

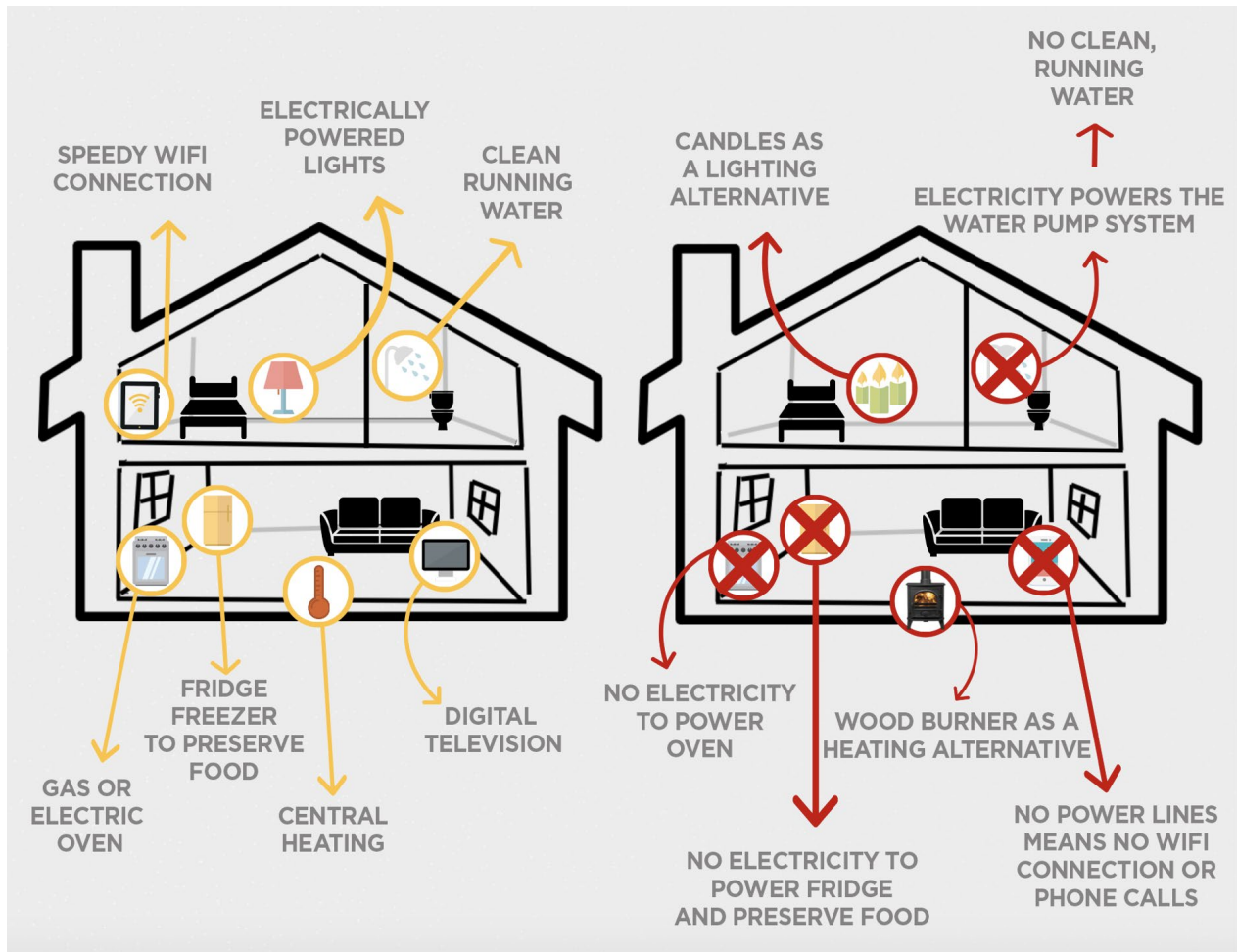
Electricity

Electricity

So what exactly is electricity?

Electricity is **the flow** of tiny particles called **electrons** and **protons**. Every time you switch on a light, electrons, and protons are traveling through wires and into lightbulbs, resulting in lights being turned on.

Electricity runs our modern world! So much so, that sometimes it can be difficult to imagine life without it. Humanity has spent the last 100 years **increasing our dependency** on electricity. Without it, we would have no cellphones, no internet, no kitchen appliances, or flushing toilets.

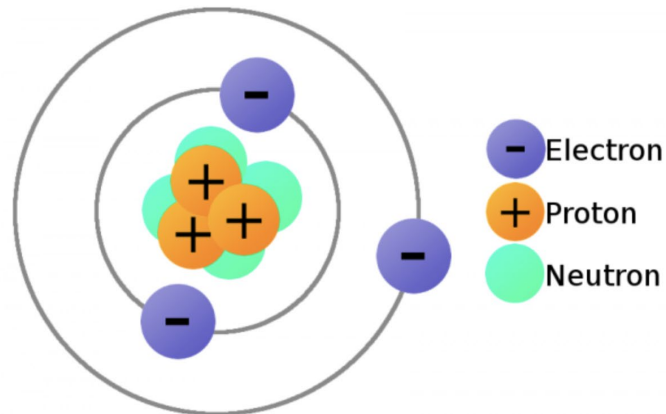


## Atoms



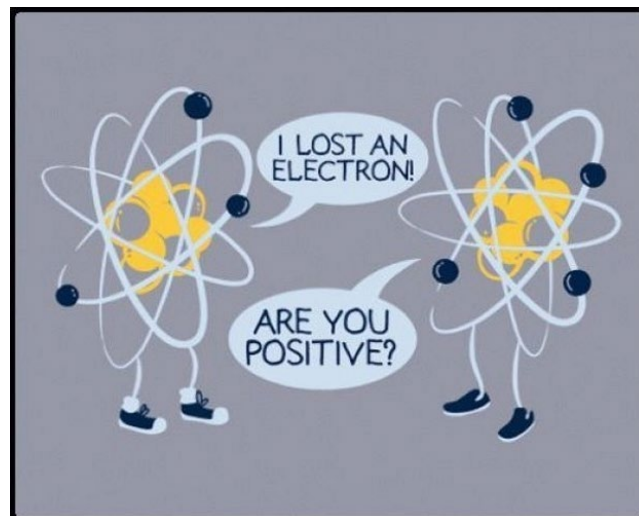
What's Matter?: <https://youtu.be/ELchwUIlWa8>

An atom is the smallest part of any material that can't be broken apart by chemical reactions. An atom consists of three types of particles: **proton**, **electron**, and **neutron**. Because they are smaller than a single atom, they are called *sub-atomic* particles.



Physics – Electricity and the Atom: <https://youtu.be/UCU1bcd2tt0>

Neutral atoms have equal numbers of protons and electrons resulting in a net zero charge on the atom. If an atom has unequal numbers of electrons and protons we refer to it as an **ion**. A large object with significantly greater numbers of electrons than protons is said to be negatively charged, and one with greater protons than electrons is said to be positively charged.



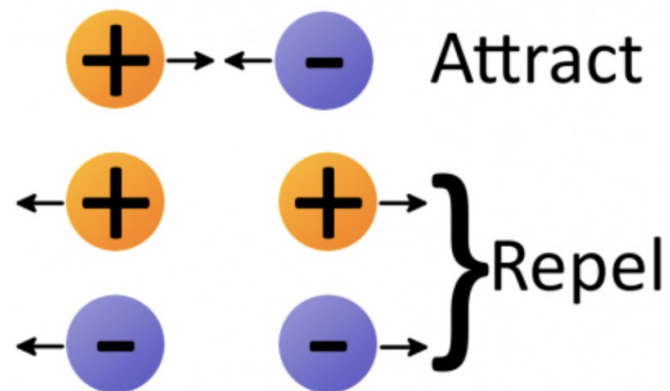
## Attract or Repel?

Electrons and protons teeny tiny little particles that form **atoms**; they cannot be seen with the naked eye. Both carry the **same amount** of charge. However, they both carry different **types** of charges.

**Electrons:** Negative Electrical Charge

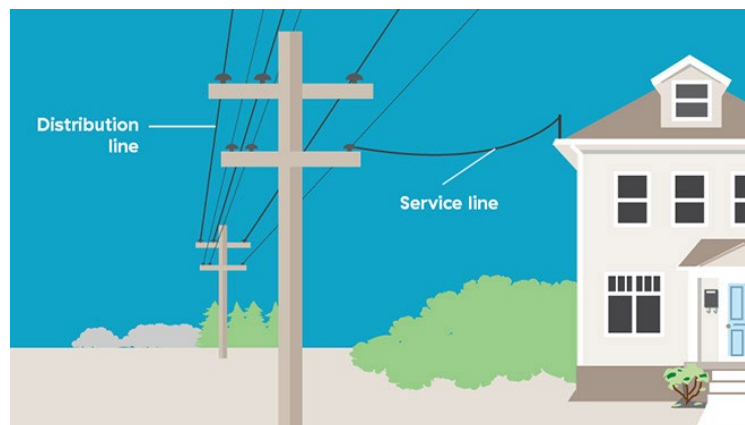
**Protons:** Positive Electrical Charge

Electrons and protons are **attracted to each other**. But, electrons and electrons, and protons and protons are repelled away from each other. Just remember, opposites attract!



## Then and Now

The ways in which we depend on electricity has evolved. Today, in Canada, over **36 million** people rely on electricity. But did you know that Canada did not have commercial electricity until **1881**? Humans have survived (and thrived) far before the invention and widespread use of electricity.

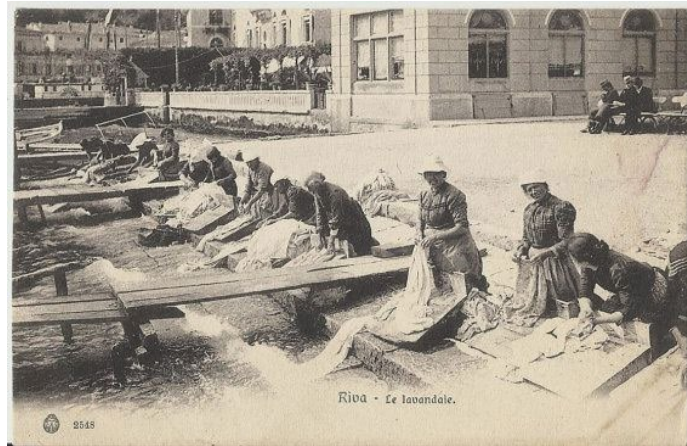


Electricity has helped **make life easier**. City distribution lines feed service lines to our homes, allowing us to watch TV, flush our toilets, wash our clothes, have running water, turn on the lights, charge our electronics, and much more. So what did life look like before electricity?

Take a look at how some of our daily activities have evolved due to electricity:

**Washing our clothes:**

Here is an image of women in Italy washing their clothes down by the river



The washboard was invented to help make handwashing clothes easier. Before this, rocks were used.



Below is an image of a manual 'washing-machine'



Here is an image of a very old Maytag washing machine:

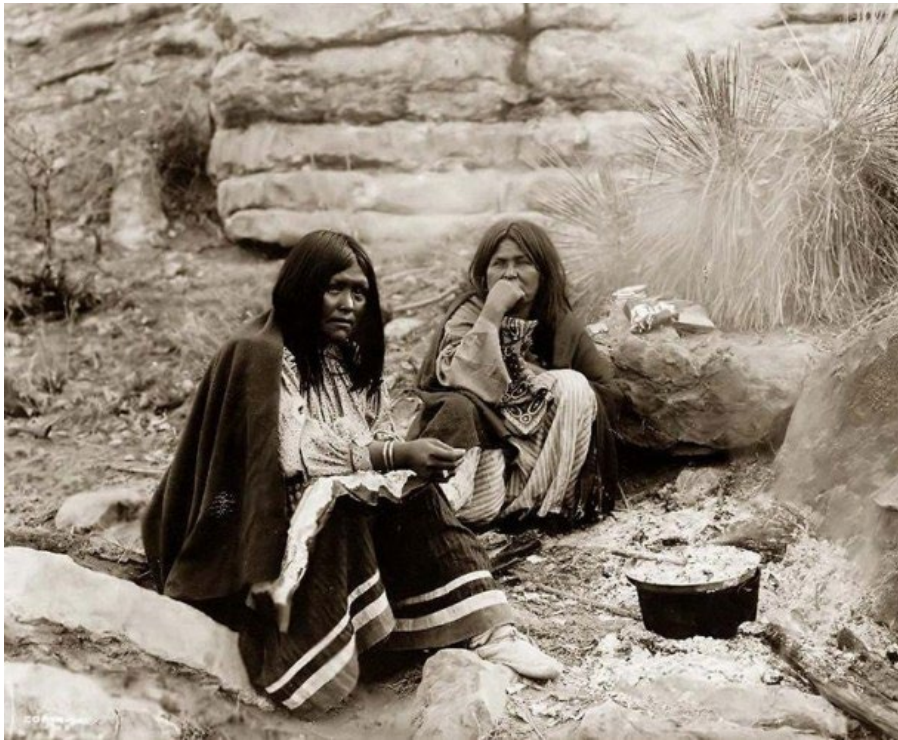


And here is a Maytag washing machine now!



**Cooking (and heating!):**

Cooking and keeping warm over an open campfire



Cooking using a wood-burning stove, which also heats the home.



Electric stoves used today don't dual as home heating systems anymore.



## Life Without Electricity

How would your life be different without electricity? What would you miss the most? What adaptations would you have to make?

The reality is, there are many people in the world who still don't know a life with power. In fact, **980 million people** in the world live **without electricity**.

So what does that look like? Take a look at the video below of a family in Morocco who live their lives entirely without the modern-day conveniences that power provides. Make sure you follow along in your Learning Guide.



People, Power, and Prosperity: <https://youtu.be/fOeLJdedKLs>

## Static Electricity



For more than two thousand years, people have observed situations where objects that are rubbed together may be attracted to or repelled from each other. For example, the ancient Greeks noticed that when amber (which they called *elektron*) was polished, it attracted small objects. They thought this ability was due to some special power that the stone had. People wore amber jewelry because of this so-called “power.” If it attracted small objects, maybe amber would attract health, energy, or even love.

We now know this special power of amber is nothing more than static electricity.

I'm certain that you have experienced static electricity at some point in your life. Have you ever touched something and felt a little shock? Or rubbed a balloon on your head to make it stick? These are examples of static electricity in action!



So what *is* static electricity? Take look at the following Bill Nye video to learn more about static electricity: <https://youtu.be/iHGpJChYQ5o>



# Physics



## Learning Guide

Name: \_\_\_\_\_

### Instructions:

Using a pencil, complete the following notes as you work through the related lessons. Show ALL work as is explained in the lessons. You are required to have this package completed BEFORE you write your unit test. Do your best and ask questions if you don't understand anything!

\*There will not be questions for every video that is in this Unit. However, it is important to watch each video as they were selected to further understand and explain concepts. Questions from the videos may appear on the Test.

## 3.1 Electricity

1. Before beginning this course, let's activate your currently knowledge on electricity. In the box below, take a few minutes to write down everything you know about electricity.

I.e. What do you know about how electricity works? Where does it come from?  
Different sources of energy? What *is* electricity?



2. **True or False:** Without electricity, we would be unable to flush our toilets.
  - a. True
  - b. False

3. Draw an atom. Make sure you label the electrons, protons and neutrons.

4. **Fill in the blank:** The atom is the basic building block for all \_\_\_\_\_ in the universe

5. **True or False:** You are made of atoms; your computer is made of atoms, but a rock is not made of atoms.

- a. True
- b. False

6. **Fill in the blank:** Atoms fit together to make up \_\_\_\_\_.

7. Watch the video to answer the following questions.

**Video: What's Matter?**



- I. Fill in the blank: Matter is anything that has \_\_\_\_\_ and takes up \_\_\_\_\_.
- II. True or false: All Matter looks the same.
  - a. True
  - b. False
- III. True or False: Air is considered matter
  - a. True
  - b. False

**8. Fill in the definitions:**

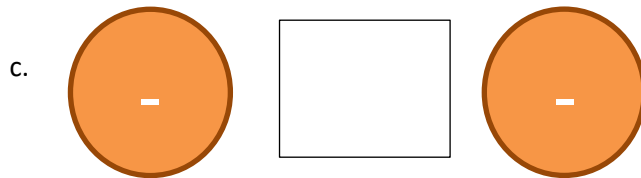
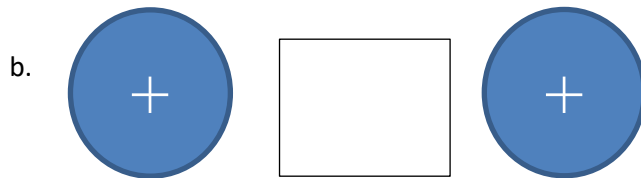
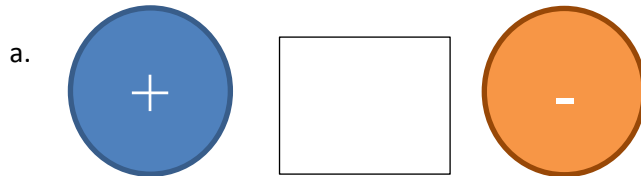
Electrons:

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Protons:

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**9. For the following protons and electrons, indicate whether each scenario will attract or repel.**



**10.** How many people in the world still live without electricity? \_\_\_\_\_

**11.** Watch the video to answer the following questions.

**Video: People, Power and Prosperity**



I. What is the family well-known for making?

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II. Explain 4 ways that your life is different from the family in the video:

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12. Watch the video to answer the following questions.

**Video:** Bill Nye the Science Guy- Static Electricity



III. What happens with Bill Nye puts his wig on, turns on the Van der Graaf Generator and touches it?

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IV. Fill in the blanks: When lightning strikes it heats the air to over \_\_\_\_\_ degrees Celsius. Hot air smacks into cool air and that creates \_\_\_\_\_.