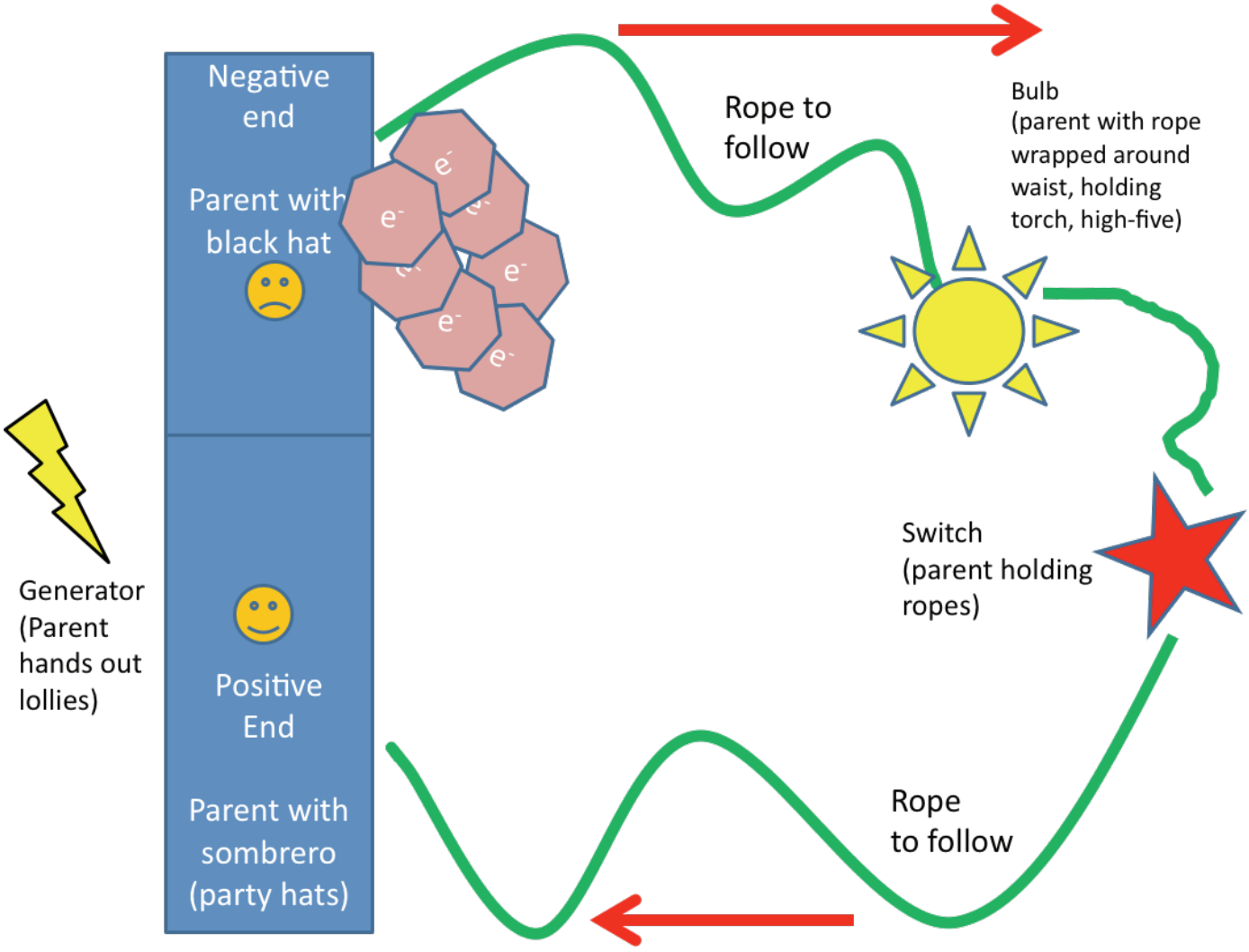
Timeline

Time	Content	What's needed
5:30pm	Order pizza delivery/pick-up Set up of room: semi-circle of 6 tables around the demo table and 2 chairs at each table. Participant box and folder on each table. See plan for role play at end of document and set that up Separate table for serving food and drink.	· Food box · Role play box · Activity boxes
5:45pm	Greet participants on arrival Pizza and water ready Get permission forms signed Name tags completed Start on demographic survey and pre-workshop (numbered) questionnaire Students colour in doily	· Pizza, cups, plates · Forms, pens · Name tags · Doilies
6:00pm	Start formal introductions – round the room and volunteers briefly **Introduction** What is science? Engineering? What's the difference? What types of science are there? What is a scientist? Tonight we will talk about energy What is energy? What types of energy are there? Drop the pen – gravity (force) and potential to kinetic energy. Battery is also potential energy (chemical). Tonight we will focus on ELECTRICAL ENERGY – energy is changed but not lost. **Explanation** Electrical energy flows through material particles, usually in a loop and in one direction, from negative to positive. If a material is made of particles that don't move much, then the energy stops flowing. If the loop is broken, the energy stops flowing. Let's try this out!	Ideas: - Include AC/DC and link this back to power supply in their house. - Introduce conductivity – name things that conduct energy (e.g. salt water) - electric shocks
6:15pm	Give energy stick to one person to hold in both hands – what happens? Get everyone to link hands to see how far the energy will flow. Break the link somewhere – what happens? Why is this happening?	· Energy stick - Can try touching different parts of the body, not just hands.
6:20pm	Tonight we are going to use this flow of energy to make things move (i.e. it becomes kinetic energy) Show fan/clock – where does the energy to move this come from? (the battery) What is the result? Where else do we see these mechanisms at home? **ACTIVITY – Make a circuit with the motor** 1. Wind the elastic band around the length of the battery twice. 2. Tape it in place on both sides if needed. 3. Clip a crocodile clip wire to the elastic band at each terminal of the battery. 4. Clip the other ends of the crocodile clip wires to the motor – LISTEN! 5. Attach the fan/doily to the motor and watch it spin. (TIP: taping the doily onto the motor makes it spin faster!) Ask open questions as you go, gauge the room and the pace.	· Frozen fan OR torch OR clock hands

6:30pm	What's going on? How is the motor moving? Let's do a role play to act out what's happening in this circuit so we can understand it better. **ROLE PLAY** See plan for the role play layout. Get each participant to go and stand in their spot in turn and explain to whole group what each role is. 1. There is a negative parent (grumpy) and a positive parent (party-time!) - The terminals are a desk/chair each, next to each other. 2. There are 2 pieces of rope, a parent "switch" holds the 2 ends together or apart. A parent is the 'bulb' (a parent holding a torch/ fan, rope wrapped around waist). This path needs to be as long as possible around the room. 3. The electrons (6 students and 1 parent) start at the negative end – very sad, and don't want to be there on the grumpy side. On the positive side there are party hats, and a fun parent – they really want to be there instead. But they have to follow the rope to get there. 4. As they move along the rope, following a volunteer to keep the pace, the switch is closed, and as they pass the 'bulb' they high-five the parent to turn the torch/fan on. They get to put on a hat at the other end and have fun. The switch can choose to be open/closed, so everyone has to watch them. The remaining parents are also electrons – they move slower, the battery running out of power... BUT if they all stay at the party, there's no electrons left to turn on the bulb/fan! 5. One parent (with demonstrator) is the 'charger' or 'generator' – stands at the positive end, gives out a lolly to each 'electron' takes their hat and pushes them back to the negative end again. Can also extend this to demonstrate a 'short circuit'. The electrons can run a short distance from the negative end to the positive end very quickly, with no spaces between them (low resistance). If they do this, they can move faster, no one holds them back, they might bump into each other, they'll get hot and sweaty and the negative end runs out of electrons faster. What does this mean for our activity? If we create a short circuit, you will notice that things get very hot, and the battery might even stop working.	Voltage = force of electron flow (how fast they move) Current = number of electrons over time Capacity = number of electrons in the battery *Don't go into the chemistry inside the battery unless needed.* *Remind students to be careful in the next bit as this short circuit may happen!*
6:45pm	Return everything to the box and go back to tables. **ACTIVITY – Make an electromagnetic motor** 1.Remove the crocodile clip wires and motors (keep for future workshops) 2. Bluetack the battery to the table if needed. 3. Keep the safety pins inside the elastic bands at the battery terminals. 4. Premade coil is ~24mm diameter, ~55cm long wire with ~4cm each side). Use the scissors/craft knife to scrape the insulation off the copper wire (fully on one side, half-way on the other). Use a 'sleeve' analogy to explain. 6. Slide the copper wire loop into the safety pins and hook the ends so it doesn't fall out. 7. Place the magnet on the battery or hold it near the copper wire. You might need to give the wire a push-start to get it spinning.	Things to adjust: - Lower the pins - Pins even height - Size of coil - Balance weight of coil - Add extra magnet - Use multimeter if needed Warning again about the short circuit!

7:05pm	Discuss this activity, with reference to the role-play. Recap what the electrical energy is doing. How/why is the copper wire able to move? Did your wire get hot at all? Is there anything you can think of that moves like this at home? Show the Frozen fan again. They have just made the mechanism that makes this fan move, the inside of the motor that they worked with earlier tonight! They can take this set-up home, in the zip lock bag with the instructions. Give some ideas about how to expand on the concept with stuff at home.	Some background around the magnetic effect of electrical current may be needed here. Explain how the coil spins as the current and therefore magnetic field is “turned on/off”
7:15pm	Show-and-tell by volunteers, careers and backgrounds	
7:20pm	Post-workshop questionnaires, certificates presented, photos, feedback	
7:30pm	Participants can take home the motor they have made.	

Room Plan for Roleplay



NOTES: Current is actually the space that moves from positive to negative, and the electrons move to fill the gaps. The flow of electricity causes a charge in the coil that is attracted to that of the magnet, it spins till the current ‘turns off’(unscraped bit) then momentum makes the coil swing round till it ‘turns on’ again, and so on (this is why it continues to spin).