2} + \frac{1}{3} - \frac{1}{5} = ?$ 　 $0.72 - 0.17 = ?$
$\frac{1}{3} \div (6 \times 5) = ?$ 　 $0.02 + 0.2 = ?$
$0.8 - 0.55 = ?$
$637 - 1.31 = ?$

5:6 **(1)** Arya and Lily's house is $\frac{1}{5}$ mile from the store.
(a) Arya ran $\frac{1}{3}$ of the way from her house to the store. How far, in miles, did Arya run? **(b)** Lily ran $\frac{2}{3}$ of the way from her house to the store. How far, in miles, did Lily run? **(2)** It is $\frac{2}{5}$ mile from Leon's house to the store. **(a)** Leon ran $\frac{1}{3}$ of the way from his house to the store. How far, in miles, did Leon run? **(b)** Compare how far Leon and Lily ran; what do you notice, and why is it true?

Arya & Lily's house — store — Leon's house

5:7
Miles North of Lighthouse

The map shows an ocean near a coastline.
Lighthouse
Miles East of Lighthouse
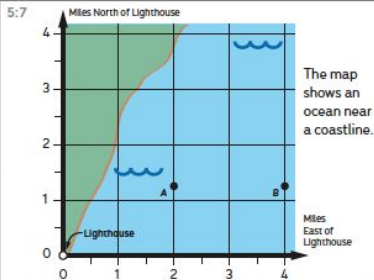
Shipwrecks are at locations A (2, 1$\frac{1}{4}$) and B (4, 1$\frac{1}{4}$). Shipwrecks are also at locations C (4, 3$\frac{1}{2}$) and D (2, 3$\frac{1}{2}$). **(1)** Mark C and D on the map and shade rectangle $ABCD$. **(2)** Some believe there is sunken treasure in the region you shaded. How large is that region in mi²?

5:8
A *scalene triangle* is a triangle in which the sides all have different lengths. Thinking about this, Alana decided there should also be a name for quadrilaterals in which the sides all have different lengths. She said, "I'll name them after myself." She defined an *alana-gon* to be a quadrilateral in which the four sides all have different lengths. **(1)** Draw an example of an alana-gon. **(2)** True or false: **(a)** All squares are alana-gons. **(b)** No trapezoids are alana-gons.

5:9 On Saturday there was a walkathon.

I walked $\frac{1}{3}$ mile farther than Leslie.
Catherine   I walked 1$\frac{1}{4}$ mile.

How many miles did Leslie walk?

5:10 **(1)** Solve: $\frac{1}{3} = 0.1 + ?$
(2) Is there a number greater than $\frac{1}{5}$ and less than $\frac{1}{4}$? If you think so, find such a number. If you think there is no such number, explain why.
(3) Show one of the above problems and its solution on a number line.

5:11 Juliet said, "I'm thinking of a rectangle. Its area is 1 square unit. Its perimeter is more than 1 million units."
(1) Is Juliet thinking of something possible or impossible? Use math to decide for sure.
(2) Explain your reasoning to your classmates. Revise your explanation based on suggestions from your classmates.

5:12 Before it rained, the teacher went outside and placed identical baking pans on the ground. After it rained, the teacher brought the pans inside, and students measured how much water was collected in each pan.

Water Collected (liters)

If all the water collected were shared equally among the pans, how much water would be in each pan?

5:13 In a snack shop there is a frozen yogurt machine. When there is 3 *l* of frozen yogurt in the machine, the machine is $\frac{1}{3}$ full. How much frozen yogurt is in the machine when it is $\frac{1}{4}$ full?

5:14 Brandon was reading his math book. He saw the equation $\frac{3}{4} \times (4 + \frac{1}{2}) = 3 + \frac{3}{8}$. He said, "I don't get it—where did the 3 and the $\frac{3}{8}$ come from?" Write an explanation that could answer Brandon's question.

Math Milestones™

Name _____   Date _____

Water Relief

After a hurricane, the 12 residents of a nursing home didn't have any clean water to drink. Their neighbors donated 40 gallons of bottled water, which would provide _____ gallons for each resident.

Answer: _____

STUDYING STUDENT THINKING
Use the suggestions below to learn about your student thinking by asking them to make it visible.

1 Say: "This is to help me understand better how you make sense of math problems."

Unless the task specifies how tools should be used, they may use any manipulatives and tools they normally use in class.
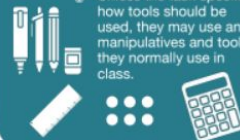
2 Ask the student to read the task out loud.

If they seem to have trouble reading the task, provide just enough scaffolding to support their comprehension of the task context.

Try hard not to suggest a specific strategy.

3 If the student seems unsure about how to start, you might ask:

- "Is there anything you recognize or know from reading the problem?"
- "What are some ideas you are having about solving the problem?"
- "Can you think of something to try and see what happens?"

6 Use the last page of Teacher Notes of this task to reflect and capture your thoughts...

- What other solution paths might you expect to see?
- What does the language they've used reveal about their mathematical thinking?
- How can you engage your students' interests, experiences, and/or funds of knowledge?

5 When done, ask the student to share their thinking:

- "What were you thinking about as you worked on the problem?"
- "What was the first thing you thought about?"
- "Can you tell me more about that?"

4 Then, observe the student engaging with the task. Some things to observe for:

- What does the student write down?
- Does it include a math diagram with a representation of the problem?
- What does the representation show about the student's understanding of the problem?

Math Milestones™

Elements of Teacher Notes

What is a central math concept?

How might I use relevant prior knowledge?

How might students drive
the conversation further?

Elements of Teacher Notes

Why is it important to know about related Math Milestones tasks?

How might I anticipate and respond to student thinking about the task?

Opportunities for Engagement
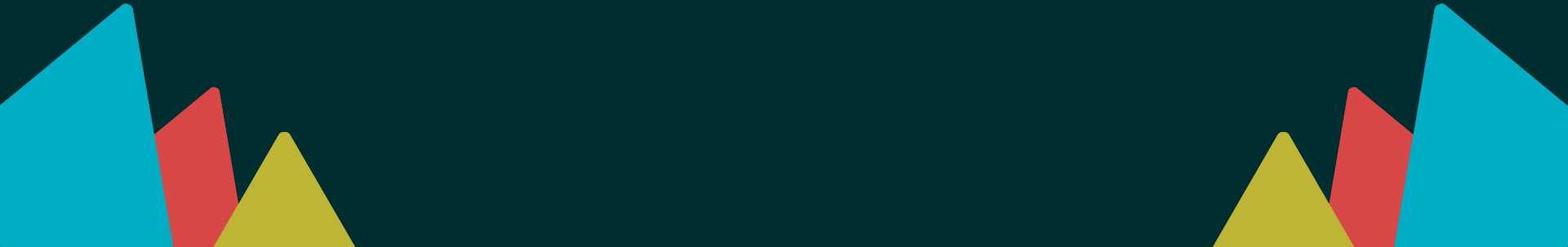
We Want You!

*How do these resources work in classrooms?*

What instructional resources might support teachers to integrate Math Milestones tasks into their instructional plans to complement the district curriculum?

This work will involve grade-level cohorts and the cultivation of resources including student artifacts, educator reflections, and more

The Math Milestones Community

MM Users

MM Educator Network
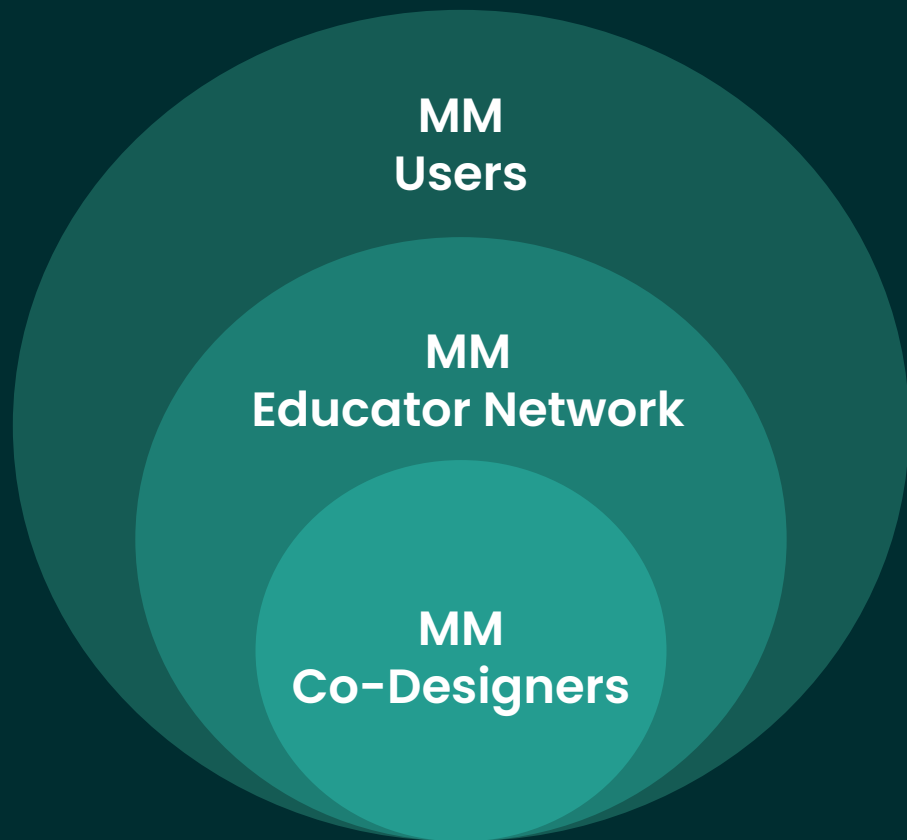
MM Co-Designers

Who We're Looking for as Co-Designers

Classroom environment that supports visible thinking

Lesson design informed by students' prior knowledge and other assets

School environment supportive of innovative instructional design

Commitment to eliminating barriers for students

Math Milestones Co-Designers

We're looking for teachers who want to help us co-design resources by trying out the tasks in SY 22-23 and collaborating with us to design supporting resources.

- **July 19-21, 2022**
  Kick-off the co-design process with professional learning and intensive collaboration around the work.

- **SY 2022-23**
  Monthly Network meetings with focus tasks to try out and share the results with your network colleagues.

- **December 2022 & June 2023**
  Post the first sets of instructional resources to the website.

How to get involved

MM
Users

MM
Educator Network

MM
Co- Designers

Sign up on
our website

Apply by
May 15
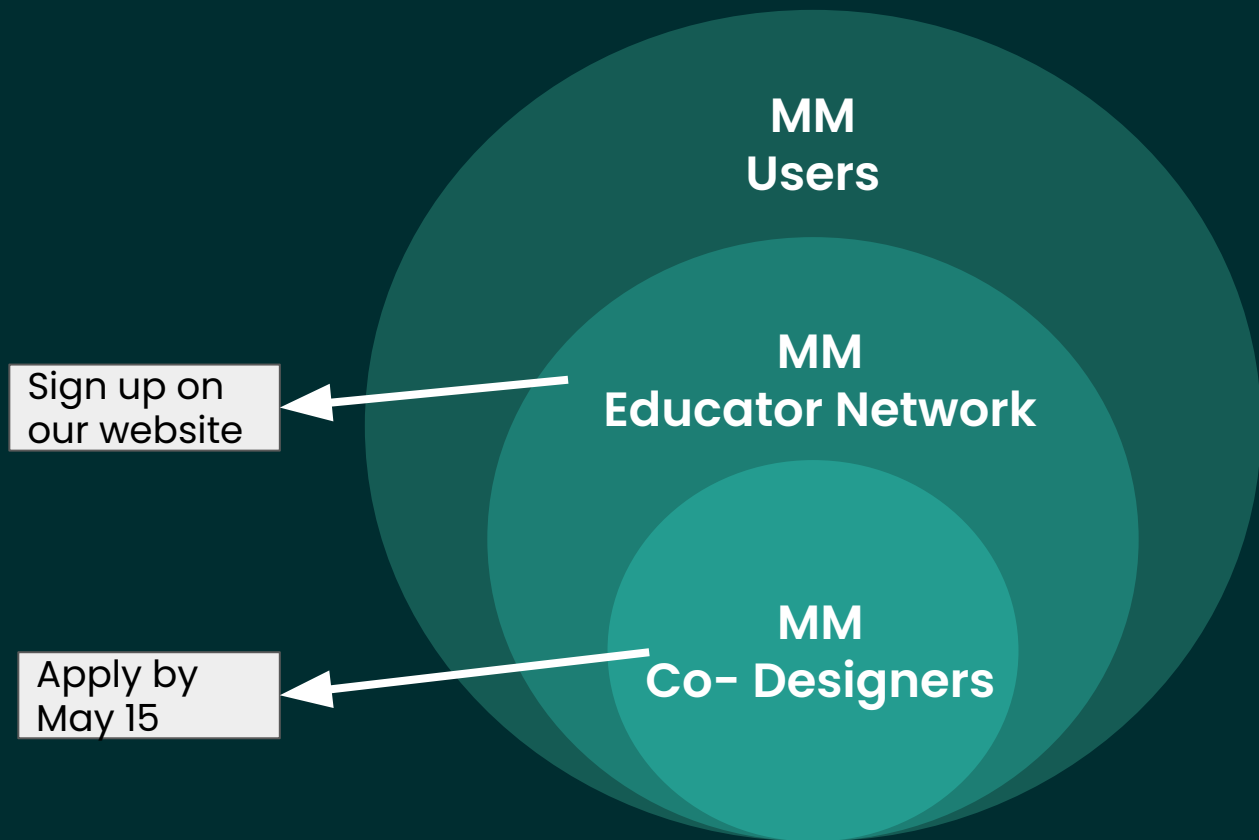
District, State and Partner Engagement Opportunities

More information to come!

Please reach out for further discussion:

salberti@studentsachieve.net

Thank you!