



TIPS FOR TINKERING SESSIONS

Safety Tips

1. All students should wear the safety glasses. Wheels and other parts occasionally go flying, and they are not dangerous unless they hit you in the eye.
2. Avoid short circuits. If a student connects both leads from the battery pack to a single bolt, the bolt will heat up after a while, and the batteries will drain quickly. Showing the students how to make safe electrical connections, or having one of the students show the others is usually a good idea.

For tips, see the video “Safe Electrical Connections” at tinkeringlabs.com/electricmotors.

Facilitation Tips

1. Have students work in pairs or individually. Groups of three can also work, but we’ve found pairs to be better.
2. Consider distributing the parts over time. We usually start by giving each team these items:

- Safety glasses
- 1 battery pack
- 1 motor with bushing already attached
- 2 AA batteries
- Motor wires
- 1 wheel

This is enough for them to get a wheel spinning, which is a good place to start. They will have to hold the wires together with their fingers, and they’ll need to discover that the battery pack has a switch on it.

3. If you add a few items, they can make the electrical connection using springs, as we show in the “Spinning Wheel” video at tinkeringlabs.com/electricmotors. To allow this you’ll need to add:
 - Bolts and wingnuts (2 of each)
 - A small wooden connector
 - 2 springsThen, distribute additional parts as they begin to get comfortable with the ones they already have.
4. Start with a challenge. A big challenge can be intimidating or inspiring, but in any case it’s likely to be exciting.
5. Consider giving each team a parts container. If each team has a small bowl or plate to hold their components, it makes it easier to distribute parts.
6. If you are going to include the markers, cover the work area and possibly the floor with paper.
7. Arrange the space to make sharing ideas easy. We’ve run Tinkering sessions in all kinds of places like classrooms, kitchens, driveways and city parks. In all cases, we try to organize the kids so that they can easily see what others are doing to encourage sharing of ideas.
8. In a room full of Tinkerers, parts will drift from team to team. If you are using the Class Pack or have re-packed your components into bins yourself, that’s fine, let it happen. If you’ll need to get all the parts from each kit back into its own bag or box at the end, consider using the large sheet of paper that comes with the kit as a work surface and ask the students to keep their parts on their work surface.
9. Encourage students to incorporate other parts and materials. We use the word “Catalyst” because these materials should be a starting point, not an end. Other hardware, building toys, paper, binder clips, corks, and even electronics such as arduinos can add new possibilities. Just try to avoid anything that will make it hard to take the inventions apart, such as tape or glue.

Clean Up Tips

1. Leave time for deconstruction. Taking the inventions apart is part of the process, and opens up the possibility of new inventions.
2. Get the kids involved in clean-up. We usually assign jobs to kids, organized according to the bins. For example, we will ask one student to find and store all the rubber bands.
3. If you have any magnets around, give them to the kids for clean up of the small hardware parts.

4. Make sure the battery packs are turned off before storing. Otherwise the batteries can drain quickly.

Philosophy

1. Remember that this is an exploration, not a series of goals per se. You want kids to discover the properties of the materials, share their discoveries virally, and build on each other's ideas.
2. Avoid getting the kids into an "ok, I did that, what next?" cycle by never directly answering "what next?" style questions. The kids will look to each other for inspiration. Only if there is a real drop in momentum should the collaborator actively nudge the kids in a direction (often the best way to do this is starting to build something yourself). The kids will see what you're doing and start to emulate it, then discover a new path.
3. The adult collaborator is there to help and should only offer suggestions when specific questions are asked. Allow kids to work through their own challenges rather than showing them exactly what to do. Learning that they are capable of solving their own challenges will lead to self-confidence and resilience.

PLEASE SHARE YOUR THOUGHTS AND QUESTIONS

We want to hear from you! We're here to help if you have any questions, if you run into any problems, or come up with new ways to use the Electric Motors Catalyst. Contact us at any time by emailing tinkering@tinkeringlabs.com and we will respond as quickly as possible. Keep on Tinkering!

—The Tinkering Labs Team