HOUSTON MUSEUM OF NATURAL SCIENCE

scouts@HMNS

Electricity Merit Badge Prerequisites

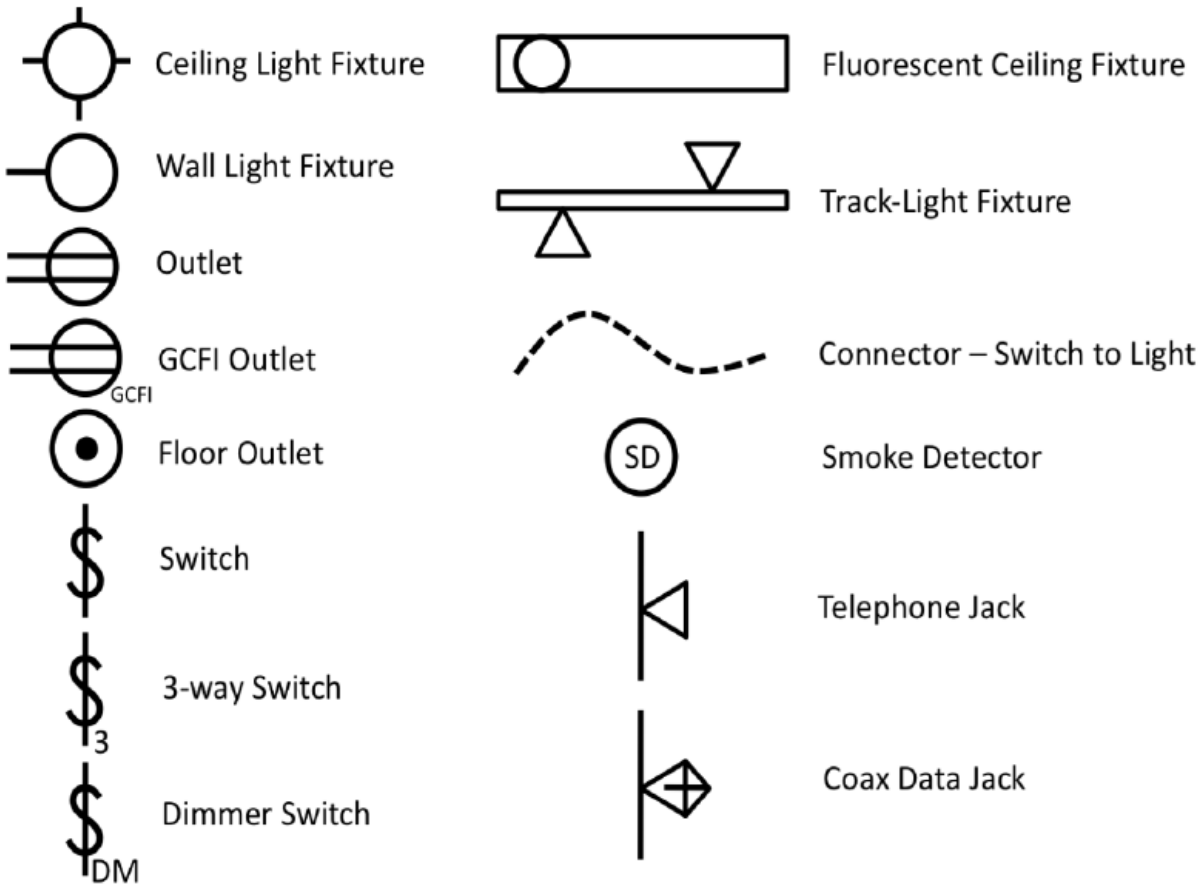
Scout's Name: _____ Unit: _____

Requirement 2

Complete an electrical home safety inspection of your home, using the checklist found on pages 4-6 in this packet. Discuss what you find with your counselor.

Requirement 8

Make a floor plan wiring diagram of the lights, switches, and outlets for a room in your home. Show which fuse or circuit breaker protects each one. Use the symbol chart and graph paper provided.



Common Electrical Symbols

REQUIREMENT 9

Do the following:

a. Read an electric meter and, using your family's electric bill, determine the energy cost from the meter readings. (Most homes are now equipped with a smart meter, we show the scouts a diagram of a three dial meter.)

kwh usage for month:
Cost per kwh:
Energy cost for the month:

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

1.	
2.	
3.	
4.	
5.	

Electricity Merit Badge
Home Electrical Safety Checklist

_____ **Adult initials:** *Adults, please ensure that scout understands and inspects for the items on the checklist.*
Scout must complete this checklist with an adult.

Instructions: ***1. Carefully read each item on the checklist.***
2. Check your home for any problems regarding the item.
3. Check the "Inspected" box indicating you have completed inspection for that item*. [if the home does not contain a certain item, write "NA" in box.]*
4. Check the "Problem Found" box for any item that requires attention. Make a note on a separate page what needs to be done to address the problem.

Inspected	Is There a Problem Found?	**Outlets**
		Check for outlets that have loose-fitting plugs.
		Check for outlets that have missing or broken wall plates.
		Check to ensure safety covers are installed all unused outlets that are accessible to children.
		Make sure that no outlets are overloaded with too many appliances.

Inspected	Is There a Problem Found?	**Appliance or Lamp Cords**
		Check to ensure all cords are in good condition - not frayed or cracked.
		Make sure cords are placed out of traffic areas.
		Check to ensure that no cords are nailed or stapled to the wall, baseboard or to another object.
		Make sure that no cords are under carpets or rugs, and that no furniture rests on them.
		Make sure all plugs fit securely into your outlets.
		Check to see that no plugs have had the ground pin (the third prong) removed.

Inspected	Is There a Problem Found?	**Extension Cords**
		Check to see that extension cords that are being used are not overloaded with too many connections.
		Check to ensure extension cords have safety closures over plug-in holes to protect from shock hazard.

Inspected	Is There a Problem Found?	**Ground Fault Circuit Interrupters (GFCIs)**
		Are GFCIs installed in the following locations, where outlets are near sinks, tubs, or water pipes? ☐ Kitchen ☐ Bathrooms ☐ Garage ☐ Laundry room ☐ Outdoor outlets ☐ in main breaker panel
		Test each GFCI according to manufacturers instructions to ensure that each works properly.
		Ensure everyone in the home knows to test GFCIs monthly and after major electrical storms to make sure they work properly.

Inspected	Is There a Problem Found?	**Circuit Breakers / Fuses**
		Inspect breaker panel, or fuse box, for any that show cracks or damage.
		Check to see that panel breakers are properly labeled, including for which circuit they operate, and the proper current rating.
		Ensure everyone in the home knows where the main breaker is located and how to shut of power to the entire house.

Inspected	Is There a Problem Found?	**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.
		Make sure all light bulbs are screwed in securely; loose bulbs may overheat.

Inspected	Is There a Problem Found?	**Electric Appliances, Electronic Equipment, and Computers**
		Make sure there are no plugged-in appliances where they might fall in contact with water.
		Are there any appliances, lamps, or other electrical equipment that repeatedly blows a fuse, trips a circuit breaker, or gives an electric shock when touched?
		Check to see that equipment is in good condition and working properly. Look for cracks/damage in wiring, plugs, connectors.
		Are surge protectors used for all electronic devices such as computers, phones, televisions, other audio and video equipment, fax machines, modems, etc.
		Check if surge protectors are of quality and bear the seal of a nationally recognized certification agency, such as UL.

Inspected	Is There a Problem Found?	**Outdoor Safety**
		Inspect power tools & electric lawn mowers before each use for frayed power cords, broken plugs & cracked or broken housings.
		Check that extension cords are rated for outdoor use, and rated for the power needs of your tools.
		Ensure that everyone in your home is warned to unplug all portable power tools when not in use.
		Ensure that everyone in your home is warned not to use electric-powered mowers and other electric tools in the rain, on wet grass or in wet conditions.
		Ensure that everyone in your home is warned to watch out for overhead wires and power lines when using a ladder outdoors, and must stay at least 10 feet from all overhead lines.

Inspected	Is There a Problem Found?	**Lightning Protection**
		Check to ensure that fresh batteries are on hand for flashlights and radios in case of a power outage.
		Ensure that everyone in your home knows where emergency equipment, such as flashlights, are located in case of power outages.
		Ensure that everyone in your home is warned not to use electrical equipment, especially telephones (except in an emergency) during an electrical storm.
		Ensure that everyone in your home is warned not to take a bath or shower; during an electrical storm.
		Ensure that everyone in your home is warned to unplug electrical devices during an electrical storm.

Inspected	Is There a Problem Found?	**Space Heaters**
		Ensure space heaters are kept at least 3 ft. away from any combustible materials such as bedding, clothing, draperies, furniture and rugs.
		Check to see that extension cords are not connected to any space heaters.
		Ensure that everyone in your home is warned never to use space heaters in rooms where children are unsupervised.
		Ensure that everyone in your home is warned to turn off and unplug space heaters when not in use.

Inspected	Is There a Problem Found?	**Lamps with Halogen Bulbs**
		Ensure lamps with halogen bulbs are not located near draperies, clothing or other combustible materials.
		Ensure that everyone in your home is warned to never use lamps with halogen bulbs in children's bedrooms or playrooms.
		Ensure that everyone in your home is warned to turn off and unplug lamps with halogen bulbs when not in use.

Home Electrical Safety Tips

Outlets – Check for outlets that have loose-fitting plugs, which can overheat and lead to fire. Have an adult replace any missing or broken wall plates. Make sure there are safety covers on all unused outlets that are accessible to children. Avoid overloading outlets with too many appliances.

Plug-in Cords – Make sure cords are in good condition-not frayed or cracked. Make sure cords are placed out of traffic areas where people can trip over them or small children can reach them. Cords should never be nailed or stapled to the wall, baseboard or to another object. Do not place cords under carpets or rugs or put any furniture on top of them. Make sure your plugs fit securely into your outlets. Never remove the ground pin (the third prong) in order to make a three-prong fit a two-conductor outlet; this could lead to an electrical shock or electrical fire. Never force a plug into an outlet if it doesn't fit.

Extension Cords – Check to see that extension cords are not overloaded. 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 protect children from shock hazards and electrical burns on their mouths and other injuries.

Ground Fault Circuit Interrupters – 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. GFCIs can be installed as an outlet, or as a replacement for the circuit breaker for an entire circuit in the home breaker panel. Test GFCIs according to the manufacturer's instructions monthly and after major electrical storms to make sure they are working properly.

Circuit Breakers/Fuses – Circuit breakers and fuses should have the correct size current rating for the circuit wiring and intended purpose. If you do not know the correct rating, have an electrician identify and label the size to be used. Always replace a fuse with one of the same rating. Make sure everyone in your home knows where the main breaker is located and how to shut of power to the entire house in case of emergency.

Light Bulbs – Check the wattage of all bulbs in light fixtures to make sure they are the correct wattage for the rating of the fixture and any connecting wires. 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.

Electrical Appliances – Make sure there are no electrical appliances such as hair dryers that are left plugged in 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 breaker panel, 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. 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. Always use a surge protector that bears the seal of a nationally recognized certification agency (such as UL). A good surge protector to protects your equipment from unexpected burst of voltage that could otherwise cause damage to your equipment.

Outdoor Safety – Electric lawn mowers and other electric power 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 any part is 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. When using ladders, watch out for overhead wires and power lines. Stay at least 10 feet from all overhead lines. Making contact with power lines can cause serious injury or death.

Lightning – During an electrical storm, do not use appliances such as hairdryers, toasters, 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. Use surge protectors on electronic devices, appliances, phones, fax machines and modems. The best protection is to unplug electrical equipment during an electrical storm.

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 space heaters in rooms where children are unsupervised. Turn off and unplug space heaters when not in use. Do not use space heaters with extension cords; plug heaters directly into an outlet on a relatively unburdened circuit.

Halogen Lamps – Halogen lamps operate at much higher temperatures than a standard incandescent light bulb. Never place a halogen 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. Never use tall floor lamps in children's bedrooms or playrooms. Consider using cooler fluorescent floor lamps.