

ANSWER: FARADAY'S PARADOX

The answer is: a. If current flows in a wire wrapped around some iron (say a nail), it becomes an electromagnet. Making such a magnet is an old standard Cub Scout project. But if a magnet is sitting inside a coil it does not cause a current in the coil or even charge the wires. In the days of Queen Victoria, Michael Faraday* and many of his contemporaries puzzled about this. They thought if current makes magnetism, then by all rights magnetism should make current, but how? While wondering about this, Michael Faraday made his big discovery. A magnet would make a current in the coil, but only if it was moved inside the coil and not locked in one place. After all, it takes energy to make a current and the energy comes from the force that moves the magnet or the coil.

Faraday's discovery was the key to electric generators. A generator just moves a magnet back and forth near a coil (or moves a coil near a magnet) and so makes an electric current flow in the wire. The Prime Minister of England came to Faraday's laboratory to actually see electricity generated in this way. After the demonstration he asked Faraday, "What good is electricity?" Faraday answered that he did not know what good it was, but that he did know some day the Prime Minister would put a tax on it!