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| Science 9 Unit Overview  |
| Unit Name: | Electricity |
| Duration:  | 3 Weeks |
| Project Idea: | Static Electricity: In partners, two students will be given three balloons. Their challenge will be to keep their balloon on a surface the longest. Current Electricity: Students will play with our current electricity boards to demonstrate their knowledge of series and parallel circuits. For the most part, I will use a guided discovery learning style of learning. Students will be given a series of challenges or questions, and it is up to the student to answer the question in whichever form they wish |
| IRP Standards: | - explain the production, transfer, and interaction of static electrical charges in various materials- explain how electric current results from separation of charge and the movement of electrons- compare series and parallel circuits involving varying resistances, voltages, and currents- relate electrical energy to power consumption |
| 21st Centuary Skills Assessed and taught(will be used for effort assessment) | - Collaboration- Critical Thinking- Use of video and computers to aid learning  |
| Driving Question: | How can our understanding of electricity help us understand our own use of power?  |
| Further Questions that focus on the IRP standards:  | Since this unit will focus on guided discovery learning, students will be free to explore different aspects of electricity. The guided part of the unit will involve directing student’s efforts and questioning towards the IRP standards |
| Major Products and Performances | Group: | Individuals may choose to work as individuals or in partnership for both the static and current electricity portions of the unit.  |
| Individual: | Static electricity- students will need to hand in a static electricity sheet (Appendix A) that outlines their strategies they used in the balloon experiment. Current electricity – students will need to hand in a sheet outlining answers to five of the questions on each of the CYU pages plus the focus and discoveries of their learning for that day.A unit test |
| Entry Events/Lessons | Day 1-3 | - Give students the Appendix B worksheet, the balloon challenge and two balloons. Students may then work independently or in partnership to answer the questions. On day three students will perform the challenge and hand in the Appendix A worksheet |
| Day 4 | - Discuss what discovery based learning is and some of the current research findings (discover based learning is better with adults and not all that useful for students, unless they are guided in some part of the learning)- Discuss learning in science and how it is not always in textbooks. Textbooks, however are great facilitators in learning- Give students electric boards and batteries and ask them to create light. Also ask them to create some different circuits |
| Day 5-9 | - Work through the textbook chapters giving students freedom to conduct their own inquiry but based on their own interests (see appendix A worksheet) |
| Project time line | Week 1 | Students will be given balloons, the challenge sheet and appendix A as a way to record their findings  |
| Week 2 -3 | Guided discovery based learning of current electricity themes  |
| End of Week 3 | Unit test |
| Reflection methods | - Appendix A worksheet to demonstrate learning |

# Appendix A – Static Electricity Unit as seen on the wiki

Explain the production, transfer, and interaction of static electrical charges in various materials
- explain, with illustrations, how static charges are separated because of transfer between various materials
- describe types of static electrical charge (positive, negative) and no charge (neutral) with reference to atomic theory
- describe how the electric force between two objects depends on types of charge, size of charge, and the distance between the two objects

In this unit you will demonstrate your knowledge of static electricity through a series of experiments and contests.

You and a partner of your choice will participate in four contests:
a) Contest one: Only using the power of static electricity and one balloon, you are to keep a balloon on a whiteboard over night. /1
b) Contest two: Only using the power of static electricity, you are to lift up any two objects you wish with any lifting item you wish. The heavier the combined two lifted objects will win extra points. Note: the items must be lifted through induction, which means that you cannot touch the object. One lifted object you can prepare (give it a charge), the other you cannot (must have a neutral charge) /1
c) Contest three: Using the power of static electricity, you are to carry any two objects with any lifting item that you wish. The heavier the combined two lifted objects that are picked up will win extra points. Note: the items must be carried through conduction, which means that you must touch the object. One object you can prepare (give it a charge), the other you cannot (must have a neutral charge). The lifting item you use for contest three cannot be of the same material as contest two (example: you cannot use a plastic comb for contest two and a plastic ruler for contest three because they are both made from hard plastic) /1
d) Contest four: Make a working electroscope. Demonstrate charging by conduction, induction and friction using the electroscope. You must be able to explain what kind of charge (positive or negative) is happening in each case. Extra points to the electroscope that looks the coolest /1.5

Rules that apply to ALL contests:
1) Each student, regardless if they are doing this with a partner, must hand in:
a. A step by step diagram showing charges of the objects and what is happening in all the contests. This will be handed in the booklet mentioned in number 1e below.
b. With all contests, you cannot charge the balloon or object using hair
c. You have up to 20 seconds to charge the balloon or object including the whiteboard
d. Answers CYU questions from 9.1 to 9.3. You only need to do half the questions in each of the CYU. Thus if there are fourteen questions, you need to answer seven of them. /1 (.5 for completeness, .5 for quality of answers)
e. All of this must be handed in a separate booklet. Typed if you wish.

# Appendix B – Current Electricity Unit as seen on the wiki

In this unit you will do teacher assisted discovery learning. You may work with a partner in this BUT please let it be a partner that you’ve never worked with before. It is up to you to learn the material and you can use your class time in any way you wish. However, you must create a booklet of your learning with the following deliverables. Note: You and your partner will need a camera and you can create the circuits together and share the pictures. However, you need to each create the booklets separately. This means you must draw the circuit yourself and do any CYU question in your own words. Of course, you may help your partner answer the questions and draw the circuits (two minds are better than one) but all the work is individual.

Day 1: Chapter 10.1

* Create any circuit, take a picture, add the picture to your booklet and then draw the circuit.
* Create another circuit, this time you must have at least one light, two batteries, and two switches. Take a picture and draw the circuit
* Answer any six questions from CYU 10.1

Day 2: Chapter 10.2

* Create any series circuit with two loads, take a picture, add the picture to your booklet and then draw the circuit.
* Create a parallel circuit with two loads. Take a picture and draw the circuit
* Answer any six questions from CYU 10.1
* Create a circuit with an ammeter. Take a picture and draw the circuit. Make sure the reading on the ammeter is clear on the picture
* How much charge passed the ammeter above in 10 seconds
* How many electrons passed the ammeter above in 10 seconds
* Answer any eight questions from CYU 10.2

Day 3: Chapter 10.3

* Create any series circuit with two loads, take a picture, add the picture to your booklet and then draw the circuit.
* Create figure 3 on page 310. Take a picture and tell me the voltage
* Create figure 5 on page 311. Take a picture and tell me the voltage
* Create figure 9 on page 312. Take a picture. Add a voltmeter near the positive end of the battery and read the voltage. What is it? Take a picture. Replace the voltmeter so it is now at the negative end of the battery and read the voltage. What is it? Take a picture…. please have the voltmeter clear.
* Create figure 10 on page 313. Take a picture. Add a voltmeter near the positive end of the battery and read the voltage. What is it? Take a picture. Replace the voltmeter so it is now at the negative end of the battery and read the voltage. What is it? Take a picture…. please have the voltmeter clear.
* Create a circuit with an ammeter. Take a picture and draw the circuit. Make sure the reading on the ammeter is clear on the picture
* Answer any six questions form CYU 10.3

Day 4: Chapter 10.4

* With a partner, do the try this on page 10.4. Answer all questions and make sure you take pictures of all your circuits, diagrams of your circuits and add it to the booklet
* Answer any six questions from CYU 10.4

Day 5: Chapter 10.5

* Answer any four questions from CYU 10.5

Day 6: Investigation 10A and B starting on page 327. I want all tables, evaluations and synthesis you have. I would also like three pictures to prove that you did the investigation.