

Safety

You are going to be doing some things in GEMS that are not normally done in a classroom.

That said, you need to **be very aware of safety** and be careful.

Rules to live by:

- Know the school rules.
 - **No fire, obviously.** Not even to demonstrate something. Even if you think that you can control an experiment, you can't. A room of 24 perfectly behaved girls still is a hazard, so don't even consider fire.
 - **No truly dangerous chemicals.** You may find something very cool on the Internet you want to try, but heed the warnings. If you have to buy it from a science supply store, it is probably not good for elementary school.
- Have soap, paper towels, and water readily available. Immediate cleanup of any spill is essential.
- Have Band-Aids™ ready. I have seen kids cut themselves using those little elementary scissors—a seemingly impossible feat, but yet they did it.
- Use goggles and gloves whenever you think you should. The kids love them, and you will be protecting the girls.
- Review the rules before you start, and stop the group and review them in the middle.
- Jump on infractions right away. It seems harsh, but if you have said, “Don't walk around with the scissors, “ then you need to stop the group the second you see a girl walking around with the scissors. They get very excited about the projects, and rule-following goes right out of their heads. And girls love to share what they are doing or run to see what others are doing, meaning there is always a lot of moving around.
- Do not use tools such as screwdrivers or hammers until you know the girls and feel that you have control of the group. After a few meetings, you and the girls will know each other well enough to be able to get their attention and give clear directions.

Safety warnings for specific activities

Computer Tear-down

Every other year in GEMS we collect old desktop computers from schools or businesses and take them apart. The girls suit up in goggles and, armed with screwdrivers and pliers, take the machines apart down to the microprocessors on the mother boards. But I usually save this activity for the last or next to last meeting of the year so that they understand my teaching style and know that I mean business.

We sit down in a group on the floor and I wait until I have their undivided attention. And then I lay out the rules of the day:

1. Every single person puts on goggles and does not remove them until the meeting is closing.
2. All tools remain on the table where the leaders can see them unless they are in a hand; i.e., no sharing by tossing them from table to table or even walking them to another table.
3. Only one person has her hand in the computer at a time. Partners can work on taking apart the pieces they have removed from the desktop, like the hard drive.
4. Do not go anywhere near the power supply. (I point this out.)
5. Consequences for violating these rules? The girl(s) will sit out the rest of the meeting and watch from the edge of the room. I have never had to enforce this.

You get the idea. And during this meeting, as with all meetings, the leaders circulate throughout the room to be sure that girls are safe. And even with all the tight regulations, this is one of our very favorite activities.

Chromatography T-shirts—an example of a dangerous but cool activity

This activity came from a high school chemistry teacher, so it immediately becomes one that you know you have to monitor carefully. But it is also one of the favorite things we do. More information is on the GEMS Web site. <https://gems.education.purdue.edu>

We use 90% isopropyl alcohol to break down the chemicals in permanent markers to create gorgeously colored T-shirts for the girls to keep. But again, there are strict rules to follow:

1. When the directions say “Make sure the room is well-ventilated,” we mean it. Open the windows and run fans.
2. Goggles are required throughout the entire activity.
3. The girls use small cups with eyedroppers and the super-strong alcohol. I sit them down at the beginning and review the goggle rule. Then I show the eyedropper, and tell them that if I see an eyedropper pointed in any direction but down (toward the cup or shirt), they are out for the rest of the meeting. Again, I have never had to enforce this—they understand the rules and follow them well. But I make the rules clear for their safety.

Use your best judgment. The girls may be too young for a really cool activity, but you can always send it home as a link for them to try at home, as things can be done at home that can't be done at school.

