Focus and Motivation in the Secondary Mathematics Classroom

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Focus and motivation activities engage students in the learning process and allow them to develop enthusiasm and curiosity that support the development of deeper conceptual understanding.

Eighth-grade Algebra 1 students work together on a sorting activity.

In the mathematics classroom, deeper conceptual understanding allows students to transfer knowledge to new concepts. These activities give students a voice and enable teachers to recognize students' prior knowledge and skills on an individual level. By providing these opportunities in my classroom, I can activate prior knowledge, engage students in discussion, and inspire mathematical thinking.

Focus and motivation activities are also valuable as they provide formative assessment data that helps guide instructional planning. By observing students as they engage in focus and motivation activities and listening in as they share what they know, the teacher can gauge where students are before starting a unit. It is much more effective for a teacher to provide an activity for students to engage their thinking rather than simply stating, "remember when you did this last year?"

When I first attended the AIMS^{3}™ math training, I was aware of the importance of focusing and motivating students in instructional settings. What I didn't realize was how much my students were missing out on because I was not planning or providing them with these opportunities. I had always viewed focus and motivation activities to be useful in an elementary setting, but never in a secondary classroom—this was new to me. The training really opened my eyes to their importance, as well as the importance of planning for authentic experiences in a secondary classroom. At first, I was overwhelmed with the idea that focus and motivation activities needed to be a part of EVERY unit. It helped to learn that they are invaluable as a way to launch a unit, and later, included during the unit as a short and sweet way to achieve a particular objective. I love using activities that remind my students of previous learnings that connect to foundational concepts. By activating their prior knowledge, students are more successful with our early lessons and have more to contribute to our Compendium (see below), a class anchor

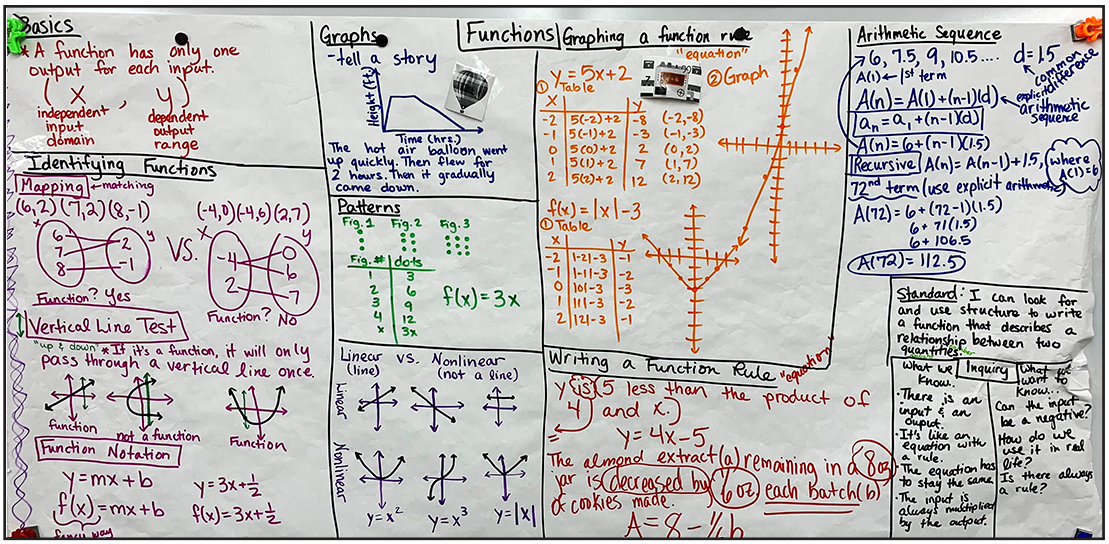

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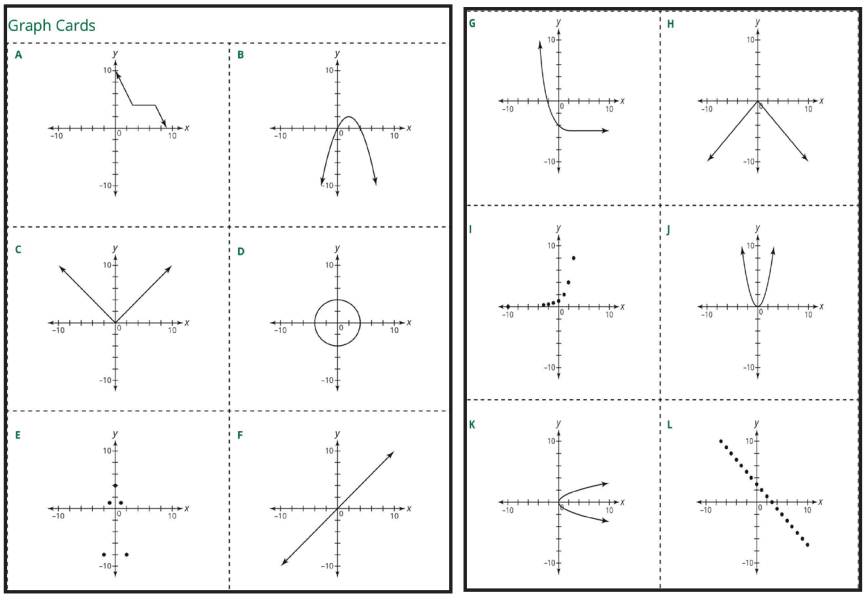
chart used by students as a reference during a unit of instruction. It includes key vocabulary, visual representations of key content, the standards, and students' inquiry questions. The answers to the questions, what do you know and what questions do you have, change dramatically after I have done a focus and motivation activity. Students are engaged, eager to share with each other, and get more excited about mathematics when they have been given the opportunity to remember the concept through a collaborative activity. I now plan focus and motivation activities for every unit.

While focus and motivation activities can take on many different forms, sorting and matching activities are a couple of my favorites because they lead to discussions within collaborative groups, lend themselves to differentiation, and are beneficial formative assessments. When students discuss and explain decisions in a collaborative setting within a hands-on, engaging activity, their thinking about the concept becomes deeper as they learn together. Sorting or matching activities involve providing students with word cards or images depicting key concepts or processes. They either sort them into categories, which can be labeled and explained, or matched in some way. An added benefit to these kinds of activities is the ease with which you can differentiate for the students in the class. One group might need to be given the headings or titles for categories in order to complete what is called a closed sort, while another group might be able to come up with the categories themselves in an open sort. By providing students with different numbers of cards to sort or blank cards to add their own examples, teachers are able to meet students at their own level. Sorting and matching activities also provide teachers with valuable information about the students' thinking or level of understanding of the key concepts, and the language needed to understand and articulate their learning. While students are working, the teacher is also able to listen to the students as a way of identifying any misconceptions that might arise. By utilizing sorting and matching activities I am able to engage students with mathematics through purposeful conversations, leading them to become deeper critical thinkers.

What do sorts and matching activities look like in my classroom?

When introducing the concept of different types of functions in Algebra 1, I use an activity where students are asked to sort various pictures of graphs into categories. In pairs or groups, students create their own categories and reasoning behind why they grouped the graphs the way they did. The students share out their reasoning for the groupings with the entire class. As the students sort the graphs into different categories, I circulate the room to listen and facilitate discussions as needed with questions to help guide student thinking. The conversations usually lead to finding the different types of functions—linear, exponential, quadratic, absolute value, and piecewise, as well as the characteristics of continuous or discrete functions. This type of activity sets students up to have created their own knowledge of the different types of functions and function vocabulary rather than simply telling them we are going to focus on these types of functions and naming them.



Graph cards that are part of the Carnegie Learning suite of materials are used for on open-sort activity.

During the introduction to the solving two-step inequalities unit (7th Grade), I use an activity in which students work in pairs to match the simple inequalities in one variable to the picture of the number line graph.

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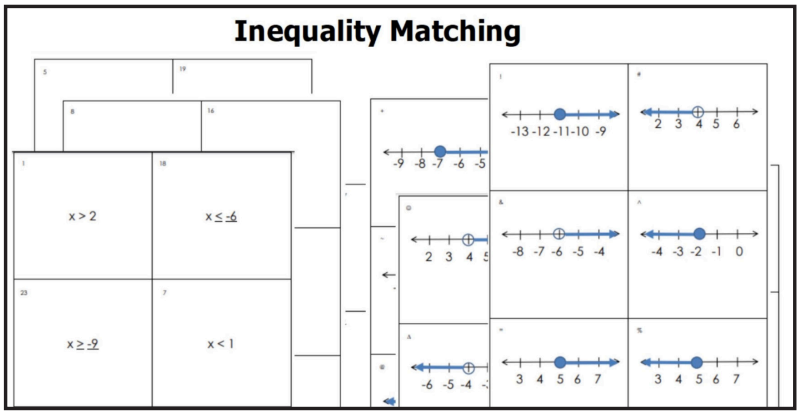
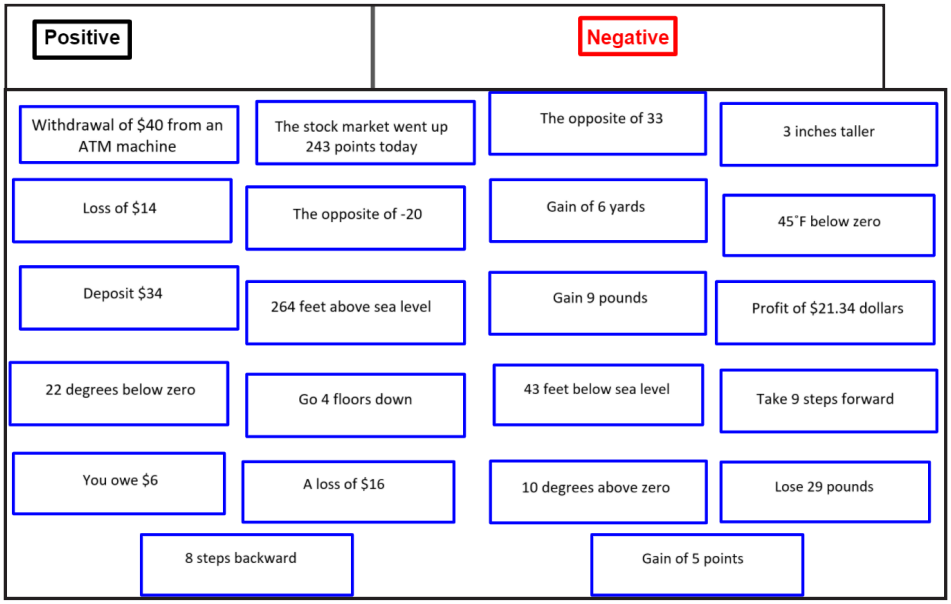


The primary reason for this activity is to activate prior knowledge and help students remember how to graph an inequality without having to tell them or show them. Through conversations with their partners, students are able to notice the details required for graphing inequalities such as open dot, closed dot, and which way the arrow should point. After students have had a chance to match some of the inequalities, I pause the class and ask students to share a pair of cards they are very confident in being correctly matched with the class. Student volunteers then show their match and explain why they think they are correct. The rest of the class analyzes the explanation and asks questions, which helps clarify their own thinking. I also ask for student volunteers to share a pair that they are unsure of which inequality and graph match. I purposefully include cards that are $x > 5$ and $x \geq 5$ for students to match, so that the conversation of the type of dot (open or closed) to be used when graphing is discussed. I then allow students time to finish the matching activity. In order to help students synthesize their prior knowledge, the students and I create an anchor chart explaining how to graph inequalities. This anchor chart stays up on the wall of my classroom and is used as a reference throughout the unit.

Another sorting activity I use to kick off my integer operations unit (7th Grade) asks students to sort situations that include positive and negative numbers. This activity helps students recall vocabulary associated with integers. Students usually work in a small group to read and talk about whether the situation is positive or negative. Some of the situations include vocabulary such as opposite, profit, withdrawal, above/below sea level, loss, gain, deposit, etc. Students usually have great success with most of the situations, but there are a few that throw them each time. For example, "withdrawal of $40 from an ATM machine" sparks an interesting discussion. Students argue about whether it is a positive or negative situation. The student who is thinking of it as a negative situation is thinking about the bank account from which the money is drawn, while the student who is thinking of it as a positive is thinking about the money in his pocket. This leads to a discussion about how words are used generally in the real world and how their meaning may change or be enhanced in their study of mathematics. Through this activity, students are able to make connections to the world around them as well as interact with the vocabulary associated with integers.



Cards used in the sorting activity include positive and negative situations.

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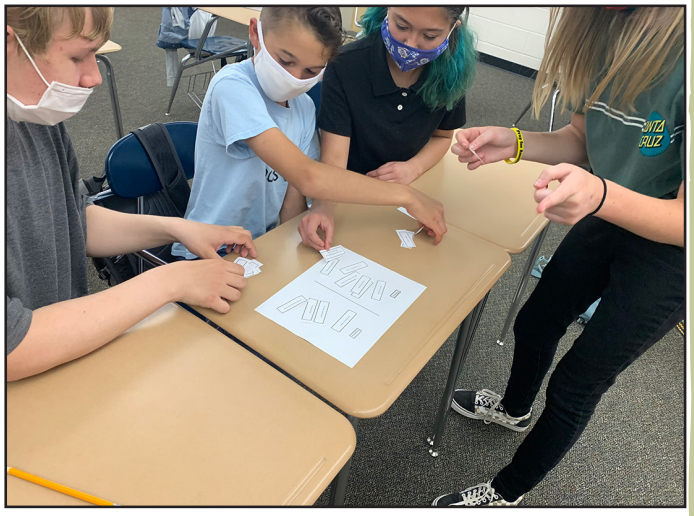
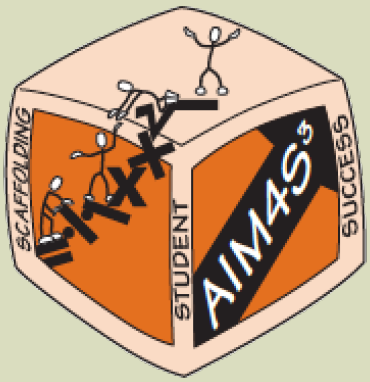
I have found multiple benefits to using focus and motivation activities in my classroom, but the transformation I have seen in my students has been amazing. Students have more confidence when sharing and talking about mathematics. This is due in part to them being more likely to engage with mathematics after I have provided them the chance to recall and discuss previous information they have learned in a non-threatening way. They use mathematics vocabulary with ease and are able to explain the connections they have made. Although sorting and matching activities are a couple of my favorites, I continue to work on a variety of positive ways to include other focus and motivation activities in my classroom.



The real-world situations listed on the cards spark interesting conversations among students.

What is AIM4S^{3}™?



Achievement Inspired Mathematics for Scaffolding Student Success (AIM4S^{3}™) is a framework that shelters mathematics content to make it comprehensible and accessible to all students, with a specific focus on language learners (ELLs/ SLLs) and students who struggle with math. Equity and accessibility are the driving forces behind why this framework was developed.

The AIM4S^{3}™ professional learning is grounded in research-based best practices and includes classroom demonstrations, theory, coaching, and feedback. Participants experience the framework in action with students, then implement strategies, and bring back artifacts to share with the group. Using assessment to drive decision making is addressed throughout the training as participants implement, assess, reflect, and adjust.

AIM4S^{3}™ is a framework, not a curriculum. The training focuses on high-quality instruction driven by standards. It can be used with any materials or math program and is applicable for kinder through middle school math teachers and instructional leaders. It is also a strong match for high school teachers working with newcomer students or open to teaching in non-traditional ways.

The Level I training is typically a six-day training with three two-day sessions spread over three to four months to support participants in implementing the strategies with students. It is offered virtually and in person. There also is a synchronous/ asynchronous training available that is completed over a three-month time span.

To learn more about the AIM4S^{3}™ math framework, go to *http://aim4scubed.dlenm.org* or email *aim4s3@dlenm.org.*