Below is a diagram of a speaker over a time of 6 milliseconds (ms).

1. Use the premade drawings below of the force and the magnets show how the speaker works.

2. Use the diagram above and your experience making your own speaker to write an argument that a current creates an electromagnet. Use the following words/ideas: current direction, permanent magnet, electromagnet, force, acceleration, movement, vibration.

I claim speaker demonstrate that a current creates an electromagnet. From my understanding of sound I can tell that the bottom of the speaker was vibrating back and forth -- that is, accelerating forwards and then backwards. This acceleration means there must have been a force. The fact that there was only a force when there was a current leads me to believe the current must have made an electromagnet that interacted with the permanent magnet. Then also the changing direction of the current created a changing direction of the electromagnet, which explains the force/acceleration changing from forwards to backwards.
3. With reference to this simulation, explain what must happen to generate current. Use the following words/ideas: permanent magnet, changing magnetic field strength, coil of wires, electric field, electricity.

By moving the permanent magnet closer to the coil of wires, there is a changing magnetic field strength through the coil. This creates an electric field inside the wire generating electricity to flow in the wire.

4. A magnet is brought towards a coil of wires, fill out the energy bar charts below then describe what happens to the energy.

5. Include the following words in the written description below: energy transfer, chemical energy, kinetic energy, electrical energy, and conservation of energy.
For the system of an arm moving a permanent magnet towards a coil to generate electricity, the energy flows as follows. It starts as chemical energy in the arm that is transformed into kinetic energy of a moving arm that quickly transfers some of this energy to motion energy of the magnet. Then, through the process described in question 3, the kinetic energy of the magnet and coil is transformed into electrical energy. While the energy transforms, transfers, and transforms again, overall the total energy of the system is conserved.