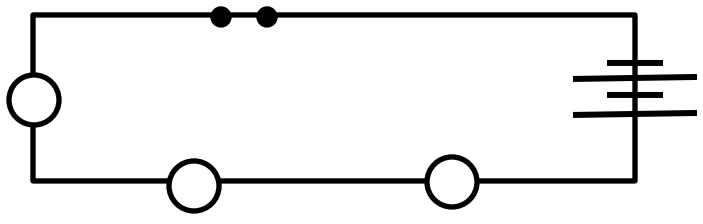
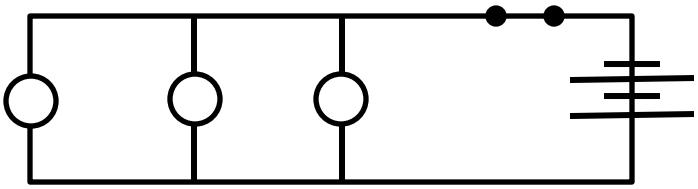
Electricity and Magnetism Study Guide KEY

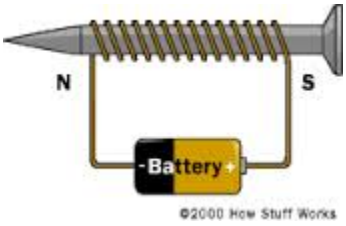
1. What is a charge? A physical property resulting from the collection of or dispersion of electrons.
2. What is static electricity? A buildup of charges on an object. Generally produced by friction or induction.
3. Describe how a charge builds up via friction. As two objects rub together, electrons from one object are transferred from one object to the other
4. Induction - describe what happens to the charge. A negative charged object – when placed near a neutral object – causes the electrons on another object to be repelled, leaving a positively charge surface because only the electron can move- the protons are locked in place by the nucleus.
5. Conduction - describe what happens to the charge. A negatively charged object (like a plastic ruler) transfer some of its electrons to a neutral object when they touch.
6. Define electricity. A form of energy cause by the movement of electrons. The flow of electrons
7. What is direct current? Current that flow through a conductor in one direction only
8. Where will you find direct current (list examples that provide or use DC)? In bettery powered objects like a laptop, cellphone or flashlight.
9. What is alternating current? A flow of electric charge that regularly reverses directions.
10. Where will you find alternating current (list examples that provide or use AC) In anything used in your home or on the main power grid from the electric company – your TV, vacuum cleaner, microwave.
11. What is voltage? The potential difference measured in volts, and the amount of work to be done to move a charge from one point to another. The "V" in V=IR
12. What is current? A movement of electrical charges around a closed path or circuit, measured in amperes (amps, A), The "I" in V=IR
13. What is resistance? A material's opposition to the flow of electric current. The "R" in V=IR
14. What is the relationship between voltage, resistance and current (you may use the math formula –Ohm's Law)? Voltage is equal to current times resistance (V=IR)
15. What are some advantages of a series circuit? It uses less wire, it uses less energy so your batteries will last longer.
16. What are some disadvantages of a series circuit? The current is shared, so each resistor gets less energy (i.e., each lightbulb will be dimmer) and if one bulb breaks, all others will stop working as well.
17. Draw and label a diagram of a series circuit with a battery, a switch and at least three resistors. Show the flow of electricity.



18. What are some advantages of a parallel circuit? The resistors each get the full benefit of the charge (i.e., lights will be brighter), and if one breaks, all others continue to function.
19. What are some disadvantages of a parallel circuit? They require more energy so your battery won't last as long, they use more wire as each resistor requires its own path.
20. Draw and label a diagram of a parallel circuit with a battery, a switch and at least three resistors. Show the flow of electricity.



21. What is a magnet? Any material that attracts iron or items that contain iron.
22. What is a permanent magnet? A material that will retain its magnetism for a long time. Its domains will remain aligned. Ex. : Cobalt, Nickel, Iron.
23. How does and electromagnet work? Define it, and then draw and label an electromagnet. A coil wrapped around an iron core that acts as a magnet when an electric current flows through the wire coil.



24. What are advantages of an electromagnet? They can be turned on and off.
25. How does a simple motor work? A current turns on and off, causing a magnet to spin.
26. If you place a compass near a wire with an electric current, what does the compass do (IT p.334)? The direction of the needle will changed due to the magnetic field surrounding the wire.
27. What are conductive solutions? Solutions that contain ions (electrolytes) that allow for the transfer of electrons (an electric current).
28. What is the law of electric charges? Opposite charges attract while like charges repel.
29. What is an insulator? A material that resists the flow of electrons.
30. What is a conductor? A material through which electrons can easily flow.
31. Use Ohm's law to calculate the voltage needed to make a current of 5A in a resistance of 15Ω. Show the formula and your work.
    V=IR, so V=5A x 15Ω = 75v

32. What current (in amperes) will a 12v battery have if the resistance is 3 Ω? Show the formula and your work.
    V=IR, so I=V/R therefore I=12v/3

33. The two opposite ends of a magnet are called Poles
34. The push or pull that magnets exert on each other is known as Magnetic Force
35. What must occur to the *domains* of an atom in order for it to be magnetic? They must all be aligned (going in the same direction)
36. What happens to a bar magnet if it cut in half? It forms two smaller magnets, each with a north and south pole.
37. What is an electric motor (ITp.335)? A device that changes electrical energy into mechanical energy.
38. What energy transformation occurs within an electric motor? Electrical energy is transformed into mechanical energy.