Subject: TAG
Grade: 5

Note: TAG instruction occurs one day a week for each student. These plans are meant to replace the time that would be spent on core learning activities (reading, ELA/writing, math social studies/science) for that one day each week. Students should still complete activities for specials classes (art, music, PE) on their TAG day.

Week 6

Standards (include both TAG standards and grade level standards addressed)	**ACS 3-8.2** Produce written and/or oral work that is complex, purposeful, and organized, includes relevant supporting examples and manipulation of language. **HO/CT 3-8.1** Ask probing, insightful, and relevant questions. **HO/CT 3-8.2** Respond to questions with supporting information that reflects an in-depth knowledge of a topic.
Brief Description	Students will engage in a quest of activities that will foster higher order thinking and critical thinking skills about electricity.

Did you know that A bolt of lightning can measure up to 3,000,000 volts, and it lasts less than one second? Also, did you know that one single lightning bolt can light up 100 powerful lamps for an entire day, or make lots and lots of toast? In fact, a couple of thousand pieces of toast. With this lesson, get ready to learn more interesting facts about electricity the will "light up" your curiosity.

Student Directions:

TASK 1: Project Questions

- On a separate sheet of paper answer the Project Questions in complete sentences

TASK 2: What is Electricity?

- Read the attached packet with information about Electricity, Conductors and Insulators, Negative and Positive Charges, Simple and Parallel Circuits, Water Conductivity, and Static and Current Electricity.

TASK 3: Questivities Thinking Questions

- Answer questions #1-7 on a separate sheet of paper.
- A Venn Diagram is included to use when comparing and contrasting conductors and insulators

TASK 4: Active Question

- Think of questions a conductor may ask an insulator.
- Write these questions on a separate sheet of paper

TASK 5: Project Activity

- Create a Jeopardy Game on Electricity. The game should include questions and answers to questions related to Electricity.
- Write the questions on one note card and the answers to the questions on another note card.

- Include directions for how to play your game. Be sure to write legibly and use the correct spelling and grammar when writing the questions and answers.
- Create enough game cards to play with another person or a small group of classmates/friends

What is Electricity?

In order to understand the basics of electricity, it helps to first understand about atoms.

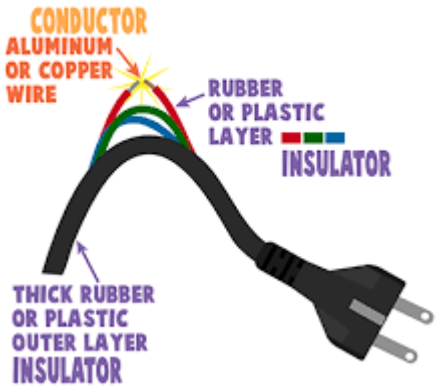
Atoms are small particles that make up all matter. They are so small that it takes billions and billions of them just to make something useful like a pencil. Inside the atom are even smaller objects called electrons, protons, and neutrons. Electrons have a negative charge (-) and the protons have a positive charge (+). The protons and neutrons stick to together in the center of the atom, called the nucleus. The electrons spin fast around the outside. The positive charge of the protons keeps the electrons from flying off and leaving the atom.

The electrons in the atom are where electricity gets its name. In some elements, there are electrons on the outside of the atom that, when a force is applied, can come loose and move to another atom. When a bunch of atoms are together and electrons are moving from one atom to the other in the same direction, this is called electricity. Electricity is the "flow" of electrons.
https://www.ducksters.com/science/electricity_101.php

Electric charge is a basic property of electrons, protons and other subatomic particles. Electrons are negatively charged while protons are positively charged. Things that are negatively charged and things that are positively charged pull on (attract) each other. This makes electrons and protons stick together to form atoms. Things that have the same charge push each other away (they *repel* each other). This is called the *Law of Charges*. It was discovered by Charles Augustin de Coulomb. The law that describes how strongly charges pull and push on each other is called Coulomb's Law.

Electrical Conductors and Insulators

Some materials allow electric current to flow more freely than others. These materials are called conductors. Other materials are resistant to the flow of electric current. These materials are called insulators. Conductors and insulators are both important in the field of electronics.



Electrical Conductors

Electrical conductors allow electric current to flow easily because of the make up of their atoms. In a conductor, the outer electrons of the atom are loosely bound and can freely move through the material when an electric charge is applied.

Conductive Materials

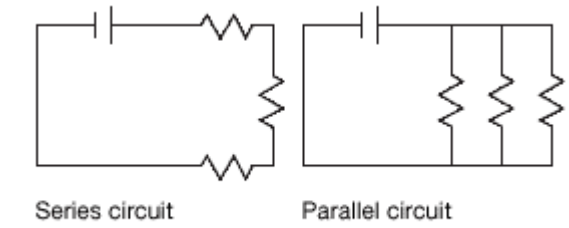
In general, the best electrical conductors are metals. Metals tend to have electrons in the outer layer of their atoms that are freely shared. The most conductive of all the elements is silver. Unfortunately, silver is too rare and expensive to use in most electrical equipment. Today, the most commonly used electrical conductor is copper. Copper is used in electrical wiring and electrical circuits throughout the world.

Electrical Insulators

The opposite of a conductor is an insulator. An insulator opposes the flow of electricity. Insulators are important to keep us safe from electricity. The wire that carries electricity to your computer or television is covered with a rubber-like insulator that protects you from getting electrocuted. Good insulators include wood, plastic, glass, the air, and paper.
https://www.ducksters.com/science/physics/electrical_conductors_and_insulators.php

Electrical Circuits

In a type of electric circuit called a series circuit, all of the current flows through each part of the circuit. In a parallel circuit the current is divided into separate paths. In the illustration, the two upright lines in each circuit represent a power source, such as a battery. Each wavy line represents a device, such as a lightbulb, that uses electric current.



https://kids.britannica.com/kids/assembly/view/178006

Water Conductivity

When we think of electricity, we usually imagine wires in our houses or the huge electrical cable lines outdoors. But did you know that water can also be used to conduct electricity? In fact, it's a very powerful conductor! The temperature of the water plays a large role in how well it conducts electricity. Hot water conducts better in general. One reason that we might want to estimate the conductivity of some water is to find the amount of solids that are dissolved in it, such as salt. When you stir salt into warm water, it dissolves. A chemical reaction takes place, so the solid salt grains turn into positive and negative ions. These ions help to carry electricity in the water. Keep in mind that adding salt to water will only work until a point, and after that adding more salt will not have much effect anymore.

Static Electricity

Static electricity is the build-up of an electrical charge on the surface of an object. The reason that it's actually called static electricity is because the charges stay in one area for some time and don't flow or move to a different area. Atoms are made up of neutrons, protons, and electrons. The electrons spin around on the outside.

A static charge happens when two surfaces touch each other and the electrons move from one object to another. One of the objects will have a positive charge and the other a negative charge.

If you rub an object quickly, like a balloon, or your feet on the carpet, these will build-up a rather large charge. Items with different charges (positive and negative) will attract each other, while items with similar charges (positive and positive) will push away from each other. It's kind of like a magnet!

https://www.coolkidfacts.com/static-electricity-for-kids/

Current Electricity

When electrons move, they carry electrical energy from one place to another. This is called current electricity or an electric current. A lightning bolt is one example of an electric current, although it does not last very long. Electric currents are also involved in powering all the electrical appliances that you use, from washing machines to flashlights and from telephones to MP3 players. These electric currents last much longer.

Have you heard of the terms potential energy and kinetic energy? Potential energy means energy that is stored somehow for use in the future. A car at the top of a hill has potential energy, because it has the potential (or ability) to roll down the hill in future. When it's rolling down the hill, its potential energy is gradually converted into kinetic energy (the energy something has because it's moving).

Static electricity and current electricity are like potential energy and kinetic energy. When electricity gathers in one place, it has the potential to do something in the future. Electricity stored in a battery is an example of electrical potential energy. You can use the energy in the battery to power a flashlight, for example. When you switch on a flashlight, the battery inside begins to supply electrical energy to the lamp, making it give off light. All the time the light is switched on, energy is flowing from the battery to the lamp. Over time, the energy stored in the battery is gradually turned into light (and heat) in the lamp. This is why the battery runs flat.

https://www.explainthatstuff.com/electricity.html

Questivities™ - Electricity

Directions: Answer the Questivities Thinking Questions and the Active Question before doing the Project Activity.

Project Activity

- Create a Jeopardy Game
- Questions and answers must relate to electricity
- Play your game with your class or a small group of students

TAG Standards

ACS 3-8.2 Produce written and/or oral work that is complex, purposeful, and organized, includes relevant supporting examples and manipulation of language.
HO/CT 3-8.1 Ask probing, insightful, and relevant questions.
HO/CT 3-8.2 Respond to questions with supporting information that reflects an in-depth knowledge of a topic.

Common Core Standards

S5P2. Obtain, evaluate, and communicate information to investigate electricity.

Assessment Mini-Rubric for the Project Activity

1. Clear and understandable rules
2. Includes at least 4 categories
3. Information used is correct
4. All writing contains correct grammar, spelling, and punctuation.

Project Questions (Essential Questions answered through the Project Activity)

What is static electricity? How does a basic electric circuit work?

Questivities™ Thinking Questions

1. List 5 facts about electricity.
2. Compare/contrast conductors and insulators.
3. What would happen if you put a negative charge with a positive charge? Positive with a positive? Negative with a negative?
4. Would you rather be a simple circuit or a parallel circuit? Why?
5. How would you feel if there were no electricity? Explain your feelings.
6. Why does water conduct electricity?
7. How do static and current electricity differ?

Active Question

Make a list of 5 questions a conductor might ask an insulator.