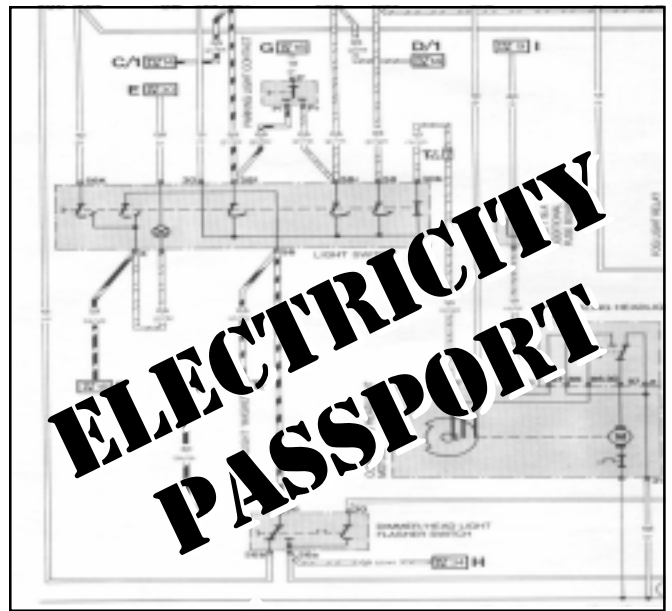


Visit the "Scouting with Mr. R." web site at:  
<http://www.relia.net/~thedane/scouting.html>

This passport belongs to:



© 2005 Kerry Rasmussen, Mr. R.  
Revised March 2005

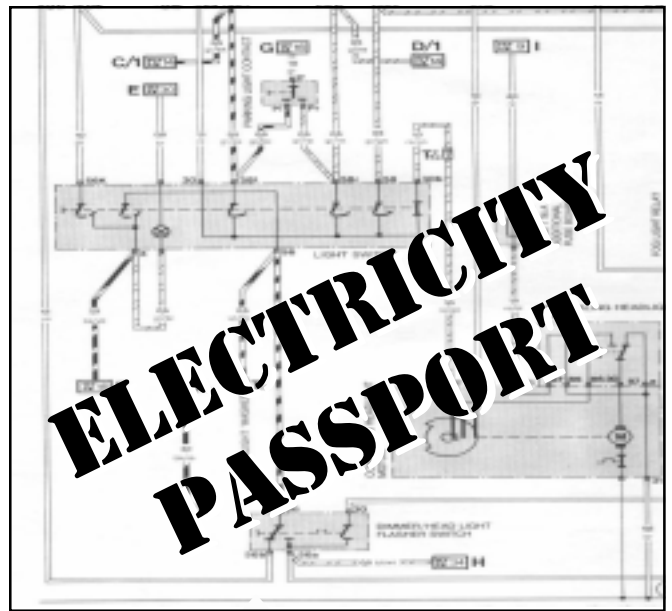


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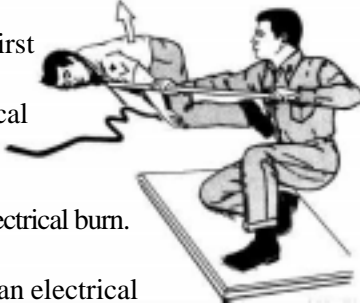
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### EMERGENCIES (1)

☐ Show how to rescue a person touching a live wire at home.

☐ Show how to render first aid to a person who is unconscious from electrical shock.



☐ Show how to treat an electrical burn.

☐ Explain what to do in an electrical storm.

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☐ Explain what to do in the event of an electrical fire.

\_\_\_\_\_

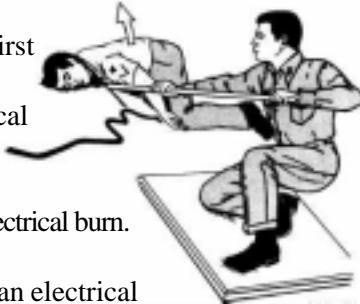
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## ELECTRICITY

S T T G M G G G G A S R R V W  
S W L N X S T R T W O N H B V  
F S I O E E I T O T L T E N T  
Y H N T V R R T C U C S O O I  
A O E S C A R U I E N L S I U  
L C Y L C H D U R N T D T S C  
T K Y T E N E I C Z G Z A L R  
E V I I O C D S I S X A T U U  
R O E C N A T S I S E R M P C  
N T E L E C T R O M A G N E T  
A Y R E T T A B I O Z M H R T  
T O V E R L O A D C E S U F A  
I O U T L E T M Z T I R H S W  
N V C N Q S H W E C S T J N K  
G U A Y M O A R I Q V W Y I B

ALTERNATING  
ATTRACTION  
BATTERY  
CONDUCTOR  
CURCUIT  
CURRENT  
DIRECT  
ELECTRICITY

ELECTROMAGNET  
FUSE  
GROUND  
MAGNITISM  
METER  
OHM  
OUTLET  
OVERLOAD

REPULSION  
RESISTANCE  
RHEOSTAT  
SHOCK  
SWITCHES  
VOLT  
WATT

## ELECTRICITY

S T T G M G G G G A S R R V W  
S W L N X S T R T W O N H B V  
F S I O E E I T O T L T E N T  
Y H N T V R R T C U C S O O I  
A O E S C A R U I E N L S I U  
L C Y L C H D U R N T D T S C  
T K Y T E N E I C Z G Z A L R  
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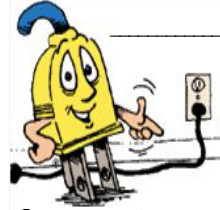
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### Here's what you can do to help!

- Turn off the lights when you leave a room.
- Turn off the computer if you won't be using it for a while.
- Recycle aluminum cans. It takes 95% less energy to recycle aluminum than to create a new can.
- Use paper more than once. If the back is blank, use that. Making new paper uses ten times more energy than printing another copy on the back of a used sheet.
- Turn off the television and VCR when not in use.
- Don't stand in front of the refrigerator with the door open. Decided what you want before you open the door.
- Shut down computer games when you are finished using them.
- Unplug appliances like the toaster oven and television when you leave the house for a few days.
- If the air conditioner is on in the summer, keep the windows closed. If you feel too cold, turn off the air conditioner.
- When the heat is on in the winter, keep the windows closed. If you feel too hot, lower the heat.

## SAFETY INSPECTION (2)

❑ Complete an electrical home safety inspection of your home, using the checklist found in the Electricity merit badge pamphlet or one approved by your counselor. Discuss what you find with your counselor.



● [www.nesf.org](http://www.nesf.org)

### Home Electrical Safety Checklist

by the National Electrical Safety Foundation

- ❑ **Outlets** - Check for outlets that have loose-fitting plugs, which can overheat and lead to fire. Replace any broken or missing wall plates. Make sure there are safety covers on all unused outlets that are accessible to children.
- ❑ **Cords** - Make sure cords are in good conditions- not frayed or cracked. Make sure they are placed out of traffic areas. Cords should never be nailed or stapled to the wall, baseboard, or to another object. Do not place cords under carpets or rugs or rest any furniture on them.

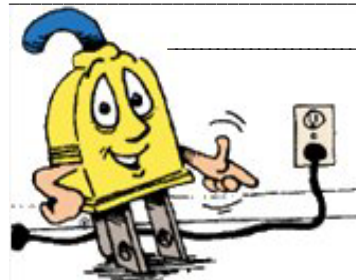
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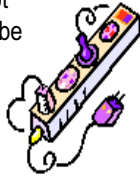
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Every year, American homes waste more than \$13 billion in energy - an average of \$150 per family.

**Extension Cords** - Check to see that cords are not overloaded. Additionally, extension cords should only be used on a temporary basis; they are not intended as permanent household wiring. Make sure extension cords have safety closures to help prevent young children from shock hazards and mouth burn injuries.



**Plugs** - Make sure your plugs fit your outlets. Never remove the ground pin (the third prong) to make a three-prong fit a two-conductor outlet; this could lead to an electrical shock. NEVER FORCE A PLUG INTO AN OUTLET IF IT DOESN'T FIT. Plugs should fit securely into outlets. Avoid overloading outlets with too many appliances.

**Ground Fault Circuit Interrupters (GFCIs)**

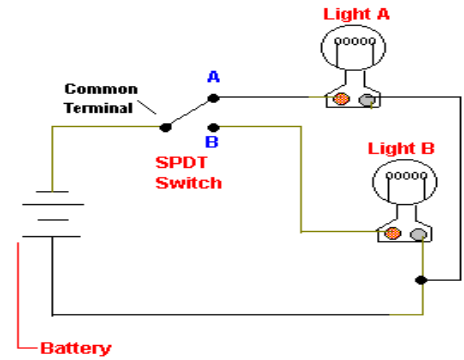
GFCIs can help prevent electrocution. They should be used in any area where water and electricity may come into contact. When a GFCI senses current leakage in an electrical circuit, it assumes a ground fault has occurred. It then interrupts power fast enough to help prevent serious injury from electrical shock. Test GFCIs regularly according to the manufacturer's instructions to make sure they are working properly.

**Light Bulbs** - Check the wattage of all bulbs in light fixtures to make sure they are the correct wattage for the size of the fixture. Replace bulbs that have higher wattage than recommended; if you don't know the correct wattage, check with the manufacturer of the fixture. Make sure bulbs are screwed in securely; loose bulbs may overheat.

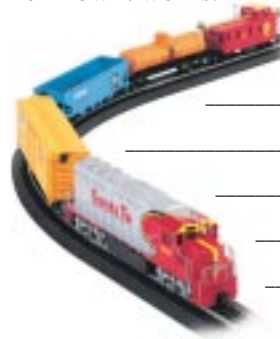
**Circuit Breakers/Fuses** - Circuit Breakers and fuses should be the correct size current rating for their circuit. If you do not know the correct size, have an electrician identify and label the size to be used. Always replace a fuse with the same size fuse.

**Build a single-pole double-throw switch. Show that it works.**

SPDT Light Switching Circuit



**Hook a model electric train layout to a house circuit. Tell how it works.**



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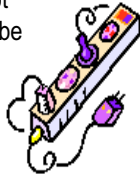
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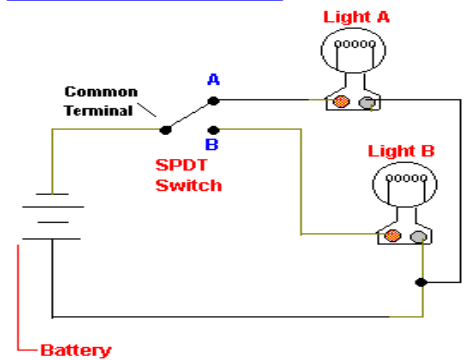
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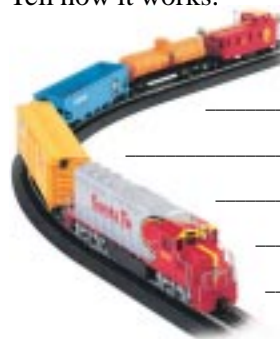
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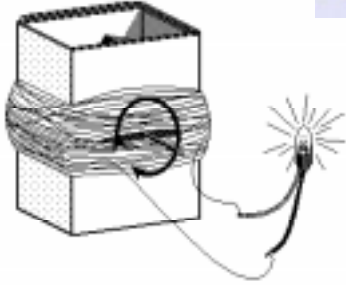
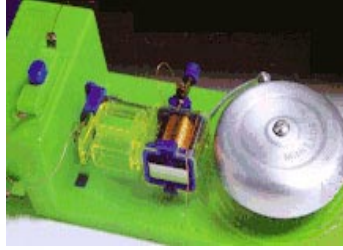
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## EXPERIMENTS (11)

Do any **TWO** of the following:

❑ Connect a buzzer, bell or light with a battery. Have a key or switch in the line.



❑ Make and run a simple electric motor (not from a kit).

● <http://amasci.com/amateur/coilgen.html>

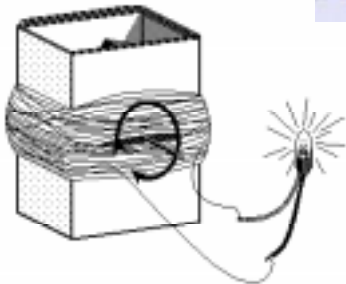
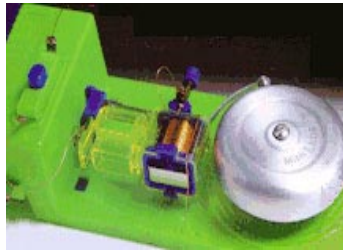
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❑ **Water and Electricity Don't Mix** - Don't leave plugged-in appliances where they might fall in contact with water. If a plugged-in appliance falls into water, NEVER reach in to pull it out - even if it's turned off. First turn off the power source at the panel board and then unplug the appliance. If you have an appliance that has gotten wet, don't use it until it has been checked by a qualified repair person.

❑ **Appliances** - If an appliance repeatedly blows a fuse, trips a circuit breaker, or if it has given you a shock, unplug it and have it repaired or replaced.

❑ **Entertainment/Computer Equipment** - Check to see that the equipment is in good condition and working properly; look for cracks or damage in wiring, plugs, and connectors. Use a surge protector bearing the seal of a nationally recognized certification agency.

❑ **Outdoor Safety** - Electric-powered mowers and other tools should not be used in the rain, on wet grass or in wet conditions. Inspect power tools and electric lawn mowers before each use for frayed power cords, broken plugs, and cracked or broken housings. If damaged, stop using it immediately. Repair it or replace it. Always use an extension cord marked for outdoor use and rated for the power needs of your tools. Remember to unplug all portable power tools when not in use. Since metal ladders conduct electricity, watch out for overhead wires and power lines.

❑ **Lightning** - During an electrical storm, do not use appliances (i.e., hairdryers, toasters, and radios) or telephones (except in an emergency); do not take a bath or shower; keep batteries on hand for flashlights and radios in case of a power outage; and use surge protectors on electronic devices and appliances.



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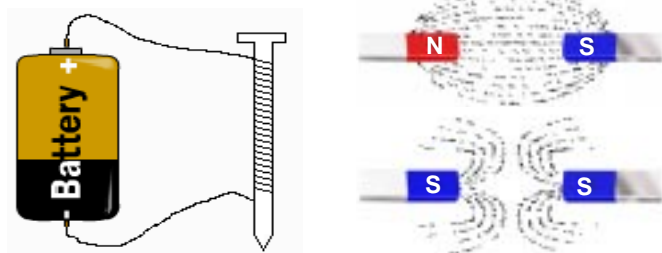
❑ **Space Heaters** - Space Heaters are meant to supply supplemental heat. Keep space heaters at least 3 ft. away from any combustible materials such as bedding, clothing, draperies, furniture, and rugs. Don't use in rooms where children are unsupervised and remember to turn off and unplug when not in use.

❑ **Halogen Floor Lamps** - Halogen floor lamps operate at much higher temperatures than a standard incandescent light bulb. Never place a halogen floor lamp where it could come in contact with draperies, clothing, or other combustible materials. Be sure to turn the lamp off whenever you leave the room for an extended period of time and never use torchiere lamps in children's bedrooms or playrooms.

● <http://www.securityworld.com/community/checklists/electricalsafety.html>

### MAGNETISM (3)

❑ Make a simple electromagnet and use it to show magnetic attraction and repulsion.



● <http://education.jlab.org/qa/electromagnet.html>  
● <http://micro.magnet.fsu.edu/electromag/java/magneticlines2/>

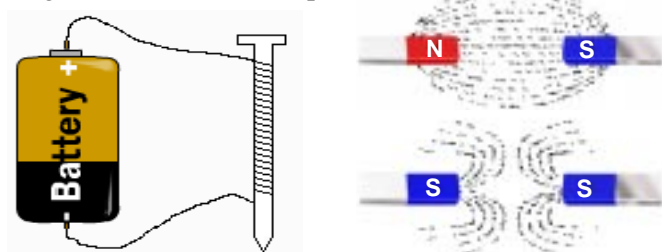
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potential difference \_\_\_\_\_

rectifier \_\_\_\_\_

rheostat \_\_\_\_\_

conductor \_\_\_\_\_

ground \_\_\_\_\_

circuit \_\_\_\_\_

short circuit \_\_\_\_\_

The electric chair was invented by a dentist.



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**SAFETY AND RESPONSIBILITY (10)**

Explain the following electrical terms:

volt \_\_\_\_\_

ampere \_\_\_\_\_

watt \_\_\_\_\_

ohm \_\_\_\_\_

resistance \_\_\_\_\_



Every year, American homes waste more than \$13 billion in energy - an average of \$150 per family.

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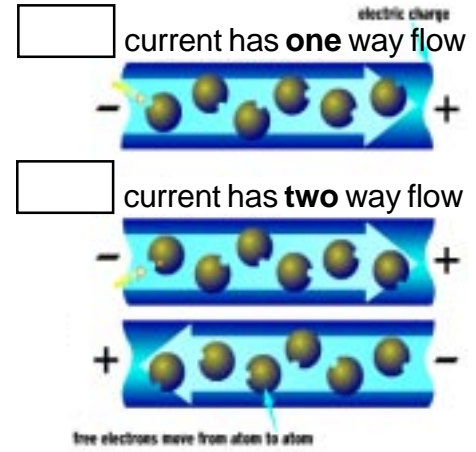
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**CURRENT (4)**

Explain the difference between:

a direct current (DC) \_\_\_\_\_

an alternating current (AC) \_\_\_\_\_



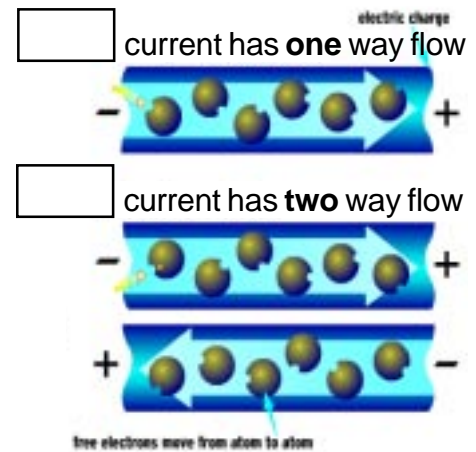
● [http://www.pge.com/microsite/PGE\\_dgz/wires/hp.html](http://www.pge.com/microsite/PGE_dgz/wires/hp.html)

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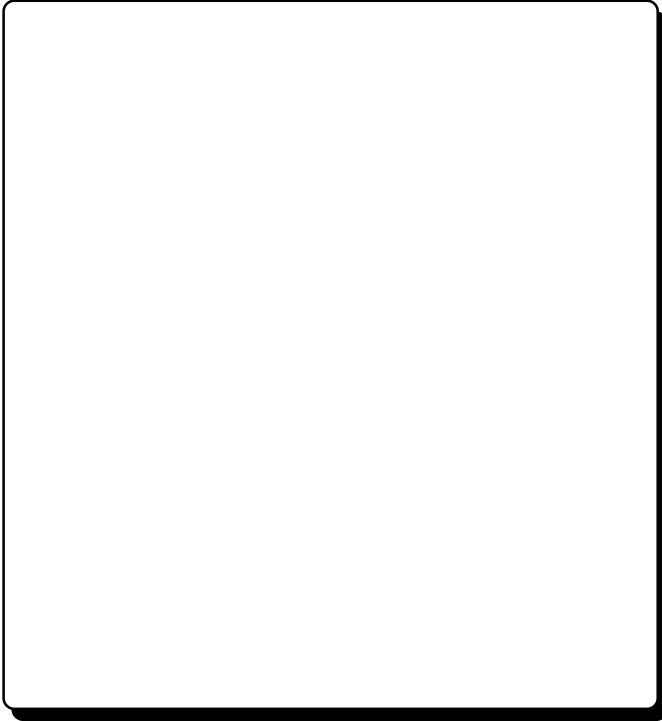
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● [http://www.pge.com/microsite/PGE\\_dgz/wires/hp.html](http://www.pge.com/microsite/PGE_dgz/wires/hp.html)

### ELECTRIC BELL (5)

Make a simple drawing to show how a battery and an electric bell work.



b. Discuss with your counselor five ways in which your family can conserve energy.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

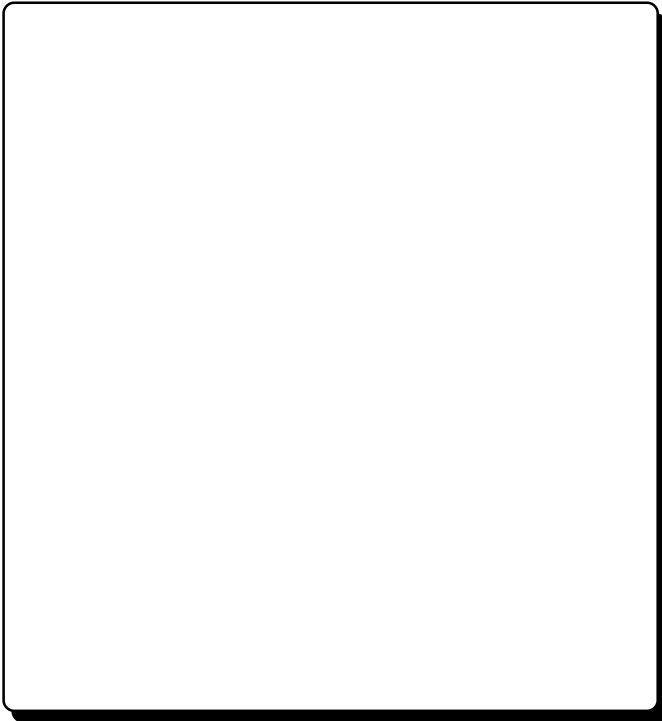
In the picture below, circle five ways of wasting energy.



● [http://www.wattsnew.com/learn3/learning\\_frame.html](http://www.wattsnew.com/learn3/learning_frame.html)

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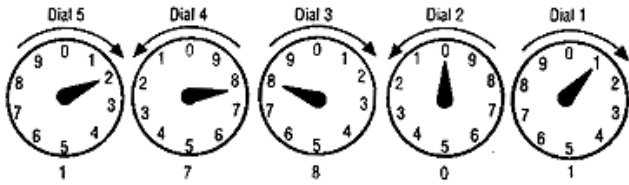
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## METER READINGS (9)



● <http://www.maritimeelectric.com/using3.html>

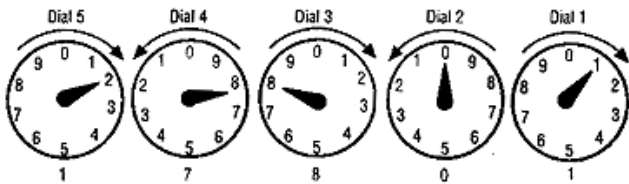
- a. Read an electric meter.
- Using your family's electric bill, determine the energy cost from the meter readings.

SAMPLE	HOURLY USAGE PER MONTH	WATTS	HOURLY ENERGY PER MONTH	MONTHLY OPERATING COST
LIGHT BULBS	224 2 hrs/day	75	16.8	\$2.02
ROOM HEATER	84 3 hrs/day	1,000	84	\$10.23
15" COMPUTER MONITOR	60 2 hrs/day	272	12.24	\$1.47
REFRIGERATOR	224 2 hrs/day	777	175	\$20.91

AT A RATE OF \$0.12 (U.S.) PER kWh.

● <http://www.tutorials.com/08/0822/0822.asp>

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## FUSES / CIRCUIT BREAKERS (6)

Explain why a fuse blows or a circuit breaker trips.

See [http://www.zlan.com/brk\\_info.htm](http://www.zlan.com/brk_info.htm)  
OR <http://www.charliecrow.net/pme9.htm>



Tell how to find a blown fuse or ripped circuit breaker in your home.

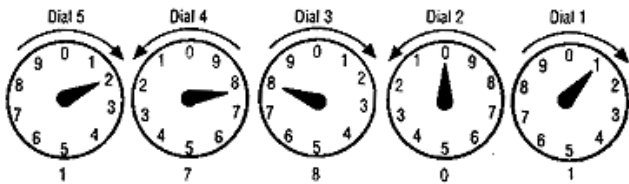


Show how to safely reset the circuit breaker.

One lightning bolt has enough electricity to service 200 000 homes.



## METER READINGS (9)



● <http://www.maritimeelectric.com/using3.html>

- a. Read an electric meter.
- Using your family's electric bill, determine the energy cost from the meter readings.

SAMPLE	HOURLY USAGE PER MONTH	WATTS	HOURLY ENERGY PER MONTH	MONTHLY OPERATING COST
LIGHT BULBS	224 2 hrs/day	75	16.8	\$2.02
ROOM HEATER	84 3 hrs/day	1,000	84	\$10.23
15" COMPUTER MONITOR	60 2 hrs/day	272	12.24	\$1.47
REFRIGERATOR	224 2 hrs/day	777	175	\$20.91

AT A RATE OF \$0.12 (U.S.) PER kWh.

● <http://www.tutorials.com/08/0822/0822.asp>

## FUSES / CIRCUIT BREAKERS (6)

Explain why a fuse blows or a circuit breaker trips.

See [http://www.zlan.com/brk\\_info.htm](http://www.zlan.com/brk_info.htm)  
OR <http://www.charliecrow.net/pme9.htm>



Tell how to find a blown fuse or ripped circuit breaker in your home.



Show how to safely reset the circuit breaker.

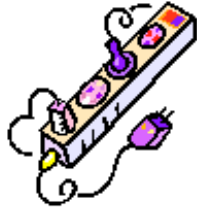
One lightning bolt has enough electricity to service 200 000 homes.



### OVERLOADED CIRCUIT (7)

Explain what overloading an electric circuit means.

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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Tell what you have done to make sure your home circuits aren't overloaded.

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Electrocution is one of the top five causes of workplace deaths.

See <http://www.texascooppower.com/safety/extcord.html>

### ELECTRICAL FLOOR PLAN (8)

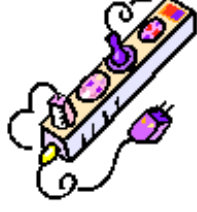
□ Draw a floor plan of a room in your home, showing a wiring diagram of the lights, switches, and outlets. Show which fuse or circuit breaker protects each one.

[Large empty rectangular box for drawing a floor plan and wiring diagram.]

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