

Section h.

Cultural Responsiveness: Demonstrate how each program submitted aligns with the expectations outlined in the New York City Department of Education Definition of Culturally Responsive-Sustaining Education and the New York State Culturally Responsive-Sustaining Education Framework.

Culturally Responsive-Sustaining Education

Alignment to NYC DOE and NY State CR-SE Frameworks

Amplify Desmos Math New York was developed to help every student learn math and love learning math. To accomplish that goal, we created an engaging, high-quality curriculum - and we know that in order to build a curriculum that is engaging and high-quality for all students, we need to ensure that we include learning experiences that are culturally responsive and inclusive. We want all students to see themselves as capable mathematicians and to recognize the brilliance of their own and their classmates' ideas about math. Our curriculum not only provides students with opportunities to express their thinking in different and interesting ways, it also offers windows for students to see into the experiences of the people and communities around them.

Amplify Desmos Math New York is proud to exemplify the philosophies and principles in the [New York City Department of Education Definition of Culturally Responsive-Sustaining Education](#) and the [New York State Culturally Responsive-Sustaining Education Framework](#). The values described in these documents and NYC Theory of Action for Mathematics Teaching and Learning are brought to life in the program. We have centered our response on both these documents and the [CR-SE in New York City Public Schools in Mathematics document](#).

The NY State CR-SE Framework notes the following four principles for culturally responsive and sustaining classrooms:

- Welcoming and Affirming Environment
- High Expectations and Rigorous Instruction
- Inclusive Curriculum and Assessment
- Ongoing Professional Learning

Welcoming and Affirming Environment

Our resources help teachers create a welcoming and affirming environment by encouraging students to share their mathematical ideas and thinking throughout Amplify Desmos Math New York lessons. Students are at the center of our program, and all students are welcomed into our program. Some of the ways we establish a welcoming and affirming environment are through:

- Our Math Identity and Community questions that invite students to reflect on their math identity, classroom community, and metacognition around mathematics.

- Low floor, high-ceiling activities that provide an entry point for all students and allow exploration for students regardless of their previous mathematics experience.
- Unit stories which help provide context for content and provide a common entry point for students into the math of the unit.

High Expectations and Rigorous Instruction

We offer an inclusive curriculum centered on rigorous instruction. Each lesson is focused on a grade-level math goal, ensuring all students have access to high-quality, grade-level math instruction. Several of the ways that we celebrate high expectations and rigor are through:

- Rigorous lesson-level content and language goals that incorporate the Standard for Mathematical Practice.
- Centering student brilliance whenever possible: through peer-to-peer discussion, collect and display routines, our Snapshot tool, Challenge Creator, and rich discourse opportunities for students to learn from one another.
- Incorporation of different modalities of language to develop students' practice with expressing their ideas in multiple ways.

Inclusive Curriculum and Assessment

We are committed to creating an inclusive curriculum where students can see themselves represented. Our curriculum and the platform allow for a range of learning styles and methods for students to communicate their mathematical understanding. Some aspects of our inclusive curriculum and assessment include:

- A variety of low-pressure formative assessments where students are encouraged to explore and develop their ideas.
- Celebration of a learning culture where students learn from each other and each other's ideas to hone their understanding of mathematics.
- Rich, diverse illustrations and representations of cultures and background through our art and unit stories.

Ongoing Professional Learning

To support adept use of Amplify Desmos Math New York, we offer educators and administrators ongoing professional learning which is detailed in our professional learning plan.

In short, the entire Amplify Desmos Math New York classroom experience is designed from the ground-up to encourage students to share their emerging mathematical thinking, immerse themselves in contextualized mathematics, and draw upon their own personal experience and insight as they solve real-world tasks.

Alignment to the NYC DOE CR-SE in Mathematics Guide

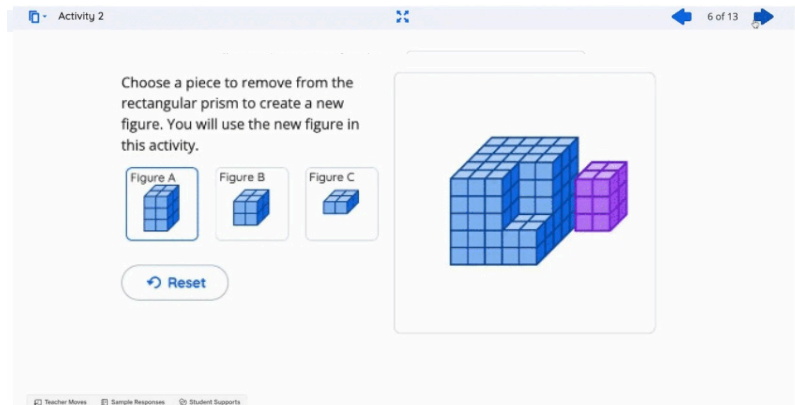
To further demonstrate Amplify Desmos Math New York's commitment to the New York City Public Schools values, we have referenced the *Culturally Responsive-Sustaining Education in New York City Public Schools in Mathematics* framework. Our submission to the NYC Department of Education Curriculum Request includes a subset of key units and lessons from our program. This document highlights components of the submitted units that align with the expectations in the framework, as well as examples from other units to demonstrate that our alignment to these principles is universal through our program.

The *Culturally Responsive-Sustaining Education in New York City Public Schools in Mathematics* framework provides insight into the aspects that New York City Public Schools value in mathematics curriculum and pedagogy through the New York City Theory of Action for Mathematics Teaching and Learning, as well as the Design Principles for Mathematics Education that are Culturally Responsive and Sustaining. Below we describe how our program philosophically aligns with these components of the *Culturally Responsive-Sustaining Education in New York City Public Schools in Mathematics* framework.

NYC Theory of Action for Mathematics Teaching & Learning

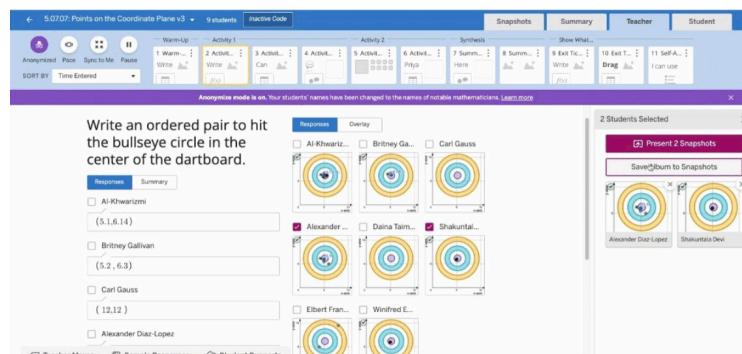
1. **Students learn mathematics best when they become math doers instead of mere answer-getters.**

Amplify Desmos Math New York is a problem-based learning curriculum, where students explore content in context. We show students what their mathematical ideas mean in those contexts and without judgment, give them the freedom to revise their thinking and the incentive to build on their earlier ideas.



2. **Students engage in a productive struggle with cognitively-demanding mathematical concepts and analyze their own and their peers' thinking as it develops.**

Student thinking is a powerful resource in Amplify Desmos Math New York classrooms, and our lessons and collaborative digital tools are centered around highlighting students' experiences, strengths, and knowledge of math through rigorous tasks - for the benefit of the entire class. For example, the

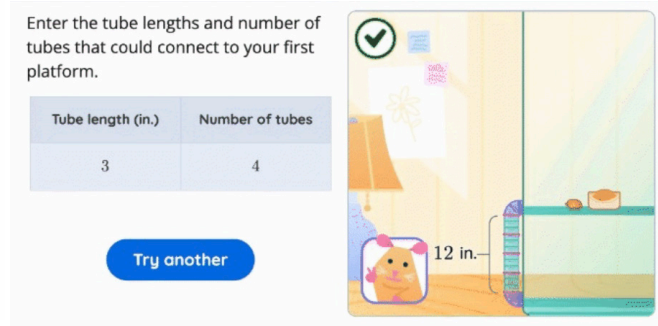


Snapshot Tool allows teachers to display a variety of student solutions and thinking, anonymized if desired, to help facilitate classroom discussions. Mathematical discourse that is grounded in student work helps students see the value of theirs and their classmates' thinking.

3. Teachers facilitate instruction that is student-centered, coherent, connected, focused, and oriented toward sense-making.

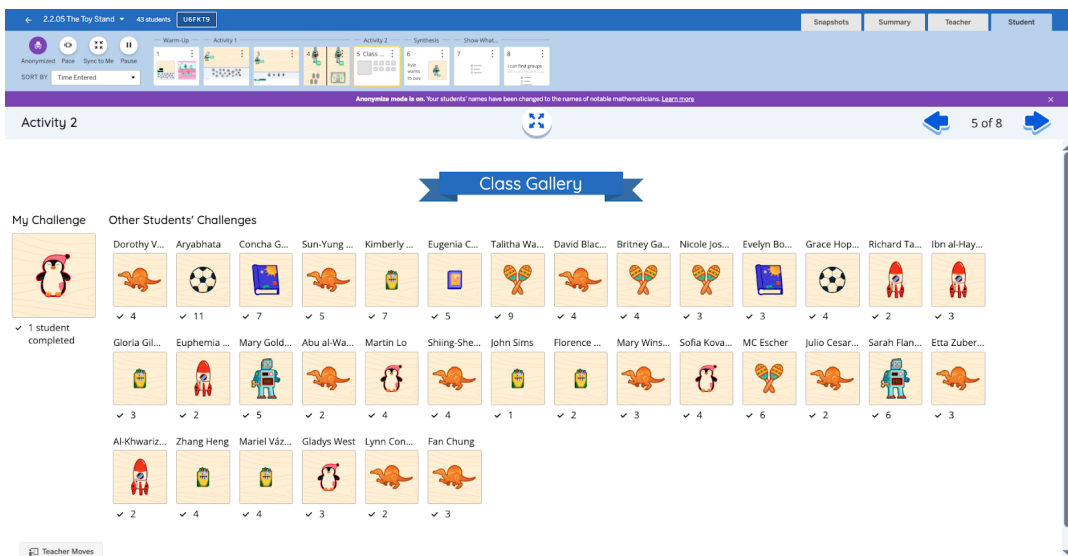
Our program is centered on sense-making and rooted in interpretive feedback. Amplify Desmos Math New York interpretive feedback goes beyond telling students whether they are wrong or right.

- We allow students to [select the path that shows less or more](#) as they develop early number sense.
- We have students [make 10 blocks that are just the right size](#) for a millipede to cross a gap.
- Students explore factors as they work to build a [tube that lets their hamster get to another part of its habitat](#).



4. In these classrooms, all students have a sense of belonging and the opportunity to create networks of understandings that empower them to make effective use of mathematics in the classroom and beyond.

Our dashboard conversation tools allow teachers to display anonymized student responses as they come in. This fosters rich discussion, and creates shared understanding of math. Students are empowered when they see how their thinking is used to drive learning in their classroom. We leverage student-to-student routines as well, such as Challenge Creator, where students create mathematical challenges for each other and solve one another's, cultivating an asset-based sense of belonging and community.



Design Principles for Mathematics Education that are Culturally Responsive and Sustaining

The *Culturally Responsive-Sustaining Education in New York City Public Schools in Mathematics* framework includes Design Principles for Mathematics Education that are Culturally Responsive and Sustaining. The principles outlined in this document are rooted in the same philosophical underpinnings as Amplify Desmos Math New York. From that document:

Culturally responsive-sustaining mathematics pedagogy is grounded in the following three principles:

1. Promoting Pedagogical Knowledge and Mathematical Thinking
2. Leveraging Cultural and Linguistic Funds of Knowledge
3. Attending to Issues of Power and Social Justice in Mathematics Education (Aguirre, 2013).

Below, we have outlined Amplify Desmos Math New York’s intentional program design and its alignment with these principles. For each item, we’ve included a brief summary of how we intentionally design for this element at the programmatic level.

CR-SE Design Principle: Promoting Pedagogical Knowledge and Mathematical Thinking

Promoting Pedagogical Knowledge and Mathematical Thinking includes several components critical to the development of mathematical thinking, specifically:

1. The Standards for Mathematical Practice (SMP)

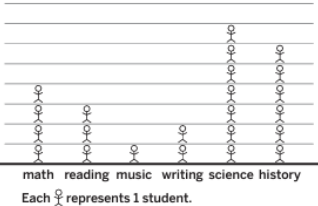

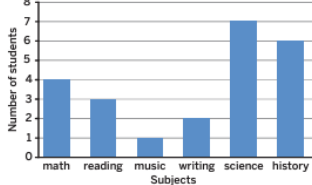
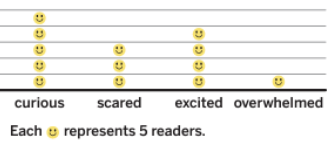

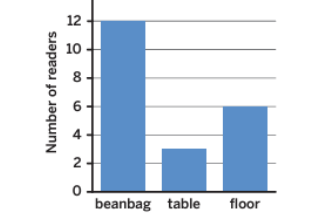
Amplify Desmos Math New York is designed with intentional development of each of the Standards for Mathematical Practice. Each lesson addresses one or more SMP, and the [Unit Overview page](#) highlights the key Math Practice Standards for the unit. SMPs are not a tacked-on addition to our program – our lessons have been designed to engage mathematical practices in conjunction with the mathematical standards. This architecture and attention to deep understanding is fundamental to our program.

Attention to the Standards for Mathematical Practice are embedded in our units, sub-units, and lessons. The unit and sub-unit pages provide an overview of the *Math that Matters Most*, which showcases the combined knowledge and skills that students will develop and hone during that learning sequence.

2. Mathematics pedagogy

We believe that students are creative, knowledgeable, and brilliant, and our design principles reflect this belief throughout our program. We center and elevate student learning through rigorous, grade-level tasks that embed content in context. We focus on conceptual understanding and interpretive feedback, welcoming students to share their thinking without judgment. We focus on developing students’ mathematical identity and providing regular opportunities for students to reflect on their mathematical journey.


Progression of Strategies, Skills, or Language

Progression	For example . . .	
<p>Creating a picture graph or bar graph with a scale of 1.</p>	<p>Subjects We Are Excited to Learn More About</p>  <p>Each  represents 1 student.</p>	<p>Subjects We Are Excited to Learn More About</p> 
<p>Interpreting data represented on a picture graph or bar graph with a scale of 1 to solve one- and two-step problems.</p>	<p>There were 23 students who responded to the question.</p> <p>The same number of students are excited to learn more about either math or reading as the number of students excited to learn more about science.</p>	
<p>Creating a scaled picture graph or scaled bar graph.</p>	<p>How Do You Feel When You Enter the Library?</p>  <p>Each  represents 5 readers.</p>	<p>Favorite Place to Read</p> 
<p>Interpreting data represented on a scaled picture graph or scaled bar graph to solve one- and two-step problems.</p>	<p>There are 10 more students who feel scared when they enter the library than the number of students who feel overwhelmed.</p> <p>There are 3 more students whose favorite place to read is a beanbag compared to the combined number of students whose favorite places are a table or the floor.</p>	

Student Brilliance


You will tell your own addition story problems.

1




Partner A picks a card and tells a story that matches the expression.

2



Partner B represents the story with cubes on the Story Mat.

3



Work together to find the sum.

Rigor

A conjecture is a statement you believe is true based on the current information you have.

Discuss

What conjectures could you make about when you would need to decompose a ten to subtract?

✎✍✏🔄

↶↷✕

43 - 1
43 - 2
43 - 3
43 - 4
43 - 5
43 - 6
43 - 7
43 - 8
43 - 9

37 - 1
37 - 2
37 - 3
37 - 4
37 - 5
37 - 6
37 - 7
37 - 8
37 - 9

Mathematical Identity

I am a doer of math.
What number patterns do you see around you?

I can be all of me in math class.
What do you do when you are faced with a math problem that you do not immediately know how to solve?

We are a math community.
How do your classmates support you as a doer of math? How do you support your classmates?

3. Collaboration

Our curriculum celebrates collaboration. We design lessons that utilize mathematical routines and structures that foster student to student collaboration, both digitally and face to face in the classroom. Amplify Desmos Math New York classrooms are language-rich. Students learn with one another, frequently collaborating in partners and in small groups in addition to independent work time. Teachers engage in a Launch-Monitor-Connect framework, engaging learners with problem contexts and then monitoring students' work, both oral and written. The teacher and students together then connect their learning as a community.

Collaboration is a central component of our digital lessons in addition to our print lessons. In every digital lesson, students are still talking with one another in partners or groups. Displayed discussion prompts make conversation a central part of lessons whether they are print or digital. Students also have opportunities to use Challenge Creator in order to make their own math challenges and share them with their classmates. Collaboration also comes alive in Teacher Presentation Screens, where the teacher and students can work together to manipulate variables and celebrate the dynamic nature of mathematics.

Our curriculum celebrates interpersonal, face to face collaboration. Many lessons contain Math Language Routines (MLRs) and collaborative structures. Teachers are prompted to utilize MLRs throughout lessons, helping foster a supportive classroom environment where all voices matter and can learn from one another. Students work with one another in Centers and on a variety of tasks, placing student brilliance at the center of our curriculum.

Compare and Connect (MLR7)

Do you want your students to make sense of multiple strategies for solving the same problem?

GOAL: Provide opportunities to identify, compare, and contrast multiple strategies

★ TIP

During partnered discussion, consider displaying sentence frames such as, "First they... Next they..." "Their strategy was to..." or "I see... in both strategies."

How to do it:

- Invite students to solve a problem that can be solved with multiple strategies. Then, display two hypothetical or anonymous examples of student work representing different strategies.
- Give students time to analyze the strategies on their own and then discuss with a partner.
- Facilitate a whole-class discussion to describe, compare, contrast, and connect the different strategies. Utilize open-ended questions like, "Why did different strategies lead to the same answer?" or "What was helpful about each strategy?"

CR-SE Design Principle: Leveraging Cultural and Linguistic Funds of Knowledge

The framework includes several approaches for leveraging the cultural and linguistic funds of knowledge that students bring to the classroom, including:

1. Collaborating with families as partners in their children’s education

Our Caregiver Hub site informs guardians about the math that their students are engaging in and welcomes them as co-learners along with their students. On our Caregiver Hub site, caregivers are provided:

- An introduction to Amplify Desmos Math New York
- A visual, accessible overview of the program and approach
- An explanation of student-centered learning
- A description of what an Amplify Desmos Math New York lesson might look like
- A collection of the unit-level and lesson-level math resources organized by grade

2. Tasks specifically designed to elicit approaches grounded in and informed by student experience

Amplify Desmos Math New York lessons are grounded in context and student experiences play an essential role as part of the learning process. Each unit is launched with a unit story, coupled with an investigation lesson.

Unit stories provide authentic contexts for the math of the unit that capture student interest, increase engagement, provide entry points for students, and provide intrinsic motivation for students to want to learn the math. These stories help foster math identity and community by helping students see themselves and their communities in math, and by helping students see math as part of their identities and communities.

Students get to know the characters, setting, and plot of the story, all of which they will encounter again across the unit. Students also engage in the Notice and Wonder routine throughout the story and share their thinking about and discuss how they see math in the story. Across the unit, the Unit Story context and characters are used at appropriate points to inspire and engage students in the math as well as in reflections about their math identity and community.



Teacher Moves

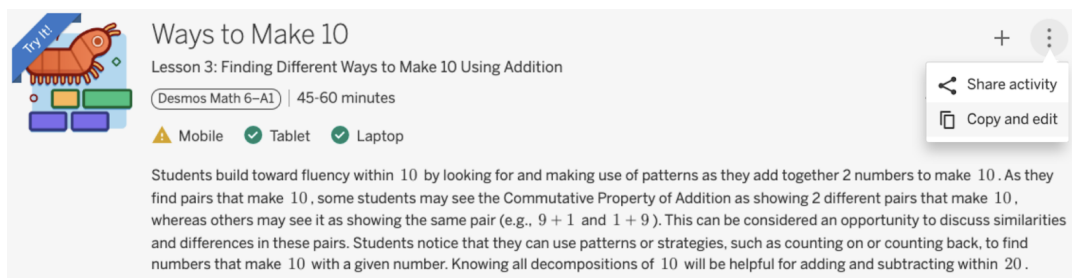
Unit Story

Say, "There's who I am when I'm with my teachers; who I am when I'm with my friends; who I am when I'm talking to my neighbors..."

Sometimes I wonder what it would be like if everybody saw every part of me all the time. Would they like what they saw? I start to feel like I'm about to split into 23 different pieces! And those pieces split into 24 pieces of their own!"

3. Resources for educators to individually, and in collaboration with colleagues, examine the ways their own identities form pedagogies

The flexible, adaptive, and social nature of the Amplify Desmos Math New York platform allows teachers to modify lessons to fit their contexts and share those lessons with each other to iterate on and improve their practice.



Teachers also find suggestions embedded in each lesson that they can use to provide opportunities for all students to mathematize their world. This is especially important for students who may not see themselves as belonging in math or may not see math as belonging in their lives. Teachers can use the suggested prompts to broaden students' ideas about what it means to be good at math, highlight the value of each student's contributions, and to celebrate math class as a place for coming together to think in flexible, creative, and interesting ways. These habits of mind can help students engage with math joyfully and successfully both in and outside of math class.

CR-SE Design Principle: Attending to Issues of Power and Social Justice in Mathematics Education

The final key component of the design principles is how math learning should be designed to reflect and challenge real-world issues of discrimination, power, and social justice. There are several tools mentioned as a way to attend to issues, including:

1. Representation

Representation is a key design principle of Amplify Desmos Math New York. In our design process, we are intentional with broadening representation in several ways. For example, the student names that we use in our lessons represent a wide range of cultural and gender identities. We highlight experiences from many different communities, geographies, and cultures in our unit stories and characters to give students windows into other experiences as well as mirrors reflecting their own world.

Anonymize n			
Wen-Tsun Wu	⋮		
Talitha Washington	⋮	●	
Mary Winston Jackson	⋮	●	
Trachette Jackson	⋮		
Zhang Heng	⋮	●	
Ibn al-Haytham	⋮		✓
Euphemia Lofton Haynes	⋮		✗
Kimberly Weems	⋮	●	✗
Aryabhata	⋮	●	✗
Mary Golda Ross	⋮	●	
Etta Zuber Falconer	⋮		✗

We thoughtfully curated a list of mathematicians used in our Anonymous mode that overrepresent identities (race, gender, sexual orientation, etc.) and have been historically excluded in mathematical fields and showcases mathematicians in many different fields, including outside of academia. We are intentional in our design for representation, and iterative. We continually assess our images, contexts, and language to consider how we might improve our processes and make changes to ensure students can see themselves reflected in our program.

2. Strategies and tools for engaging more learners

The Amplify Desmos Math New York curriculum is designed to welcome all students with “low floor, high-ceiling” experiences and provide a common entry point, as well as multiple modalities of learning. The stories that ground each unit welcome each student to the math of the unit through a narrative, regardless of their background knowledge. At the same time, students are prompted and welcomed to provide their funds of knowledge during the story and throughout each unit.

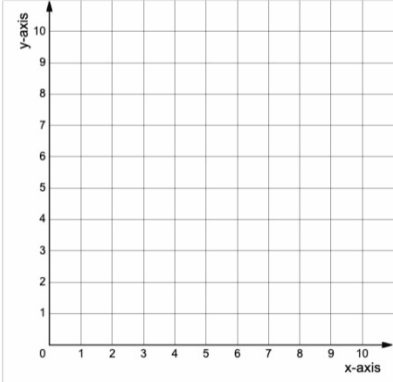
Our lessons are rooted in rich feedback where students can see the meaning of their mathematical ideas - both in digital lessons through our responsive platform and in paper lessons as teachers are guided to launch, monitor, and connect mathematical concepts. With interpretive feedback, students can feel comfortable to take risks without the fear of being marked incorrect and not knowing why. Some lessons also utilize digital tools that allow students to submit written, audio, or pictorial evidence of their responses to prompts. Giving students choice in how they convey their thinking helps promote inclusivity and keeps students engaged with the math.

Warm-Up

Write numbers in the table and then press **Try it!**

x	y	Ordered pair
		(,)

Try it!



3. Using the math discipline to inspect and address injustices in society

In Amplify Desmos Math New York, students engage with the broad spectrum of the human experience through images, names, scenarios, and text. In our elementary lessons, students engage with issues of justice in age-appropriate ways. In the Grade 2, Unit 2 story, students

learn how “regular” people can be superheroes and impact their communities through the context of a community rallying to fix a library impacted by a storm.



Our program includes specific attention to creating a supportive and equitable mathematical community, with student-facing questions and prompts for the teachers to discuss these questions with students.

We are a math community.
What does good listening look like and sound like in a math community?

I can be all of me in math class.
What is something you are proud of from your work today?

We are a math community.
Mel was a good role model in the story. How can you be a good role model for your math peers?



CR-SE Curriculum Attributes

The *Culturally Responsive-Sustaining Education in New York City Public Schools in Mathematics* framework includes, as an appendix, attributes of tasks, units, and contexts that are culturally responsive and sustaining. The attached appendix utilizes these culturally responsive-sustaining task attributes, unit attributes, and contexts to demonstrate how both tasks and units in Amplify Desmos Math New York align to these values.

Conclusion

It is clear how deeply connected and shared the principles of curricular design for equity are between New York State, New York City, and Amplify Desmos Math New York. The examples cited in this document are just a selection of cases showing how our program aligns with the NY State and City CR-SE Frameworks and the NYCPS CR-SE in Mathematics documents. This alignment grows out of our passionate belief in students’ brilliance, and our mission to help teachers nurture that brilliance.

Appendix: Alignment to CR-SE Curriculum Attributes

Culturally Responsive-Sustaining Task Attributes	
<p>To illustrate our alignment to the attributes of culturally responsive-sustaining tasks, we have included example tasks and activities. These tasks are representative of our approach and not an exhaustive listing of material exemplifying the attributes..</p>	
<p>Welcoming: Is inviting and engages all students. Is respectful of any cultures it represents, and welcoming to people of any identity, background, and culture.</p> <p>Amplify Desmos Math New York K-5: Each K-5 unit begins with a unit story. The unit story not only provides cross-curricular connections, it also provides a common entry point for all students. Students are provided with a background context, and are invited to share their own knowledge through teacher-directed questions in the read-aloud.</p>	
<p>Grade 1, Unit 5, Lesson 1: Squashes at the Playground</p> <p>In this unit story, students read about wazzle-squashes that fall from the sky. The townspeople clean them up and make pies and sculptures out of the squashes.</p> <p>Students begin this lesson with their teacher, immersed in a story about the wazzle-squashes that fell from the sky. Students are asked to use information from the town’s mayor to identify how many wazzle-squashes are on the playground. The story context invites all students to the lesson in an engaging context.</p> <p style="text-align: center;">Mayor Viola’s Information</p> <ul style="list-style-type: none"> • There are wazzle-squashes on the <i>bench</i> and on the <i>slide</i>. • The amount of wazzle-squashes on the <i>bench</i> is a <i>number of tens</i>.  • The amount of wazzle-squashes on the <i>slide</i> is a <i>one-digit number</i>.  • The total amount of wazzle-squashes is <i>greater than 50</i>. • The total amount of wazzle-squashes is <i>less than 90</i>. 	<p>Grade 3, Unit 5, Lesson 1: Making Parts and Wholes</p> <p>In this unit story, students read about a character who befriends a tiny tailor. They give each other material to make new patterns, needing to measure the shape just right.</p> <p>After engaging in the unit story with their teacher, students are given pattern blocks to match the shapes they are given with their partners. Students receive a shape and can collaborate to build that shape, with no wrong approach and an emphasis on exploration. They then refine their approach and build strategy through a series of guiding questions. Students leverage their own knowledge in the activity to explain how they could use pattern blocks to meet each description.</p> <p>Use your pattern blocks to create as many shapes as you can that match each description. Then create a poster for each description showing the shapes that match that description.</p> <ul style="list-style-type: none"> • Description A: Each individual block is a <i>half</i> of the whole shape. • Description B: Each individual block is a <i>third</i> of the whole shape. • Description C: Each individual block is a <i>fourth</i> of the whole shape.

Rigorous: Provides students the opportunity to go deep with mathematics by being cognitively demanding, aligned to standards, and conceptually based.

Amplify Desmos Math New York K-5: Our lessons do not shy away from rigorous math, and in fact celebrate rigorous math and student-constructed explanations. We both provide students with enough support to both allow them to showcase and explain their math knowledge and the space and items to practice their new understanding.

Grade 2, Unit 7, Lesson 6: Sorting Addition Expressions

In this lesson, students analyze addition expressions and sort them into categories based on what they know about composing. They make use of place value structures and discover that some expressions require composing a ten and a hundred to find the sum. They notice that sometimes a hundred is composed only after composing a ten. Students utilize their brilliance by highlighting this discovery for themselves in an oral explanation, synthesizing their work in the classroom through that understanding.

Grade 5, Unit 3, Lesson 11: Sharing Cat Food

Students use diagrams and division equations to interpret and represent story problems in which a part of a whole is shared equally. They explain how familiar diagrams, such as number lines, area diagrams, and tape diagrams, and a division equation in which a unit fraction is divided by a whole number, represent the same problem. Students conclude the lesson by utilizing their understanding of equal-sharing division problems to explain why the quotient is always a unit fraction smaller than the dividend.

Interconnected: Ensures that mathematical ideas are not learned in a vacuum by providing opportunities for students to make connections. Possible connections can include other mathematical concepts, other content areas, real-world contexts, and cultural and linguistic funds of knowledge.

Amplify Desmos Math New York K-5: Unit stories provide a rich context for the unit's content. Each unit provides connections back to the unit story, linking math with literacy and story-telling. Tasks in lessons often link back to the unit story.

Grade 2, Unit 4, Lesson 11: Showing Strategies

In *Showing Strategies*, students connect back to the unit story, in which they learned about a seed named Sid. In this lesson, students use number lines to represent equations, focusing on the number of sunny days as they consider what silver wattle trees need - the very tree that Sid grew up to be.



Grade 5, Unit 1, Lesson 7: Packing the Barge

This unit's story centers on Trashville's overflowing landfills and how they learn from another town how to reduce their waste. This lesson connects to the unit story as students explore how different units can affect the measurement of volume as they consider how to pack Trashville's trash barge.



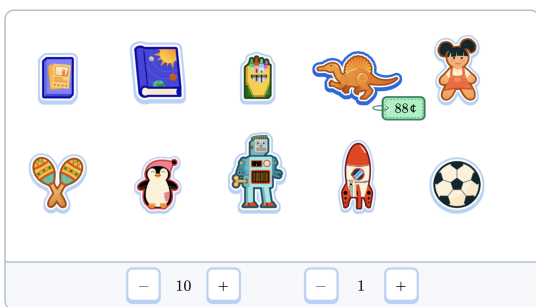
Sustaining: Empowers students through explicitly and implicitly accessing student experiences, choices, and agency. Centers students' identity, perspective, ideas, and experiences as core assets to the task.

Amplify Desmos Math New York K-5: One of the benefits of our powerful digital platform is that teachers and students can use data to both create and modify real-time mathematical representations. Students can see themselves reflected in both problem contexts and data.

Grade 2, Unit 2, Lesson 5: The Toy Stand

In this lesson, students use Challenge Creator in a digital lesson. Students select a toy and choose a price for their toy, then identify what combination of coins could be used to purchase their toy. They solve their own challenge and then can complete their classmates' challenges.

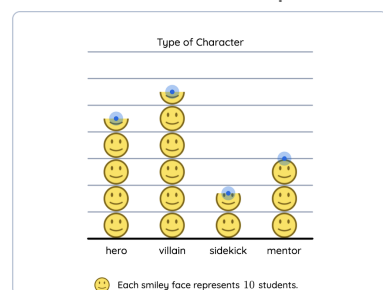
Choose a toy and a price.



Grade 3, Unit 1, Lesson 14: Which Character Are You?

Students collect data about their class, working in partners and self-identifying as a hero, villain, sidekick, or mentor and explaining their reasoning. The students collect the class's data and use their class data to create a scaled picture graph unique to their classroom's makeup.

How can you show that 27 students chose villain on this scaled picture graph?



Culturally Responsive-Sustaining Unit Attributes

Amplify Desmos Math New York units align to the principles of culturally responsive-sustaining units by design. Our units emphasize flexibility in student thinking and discourse is a centerpiece of our approach. Students are invited to utilize multiple domains of language and to reflect metacognitively on their own thinking.

Flexible: Elicits and highlights varied mathematical thinking by allowing for:

- a wide variety of engagement modalities;
- the use of multiple solution paths (including those aligned to standards that are above, at, and below grade level); and
- multiple representations, tools, and manipulatives.

Amplify Desmos Math New York K-5: Our program is centered on celebrating the ways that students work through their understanding. We leverage student thinking and student explanations of multiple approaches to develop authentic conceptual understanding that can translate into fluent application.

The examples below are demonstrative of how all of our units celebrate the flexibility of student thinking. While each example relates to a specific lesson, these examples illustrate our underlying pedagogy of welcoming and leveraging flexible student thinking.

- **In Grade 1, Unit 4, Lesson 21**, students use connecting cubes and towers of 10 to represent a given two-digit number in three different ways.
- **In Grade 3, Unit 2, Lesson 10**, students determine the areas of rectilinear figures shown on a grid in a way that makes sense to them. Students use their understanding of the structure of rectangles to choose a strategy for determining the area, and they see that area is additive.
- **In Grade 4, Unit 5, Lesson 7**, students create two-step problems for their classmates to solve. Students focus on what information is important to include when creating their problem and make decisions about how to communicate multiplicative comparison relationships in their problems.

Promote Discourse:

- Provides the opportunity for meaningful collaboration through oral, written, and technology-based communication.
- Provides supports for respectful sharing and critiquing of reasoning using a mix of academic, home, familiar, and informal language.
- Promotes the understanding and valuing of contributions from a diverse community of learners.

Amplify Desmos Math New York K-5: A classroom using Amplify Desmos Math New York is one rich in discourse, both between students and between the teacher and students. We provide strategies for students and teachers to talk about students' ideas and to continue to develop their thinking in collaboration with one another. The selected Math Language routines below are embedded into each unit and provide examples of the rich discourse in our program.

Number Talk

Do you want to encourage students to think about structure, patterns, and properties?

GOAL: Develop fluency and solve problems efficiently with various strategies

★ **TIP**

During class discussion, consider asking open-ended questions like, "Did anyone find the answer a different way?" or "How are the strategies we used the same? How are they different?"

How to do it:

- Display one math problem at a time.
- Say, "Take a few moments to quietly think about how you would solve this problem. Then, give me a signal when you are ready to share."
- During class discussion, ask several students to share how they solved the problem. Record explanations for all to see.

Which One Doesn't Belong?

Do you want to support students in noticing and precisely describing properties of mathematical objects as they compare and contrast them?

GOAL: Foster a need to define terms carefully and use words precisely

★ **TIP**

Consider labeling each corner of the room as a different object. Then, invite students to move to a corner of their choosing and explain how the object does not belong.

How to do it:

- Display four mathematical objects such as, figures, diagrams, graphs, or expressions. Then ask, "Which one doesn't belong? Why?"
- Give students time to think independently and encourage them to look for more than one possibility.
- Invite students to share ways that each choice is different from the rest with the whole class, and consider recording each students' name and their shares.

Compare and Connect (MLR7)

Do you want your students to make sense of multiple strategies for solving the same problem?

GOAL: Provide opportunities to identify, compare, and contrast multiple strategies

★ **TIP**

During partnered discussion, consider displaying sentence frames such as, "First they... Next they..." "Their strategy was to..." or "I see... in both strategies."

How to do it:

- Invite students to solve a problem that can be solved with multiple strategies. Then, display two hypothetical or anonymous examples of student work representing different strategies.
- Give students time to analyze the strategies on their own and then discuss with a partner.
- Facilitate a whole-class discussion to describe, compare, contrast, and connect the different strategies. Utilize open-ended questions like, "Why did different strategies lead to the same answer?" or "What was helpful about each strategy?"

Language Rich: Exposes students to academic language and discipline specific vocabulary in context to support them in forming, articulating, and communicating complicated mathematical ideas.

Amplify Desmos Math New York K-5: Classrooms are filled with mathematical language—spoken, written, illustrated, and otherwise expressed. In every lesson, students engage with mathematical language, encountering words in context before assigning a formal definition. Language is not gatekept and students are empowered to practice their mathematical vocabulary as it develops.

The lessons below are demonstrative examples; every lesson in every unit is grounded in Math Language Routines and frequent, respectful collaboration meant to promote understanding for all learners.

- **In Kindergarten, Unit 3, Lesson 15**, students compose shapes from simple shapes. Students then try to explain to their partner how to build a shape that matches their shape. They are introduced to the terms *above*, *behind*, *below*, *beside*, *between*, *in front of*, and *next to*. Students apply their understanding of the positional words as they identify the location of shapes in a drawing. Then students build and describe shapes again to practice using more precise mathematical language.
- **In Grade 2, Unit 2, Lesson 20**, students construct arguments based on their conceptual understanding of interpreting and solving one- and two-step story problems. They use their own language to justify whether student work samples show a correct solution for a two-step story problem where only two values are given.
- **In Grade 5, Unit 1, Lesson 3**, students compose and decompose rectangular prisms with unit cubes, developing language to describe the layered structure. They use the layered structure to develop more efficient strategies to determine volume and to consider what makes 2 prisms different.

Metacognitive:

- Encourages students to reflect on their own learning about both the mathematics and their executive functioning.
- Helps students understand how what they learned will be useful in the future.

Amplify Desmos Math New York K-5: Metacognition is a routinized and intentional piece of our curriculum. Students are regularly invited to reflect on their classroom, their thinking, and their developing and iterating understandings of mathematical concepts. These questions lead into each lesson, providing dedicated space for metacognition in addition to embedded moments in lessons.

G1: G3: G5:

- **Grade 1, Unit 3, Lesson 20** includes several metacognition moments, including:

A2 Connect: Use the **Think-Pair-Share** routine. Ask, “Think about a strategy that a classmate shared that was different from yours. Why do you think mathematicians sometimes use different strategies?”

Synthesis: Use the **Think-Pair-Share** routine. Ask, “What is 1 way you have grown as a mathematician during this unit?” Have students reflect independently for 1 minute before sharing with a partner.

- The following examples from **Grade 5, Unit 4** outline several think-pair-share moments where students engage in metacognition, with scaffolded sentence stems to provide structure to students’ responses.

Use the Think-Pair-Share routine. Invite students to reflect on everything they have learned about multiplication and to use the sentence frame to structure their reflection.

Use the Think-Pair-Share routine. Invite students to reflect on everything they’ve learned about division and to use the sentence stem on the screen to structure their reflection in conversation with their partner.

Use the Think-Pair-Share routine. Invite students to reflect on what they have learned about parentheses. Invite students to use the sentence stem on the screen to structure their reflection in conversation with their partner.

Culturally Responsive-Sustaining Contexts

Amplify Desmos Math New York K-5: Our program is grounded in students making sense of mathematics and how it connects with the world. One of the ways that we emphasize the interconnected and meaningful nature of mathematics is by grounding each K-5 unit in a unit story. The story both launches the unit and provides a common entry point to all students. Through stories, students can access familiar and novel contexts, as well as city-specific applications of math. They see math as its *own* context and engage with age-appropriate applications of social justice and equity.

Our stories are not a one-and-done for the unit. Instead, students return to the context of the story multiple times throughout a unit, continually applying their understanding of mathematics to the context of the story.

Familiar contexts (mirrors): Allowing students to build upon their existing understandings about the world in order to explore mathematical relationships and use mathematics to understand situations that are relevant to their lives.

- The **Grade K, Unit 1** story centers on a familiar context: The first day of school. This story features several students and the journeys that they take on their way to their first day of school.
- In **Grade 2, Unit 5**, a student learns all about her mail carrier and how the mail carrier gets to know a neighborhood and community. In **Grade 3, Unit 1**, the story centers around a library and organizing an event at a library. In both examples, students see familiar contexts that can connect to their own knowledge.
- **Grade 5, Unit 2**’s story is centered around planning a family party. Sage spends the whole morning cleaning the house for a family arrival, a context that might be very familiar for many students.

Unfamiliar contexts (windows):

Broadening students' exposure to other cultures and other patterns of thinking, and allowing them to apply mathematics as a tool to make sense of the world.

- In **Grade 1, Unit 6**, two siblings go to a bird sanctuary. Some students may have visited one before and many may not have. All students can explore the sanctuary through the rich illustrations and narration of the story.
- The **Grade 3, Unit 3** story is centered around a photographer who travels to different monuments to take pictures, including the Seattle Space Needle and Hoover Dam. Students see images of many monuments, some of which may be unfamiliar and spark curiosity.
- Several fourth grade stories offer novel contexts for many students, including the **Grade 4, Unit 4** story where students learn about rescuing sea turtles, and in **Grade 4, Unit 6** where students read about a lei shop in Hawaii.

NYC contexts: Leveraging the diversity and vibrancy of NYC and providing opportunities for students to use mathematics to understand the city where they live, making cross-disciplinary connections wherever it is supportive to the learning.

There are several unit stories that connect to the rich vibrancy of New York City. In **Grade 1, Unit 1**, students may recognize the sign on a subway illustration that says, *Union Station*. A teacher might draw a connection between New York City's rich cultural centers and art museums when students visit an art museum in **Grade 2, Unit 6**. The story in **Grade 3, Unit 3** begins in New York City, with an illustration of the Statue of Liberty. Many other stories involve contexts that may be familiar to New York City students, including stories about community centers (**Grade 4, Unit 5**) and students playing games with one another on their city sidewalk (**Grade 2, Unit 8**).

Math as its own context: Deepening students' abstract thinking skills, sparking curiosity about mathematics, and developing their ability to see, predict, generalize, and communicate patterns.

Amplify Desmos Math New York K-5: Our program celebrates mathematics and curiosity around mathematics. The following lesson examples are only a few of the many rich experiences centered around math as its own context.

- In **Grade 1, Unit 1, Lesson 7**, students find the value of $n + 1$ expressions within 10. They make conjectures around what is always true about the sum of $n + 1$ and test one of their class conjectures for sums within 10.
- The very first lesson of **Grade 2 (Unit 1, Lesson 1)**, welcomes students to math with a low floor, high-ceiling activity. Students are given pieces of an addition table and put them together, looking for patterns. They are able to engage in a non-routine task with multiple approaches and strategies, and then discuss the relationships they see.
- In **Grade 4, Unit 1, Lesson 2**, students analyze visual patterns where a design grows with each step. Students extend these patterns and make predictions using

the structure of the quantity represented in each step, moving away from relying only on drawing or listing the counts.

Social justice contexts: Giving students the opportunity to use mathematics to understand and address local and global priorities as well as current and historical inequities in society, making cross-disciplinary connections wherever it is supportive to the learning.

- The **Grade K, Unit 4** unit story centers around the workers in a town who all play a part in helping the town run and grow. Students learn about how people can work together and celebrate contributions of all people.
- In **Grade 2, Unit 2**, students read about a community that works together to fix the roof of the library after it's been damaged in a storm. The community members donate items and collect funds to fix their building.
- The **Grade 5, Unit 1** story focuses on a town called Trashville. They have to figure out how to solve their massive trash problem, learning from a town called Joyful Green. The citizens of Trashville are able to clean up their town by reducing, reusing, and recycling.

