Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	Lesson Title: Overview of Unit	Teacher: Miss Fedak

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

→ EL6.1: Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts. (CP, DM)
→ EL6.2: Investigate the characteristics and applications of static electric charges, conductors, insulators, switches, and electromagnetism. (SI)
→ EL6.3: Explain and model the properties of simple series and parallel circuits. (SI, TPS)

These outcomes are for the entire unit… but will not be the focus of this lesson as it is an introduction to the new unit.

Objective/Purpose: Students will review their previous knowledge on energy and be introduced to the new unit. Discussion will involve finding out what they already know about: electricity, energy, magnets, renewable and non-renewable resources, and circuits.

Key Understandings: ('I Can' statements)	Essential Questions:
	• What is energy? • What is an atom? • What is an electron? • What is electricity? • What is a circuit? • What are the parts of a circuit? • What are some effects we cause the Earth when we use electricity? • What can we do to reduce our electricity use?

Prerequisite Learning:
N/A

Instructional Strategies:

Think-Pair-Share
Effective Questioning
Lecture
Reflection (exit cards)

Stage 2: Determine Evidence for Assessing Learning

Exit Card: What did you learn today? (Formative assessment)

Stage 3: Build Learning Plan

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Set (Engagement): **Length of Time:**

This lesson introduces the concept of electricity by asking students to imagine what their life would be like without electricity.

Explain to students that electricity is so common in our lives that we sometimes take it for granted. Ask the students to brainstorm how their lives would be different if they did not have electricity. (Possible answers: There would be no television, computer games, lights in the house, garage door openers, etc.). Tell students that without electricity we would have to wash our laundry by hand!

Ask students: Is electricity a form of energy? (Answer: Yes.). What is electricity? (Answer: It depends.) Explain to students that there are two types of electrical happenings: static electricity and current electricity. To answer the question "What is electricity?" depends on whether we are talking about static electricity or current electricity.

Development: **Time:**

The Greeks first discovered static electricity about 2,500 years ago. However, we did not start to understand current electricity until 1752 when Benjamin Franklin conducted an experiment with a kite, iron spike and iron key during an electrical storm in Philadelphia, proving that lightning was a form of electricity. Also, it was just over 100 years ago in 1879 that Thomas Edison changed the world we live in by inventing the electric light bulb.

Draw a diagram of a Bohr model (see Figure 2) on the board and explain to the students that all matter (everything around them) is made of atoms. An atom has a positively-charged nucleus and negatively-charged electrons surrounding the nucleus. In the nucleus are protons, which have a positive charge, and neutrons, which have a neutral charge (neither positive nor negative).

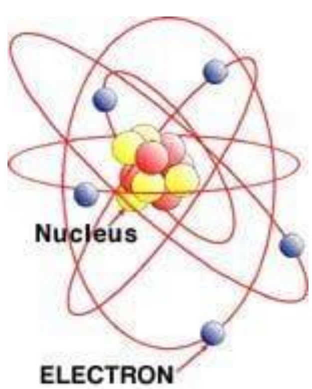


Figure 2. The Bohr Model: A basic (not to scale) model of an atom displaying the nucleus, electrons and orbiting paths of electrons.

(to be put onto a PowerPoint)

Materials/Resources:

Possible Adaptations/ Differentiation:

Have Carina or EA work with any students who need some extra support.
Have a visual (PowerPoint)
Eliminate distractions.

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Encourage initiative
Offer praise
Build excitement for the new unit
Address bad behavior quickly

Safety Considerations:

N/A

Tell students that static electricity and current electricity both depend on electrons. An electron can move from one atom to another trying to balance charge and creating electricity. Let the students know that they will learn more about each type of electricity in the activity and future lessons in this unit.

Learning Closure: **Time:**

Ask students to name objects that they use in their daily lives that utilize current electricity. (Possible answers: Toasters, blenders, electric toothbrush, light bulb, radio, printers, computers, televisions, washing machine, VCRs and DVD players.) Ask students, from where does the current electricity in your home come? (Answer: Power plants.)

Explain that engineers are continuously developing new methods for efficiently creating electricity. Currently, the most common way to create electricity at a power plant is to convert fossil fuels (such as coal, gas or oil), a finite primary source of energy, into electricity. If we want to continue to conserve these resources for future use, it is necessary for engineers to find ways to use less of these primary resources to produce more electricity. Some primary energy sources that are alternatives to fossil fuels and are renewable include hydroelectric power, photovoltaic energy and wind energy.

Ask students to name some possible alternatives to using fossil fuels to create electricity? **Think-Pair-Share**

(Possible answers: Dams/water power, solar cells and windmills.)

Extension:

Have students build a model of a Bohr atom. The model should include electrons, protons and neutrons.

Have students research Ben Franklin's kite experiment and electricity.

Have students investigate methods of producing electricity, for example, various types of power plants (coal, hydro), solar energy, wind energy.

Stage 4: Reflection

Reagan Fedak
‘Lived’ Three-Week Block Unit 2019

Lesson Background for Teacher

The Atom

Everything we see around us — all ordinary matter — is made of atoms. Every atom consists of negatively-charged electrons and a positively-charged center called a nucleus. The nucleus is made of positively-charged protons and neutral-charged (neither positively- nor negatively-charged) neutrons. In a simple model of an atom, known as a Bohr model (see Figure 2), it is assumed that the electrons are spinning around the nucleus of the atom on paths called *orbitals*. One can visualize this by thinking of satellites orbiting the Earth, or the moon orbiting around the Earth. The positive charges of the protons in the nucleus attract the negative charges of the electrons orbiting around the nucleus (opposites attract), maintaining the electrons' orbit. *Charge* is a fundamental quantity in electricity. The smallest amount of charge known to exist is carried by an electron and is -1.602×10^{-19} coulomb [C]. The other charge-carrying portion of the atom is the proton, which has a charge of $+1.602 \times 10^{-19}$ coulomb [C]. The unit used to measure charge is known as the Coulomb, named after French engineer and physicist Charles Coulomb.

Static Electricity

In an atom, the protons and neutrons that make up the nucleus are held together very tightly and rarely does the nucleus experience a change. However, some of the electrons that are associated with the atom are loosely held to their orbital. These electrons, which typically reside in the outer orbitals, can move from one atom to another. When an atom loses electrons, it has more positive particles than negative particles, which results in a positive net charge for the atom. An atom that acquires electrons has more negative particles than positive particles and, thus, has a negative net charge.

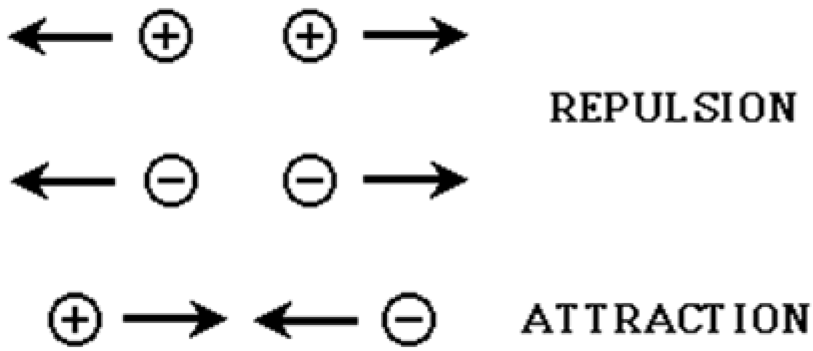
If the atoms in a material hold the electrons in the outer orbits tightly, the electrons are less likely to move to another atom. Such materials are known as *insulators*. Alternatively, materials whose atoms willingly give up and accept electrons are known as *conductors*. Conductors allow electrons to move through the material easily.

It is possible to transfer (or move) electrons from one material to another. One way to do this is by rubbing two objects together. The longer that two objects are rubbed together, the larger the quantity of electron movement from one object to the other, which results in a charge build up on each object. *Static electricity* occurs when there is an imbalance of positive charges and negative charges.

Positive and negative charges behave similarly to the north and south poles of a magnet: Opposite poles attract and like poles repel. In the case of charges, a positive and negative charge pull towards each other. Positive charges repel other positive charges, and negative charges push away other negative charges. Therefore, an object that has a positive or negative charge build up (net charge) attracts an object that is neutral. For instance, when you rub a balloon on your hair or a piece of wool cloth, the balloon acquires additional electrons. If you hold the balloon against a wall, the balloon sticks. This is because the negatively-charged electrons on the balloon push away the negatively-charged electrons in the wall (like charges repel) and attract the positive charges in the wall (opposites attract), causing the balloon to stick to the wall. Additionally, when an object with charge build-up attracts a neutral object, the electrons tend to move to areas where the electrical charge is positive until the atoms in both objects are neutral or balanced. When many electrons move in an effort to balance the atoms, there is a chance of seeing a spark. This spark is a result of static electricity.

Demonstrate the effects of static electricity using an inflated balloon. Rub the balloon on your head, or if you have enough balloons for half the students, have them form groups of 2. Each group can have a balloon which they need to inflate, and then rub on their partners head. Explain to the children that both air and rubber are good electrical insulators, and do not conduct electricity well. When you rub the balloon on your hair, electrons are transferred TO the balloon where they stay. Since your hair has less electrons, it is positively charged. Show the students the figure below and explain that OPPOSITES ATTRACT. Anything with more electrons than protons (negative charge, like the balloon in this example) will want to find something with a positive charge (more protons than electrons, like your hair in this example). When this happens, the charges on the objects can even out. This is what causes a shock when you open a car door or walk across carpet and touch a conductor (metal). Lightning is like a huge shock in the sky!

Reagan Fedak
'Lived' Three-Week Block Unit 2019



Attraction of Oppositely Charged Particles

Current Electricity

Current electricity is the flow of charge through a material. Electricity is when electrons are quickly passed from one atom to another atom within a material and 'flow' from one end of the material to the opposite end. This 'flow' is like the cascading you would see in a pipe filled with flowing water. Some materials, such as metals, allow electrons to flow more easily than other materials; they are called *conductors*. Computers, stereos, toasters, dryers and handheld computer games are examples of everyday electronics that utilize current electricity.

An *electric current* can be defined as the rate of change of charge passing through a pre-determined area during a period. The unit used for current is an ampere [A], where 1 ampere = 1 coulomb/second.

History of Electricity

The Greeks first discovered the concept of static electricity about 2,500 years ago by rubbing amber with fur cloth. They found that amber would attract certain objects, such as straw, after it was rubbed with the goatskin. Static electricity was not scientifically explored until 1600, when the English scientist William Gilbert performed several experiments to understand the static electricity phenomena. William Gilbert was also the first to record the word "electric" in his theory of magnetism report.

The fundamentals of current electricity were discovered in 1752 when Benjamin Franklin performed his famous kite experiment during an electrical storm in Philadelphia. Using an iron spike fastened on a kite and holding the end of the kite with an iron key, Franklin proved that lightning was a form of electricity. In 1879, Thomas Edison brought current electricity to our homes with the invention of the electric light bulb. This light bulb made it possible for people to have indoor lighting, which was previously provided by kerosene lamps. In the late 1800s, George Westinghouse embarked on an effort to refine the design of the power transformer and also worked to build a practical alternating current (AC) power network. The AC power distribution network created by Westinghouse Electric and Manufacturing Co. made it possible to transmit current electricity over long distances. As a result, electric generating plants could be located significant distances from homes and businesses and still supply current electricity.

Vocabulary/Definitions

charge: A fundamental quantity in electricity.

current electricity: The flow of electrons (negative charge) through a material.

electric generator: A device that changes mechanical energy into electricity.

electricity: The flow of electrons.

electron: The negatively-charged particle of an atom.

neutron: The neutral-charged particle of an atom.

Reagan Fedak
'Lived' Three-Week Block Unit 2019

orbital: The path of an electron in an atom or molecule, indicating the electron's probable location spinning around the nucleus of the atom.

proton: The positively-charged particles of an atom.

static electricity: The instantaneous movement of electrons due to the imbalance of states; the movement from negatively-charged atoms towards positively-charged atoms.

transformer: Changes the voltage of electricity so it can be transmitted over long distances.

Associated Activities

- Static Cling - Students explore static electricity using a comb (or balloon), O-shaped cereal and Styrofoam pellets.

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	**Lesson Title: Static Cling**	**Teacher: Miss Fedak**

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

- Describe static electricity and how it affects different objects.
- Describe different manifestations of the electrostatic force that occur as a result of the transfer of electric charge.

→ EL6.2: Investigate the characteristics and applications of static electric charges, conductors, insulators, switches, and electromagnetism. (SI)

(a) Conduct investigations to determine the attraction and repulsion of electrostatically charged materials and represent the results of those investigations using drawings, sketches, tables, charts, and/or other representations.

Key Understandings: ('I Can' statements)	**Essential Questions:**
I can explain what static electricity is. (a stationary electric charge, typically produced by friction, which causes sparks or crackling or the attraction of dust or hair.)	**What is static electricity?**

Prerequisite Learning:

Instructional Strategies:

Effective Questioning
Activities (experiment)
Reflection
Discussion
Strategic Grouping

Stage 2: Determine Evidence for Assessing Learning

Engagement in activity.
Reflection piece at end of activity.

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**	**Materials/Resources:**
Have you ever removed a hat during the winter and noticed your hair standing up—or even crackle? (Listen to students; some may say yes.) What causes this to happen? (Answer: Static electricity.) Have you ever removed clothes from a dryer and noticed them sticking to each other? (Expect some to say yes.) And did you ever hear the crackle sound when you pulled the clothes apart? What causes that? (Answer: This is also static electricity.) How is it possible that what causes your hair to stand up after taking off a winter hat is the same as what makes your clothes stick together in the clothes dryer?	• comb, rubber or plastic; alternatively, a balloon that is blown-up and tied-off • thread, 12-inch piece • O-shaped cereal, 1 piece • long dry hair, or dry wool cloth • a few Styrofoam packing pellets

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Development: **Time:**

(On the classroom board, draw a diagram of a Bohr model, as shown in Figure 1.) All ordinary matter—everything around us—is made of atoms. Atoms have positively charged nuclei and negatively charged electrons surrounding the nucleus. In the nucleus are protons, which have a positive charge, and neutrons, which have a neutral charge (neither positive nor negative).

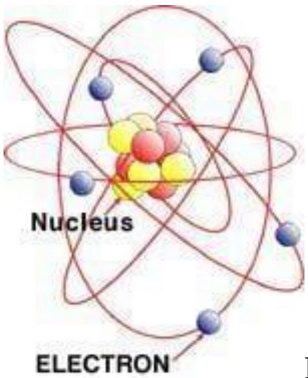


Figure 1. The Bohr model: A basic (not to scale) model of an atom displaying the nucleus, electrons and orbiting electron paths.

Let's demonstrate the Bohr model of an atom—at human scale. (Have students create a human diagram of the Bohr model. Set up two chairs in an open area. Ask for 12 volunteers. Have two students walk in one direction around the first chair and two students around the second chair. They represent the first shell of the atom. Next, have one student walk in the other direction around the first chair, and seven students walk around the second chair to represent the second shell of electrons.) Static electricity happens when the two atoms rub together and the single electron from the first atom is transferred to the seven-electron shell of the second atom.

Static electricity depends on the balance of charges in an atom. We know that atoms can move from one atom to another, creating electricity! Also, electrons (or charge) can move from one object to another by rubbing two objects together. Have you ever heard the phrase "opposites attract" when talking about magnets? Well, the same is true when it comes to charges in an atom. A positive and a negative charge (opposites) pull toward each other. However, negative charges push away other negative charges and positive charges repel other positive charges. The attraction and repulsion (pushing away) of charges is the basis of static electricity. We will learn more about static electricity during the upcoming activity.

Activity:

1. Direct students to suspend an O-shaped piece of cereal from a tabletop, using tape and a piece of thread (see Figure 2).
2. Next, quickly rub a comb (or balloon) through your hair or on a piece of wool cloth. Note: For this entire activity, a blown-up and tied-off balloon may substitute for a rubber comb.

- scotch tape
- counter top or table
- Fun Things to Do with a Rubber Comb Worksheet, one per student

Possible Adaptations/ Differentiation:

Have Carina or EA work with any students who need some extra support.
Have a visual (PowerPoint)
Eliminate distractions.
Effective grouping/pairs

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Encourage initiative
Offer praise
Build excitement for the new unit
Address bad behavior quickly

Safety Considerations:

Scissors for cutting thread.
Balloons popping.

3. Hold the comb near the cereal. Expect the cereal to swing toward the comb (see Figure 1). Hold the comb still until the cereal touches the comb. Continue to watch and observe the cereal quickly move away from the comb

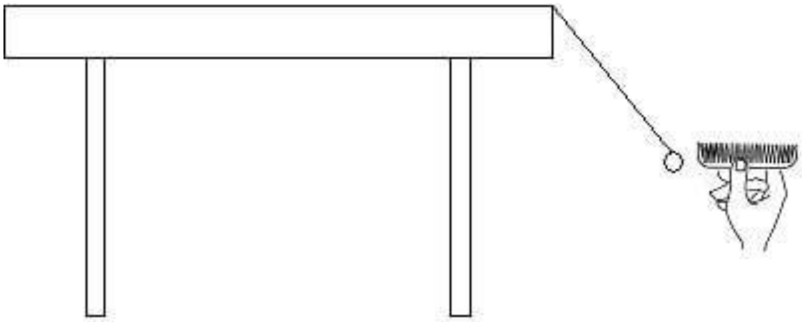


Figure 2. The activity setup for using static electricity to attract an O-shaped cereal with a comb.

4. Ask students: Why was the cereal attracted to the comb? And then why did it move away once it touched the comb? (Answer: The rubber comb attracted the loosely bound electrons that were on your hair or wool. Once the comb attracted the electrons, it gained a negative charge. The cereal initially has a neutral charge; therefore, it is attracted to the comb because of its different charge distribution. However, when the cereal touches the comb, it gains some of the comb's negative charge, and the cereal's charge distribution becomes the same as that of the comb. Next, the two objects repel each other since they are now "like objects," and as a result, the cereal moves away.)
5. Direct each group to spread some Styrofoam pellets on a table.
6. Rub the comb through your hair or against the wool cloth again. Next, move the comb close to the Styrofoam pellets. The pellets stick to the comb. After several seconds, the Styrofoam jumps back to the table. Discuss what was observed (like step 3).

Learning Closure: **Time:**

Write, draw or use some other way to represent what happened when you participated in the activity today.
Talk as a class about the activity.

Stage 4: Reflection

Background: The Atom-- Everything we see around us—all ordinary matter—is made of atoms. Every atom consists of negatively charged electrons and a positively charged center called a nucleus. The nucleus is made of positively charged protons and neutral-charged (neither positively nor negatively charged) neutrons. In a simple model of an atom, known as a Bohr model (see Figure 1), it is assumed that the electrons are spinning around the nucleus of the atom on paths called orbitals. One can visualize this by thinking of satellites orbiting the Earth, or the moon orbiting around the Earth. The positive charges of the protons in the nucleus attract the negative charges of the electrons orbiting around the nucleus (opposites attract), maintaining the electrons' orbit. Charge is a fundamental quantity in electricity. The smallest amount of charge that is known to exist is carried by an electron and has a charge of -1.602×10^{-19} coulomb [C]. The other charge-carrying portion of the atom is the proton, which has a charge of $+1.602 \times 10^{-19}$ coulomb [C]. The unit used to measure charge is known as the Coulomb, named after French engineer and physicist Charles Coulomb.

Background: Static Electricity -- In an atom, the protons and neutrons that make up the nucleus are held together very tightly and rarely does the nucleus experience a change. However, some of the electrons that are associated with the atom are loosely held to their orbital. These electrons, which typically reside in the outer orbits, can move from one atom to another. When an atom loses electrons, it has more positive particles than negative particles, which results in a positive net charge for the atom. An atom that acquires electrons has more negative particles than positive particles and, thus, has a negative net charge.

If the atoms in a material hold the electrons in the outer orbits tightly, the electrons are less likely to move to another atom. Such materials are known as *insulators*. Alternatively, materials whose atoms willingly give up and accept electrons are known as *conductors*. Conductors permit electrons to move through the material easily.

It is possible to transfer (or move) electrons from one material to another. One way to do this is by rubbing two objects together. The longer that two objects are rubbed together, the larger the quantity of electron movement from one object to the other, which results in a charge build up on each object. *Static electricity* occurs when imbalance of positive charges and negative charges exists.

Positive and negative charges behave similarly to the north and south poles of magnets: Opposite poles attract and like poles repel. In the case of charges, a positive and negative charge pull towards each other. Positive charges repel other positive charges, and negative charges push away other negative charges. Therefore, an object that has a positive or negative charge build up (net charge) attracts an object that is neutral. For instance, when you rub a balloon on your hair or a piece of wool cloth, the balloon acquires additional electrons. If you hold the balloon against a wall, the balloon sticks. This is because the negatively charged electrons on the balloon push away the negatively charged electrons in the wall (like charges repel) and attract the positive charges in the wall (opposites attract), causing the balloon to "stick" to the wall. Additionally, when an object with charge build-up attracts a neutral object, the electrons tend to move to areas where the electrical charge is positive until the atoms in both objects are neutral or balanced. When many electrons move to balance the atoms, sometimes it causes a spark. This spark is a result of static electricity.

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	**Lesson Title: Take Charge!**	**Teacher: Ms. Fedak**
Stage 1: Identify Desired Results		
Outcome(s)/Indicator(s): **EL6.2:** Investigate the characteristics and applications of static electric charges, conductors, insulators, switches, and electromagnetism. a) Conduct investigations to determine the attraction and repulsion of electrostatically charged materials and represent the results of those investigations using drawings, sketches, tables, charts, and/or other representations.		
Key Understandings: ('I Can' statements) I can determine and explain the attraction and repulsion of electrostatically charged materials. I can explain the basic properties of electric charge. I can explain the transfer of electrons between two objects.	**Essential Question(s):** **What is happening when something is electrostatically charged?** **What are conductors and insulators?**	
Prerequisite Learning: Atoms, electrons, electric charge		
Instructional Strategies: Effective Questioning Turn and Talk Work Together Share ideas and opinions Form groups Journals		
Stage 2: Determine Evidence for Assessing Learning		
Pre-Lesson Assessment *Discussion Questions:* Solicit, integrate and summarize student responses. • Why do you think that your hair stands up after rubbing it with a balloon? (Answer: Electrons move from your hair to the balloon. Then, each of the hairs has the same positive charge. Since objects with the same charge repel each other, the hairs try to get as far from each other as possible, which is by standing up and away from the other hairs.) • What are some examples, from your own experiences, of the buildup or discharge of static electricity? (Possible answers: Walking across the carpet [buildup] and touching a door knob [discharge].) **Lesson Summary Assessment** Worksheet: Assess students' understanding of the lesson by assigning the Take Charge! assignment. Journaling.		
Stage 3: Build Learning Plan		

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Set (Engagement): **Length of Time:**

Have students try to make a list of materials that cause static electricity. (examples attached). – this will also be a good lead up to conductors and insulators.
Have students make a list of examples of static electricity.

Rub a balloon on my hair or have a volunteer do it for me and observe that the student's hair stands on end.
Ask students: why does this happen? (answer: electrons move from your hair to the balloon, causing each of the hairs to have the same positive charge. Since objects with the same charge repel each other, the hairs try to get as far from each other as possible.)

Development: **Time:**

1. Ask students: True or false: Are electrons the only particles in atoms that can move between materials? (Answer: True.) True or false: Do like-charged objects attract while unlike-charged objects repel? (Answer: False. The reverse is true.)
2. Have students blow up their balloons and tie knots in the ends.
3. To charge the balloons, have students rub their balloons vigorously on their hair or on a piece of wool.
4. Have students try each of the following and write their observations on a sheet of paper or in their science journal. Remind them to recharge the balloon between each experimental trial.

- Move a finger toward the balloon.
- Hold two charged balloons near each other.
- Put the balloon on a large tabletop (or the floor) and try to gently roll it.
- Try to stick the balloon to one or more of these surfaces (or any others around the classroom): wooden door, wall, metal desk, metal file cabinet, blackboard, window, plastic chair, clothing, mirror.
- Have a few students stick their balloons to different surfaces and leave them there. Have one or two students time how long each balloon stays up.

Activity Observations and Explanations

A balloon rubbed on clothing becomes negatively charged because the balloon is made from an insulating material (usually natural

Materials/Resources:

Balloons
Worksheets (extra)
Assignment #1
Definitions Handout

Possible Adaptations/ Differentiation:

Have Carina or EA work with any students who need some extra support.
Have a visual (PowerPoint)
Eliminate distractions.

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Encourage initiative
Offer praise
Build excitement for the new unit
Address bad behavior quickly
Have students put balloons away into their lockers after activity is complete

Safety Considerations:

Balloons popping

latex from rubber trees). Electrons deposited on the balloon are confined to the region that was rubbed, so only a portion of the surface of the balloon is negatively charged. When you hold your finger near a charged balloon you hear a crackling sound due to the balloon discharging. The spark is too small and fast to see with the human eye. The same thing happens if you hold two charged balloons near each other. When you try to roll a charged balloon, you notice that the balloon only rolls a short distance; then, it stops and wobbles about the portion of the balloon that you charged. This charged portion of the balloon "sticks" to the floor (a neutral insulator) due to charge polarization that occurs in the molecules of the floor. A charged balloon "sticks" to a wooden door, a wall, ceiling, a plastic chair, window, mirror, and clothing due to charge polarization in these insulators. It quickly slides down a metal surface because metal is a good conductor and electrons "leak off" the balloon to the metal. **Learning Closure:** **Time:** Ask the students to explain how an object can become electrically charged. Have the students make a list of conductors and insulators on the board. (Possible answers: Insulators could be wood, plastic, Styrofoam. Conductors could be metals.)	
Stage 4: Reflection	

Backwards by Design Lesson Plan Template

Become positive in charge

The following materials tend to give up electrons when brought in contact with other materials. That means they will have an increase of positive (+) charges.

The materials are listed with those that have the greatest tendency to give up electrons at the top to those that barely give up electrons.

Materials that gain a positive (+) electrical charges (Tend to give up electrons)		
Most (+) charges	**Air**	Greatest tendency for giving up electrons and becoming highly positive (+) in charge
	Dry human skin	Greatest tendency of a solid to give up electrons and becoming highly positive (+) in charge
	Leather	
	Rabbit fur	Fur is often used to create static electricity
	Glass	The glass on your TV screen gets charged and collects dust
Moderate (+) charges	**Human hair**	"Flyaway hair" is a good example of having a moderate positive (+) charge
	Nylon	
	Wool	
	Lead	A surprise that lead would collect as much static electricity as cat fur
	Cat fur	
	Silk	
	Aluminum	Gives up some electrons
Least (+) charges	**Paper**	

Neutral

There are very few materials that do not tend to readily attract or give up electrons when brought in contact or rubbed with other materials.

Materials that are relatively neutral		
	Cotton	Best for non-static clothes
	Steel	Not useful for static electricity

Become negative in charge

The following materials tend to attract electrons when brought in contact with other materials. They are listed from those with the least tendency to attract electrons to those that readily attract electrons.

Materials that gain a negative (−) electrical charges (Tend to attract electrons)		
Least (−) charges	**Wood**	Attracts some electrons, but is almost neutral
	Amber	
	Hard rubber	Some combs are made of hard rubber
	Nickel, Copper	Copper brushes used in Wimshurst electrostatic generator
	Brass, Silver	
	Gold, Platinum	It is surprising that these metals attract electrons almost as much as polyester
	Polyester	Clothes have static cling
	Styrene (Styrofoam)	Packing material seems to stick to everything

Moderate (−) charges	**Saran Wrap**	You can see how Saran Wrap will stick to things on (+) list
	Polyurethane	
	Polyethylene (like Scotch Tape)	Pull Scotch Tape off (+) surface and it will become charged
	Polypropylene	
	Vinyl (PVC)	Many electrons will collect on PVC surface
	Silicon	
Most (−) charges	**Teflon**	Greatest tendency of gathering electrons on its surface and becoming highly negative (−) in charge

Best combinations to create static electricity

The best combinations of materials to create static electricity would be to have one material from the positive charge list and one from the negative charge list. Examples include combining human skin with polyester clothes, combing your hair with a plastic comb, and rubbing fur on a Plexiglas rod.

Skin and polyester clothes

A common complaint people have in the winter is that they shoot sparks when touching objects. This is typically caused because they have dry skin, which can become highly positive (+) in charge, especially when the clothes they wear are made of polyester material, which can become negative (−) in charge.

People that build up static charges due to dry skin are advised to wear all-cotton clothes, which is neutral. Also, moist skin reduces the collection of charges.

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Combing your hair

Human hair becomes positive (+) in charge when combed. A hard rubber or plastic comb will collect negative (−) charges on its surface. Since similar charges repel, the hair strands will push away from each other, especially if the hair is very dry. This is called "flyaway" hair. Since the comb is negatively charged, it will attract object with a positive charge—like hair. It will also even attract material with no charge—like small pieces of paper.

Examples of Static Electricity in our daily life:

- When we walk on a carpeted floor and getting shock when touching a door knob or any other metal object is one of the best examples of static electricity.
- Clothes stuck to one another after being in the dryer is another example of static electricity.
- When dry hair is brushed with a plastic comb static electricity is produced. If it is done in a dark room you will notice the sparkles.
- The same thing; when a comb is passed through the hair, the hair which is dry starts falling apart from each other or it may be in strands and start moving apart.
- When plastic pen passes through a woolen garment, a static electricity is generated. Because of this the plastic pen can attract small pieces of papers.
- Lightning is one of the main examples of static electricity. The positive and negative charges inside the cloud makes the electric current and causes the lightning.

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	**Lesson Title: Current Electricity**	**Teacher: Ms. Fedak**

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

EL6.3- Explain and model the properties of simple series and parallel circuits.

- **(a)** State the required characteristics of a simple electric circuit (e.g., a source of electrical energy, a closed path to conduct electrical energy, and a load to convert the electrical energy into another form of energy).
- (f) Draw electrical circuit diagrams to represent simple series and parallel circuits using appropriate symbols (e.g., battery, conductor, light bulb, motor, and switch).

Key Understandings: ('I Can' statements)	**Essential Questions:**
• Understand the concept of current electricity, and the relationship between current, voltage and resistance. • Recognize that electrical energy in an electric circuit can be converted to different forms of energy, such as motion, thermal and light energy. • List alternative sources of electricity.	What is current electricity? What is a circuit? Can electric energy in an electric circuit be converted into different forms of energy? (such as motion, thermal and light energy) What are some alternative sources of electricity?

Prerequisite Learning:

atoms, electrons, electric charge

Instructional Strategies:

Effective Questioning
Turn and Talk
Work Together
Share ideas and opinions

Stage 2: Determine Evidence for Assessing Learning

KWL Chart
Discussions
Booklets

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**	**Materials/Resources:**
Ask the students: Have you ever had to replace the batteries in a flashlight? (Many will answer yes.). Why did you have to replace the batteries? (Possible answers: The batteries were dead; the flashlight did not work or the light was dim.) Once you place new batteries in the flashlight, you complete an electric circuit and the flashlight operates and the light shines brightly. Remind students that atoms are made of smaller	**Booklets** **Possible Adaptations/ Differentiation:** Have Carina or EA work with any students who need some extra support. Have a visual (PowerPoint)

parts called protons, neutrons and electrons. The electrons can carry a negative *electric charge* and can move from atom to atom and create *current electricity*. Tell students that during this lesson, they will learn how the electrons' charge can help light a bulb in a flashlight and what is trying to stop charge from lighting the bulb! **Development:** **Time:** Ask the students: Does anyone know of any alternatives to generating current electricity at a power plant? (Possible answers: solar cells, wind farms.) Photovoltaic (PV) cells, commonly called solar cells, have been powering satellites in space for decades. Most people have seen solar cells on calculators, and on road signs and lights along highways. Photovoltaic cells use sunlight to make electricity. Using photovoltaic cells to produce electricity does not produce the polluting emissions that conventional power plants produce. Conventional fossil fuels require costly operations to extract, while sunlight is freely available everywhere. Unfortunately, photovoltaic cells are still expensive to manufacture (and require non-solar power to manufacture!). Engineers and scientists are working to make solar electricity affordable for everyone. *-Brainstorming:* In small groups, have students engage in open discussion. Remind students that in brainstorming, no idea or suggestion is "silly." All ideas should be respectfully heard. Encourage wild ideas and discourage criticism of ideas. Ask the students: • From where does electricity come? (Possible answers: A wall outlet, a power plant, photovoltaic/solar cells, batteries, wind, etc.) **-KWL Charts** **-Make and Go over their booklets with them.** **Learning Closure:** **Time:** Ask students to give examples of devices that use current electricity. Have the students categorize the devices by the source of electricity, whether from solar cells, typical chemical batteries, a wall outlet (ultimately from a power plant) or a portable generator. Ask students to list some advantages and disadvantages of using the different power sources. As a class, discuss the functions of various devices, paying attention to the role of current electricity and the transformations of energy in the device. For example,	Eliminate distractions. **Management Strategies:** Establish expectations (ask students what my expectations are using their raised hands of course) Encourage initiative Offer praise Address bad behavior quickly **Safety Considerations:** **N/A**

contrast the use of current electricity to power a lamp and a fan. (The electricity is converted to light in the lamp, and to the movement of the blades in the fan.)	
Stage 4: Reflection	

Backwards by Design Lesson Plan Template

Reagan Fedak
'Lived' Three-Week Block Unit 2019

K-W-L Chart

Topic: ____________________

What I Know	What I Want to Know	What I Learned

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	Lesson Title: Circuits	Teacher: Ms. Fedak

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

EL6.3- Explain and model the properties of simple series and parallel circuits.

(a) State the required characteristics of a simple electric circuit (e.g., a source of electrical energy, a closed path to conduct electrical energy, and a load to convert the electrical energy into another form of energy).

(c) Contrast a closed circuit, open circuit, and short circuit.

(f) Draw electrical circuit diagrams to represent simple series and parallel circuits using appropriate symbols (e.g., battery, conductor, light bulb, motor, and switch).

Key Understandings: ('I Can' statements)	Essential Questions:
• Predict whether an object is likely to conduct electricity. • Distinguish between electrical conductors and insulators.	**What is a conductor?** **What is an insulator?** **What is a circuit?**

Instructional Strategies:

Questioning
Exit cards

Stage 2: Determine Evidence for Assessing Learning

Post-Introduction Assessment

Voting: Ask a true/false question and have students vote by holding thumbs up for true and thumbs down for false. Count the votes, and write the totals on the board. Give the right answer.

- True or False: The materials that electrons can move through are called conductors. (Answer: True.)
- True or False: If no electricity flows through a material, that material is called an insulator. (Answer: True.)
- True or False: Metals are examples of insulators. (Answer: False. Metals are often used as conductors, but never as insulators.)

Lesson Summary Assessment

Quick Survey: Give students a piece of paper and ask them to write down the answers to the following three questions:

- What did you like best about the lesson?
- What did you learn that you didn't know before?

Stage 3: Build Learning Plan

Reagan Fedak
'Lived' Three-Week Block Unit 2019

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Set (Engagement): 5 mins **Length of Time:**

Review Current Electricity Booklet (possibly have them color them in later)

Development: **Time:**

Before starting the lesson, ask the students**, what do you know about electricity?** (Possible answers: It is the movement of electrical charge, it has to do with electrons, it can be dangerous.) Remind students that current electricity is the movement of electrons from atom to atom. You may also want to review that electrons carry a negative electric charge.

Next, ask students if they know how current electricity is able to move to the outlets in our walls and throughout our houses? (Answer: Wires.) Explain that the wires in our homes are made of copper, the same material as a penny. The reason that copper is used in electrical wires is because electricity can easily flow through copper. Electricity can flow more easily through some objects than others. The materials that electrons can move through are called *conductors*. The atoms in a conductor have loosely-attached electrons and a negative charge buildup pushes electrons through the material. Electrons in metals are loosely attached to the atom, so metals are conductors.

If the electrons are tightly attached to the atoms in a material and cannot be forced to move from one atom to another, no electricity flows; these materials are called *insulators*. Some examples of insulators include rock, wood, plastic, glass, cloth and air.

Watch video:

https://www.youtube.com/watch?v=HsgiZCAwyh8

Voting: Ask a true/false question and have students vote by holding thumbs up for true and thumbs down for false. Count the votes, and write the totals on the board. Give the right answer.

- True or False: The materials that electrons can move through are called conductors. (Answer: True.)
- True or False: If no electricity flows through a material, that material is called an insulator. (Answer: True.)
- True or False: Metals are examples of insulators. (Answer: False. Metals are often used as conductors, but never as insulators.)

Learning Closure: **Time:**

(They can write this stuff in their duo tangs) Ask the students to give examples of materials and objects that are conductors and insulators. As a class, list on the board at least five conductors and five insulators. (Possible answers: Conductors: iron, tap water, copper, silver, aluminum; Insulators: dry air, wood, ceramics, glass, plastics.) How are conductors and insulators used in electrical circuits? (Possible answers: Conductors are used in the wires, in filaments, in the connections, in the switch, etc. — wherever it is desirable to have current. Insulators are used around the

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Materials/Resources:

Video.

Possible Adaptations/ Differentiation:

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Encourage initiative
Offer praise
Address bad behavior quickly

Safety Considerations:

N/A

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wires and as parts of the bulb and battery holders — wherever it is desirable to prevent current leakage.) *Quick Survey:* Give students a piece of paper and ask them to write down the answers to the following two questions: • What did you like best about the lesson? • What did you learn that you didn't know before?	
Stage 4: Reflection	

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 6	Lesson Title: Will it Conduct?	Teacher: Ms. Fedak

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

EL6.2- Investigate the characteristics and applications of static electric charges, conductors, insulators, switches, and electromagnetism.

(g) Test the conductivity of a variety of solids and liquids, following a given set of procedures, to identify which materials are conductors and which are insulators, and draw conclusions about the types of materials that work best as conductors and which work best as insulators

EL6.3- Explain and model the properties of simple series and parallel circuits.

(a) State the required characteristics of a simple electric circuit (e.g., a source of electrical energy, a closed path to conduct electrical energy, and a load to convert the electrical energy into another form of energy).

(c) Contrast a closed circuit, open circuit, and short circuit.

(f) Draw electrical circuit diagrams to represent simple series and parallel circuits using appropriate symbols (e.g., battery, conductor, light bulb, motor, and switch).

Key Understandings: ('I Can' statements)	Essential Questions:
• Predict whether an object is likely to conduct electricity. • Use the Makey Makey's to determine whether their prediction was correct. • Identify what is an open and closed circuit.	**What objects conduct electricity the best?** **What are conductors/insulators?** **What is a circuit? What are the parts of a circuit?**

Instructional Strategies:

Effective Questioning
Exit cards
Group work
Share ideas and opinions
Take notes
Work together
Monitor progress

Stage 2: Determine Evidence for Assessing Learning

Worksheet: **During the activity, have students use the Will It Conduct? Worksheet to record their observations and answer questions.**

Prediction Analysis: **Have students compare their initial predictions with their test results, as recorded on the worksheets. Ask the students to explain why some solutions conducted electricity while others did not.**

- What types of materials are good conductors? (Answer: Any metals.)

- Do some metals conduct better than others? Why? (Answer: Yes, conductance varies with the number of valence electrons (those in the outer shell, available to move around). For practical applications, density plays an important role, and that's why power lines are usually made of aluminum instead of copper (less conductive material, but much lighter, so even if thicker, aluminum will be lighter for the same conductance).
- What were the three best conductors in the activity? (Answer. Will vary, depending on materials provided.)
- What was the best solid conductor in the activity? (Answer: Will vary.)

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**

Before starting the activity, you may want to remind students that current electricity is the movement of electrons from atom to atom. You may also want to review that electrons carry a negative electric charge.

To begin, ask students, if they know where we get electricity from? (Possible answers: The socket in the wall, a power plant, from fossil fuels.) Explain to students that the current electricity we use in schools, businesses and homes comes from a power plant. The power plant sends electricity to substations, which are located in neighborhoods. The substations send the electricity to local businesses and houses.

Next, ask students if they know how current electricity is able to move from a power plant to substations and, finally, to businesses and homes? (Answer: Via electrical wires.)
Now, ask students if they know from what material these wires are made? (Answer: Copper.)
Explain that the wires that link a power plant, to a substation, and then to businesses and homes are made from copper. Inform students that we use copper for electrical wires because electricity can easily flow through copper. Explain that current electricity can flow more easily through some objects than others.
The materials that electrons can move through are called *conductors*. Most metals make good conductors because the electrons are loosely attached to the atoms. When this is the case, a negative charge buildup can push these electrons through the material.
Now, ask students if only solids can conduct electricity? (Answer: No. Electrolyte solutions can also conduct electricity.) Explain that when certain solids are dissolved in a liquid, the resulting solution is able to conduct electricity; we call these solutions *electrolyte solutions*.

Ask students if they know what we call materials that do not allow electrons to flow through them? (Answer: Insulators.) In an *insulator*, the electrons are tightly attached to the atoms in a material and cannot be forced to move from one atom to another, so no electricity flows. Some good examples of insulators include plastic, cloth, air, rock and glass. Explain that they will learn more about conductors and insulators during the activity.

Development: **Time:**

-Group off students into 4 groups. (we only have four Makey Makey's)
-Then as a class, go through expectations of group work on the board
-Have students make predictions whether an object will conduct electricity on their worksheets.
-Then they can actually test their theories.

Materials/Resources:

Makey Makey's
Predictions worksheet

Possible Adaptations/ Differentiation:

Have Carina and EA if we have one to help groups and manage them.

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Write expectations for group work on the board
Encourage initiative
Offer praise
Address bad behavior quickly

Safety Considerations:

Electricity going through the makey makey's

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Learning Closure: **Time:**

Prediction Analysis: **Have students compare their initial predictions with their test results, as recorded on the worksheets. Ask the students to explain why some solutions conducted electricity while others did not.**

- What types of materials are good conductors? (Answer: Any metals.)
- Do some metals conduct better than others? Why? (Answer: Yes, conductance varies with the number of valence electrons (those in the outer shell, available to move around). For practical applications, density plays an important role, and that's why power lines are usually made of aluminum instead of copper (less conductive material, but much lighter, so even if thicker, aluminum will be lighter for the same conductance).
- What were the three best conductors in the activity? (Answer. Will vary, depending on materials provided.)
- What was the best solid conductor in the activity? (Answer: Will vary.)

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<tr><td colspan="2">Stage 4: Reflection</td></tr>
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Reagan Fedak
'Lived' Three-Week Block Unit 2019

Name: ________________________________ **Date: ________________________**

Will it Conduct?

1) **In the space below, draw a picture of the Makey Makey (conductivity tester).**

2) **What happened when you touched the free ends of the conductivity tester together?**

3) **How will you know if an object you test is a conductor or an insulator?**

4) **In the table below, list the objects you are testing in the left column. Predict whether each object is a conductor or an insulator by placing an X in the Prediction column for conductor if you think it is a conductor, or an X in the Prediction column for insulator if you think it is an insulator.**

5) **Test each object to determine whether it is a conductor of electricity. Once you have determined whether it is a conductor or an insulator, place an X in the correct Test Results column.**

Solid Object	Prediction		Test Results	
	Conductor	Insulator	Conductor	Insulator

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade: Science 5/6	**Lesson Title: Cicuits and Conductors**	**Teacher: Ms. Fedak**

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

EL6.2- Investigate the characteristics and applications of static electric charges, conductors, insulators, switches, and electromagnetism.

(g) Test the conductivity of a variety of solids and liquids, following a given set of procedures, to identify which materials are conductors and which are insulators, and draw conclusions about the types of materials that work best as conductors and which work best as insulators

EL6.3- Explain and model the properties of simple series and parallel circuits.

(a) State the required characteristics of a simple electric circuit (e.g., a source of electrical energy, a closed path to conduct electrical energy, and a load to convert the electrical energy into another form of energy).

(c) Contrast a closed circuit, open circuit, and short circuit.

(f) Draw electrical circuit diagrams to represent simple series and parallel circuits using appropriate symbols (e.g., battery, conductor, light bulb, motor, and switch).

Key Understandings: ('I Can' statements)	**Essential Questions:**
• Predict whether an object is likely to conduct electricity. • Use the Makey Makey's to determine whether their prediction was correct. • Identify what an open and closed circuit are.	**What objects conduct electricity the best?** **What are conductors/insulators?** **What is a circuit? What are the parts of a circuit?**

Instructional Strategies:

Effective Questioning
Exit cards
Group work
Share ideas and opinions
Take notes
Work together
Monitor progress
Worksheets

Stage 2: Determine Evidence for Assessing Learning

Worksheet: **During the activity, have students use the Will It Conduct? Worksheet to record their observations and answer questions.**

Prediction Analysis: **Have students compare their initial predictions with their test results, as recorded on the worksheets. Ask the students to explain why some solutions conducted electricity while others did not.**

- What types of materials are good conductors? (Answer: Any metals.)

- Do some metals conduct better than others? Why? (Answer: Yes, conductance varies with the number of valence electrons (those in the outer shell, available to move around). For practical applications, density plays an important role, and that's why power lines are usually made of aluminum instead of copper (less conductive material, but much lighter, so even if thicker, aluminum will be lighter for the same conductance).
- What were the three best conductors in the activity? (Answer. Will vary, depending on materials provided.)
- What was the best solid conductor in the activity? (Answer: Will vary.)

Worksheet:

Students will be split into two groups, and the one group will be working on some questions while the others do the activity.

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**

- **Current electricity:** is the movement of electrons from atom to atom
- **Circuits:** Every electric circuit, regardless of where it is or how large or small it is, has these basic parts: an energy source (AC or DC), a conductor (wire), an electrical load (device).

Development: **Time:**

Split groups into two: one half does worksheets and the other does the activity.
Group off students into 4 groups. (we only have four Makey Makey's)
-Then as a class, go through expectations of group work on the board
-Have students make predictions whether an object will conduct electricity on their worksheets.
-Then they can actually test their theories.

Learning Closure: **Time:**

Prediction Analysis: **Have students compare their initial predictions with their test results, as recorded on the worksheets. Ask the students to explain why some solutions conducted electricity while others did not.**

- What types of materials are good conductors? (Answer: Any metals.)
- Do some metals conduct better than others? Why? (Answer: Yes, conductance varies with the number of valence electrons (those in the outer shell, available to move around). For practical applications, density plays an important role, and that's why power lines are usually made of aluminum instead of copper (less conductive material, but much lighter, so even if thicker, aluminum will be lighter for the same conductance).
- What were the three best conductors in the activity? (Answer. Will vary, depending on materials provided.)
- What was the best solid conductor in the activity? (Answer: Will vary.)

Materials/Resources:

Makey Makey's
Predictions worksheet

Possible Adaptations/ Differentiation:

Have Carina and EA if we have one to help groups and manage them.

Management Strategies:

Establish expectations (ask students what my expectations are using their raised hands of course)
Write expectations for group work on the board
Encourage initiative
Offer praise
Address bad behavior quickly

Safety Considerations:

Electricity going through the makey makey's

Stage 4: Reflection	

Backwards by Design Lesson Plan Template

Reagan Fedak
'Lived' Three-Week Block Unit 2019

Subject/Grade : Science 6	Lesson Title: Resourceful Resources	Teacher: Ms. Fedak

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

EL6.1: Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts.

(a) Provide examples of the types of energy sources used to provide heat and light to homes in the past and describe ways in which electricity-based technologies have changed the way people work, live, and interact with the environment in Saskatchewan.

(b) Describe how electrical energy is generated from hydroelectric, coal, natural gas, nuclear, geothermal, biomass, solar, and wind sources and categorize these resources as renewable or non-renewable.

(Maybe get to indicator "f" today)

(f) Research employers and careers related to electrical energy generation, distribution, and conservation in Saskatchewan.

Key Understandings: ('I Can' statements)	Essential Questions:
I can explain the difference between renewable and non-renewable energy sources. I can identify impacts of electricity use in Saskatchewan on the environment and propose actions to reduce those impacts.	**What is renewable energy?** **What is non-renewable energy?** **What are some impacts of electricity on the environment?** **How can we reduce impacts from energy use?**

Prerequisite Learning:

- Non-renewable resources, or finite resource, is a resource that does not renew itself at a sufficient rate for meaningful use on a human scale. examples are: *fossil fuels*, metal ores, and ground water. *Fossil fuels* are consumed to create electricity. To be discussed later.
  - Fossil Fuels are fuels formed by natural processes such as decomposition.
- Renewable resources is a natural resource that replenishes to overcome depletion caused by human or natural consumption. Renewal happens through biological reproduction or through naturally recurring processes in a finite amount of time on the human scale. Examples are: timber, water with carefully controlled usage, treatment, and release, wind, wild foods (meat, berries).
- Sustainability is the process of maintaining change in a balanced fashion, in which the exploitation of resources happens in such a way that the resources are renewed at the same rate that they are used.

Background Knowledge:

Prediction of how long various energy resources will last is risky at best. In the early 1970's, it was predicted that we would run out of natural gas by the late 1980's! In the 1950's, utilities predicted California would need a nuclear power plant every 10 miles along their coastline to meet their electrical energy needs. It is important to know whether a prediction assumes a constant rate of use or a changing rate. It is also important to know whether a rate assumes that more resources will be found or it assumes use of only known reserves. It is also important to consider if foreign resources are included.

The point of this activity is not so much to show the actual numbers, but rather that non-renewable resources will be depleted and that conservation (reduction of use/waste) together with the development of renewable resources can extend the availability of non-renewables. It may help you to check the definitions of renewable and non-renewable in the glossary. The "Draw Chart" on the following pages tells you how many beans to draw if you want to adapt for changes in rate of energy use. For example, if use remains constant from year to year, each person draws 10 beans. If you want to simulate a 4% per year increase in energy use, you go to the column marked 4% per year. Students will predict how many years the energy supply will last, then fill in the number of beans left after each "year." Be sure to look the chart over before you begin so you understand the procedure.

Indigenous science worldview see natural resources as gifts and the relationship with nature is a continuous two-way reciprocal relationship. Indigenous worldviews honour nature on a daily basis and assume the responsibility for maintaining a harmonious relationship with the natural world. Western science worldviews see natural resources as resources that are available for human usage, to use for personal and economic gain.

When we start to understand the relationship between the land and First Nations people than we can begin to examine and change our personal, societal, economic, and environmental impacts we have towards the Earth and its' resources.

- We can incorporate the medicine wheel teachings into how we view the Earth's resources.
- We can question how we view our relationship with the land and ways in which we can change how we view these resources. Ask ourselves, how can we change the ways in which we use these items to show we are grateful, humble, appreciative and thankful?
- Understand that we need electricity for survival and being grateful to mother earth for providing us with these resources.

ENERGY

Renewable	**Non-renewable**
1. sun	1. coal
2. water	2. natural gas
3. wood	3. petroleum
4. wind	4. nuclear fission
5. biomass	
6. geothermal	
7. ocean tides	

Reagan Fedak
'Lived' Three-Week Block Unit 2019

HOW CAN WE SAVE ENERGY?

Energy saved is energy gained for another day! Saving energy will cut down on pollution and help our fossil fuels last longer, at least, until renewable energy sources become more practical. Conservation is the least expensive source of energy available today. Every bit of electricity that is not used to light a room that no one is in, could be used to operate a computer. Power companies have found that mining this kind of wasted energy is often more profitable than generating more energy. The amount of energy that a utility can get its users to save can be sold to other users; incentive programs for saving energy turn out to be profitable to the utility companies. Because of peak-use problems, the utility must have enough energy available to satisfy the needs of all users at peak hours. This often means building an entire power plant (or more) just to cover the demand over a 2-4-hour portion of the day. When everyone conserves energy, the utility can meet peak demand without a new plant, and the building and maintenance expenses that it would incur. Finding a way to do more with less, benefits everyone. Consumers can actively participate in energy conservation through recycling. Some communities have recycling centers and perhaps your school has a site recycling center. Often recycling centers provide containers for gathered materials, handle all the pick-up, and even supply educational materials to boot! Citizens need to realize that each and every one of us does make a difference. The solution to energy problems will be solved by individuals. While it may seem nebulous, we are the ones who need to pass laws or quit polluting, it will be us who will write letters to, and cast votes for, the lawmakers. Likewise, it will be individuals who ride the bus or a bike, instead of driving our own cars. The sum of our individual, daily decisions determines the net outcome of the world's energy use. We want to encourage an honest effort.

Instructional Strategies:

Monitor progress
Form Pairs
Get moving
Work together
Compare and contrast ideas
Take notes
Questioning
Exit Cards

Stage 2: Determine Evidence for Assessing Learning

Worksheets
Exit Card

Stage 3: Build Learning Plan

Set (Engagement): Length of Time:	Materials/Resources:
What did we do last day? (Makey Makey's) What did we find out? Remember when we said we get energy in the form of electricity through outlets in our homes, schools, etc... and that the energy comes from power plants through copper wires? Well what kind of power plants? And how do they create energy? Where does it really come from? **Development:** **Time:** **ACTIVITY**	<u>Pre-lesson Preparation</u> Purchase 1 bag of RED dried beans and one bag of WHITE dried beans. They must look distinctly different. • Before students arrive, place approximately 100 beans around the classroom, approximately 92% of one colour, and 8% of the other. They don't need to be hidden, but should be spread out.

1. Divide students into pairs and have them fill an open container with exactly 100 beans: 92% of one kind; 8% of another. 2. Hand out and discuss the Renewables Data Sheet. (Explain that more recent information tells us that the total renewable energy percentage has changed from 7% to 8%.) 3. Explain to students that because the U.S. depends on nonrenewable energy and because the human population is growing (thereby demanding more energy), we face the eventual depletion of this resource. But when? It all depends on how quickly and how much we use energy. If all our energy were renewable, we wouldn't have a problem...there would always be energy. This simulation will show the conditions that affect the depletion of nonrenewable resources. Students will experiment with these conditions to see how long they can extend the use of energy resources. 4. Hand out and explain the Draw Chart. All students should do the first trial together to get the idea of the simulation. Have one student in each pair put on the blindfold. This represents a population that is using energy without thinking about whether it is renewable or nonrenewable. When a student takes beans from the container, they won't be making a conscious choice between renewable or nonrenewable. 5. Review the rules. Explain that the first trial will be based on a population that is using energy at a constant rate. In other words, there is no growth in population and they use the same units of energy from one year to the next. Have students predict how many "years" it will take to deplete the beans in the container. Record it on the Data Chart #1. 6. Begin the activity, reminding students that any renewable beans pulled from the container can be replaced and counted for that year. Continue until only renewable beans are left in the container. Calculate percentages of renewables and nonrenewable that remain after each drawing. 7. Record the number of years it took to deplete all nonrenewable beans. Compare to predictions. 8. Remove blindfolds. Refer students to Data Chart #2. The first two rows represent populations with varying degrees of energy consumption. These would be populations much like ours in the U.S. and other "developed" nations. Countries with a high standard of living consume much more energy than developing, or third world nations. Look at the number of cars we drive, the plastic we use, and the fuel we use to heat /air condition our homes. All this energy consumption is primarily from nonrenewable resources. Remind students, however, that the "consumption" of beans and the years it takes to empty the container are only representative. It doesn't mean we'll run out of energy in 7 or 15 years. The simulation is designed to show how quickly a growing consumption level can deplete a resource. You may want to change the time units to reflect a more realistic picture, i.e. each box representing every 5 or 10 years.	• Renewable Data Sheet • Data Charts **Possible Adaptations/ Differentiation:** Have Carina and EA if we have one to help groups and manage them. **Management Strategies:** Establish expectations (ask students what my expectations are using their raised hands of course) Write expectations for group work on the board Encourage initiative Offer praise Address bad behavior quickly **Safety Considerations:** Remind students when they are moving around the room to walk, not run. Remind students not to eat the beans as they pose a choking hazard.

9. Now, the other student in the pair is blindfolded. Replace all the beans. Have students choose Data Chart #2 or #3. Repeat the same procedure as above. Be sure they predict before starting.

10. At the conclusion of the second round, discuss again the time it takes to deplete a resource when consumption levels increase. This represents an increasing population. More people place more demands on fewer resources.

11. At this point, tell students to design a way to extend the use of energy resources for as long as possible. The rules remain the same, however. Students are blindfolded, and they must begin by removing 10 beans. They are to establish a rate of consumption that will last longer than either of their previous trials. Have them record their trials in the remaining data boxes. (They should run at least two trials.)

12. When finished, discuss methods used to extend the energy resources, both renewable and nonrenewable. Have students write a conclusion.

ASK NEW QUESTIONS

13. What kind of energy will people be using in the future? Why?

14. Why don't people use more renewable energy now?

15. Are there reasons to use more renewables now rather than wait until the nonrenewable run out?

Learning Closure: **Time:**

Exit Card:
What did you learn about renewable and non-renewable energy?

Identify impacts of electricity use in Saskatchewan on the environment and propose actions to reduce those impacts.

Stage 4: Reflection

- *Students will have the opportunity to dive deeper into the different renewable and non-renewable energy sources when they begin their Career projects.*

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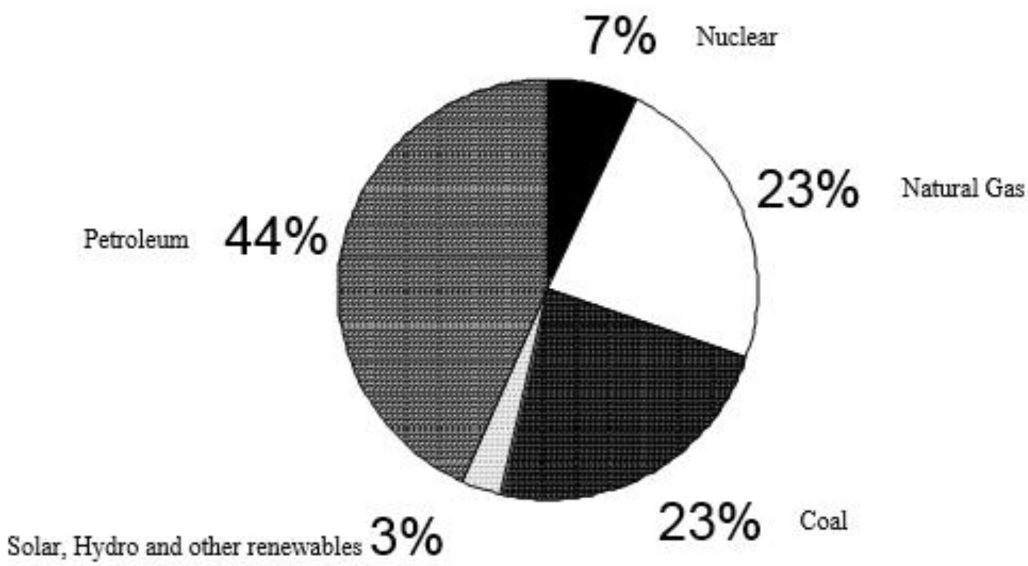
RENEWABLES DATA SHEET

The United States derives approximately 97% of its total energy from nonrenewable sources. About 3% of our energy comes from renewable resources. From 1986 to 1988 energy consumption increased by 12%.

PIE GRAPH OF ACTUAL CONSUMPTION BREAKDOWN
(1988 figures)



(note: these figures do not include direct solar-gain heating and lighting, which is a major energy source).

Subject/Grade: Science 6	**Lesson Title: Electrifying Careers!**	**Teacher: Ms. Fedak**
Stage 1: Identify Desired Results		
Outcome(s)/Indicator(s): **EL6.1:** Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts. **(f)** Research employers and careers related to electrical energy generation, distribution, and conservation in Saskatchewan.		
Key Understandings: ('I Can' statements) I can research employers and careers related to electrical energy generation, distribution and conservation in Saskatchewan.	**Essential Questions:** **What is a career related to electrical energy generation, distribution and conservation in Saskatchewan?**	
Instructional Strategies: Monitor progress Work independently (or in pairs) Questioning		
Stage 2: Determine Evidence for Assessing Learning		
Rubric **Presentation** **Questioning**		
Stage 3: Build Learning Plan		
Set (Engagement): **Length of Time:** **Talk about the project and what the expectations are. Go over rubric.** **Development:** **Time:** Procedure Create a group mind map, discussing: • Where electricity comes from • How it comes to our homes • Who brings it to our homes/schools Class 1: Research Students are going to create 7-minute presentations based on a career that they can have with SaskPower to bring electricity to your school. 1. Introduce students to the career paths and jobs in demand areas on SaskPower's website. Recommended sites:	**Materials/Resources:** Handout Computers **Possible Adaptations/ Differentiation:** EA or Carina helping students who need extra guidance. **Management Strategies:** Establish expectations (ask students what my expectations are using their raised hands of course) Write expectations for group work on the board Encourage initiative Offer praise Address bad behavior quickly	

https://www.saskpower.com/careers/ join-our-team/career-paths
https://www.saskpower.com/careers

2. Presentation MUST include:

- *Job Title and Description* – describe the basic task of the career, what responsibilities are required.
- *Education* – What education, high school and post-secondary courses, are required?
- *Personality Attributes* – Do you like to work outdoors? Do you like to work in an office? What is required for the chosen profession? If none are listed, consider attributes that you think would be beneficial to the job.
- *Physicality* – Describe if there is heavy lifting, climbing or working underground involved. Or do you sit at a desk or do you work from a vehicle?
- *Location* – If it isn't indicated, describe where you think this job might be located (outdoors, office building…)
- *Why SaskPower should hire you* – Describe how you think this job would suit you and why SaskPower should hire you.

3. Ask students to select one career they feel they would be most interested in and have them research it and create a presentation for a mini electricity job fair.

Class 2: Presentations

- Students present their chosen SaskPower careers.

Learning Closure: **Time:**

Follow Up
Did you expect to see so many jobs?
What was most surprising?
What was least surprising?
What jobs could you see yourself fulfilling? Why?

Stage 4: Reflection

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Assessment	**Points**	**Comments**
Job Description	/5	
Education	/5	
Personality Attributes	/5	
Physicality	/5	
Location	/5	
Why should SaskPower Hire You	/5	
TOTAL	**/30**	

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<table>
<tr><td colspan="2">Subject/Grade: Science 6   Lesson Title: Electrifying Careers! Con'td   Teacher: Ms. Fedak</td></tr>
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<tr><td colspan="2">Outcome(s)/Indicator(s):

EL6.1: Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts.

(f) Research employers and careers related to electrical energy generation, distribution, and conservation in Saskatchewan.

(Indicator "b" will potentially come in at the end of the lesson to begin our art projects)

(b) Describe how electrical energy is generated from hydroelectric, coal, natural gas, nuclear, geothermal, biomass, solar, and wind sources and categorize these resources as renewable or non-renewable.</td></tr>
<tr><td>Key Understandings: ('I Can' statements)

I can research employers and careers related to electrical energy generation, distribution and conservation in Saskatchewan.</td><td>Essential Questions:

What is a career related to electrical energy generation, distribution and conservation in Saskatchewan?
What are renewable and non-renewable resources and/or energy?</td></tr>
<tr><td colspan="2">Instructional Strategies:

Monitor progress
Work independently (or in pairs)
Questioning</td></tr>
<tr><td colspan="2">Stage 2: Determine Evidence for Assessing Learning</td></tr>
<tr><td colspan="2">Rubric
Presentation
Questioning
Art work</td></tr>
<tr><td colspan="2">Stage 3: Build Learning Plan</td></tr>
<tr><td>Set (Engagement):   Length of Time:

Kahoot!

Remind students of their projects... every one needs a computer to finish up their questions.
Show your Career Poster example.
Also talk briefly about how we may begin an art project if everyone finishes their posters. (they may also want to present their career through PowerPoint, etc.)

Development: Time:</td><td>Materials/Resources:

Career worksheet
Kahoot!
Construction paper, markers, pencil crayons for posters

Possible Adaptations/ Differentiation:

EA or Carina helping students who need extra guidance.</td></tr>
</table>

Finish question sheet for careers using the SaskPower website. https://www.saskpower.com/careers/ join-our-team/career-paths https://www.saskpower.com/careers Start and/or finish posters. Once done Career projects, we will begin an art project. **Learning Closure:** **Time:** Follow Up Did you expect to see so many jobs? What was most surprising? What was least surprising? What jobs could you see yourself fulfilling? Why?	Options for how students want to present their careers. **Management Strategies:** Establish expectations (ask students what my expectations are using their raised hands of course) Write expectations for group work on the board Encourage initiative Offer praise Address bad behavior quickly **Safety Considerations:** Scissors
Stage 4: Reflection	