

actually work with (or in some cases even contact) the group with whom they were matched. I am not sure that this is a problem technology can solve.

It is surely too soon to declare the project a success or failure. The system is still very new, and last year was exceptional in so many ways that I hesitate to draw any long-term conclusions. But I was heartened by the following survey comment:

I would not have been able to get through ... if it wasn't for the support and community that my pset group brought.

At least in this one case, the project achieved its goal.

If you would like to learn more about Pset Partners, I invite you to visit <https://psetpartners.mit.edu/about>, which gives a brief overview of the site and includes a link to our sandbox,⁵ where you can try out the system for yourself, both as a student and as an instructor. The software that runs the website can be found at our GitHub repository⁶ and is available to everyone under an open source AGPL license.

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Andrew V. Sutherland

Credits

Photo of Andrew V. Sutherland is courtesy of Andrew V. Sutherland.

How to Run a Math Group

Tom Gannon

Often, we meet students (and others!) who believe that mathematics is a series of rote memorization of formulae and algorithms. Even students more interested in mathematics can still earn a high school diploma while believing that the only valid proofs are two-column proofs used in a geometry class. In 1993, the University of Texas at Austin created a program now known as the *Sunday Morning Math Group* to fight these stereotypes, and to help spread the fun that critical thinking in a mathematical context can really have. I had the privilege of running this group for two years, and in this article, I'll give you tips on how to start your own!

What Is a Math Group?

A *math group* (also known as a *math circle*) is a tool invented by mathematicians to try to teach students the creativity and problem-solving skills that are often used in pure mathematics. All math groups are different—what works well for one group may not work as well for others. Most emphasize math that isn't typically covered in school curricula, such as the basics of proofs (such as the pigeonhole principle, the basics of logic, or induction) and other topics such as combinatorics. Like good mathematicians, we will give an example.

An example

At the University of Texas at Austin, our Sunday Morning Math Group (SMMG) ran as follows. Every other Sunday during the fall and spring semesters, students would arrive at noon and receive a slip of paper containing their first “riddle.” The “riddle” is often a relatively easy question, to get any new students used to the flow of the riddle system. After receiving a riddle, students will think about the riddle, and then raise a hand to chat with a math department volunteer, either to explain the answer to the riddle or ask a question about it. If the student gets the answer to a question right, they receive the next “riddle” which explores the concept a bit deeper.

For example, one of our sessions had riddles which were designed to teach the students binary. The first question they received was “You have a 1 pound weight, a 2 pound weight, and a 4 pound weight. Can you combine the weights to make something that weighs 5 pounds? Can you combine the weights to make something that weighs 6 pounds?” Slowly, the riddles “build up” to introducing notation such as 1011_2 , and later go on to explore other concepts (for example, other number bases and the algorithms

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⁵<https://psetpartners-test.mit.edu/>

⁶<https://github.com/AndrewVSutherland/psetpartners>

used for addition and multiplication, and, after that, some additional challenge problems).

One advantage of this riddle system as opposed to, say, worksheets, is that the students can work at their own pace. Some students (for example, those who have already worked with binary numbers a bit) can be quickly “promoted” to harder riddles. Another consequence is that, depending on the size of the room, different students don’t know the exact progress of the other students, which can help combat feelings of imposter syndrome.

In this riddle system, idle volunteers can also try to spot discouraged students, which helps combat a feeling of mathematical hopelessness. Furthermore, often times, parents also become interested in the riddles, and sometimes causing a *parent* to appreciate math more can sometimes help the *student* appreciate math more in the long run.

After roughly one hour, I would give a “five-minute warning” to the students, letting them know that they should wrap up whatever they are doing and return to their seats (students would often sit with their families during the sessions) for the second half of SMMG. In this second half, a faculty member or graduate student of UT (or a nearby math department!) would prepare an activity or talk for the students to think about, usually unrelated to the riddles. For example, one speaker (graduate student Cas Monroe) played the game *Spot It!* with students and, through the game, taught them the basics of projective geometry over a finite field. Another great talk involved the speaker (Dr. Jennifer Mann-Austin) using DNA to explain the basics of topology, and leading students through crafting a Möbius strip.

Benefits

The benefits of running a math group are numerous. I can tell you from personal experience that it is a ton of fun to get kids to realize how, with just a few basic principles, they can answer complex logic puzzles or figure out the probability of getting a flush in poker. I can also anecdotally say that students who go through a math circle are more confident and engaged in the math courses they take at their schools. By constantly asking themselves *why* the statement in question is true, they can enrich their own educational experiences. Some students who believe they are “not good at math” can see math in a new light and gain confidence. Some may see that math is actually a *fun* thing.

Additionally, running a math group is a great way for a department to reach out to a community. It gives a mathematics department the opportunity to demonstrate the joy of mathematics and can give faculty and students a new opportunity to explain mathematical concepts in a low-pressure environment.

Some Tips for Running the Best Possible Math Group You Can

Make food available. Students are often motivated by the promise of some sweets. We often would provide bagels,

coffee, and orange juice during our meetings, which makes students (and volunteers!) more excited to come.

Give nametags. Encourage students and volunteers to wear nametags. One disadvantage of the riddle system above is that it can often feel impersonal, both to the volunteers and to the students. Nametags help eliminate this.

Market to your department. People who work in math departments are very busy, and often need a reminder that they can volunteer at their math group. For example, we sent out one email every other week, reminding faculty and graduate students that they could volunteer. Even if you don’t receive email responses, people are likely reading your emails! I received many thank yous from people for reminding them that the event was happening.

Market to teachers and parents. The idea of a math group may sound unappealing to some students at first. However, teachers are often willing to offer extra credit to students who go to a math circle. In my experience, once students attend, most are sold on the value of a math circle. It helps to be outgoing—introduce yourself to new attendees (both students and parents!) and continue maintaining relationships with old ones! I have also had some success posting listings on websites which list free activities for families.

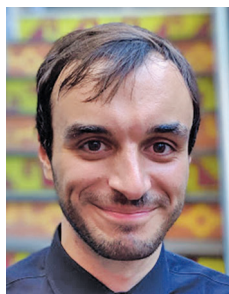
Maintain an email list. Encourage participants to share their email addresses with you. This will allow you to announce the topic of the riddles and the activity in advance, and will allow you to spread news of other fun math activities over the internet!

Consider hosting the American Math Competition (AMC). Many nearby students are interested in taking the American Math Contest, but are unable to because their school does not purchase the exam. If your department is willing to purchase these exams, they can be used as a great marketing tool for your math group.

Plan ahead. Often, universities require special forms to be filled out and signed by higher ups to run an activity which hosts minors. Furthermore, depending on the room you want to use, other groups may want to reserve it. I recommend avoiding home football game days if you plan to host in your university. You may also want to check to make sure that you are avoiding special days which fall on Sunday, such as Easter or the “Spring Forward” day of daylight savings.

Consider rewarding the department members who run the group. At the University of Texas at Austin, graduate students who run the SMMG are paid as a TA. As one might imagine, this leads to SMMG coordinators who are more focused on running every aspect of the program—from curriculum writing, to talk organizing, to marketing, and beyond. You may also consider hiring an undergraduate to work at the “front desk,” signing students in and taking care of some of the tasks volunteers like to do less.

Have a backup activity planned. Once in a while, an alarm doesn’t go off, or a mix up occurs. Having a backup talk prepared can help a day go seamlessly.



Tom Gannon

Start a website. The website doesn't need to be too complicated, but attendees often check a website hosted by a university to ensure that the activities are actually happening. You can check our SMMG webpage, <https://web.ma.utexas.edu/users/smmg/>.

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Photo of Tom Gannon is courtesy of Michael Hott.

Some Advice on Filing a Harassment Complaint

Jesse Leo Kass

There have been major recent changes in how our profession deals with harassment. While federal laws have prohibited certain forms of harassment since the 1960s, in the past few years several new policies have been created by funding bodies and professional organizations. For example, the National Science Foundation (NSF) started to require that universities report harassment findings in 2018. The commonality of these policies is that the stated purpose is to stop or prevent unwanted behavior against others.

With a view towards these new policies, I will offer advice about what to do before and after you report harassment. I will then offer advice about things you can do to help our community improve how it implements antiharassment policies.

I think it is helpful to divide the policies into (a) internal policies set by a university and (b) external policies set by, say, a funding agency. The internal policies typically create a process by which individuals can submit a complaint of harassment. The university is to respond to a complaint by making an investigation and, if the investigation produces a finding, taking corrective actions. In contrast, under external policies, a funding agency typically does not conduct investigations. Instead, it requires that universities report on investigations produced under internal policies, and it acts in response to those reports. However, when everything works, the two types of policies should form parts of one system: external policies providing oversight so that internal policies are carried out in a way that meets shared expectations of the community, such as members of the AMS.

My article will focus on advice related to filing a complaint under an internal procedure. I will say nothing about the issue of false complaints or more generally how organizations act in response to a finding. I will also say

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little about how harassment interacts with protected categories like gender or race, although there is a very strong interaction. These are important issues that are deserving of separate articles.

Advice Before You Report Harassment

If you are considering reporting harassment, a first step should be figuring out what harassment is. Harassment is broadly understood to be unwanted behavior against others, but the formal definition differs in important ways from written policy to written policy. For example, under federal law, unwanted behavior only becomes unlawful when it is based on a protected category like sex. Similarly, under some universities' policies, the behavior only becomes harassment if it is persistent and severe.

Regardless of what written policies say, you should consider how the unwanted behavior is impacting you. If the behavior is having a significant negative impact, then you should take steps to remove yourself from the behavior regardless of what written policy says. The specific steps you should take depend a lot on your circumstances. For example, it could be the case that you can do this by working with your Department Chair, for example by moving your office space. However, it could instead be the case that, if you ask for help, the Chair will retaliate against you in an effort to protect the harasser.

There are a lot of good resources for advice about how to remove yourself from the situation. Some articles I found especially useful are Aisha S. Ahmad's articles "How to detect and dodge a predatory professor" and "Why is it so hard to fire a tenured sexual predator?" They were published in the *Chronicle of Higher Education*, on September 9, 2020, and October 14, 2020, respectively. Those articles focus on sexual harassment of students by tenured professors, but much of the advice applies more broadly.

If you have removed yourself from the harassment, and you are considering taking further action by filing a formal report, it is usually good to first try and informally stop the harassment, for example by asking a supervisor like the Chair to take action. While doing this, you should collect evidence of the harassment and your efforts to stop it.

It can be helpful to research how university officials respond to harassment reports. A good way to do this is to learn about past cases. Finding accounts can be difficult because some organizations are resistant to releasing this type of information. Local media like student newspapers can be a useful source as they often report high-profile harassment cases. However, their reporting does not always provide detailed information about what happened administratively. I have found that lawsuits and similar legal documents can be more useful to read. These documents are sometimes posted online and can be found through an internet search.

Individuals who have filed reports in the past might also be willing to offer advice. However, if you are considering reaching out to somebody, make sure to respect their