Using Charting at the Secondary Level to Support Students who are Struggling with Math

by Evelyn Chávez and Lisa Meyer—Dual Language Education of New Mexico

Using various types of charts in classrooms is not a new concept—anchor charts have long been created by teachers to support student learning across content areas. In the math framework *Achievement Inspired Mathematics for Scaffolding Student Success* (AIM4S^{3}™), charting is used to provide equitable access for all students to grade-level content; it is especially beneficial for students who are a 1 to 2 years behind in math, those who struggle with math, and for language learners. In this article, we will share what charting might look like in secondary math.

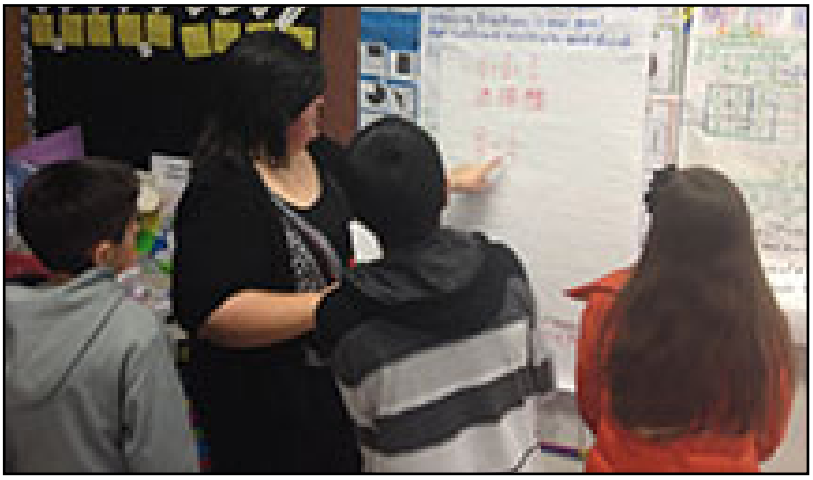


Chart talks provide opportunities to differentiate instruction to address specific student needs.

Why do I chart?

Teachers utilize charts for different reasons. Math charts support student learning by reinforcing conceptual understanding through visuals and models. This is a powerful way to explain an algorithm or why a formula works. Some teachers use charts to fill in gaps from previous learning as they focus on tier 1, grade-level instruction. Still others might use the charts to clear up misconceptions in students' learning. Charts are most often created for use with a whole class, but they can also be used in targeted small-group instruction; with older students this often takes the form of chart talks. However they are used, they provide equitable access for all students.

Where do I start?

Charting is most powerful when it is intentional and purposeful. For this reason, charts are preplanned by the teacher and relevant to the current topic students are learning. The information can be planned out on an 8 ½ x 11 piece of paper and later penciled in on chart paper. This allows the teacher to consider what will be most helpful to the students and facilitates the presentation of concepts, vocabulary, and language. Watching as a class chart is built allows the information to be imprinted on students' brains. By presenting the information in an interactive way, the students are more engaged and motivated to take ownership of their learning.

How do I present the information?

During the building of the chart, teachers provide direct instruction with clear and accurate information. Color-coding supports students in chunking the information into smaller sections or ideas. Having students repeat key language and vocabulary increases the likelihood students will use this language later. As the teacher traces over the penciled information with colored markers, some students might take notes, while others might simply watch and listen. In either case, snapping a picture of the completed chart can serve as a handy reference when students are doing independent work away from the classroom.

How do I prepare charts for multiple class sessions?

Often, teachers at the secondary level voice concern for having to create a chart for each of their class periods when they teach the same subject multiple times. We recommend that teachers pencil in one chart and deliver the information to their first class with colored markers. Once they have a completed chart, they can place that chart under a new blank piece of chart paper and utilize the first chart to build the next one. It is important to build the chart with each class for the reasons mentioned above. This process gives all students access to the information in

—continued on page 3—

—continued from page 2—

the same way. When each class has a chart, students take ownership of the document, and this ensures that specific information can be included based on the engagement and interaction of the class.

How do I organize and manage the charts?

Charts can be organized for different class periods. Teachers store and organize their charts in a number of different ways. Some have the charts in the same area and roll up those they are not using. Some teachers fold them and have them clipped from clothes hangers, and still others roll or fold them and store them in a bucket or another type of container. The key idea to managing the charts is that the students have access to them when they need them. Students are generally more than willing to assist teachers in changing the charts out for their class—this could be an assigned responsibility.

How do I keep the chart meaningful?

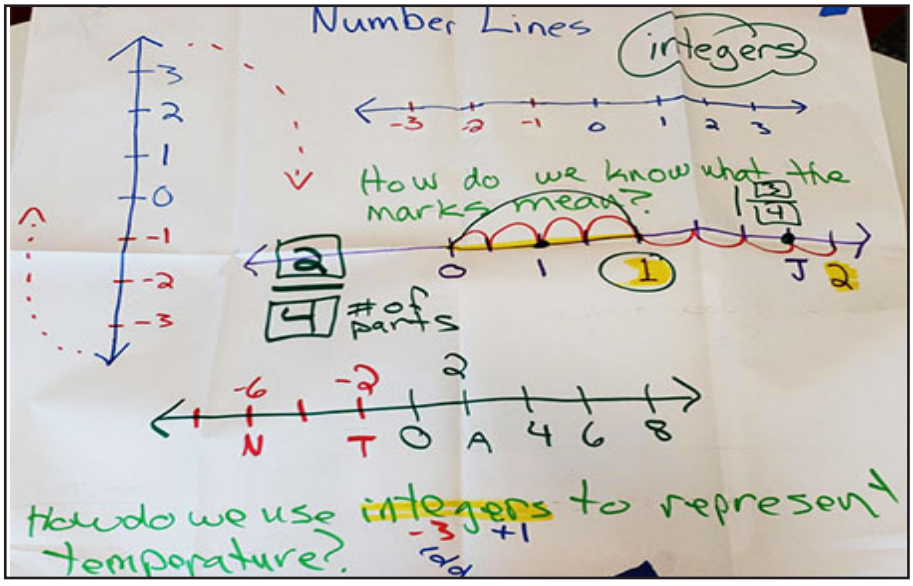
In order to make the chart meaningful to students, it must be referred to and processed throughout the unit of instruction or anytime students need the concept reinforced. This "living document" becomes a resource that students can utilize to make connections to their new learning. The processing of the chart may include adding information as new learning takes place, highlighting ideas as students make connections, or adding answers to questions that arise about the content on the chart.

This "living document" becomes a resource that students can utilize to make connections to their new learning. The processing of the chart may include adding information as new learning takes place, highlighting ideas as students make connections, or adding answers to questions that arise about the content on the chart.

Number Lines

This number-line chart was a response to information gathered from a preassessment—the teacher learned that students had little understanding of negative numbers. In order for students to apply what they learn about integers, they need to know how to read a number line. The students recognized a vertical number line because of their prior experiences with thermometers, so the teacher first built a vertical number line and reminded them what the positive and negative numbers represented. She then used the arrows to demonstrate that if the number line is rotated clockwise 90° it works in the same way. Now the positive integers are to the right and the negative integers are to the left of the 0. Then, the teacher demonstrated what the marks, or intervals mean or represent. These number lines were examples of scaffolding provided by the teacher to fill the gaps of knowledge students demonstrated on the preassessment. Taking the time to model this for students supports their learning and prepares them for the sixth grade standards.

Example Charts

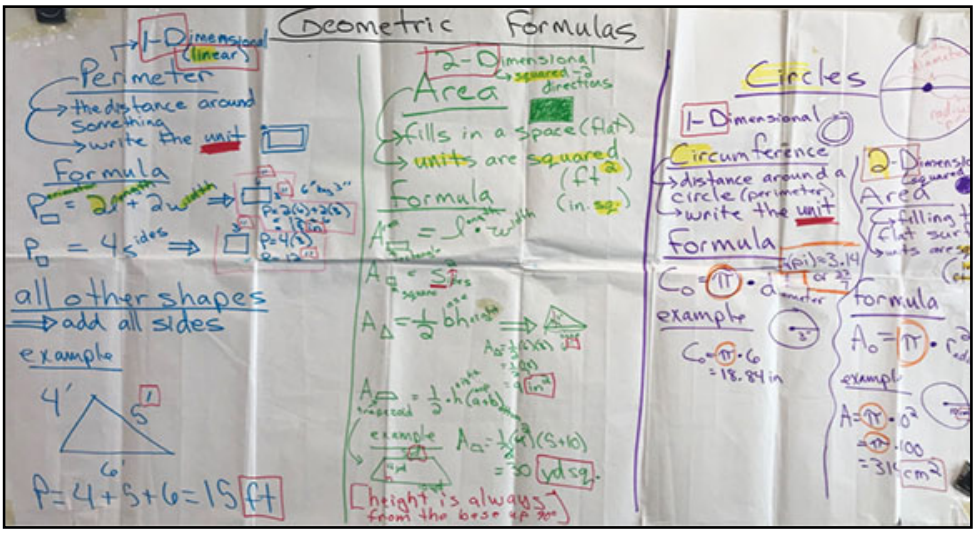


For more information about AIM4S3™ and supporting language learners or students who struggle with math, visit www.aim4scubed.dlenm.org.

—continued on page 16—

—continued from page 3—

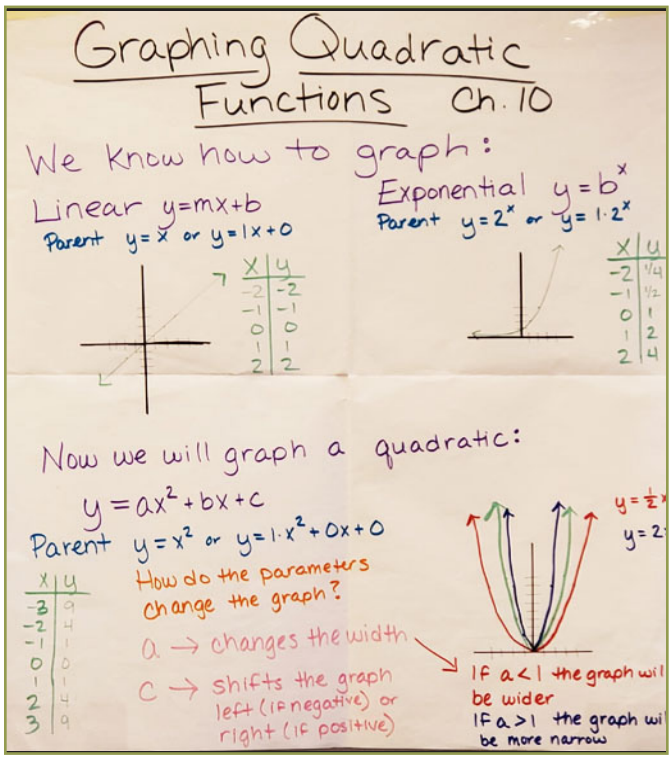
Geometric Formulas



In the Geometric Formulas chart, the teacher uses highlighting to emphasize the language needed to understand the formulas. In the example for perimeter: P(erimeter) = 2 l(ength) + 2w(idth), the teacher writes and color-codes the language. This is seen in various places throughout the chart. Writing what the variables actually represent assists students in making a connection to the visuals, which represent the concept and supports the students to better understand why P=2l+2w. The same is true in the section devoted to Area: A= L x W. The teacher demonstrated that area is two dimensional by representing the concept of squared with a filled-in rectangle and the term highlighted. She also added other ways of writing it, like sq. or 2. Likewise, in the section devoted to Circles, the teacher highlighted the similarity in circle and circumference as a way to support the students' understanding of the word family. She also highlighted the radius and diameter of a circle. The chart demonstrates what circumference is with words and a model.

Graphing Quadratic Functions

The teacher in this algebra class made a connection between students' new learning and their prior knowledge in order to expand the concept of graphing quadratic functions. The chart held powerful visuals for students as they would soon attempt to graph quadratic functions independently. In the top left section, the teacher reminded the students how to graph linear and exponential functions. Once the students' prior knowledge was accessed, the teacher moved to the new learning. Next, the teacher presented the method for graphing an exponential function. As with the functions above, the teacher wrote the formula and graphed the examples. Students then looked at how changing the parameters effected the graph. This succinct chart allowed the students to access information over time.



As I reflect on my charting …

Does my chart include a conceptual explanation and/or visuals to help students understand the concept?

Is key vocabulary embedded in context?

Have I intentionally planned the chart to support my language learners, students with special needs, and students working below grade level? This might mean that unnecessary language is eliminated, there are clear visuals, the chart is easy to read from across the room, the writing is legible, and the chart includes plenty of white space for easy reading.