

Electricity and Magnets

In this interactive lesson we will be working with magnets, wires, batteries, and coils to study the relationship between magnetism and electricity.

After some play to familiarize ourselves with magnets and with a way to detect a magnet using a compass needle, we will use a nail with wire wrapped around it and connected to a battery to create an electromagnet, a magnet produced by flowing electric current.

We will discuss the uses of electromagnets, from the classic junkyard crane, through standard doorbells, to electric motors, which operate by using electric currents to produce magnets; the forces between these magnets are then used to turn the motor.

Our last activity will study the inverse relationship. A change in the magnetic field around a wire causes an electric current to flow. This phenomenon – induction – is more difficult to create or detect and we will use prewrapped coils from the Duke Physics labs to enhance the effect.

We will discuss the uses of induction in everything from power generating turbines to audio tape pickups. I will demonstrate the former by using the same electric motor from before as a generator, and the latter by using one of our wrapped nails as a cassette tape pickup coil.