**Lab 1- Static Discharge and Lightning Virtual Lab**

Use the website and links below to answer the following questions.

First go to [www.learnalberta.ca](http://www.learnalberta.ca)

Type in **Static Discharge** into the Find Resources box.

The link will be on the right hand side of the screen.

Work through the tour and answer the following questions. Be sure to click “play” wherever necessary.

1. What is an **electroscope and how does it work**? (2)
2. Why does a sock have a **negative charge** and the shirt have a **positive charge**? (1)
3. **What happens when there is static discharge** between the sock and the shirt? (1)

**Lab 2- Static Discharge and Lightning Virtual Lab**

Go back to [www.learnalberta.ca](http://www.learnalberta.ca)

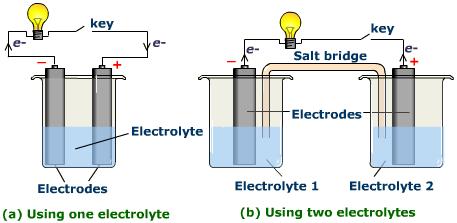
Type in **Lightning** into the Find Resources box

The link will be on the right hand side of the screen.

Work through the tour and answer the following questions. Be sure to click “play” wherever necessary.

1. How does static electricity **build up in clouds and discharge** as lightning? (2)
2. List two places/structures from the picture that are **considered safe** during a lightning storm. Explain what precautions you should take for each. (2)
3. List two places/structures from the picture that are **considered NOT SAFE** during a lightning storm. Explain why. (2)
4. **How long** between lightning and thunder (delay) should you take action to decrease the likelihood of being hit by lightning, according to Environment Canada. (1)

**Lab 3- What is an Electrochemical Cell? Virtual Lab**



Use the website and links below to answer the following questions.

First go to [www.learnalberta.ca](http://www.learnalberta.ca)

Type in **Electrochemical Cell** into the Find Resources box.

The link **“What is an Electrochemical Cell”** will be on the right hand side of the screen.

The login in username is LA06 and the password is 4105

Work through the tour and answer the following questions. Be sure to click “play” to see all the animations.

1. Technically, what is a **battery**?
2. **Why** are cells wired together?
3. **What is a 9 V battery made** up of?
4. A) What are the **two types** of cells?

B) What is the **difference between** the two of them?

1. Describe the **FOUR basic components** of electrochemical cells?

a)

b)

c)

d)

6. **Draw the final set-up** from constructing your own electrochemical cell (remember labels).

**Lab 4- Modifying Electrochemical Cells Virtual Lab**

Use the website and links below to answer the following questions.

First go to [www.learnalberta.ca](http://www.learnalberta.ca)

Type in **Electrochemical Cell** into the Find Resources box.

The link **“Modifying Electrochemical Cells”** will be on the right hand side of the screen.

Work through the tour and answer the following questions. Be sure to click “play” to see all the animations.

**QUESTION**: How do the changes in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ affect the voltage and current produced by an electrochemical cell?

The four variables we will be testing are:

**Variable 1**

Vary the selection of electrodes and record the voltage.

|  |  |
| --- | --- |
| **Electrode combination** | **Voltage (V)** |
|  |  |
|  |  |
|  |  |

**Variable 2**

Vary the electrolyte solution and record the voltage.

|  |  |
| --- | --- |
| **Electrolyte Solution** | **Voltage (V)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Variable 3**

Vary the concentration of the electrolyte solution and record the voltage.

|  |  |
| --- | --- |
| **Electrolyte Concentration** | **Voltage (V)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Variable 4**

Vary the temperature of the electrolyte solution and record the voltage.

|  |  |
| --- | --- |
| **Electrolyte Temperature (ºC)** | **Voltage (V)** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Conclusion**

The electrode combination that produced the highest voltage was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The electrolyte solution that produced the highest voltage was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The concentration of electrolyte solution that produced the highest voltage would be \_\_\_\_%. The temperature of electrolyte solution that produced the highest voltage was \_\_\_\_\_ºC.

**Lab 5- Building a Motor – Virtual Lab**

Using the **learnalberta.ca** website, choose “Building a Motor” under grade 9 science and “Electrical Principle and Technology”

List the three questions that will be answered through this investigation

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Now build a motor**

The three components that all motors have are an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a stationary \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are the most common problems found in a motor? (to troubleshoot?)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**MAGNETIC FIELD STRENGTH**

Which setting makes the motor run the fastest? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ARMATURE BALANCE: Aligning end wire**

Which setting makes the motor run fastest? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ARMATURE BALANCE: Centering the coil**

Which setting makes the motor run the fastest? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**COMMUTATOR DESIGN**

Why do we need to remove part of the coating? (two reasons)

**Which** commutator works best? And why? (1)

In the space below, **draw and label a complete motor (5)**