Performance Task

20.2 Motors, Generators, and Transformers 21.

Your family takes a trip to Cuba, and rents an old car to drive into the countryside to see the sights. Unfortunately, the next morning you find yourself deep in the countryside and the car won't start because the battery is too weak. Wanting to jump-start the car, you open the hood and find that you can't tell which battery terminal is positive and which is negative. However, you do have a bar magnet with the north and south poles labeled and you manage to find a short wire. How do you use these to determine which terminal is which? For starters, how do you determine the direction of a magnetic field around a current-carrying wire? And in which direction will the force be on another magnet placed in this field? Do you need to worry about the sign of the mobile charge carriers in the wire?

Teacher Support

Teacher Support This experiment can be done by using typical AAA batteries or similar batteries, a short length of flexible wire, and normal magnets, for example a good refrigerator magnet. The magnet should have the north and south poles labeled. Place the magnet near the wire so that the magnetic field of the magnet will be roughly parallel or antiparallel to the magnet field created by current in the wire. Upon briefly connecting the wire across the terminals of the battery, the wire will be attracted or repelled, respectively, from the magnet. By using the right-hand rule, you can determine in which the direction the current is flowing in the wire and thereby determine the polarity of the battery.