



This document describes general norms and expectations about mathematics that can help to promote a culture of thinking in math class. The last page offers a progression of expectations and taught behaviors for supporting argumentation in an elementary classroom.

Positive Norms to Encourage in Math Class

By Jo Boaler

<http://www.youcubed.org/wp-content/uploads/Positive-Classroom-Norms2.pdf>

1. Everyone Can Learn Math to the Highest Levels.

Encourage students to believe in themselves. There is no such thing as a “math” person. Everyone can reach the highest levels they want to, with hard work.

2. Mistakes are valuable

Mistakes grow your brain! It is good to struggle and make mistakes.

3. Questions are Really Important

Always ask questions, always answer questions. Ask yourself: why does that make sense?

4. Math is about Creativity and Making Sense.

Math is a very creative subject that is, at its core, about visualizing patterns and creating solution paths that others can see, discuss and critique.

5. Math is about Connections and Communicating

Math is a connected subject, and a form of communication. Represent math in different forms eg words, a picture, a graph, an equation, and link them. Color code!

6. Depth is much more important than speed.

Top mathematicians, such as Laurent Schwartz, think slowly and deeply.

7. Math Class is about Learning not Performing

Math is a growth subject, it takes time to learn and it is all about effort.



Some Additional Resources for Norms and Expectations in the Mathematics Classroom

This handout contains excerpts from three resources focused on supporting discussion and reasoning in mathematics classrooms.

1) Excerpt from *Classroom Norms for Productive Discourse & Discussion* (O'Connor & Ruegg, 2012)

Classroom discourse and discussion are crucial sites for student development: they can help students develop the ability to be critical thinkers, and to feel more confidence in their own abilities to construct arguments and to understand the arguments of others.

Nevertheless, classroom talk and discussion can be challenging. Teachers who tend to have success with classroom discourse and discussion usually have worked out dependable ways to make sure that the discourse is *respectful*, *equitable*, and *focused on reasoning*. They make sure that they set up norms of productive discussion within the first week or so of school. This usually includes more than posting norms on the wall. It usually includes a discussion about what is involved, to get student understanding and buy-in.

What is included in setting up norms for discussion?

In setting up norms, you will be letting your students know about how talk and discussion will play a role in their learning during the coming year. You are setting up expectations, and so your students need to understand those expectations. Depending on the ages and stages of your students, it is most helpful if you can enlist their participation in co-constructing those expectations. Consider having a discussion about these three different kinds of discussion norms and goals:

- 1) Talk that is focused on *reasoning*
- 2) Talk that is *respectful*
- 3) Talk that is *equitable*

Here is an example of norms for discussion that an eighth grade teacher co-created with her students:

- We come prepared for discussions with notes, examples, stories, texts.
- We are active participants, responsible for our own learning. This means we speak, request clarification, show agreement or confusion, verify, ask others to repeat.
- We strive to have authentic discussions that are academically rich. This means we stay on topic and ask what we really want to know.
- We push ourselves and each other to think beyond the obvious, popular, or easy answers. This means we request proof or reasoning, point out misinformation, disagree with parts, draw others out, and are open to changing our minds.

2) Excerpt from “Revoicing: The good, the bad, the questions” by Jean Krusi (High School Algebra Teacher) in the collection *Promoting Purposeful Discourse* (Herbel-Eisenmann & Cirillo, 2009, p. 121)

As I thought about how I wanted to change the discourse patterns in my classroom, I decided I wanted to involve my students in the process. I started by asking them what made a good classroom discussion. The students seemed to be importing ideas about class discussion from their other classes, possibly indicating that they did not think of mathematics classes as places for rich discussion. We used the ideas of what makes a good discussion, more generally, to produce the following set of discussion norms for our classroom:

- Everyone is listening. Everyone is involved. Everyone puts out ideas. No one is left out.
- No one is talking while someone else is. Take turns.
- Questions are asked. Make your point clearly and quickly. Have facts to back up your point. It is safe to be wrong.
- No rude comments or put-downs. All ideas and opinions are respected. Different points of view are valued. "Out of the box" thinking can be helpful.
- Everyone is understanding-if not at the beginning, then by the end.

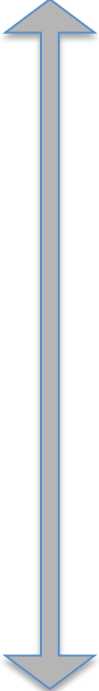
Most of these norms are social norms. Some, such as "have facts to back up your point" and "everyone is understanding," do have the potential to suggest mathematical norms. During our discussions, I found that I needed to bring up mathematical norms, such as what counts as evidence in mathematics or the idea of generalizing statements. In the future, I would like to try having a discussion about elements particular to mathematical discourse as a class, with the idea of generating mathematical norms as well as social norms.

3) Excerpt from the book *Making Number Talks Matter* about how to make a safe classroom environment (Humphreys & Parker, 2015, p. 169)

Our bottom line is that we want the learning environment to be safe for all students. Ruth shares, “I tell my students on the first day of class that I won’t put them on the spot but that I will give them lots of opportunities to share their thinking when they choose to. I try hard not to violate this trust. I want the learning environment to be safe for all students. I do talk with kids about how important it is for them to talk about and explain their thinking. With quieter students, I sometimes ask them, one-on-one, to share with me how they thought about a problem. Once they have had a chance to rehearse their thinking with me, I ask them to think about whether they might be willing to share their ideas. Once students have had their own way of thinking recognized and valued, they may become more confident in sharing their ideas.”

Norms & Expectations for Argumentation in Partners

Progress Across the Year in a 3rd Grade Class

	<ul style="list-style-type: none"> • Facing each other, hands and legs quiet. • Looking at each other. • One person shares their claim, evidence and warrant and the other person listens. • The other person can say or write exactly what the other person has just told them. • Repeat with the other person
	<ul style="list-style-type: none"> • One person shares their claim, evidence and warrant and the other person listens. • The other person can say or write in their own words and ask questions what the other person has just told them. • Repeat with the other person.
	<ul style="list-style-type: none"> • One person shares their idea and the other person listens. • The other person agrees or disagrees with the other person's claim, evidence and/or warrant and explains why. (Concentrate on agreeing or disagreeing with the argument, NOT the person.) • Repeat with the other person.
<p>Later in the School Year</p>	<ul style="list-style-type: none"> • Each person shares their claim, evidence, and warrant. • They ask each other clarifying questions. • They ask each other to explain their evidence in a different way. • They agree or disagree with each other and state why using their evidence. • They build upon what they are learning from their partner's argument and improve or change their own argument.

Questions a teacher can ask to help promote argumentation	
Can you explain? What happened before? What would happen if you used this number? What would change if...	What does that look like? What happened after? Can you tell me why...? Tell me more.
Show me where... What could you add to strengthen this part? How would that work?	How does this fit? Why did you use that equation? So you are saying...?

Modified based on resources created by Sarah Brown
 ATOMIC 2015 Presentation: *What is Mathematical Argumentation?*