Science 9 with Mrs. M
Unit D: Topics 4 and 5

Name: _____

Brainstorm examples of each energy conversion type:

Converted to: Second Form of Energy

Start: First Form of Energy	chemical	electrical	mechanical	thermal
chemical				***hand warmer, fire (exothermic)***
electrical				
mechanical	***extreme stress or compression***			
thermal	***cooking food (endothermic)***			
nuclear	***stellar cores (Sun's core H -> He)***		***nuclear submarine***	

Use these advantages and disadvantages of batteries to help you fill in other characteristics

Battery	ADVANTAGES	DISADVANTAGES
A. Dry Cell	- can be inverted, rotated, is portable - many sizes (AAA, AA, A, C, D) - long shelf life	- not all rechargeable (disposable) - expensive - do not last long
B. Wet Cell	- can not be inverted or rotated - cheap - large currents (long lasting)	- not all rechargeable (disposable) - generally large - liquid contents=special container
C. Rechargeable	- environmental pros - reversible/rechargeable - can be dry or wet cell - long-lasting lithium ion in pacemakers	- very expensive - only small currents

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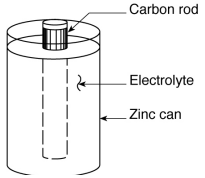
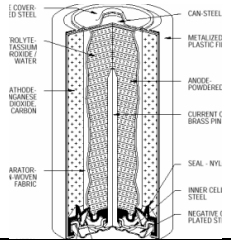
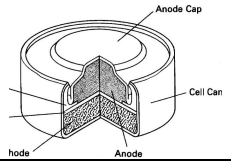
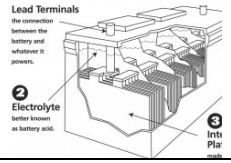
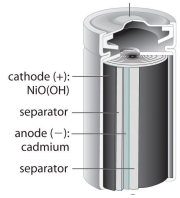
Cell Name and Picture	Primary/ Secondary	Wet/ Dry	Positive Electrode	Negative Electrode	Electrolyte	Typical Uses	Pro's and Con's
Zinc Carbon 			Carbon rod and Manganese Dioxide		Paste made from: ammonium chloride, flour, starch	Flashlights, Portable radios, CD players	Pro: Con: not efficient at low temperatures
Alkaline 			Carbon and Manganese Dioxide	Powered Zinc	Potassium Hydroxide (KOH) Basic gel	Flashlights, Portable radios, CD players	Pro: lasts longer than zinc Con: expensive
Zinc Air 			Cell cap open to the air, and air distribution membrane		Potassium Hydroxide (KOH) Basic gel		Pro: highest energy per unit mass Con: discharges rapidly
Lead Acid 						Cars, motorbikes, snowmobiles, golf carts	Pro: dependable Con: heavy corrosive liquid
Nickel Cadmium 					Potassium Hydroxide (KOH) Basic gel	Electric shavers, laptops, power tools, portable TVs	Pro: Rechargeable Con:

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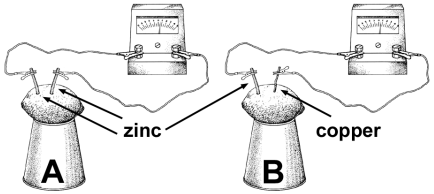
1. Explain the difference between: (2)
   A. Wet cells and dry cells

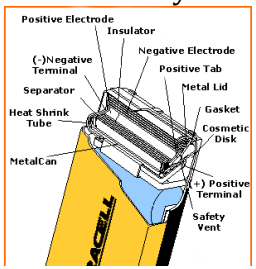
   B. Primary and secondary cells

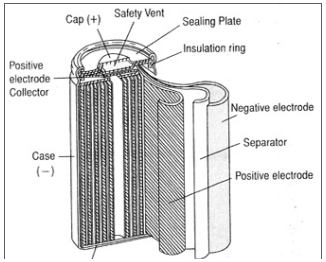
2. Two lemon-batteries are shown below. Which of the batteries will not work? Why? (2)



3. A voltaic cell is a simple wet battery. Sketch, label and describe the function of each component of a voltaic cell. (2)

4. A nickel-metal hydride battery is a secondary dry cell with KOH electrolyte. What metals are used for electrodes? (2)





5. Create a working battery using only the materials below. Sketch the operational battery. (2)

plastic	aluminum	wood	copper

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Use the following words to fill in the blanks. You may use a word more than once, not at all, or only part of the term.

Electrical energy	Thermo-electric generator	Photovoltaic cell (PV)	Fuel Cell
Electrons	Chemical energy	Ions	Alkaline
Heat	Thermopile	Electrodes	Electrolyte
Thermocouple	Wet cell	Piezoelectric effect	Dry cell
Primary cell	Secondary cell	Voltaic cell	Battery

6. Connecting a series of cells together produces a _____.

7. Batteries are electrochemical cells that convert _____ energy into _____ energy.

8. The negative electrode releases _____ to travel to a device, then return to the positive electrode.

9. _____ is a form of energy that is always transferred from a warmer substance to a cooler one.

10. _____ is a device that converts heat to a small amount of electricity often used in temperature sensors.

11. The phenomenon that describes a push-button barbeque lighter producing a small electric current is called the _____ _____.

12. A _____ is a series of thermocouples combined. This is used in a _____, which produces greater amounts of energy.

13. Electricity can be produced from light with a device usually composed of silicon, called a _____.

14. Different types of metals in a voltaic cell that have different attractions for electrons are called _____.

15. _____ is a substance that can conduct an electric current through the movement of ions.

16. A primary battery, such as an _____ battery, that uses a strong base (KOH) as a gel/paste electrolyte is a _____ cell.