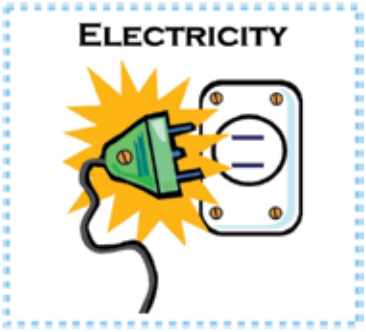
Electricity Basics

name_____



- **Watts** are a basic measure of power.
- **Volts** are the standard unit of electromotive force. You can think of volts literally as a pushing force. The higher the voltage, the harder the electricity is being pushed through the circuit.
- **Amps** are the equivalent of volume. When you think about how much amperage you have available, you're basically asking, How big is your "container" full of electricity?
- **Circuit**: Electricity flows in a loop called a circuit which begins and ends at the battery pack.
- **Load**: Any device that consumes the energy flowing through a circuit and converts that energy into work is called a load. A light bulb is an example of a load; it consumes the electricity from a circuit and converts it into work (in the form of heat and light).

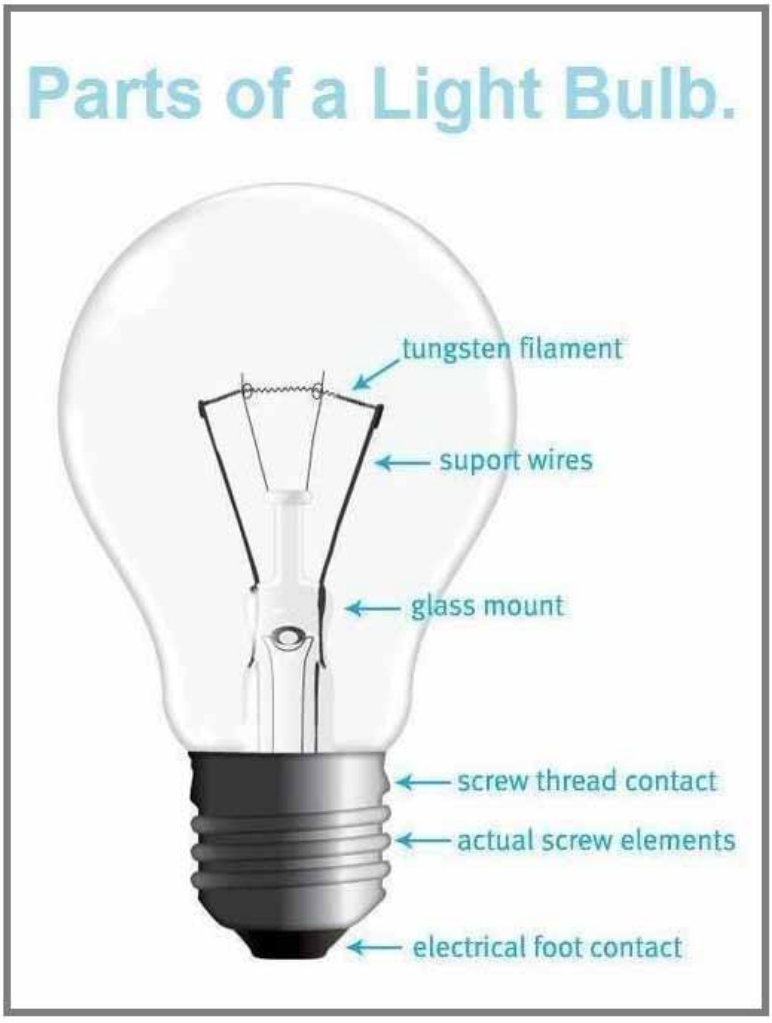
The Challenge:

Light the blub with only a battery and wire

Draw designs that do not work	Draw designs that do work (4 total ways!)

What do you now know about electrical circuits that you didn't know before? Draw a picture to explain...

Trace the flow of the circuit through the bulb.



Activity Sheet for Learning Experience #2 Name_____

SIMPLE CIRCUITS WITH A BULB, A BATTERY AND WIRES

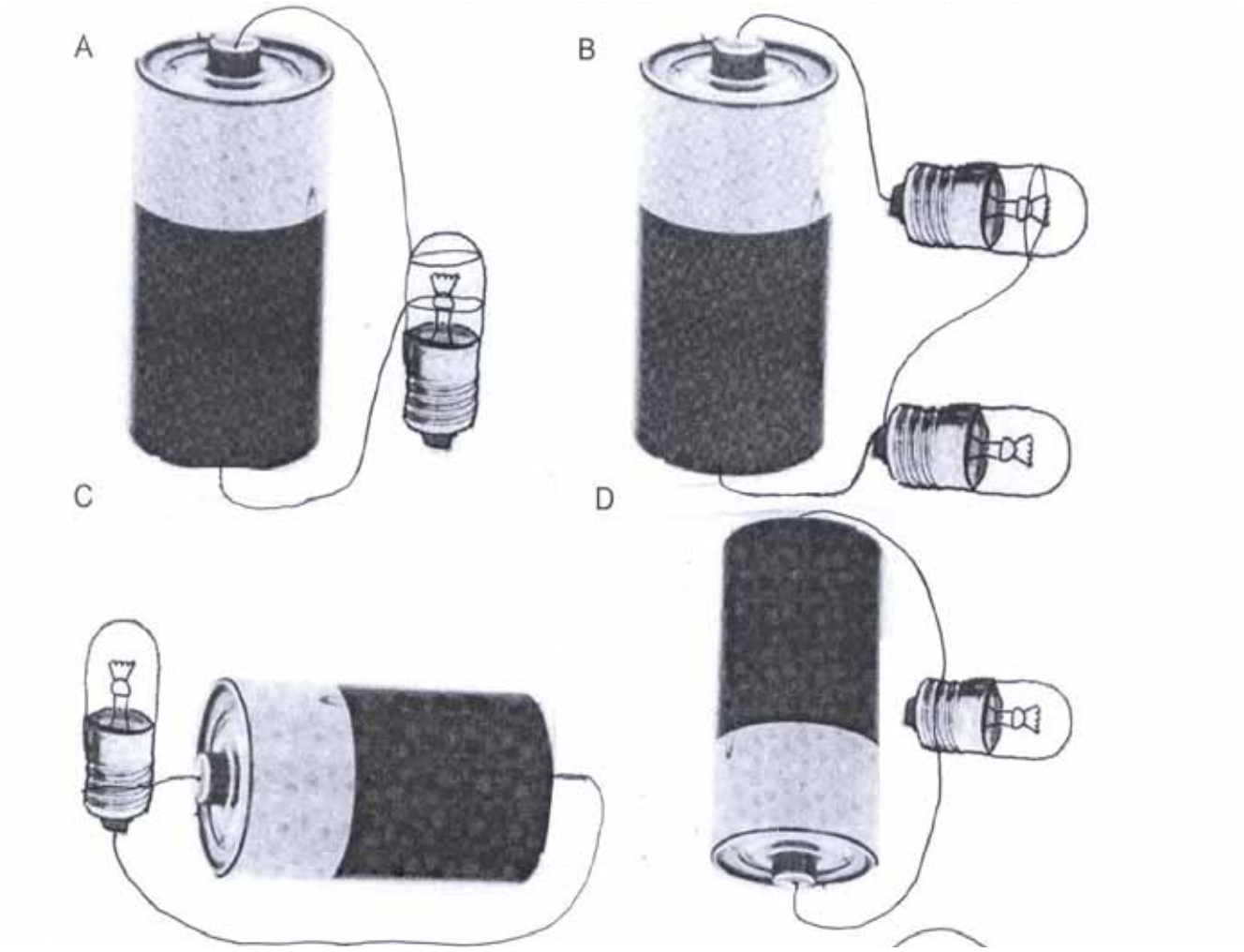
Materials:
Electrical Circuits Student Activity Book
2 15 cm. pieces of #20 bare copper wire
#48 bulb
"D" battery

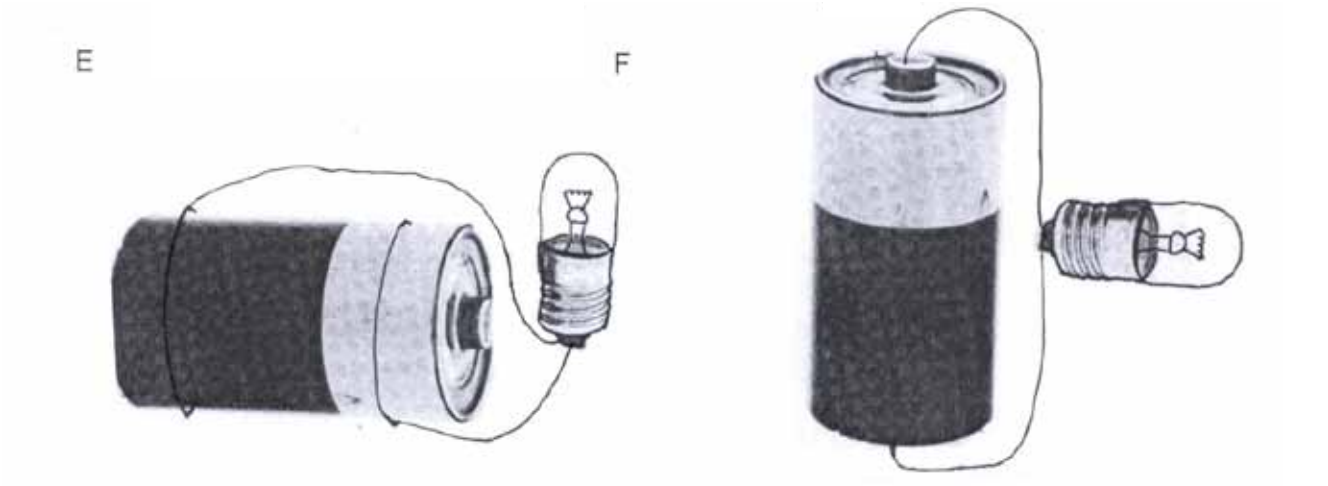
1. Examine diagrams A–J on the next two pages. Predict whether the circuit will be complete, and record your prediction on the chart below.

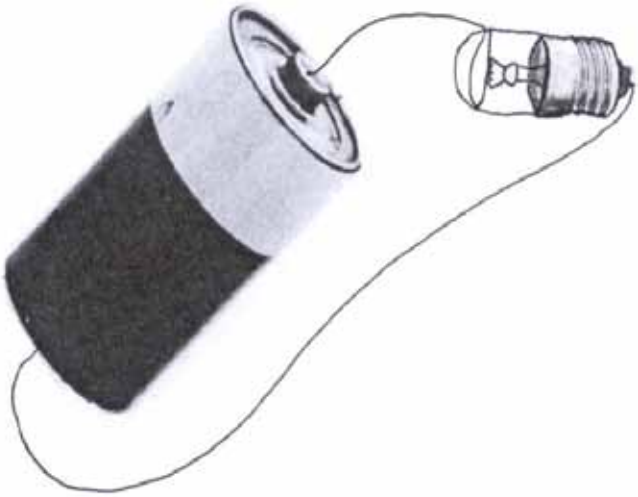
2. Your teacher, with a helper, will demonstrate the arrangements to test your predictions. Record their results on the chart below.

PREDICTION CHART

	Prediction		Test	
Circuit	Bulb will light		Results	
	Yes	No	Yes	No
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				


A
B
C
D


E
F



J

NEXT GENERATION SCIENCE STANDARDS For States, By States

Physical Science Progression

INCREASING SOPHISTICATION OF STUDENT THINKING

	K-2	3-5	6-8	9-12
PS1.A Structure of matter (includes PS1.C Nuclear processes)	Matter exists as different substances that have observable different properties. Different properties are suited to different purposes. Objects can be built up from smaller parts.	Because matter exists as particles that are too small to see, matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials.	The fact that matter is composed of atoms and molecules can be used to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter.	The sub-atomic structural model and interactions between electric charges at the atomic scale can be used to explain the structure and interactions of matter, including chemical reactions and nuclear processes. Repeating patterns of the periodic table reflect patterns of outer electrons. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy to take the molecule apart.
PS1.B Chemical reactions	Heating and cooling substances cause changes that are sometimes reversible and sometimes not.	Chemical reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same.	Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy.	Chemical processes are understood in terms of collisions of molecules, rearrangement of atoms, and changes in energy as determined by properties of elements involved.
PS2.A Forces and motion	Pushes and pulls can have different strengths and directions, and can change the speed or direction of its motion or start or stop it.	The effect of unbalanced forces on an object results in a change of motion. Patterns of motion can be used to predict future motion. Some forces act through contact, some forces act even when the objects are not in contact. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	The role of the mass of an object must be qualitatively accounted for in any change of motion due to the application of a force.	Newton's 2nd law (F=ma) and the conservation of momentum can be used to predict changes in the motion of macroscopic objects.
PS2.B Types of interactions			Forces that act at a distance involve fields that can be mapped by their relative strength and effect on an object.	Forces at a distance are explained by fields that can transfer energy and can be described in terms of the arrangement and properties of the interacting objects and the distance between them. These forces can be used to describe the relationship between electrical and magnetic fields.
PS2.C Stability & instability in physical systems	N/A	N/A	N/A	N/A
PS3.A Definitions of energy	N/A	Moving objects contain energy. The faster the object moves, the more energy it has. Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents. Energy can be converted from one form to another form.	Kinetic energy can be distinguished from the various forms of potential energy. Energy changes to and from each type can be tracked through physical or chemical interactions. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter.	The total energy within a system is conserved. Energy transfer within and between systems can be described and predicted in terms of energy associated with the motion or configuration of particles (objects). --- Systems move toward stable states.
PS3.B Conservation of energy and energy transfer	[Content found in PS3.D]			

	K-2	3-5	6-8	9-12
PS3.C Relationship between energy and forces	Bigger pushes and pulls cause bigger changes in an object's motion or shape.	When objects collide, contact forces transfer energy so as to change the objects' motions.	When two objects interact, each one exerts a force on the other, and these forces can transfer energy between them.	Fields contain energy that depends on the arrangement of the objects in the field.
PS3.D Energy in chemical processes and everyday life	Sunlight warms Earth's surface.	Energy can be "produced," "used," or "released" by converting stored energy. Plants capture energy from sunlight, which can later be used as fuel or food.	Sunlight is captured by plants and used in a reaction to produce sugar molecules, which can be reversed by burning those molecules to release energy.	Photosynthesis is the primary biological means of capturing radiation from the sun; energy cannot be destroyed, it can be converted to less useful forms.
PS4.A Wave properties	Sound can make matter vibrate, and vibrating matter can make sound.	Waves are regular patterns of motion, which can be made in water by disturbing the surface. Waves of the same type can differ in amplitude and wavelength. Waves can make objects move.	A simple wave model has a repeating pattern with a specific wavelength, frequency, and amplitude, and mechanical waves need a medium through which they are transmitted. This model can explain many phenomena including sound and light. Waves can transmit energy.	The wavelength and frequency of a wave are related to one another by the speed of the wave, which depends on the type of wave and the medium through which it is passing. Waves can be used to transmit information and energy.
PS4.B Electromagnetic radiation	Objects can be seen only when light is available to illuminate them.	Object can be seen when light reflected from their surface enters our eyes.	The construct of a wave is used to model how light interacts with objects.	Both an electromagnetic wave model and a photon model explain features of electromagnetic radiation broadly and describe common applications of electromagnetic radiation.
PS4.C Information technologies and instrumentation	People use devices to send and receive information.	---------- Patterns can encode, send, receive and decode information.	Waves can be used to transmit digital information. Digitized information is comprised of a pattern of 1s and 0s.	Large amounts of information can be stored and shipped around as a result of being digitized.