**Q405: Saturday Science**

**Lesson 1 Plan Template**

**Lesson Topic:** Basics of Electricity  **Grade level(s):** 3rd-4th

**Instructor Names:**

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| **Desired Results** |
| **Overarching Focus Question for the Session** How can science help us to design art that lights up? |
| **Central Focus/Topic for today:**Students will understand:* What electricity is and how it moves

Therefore, the guiding question for today’s learning is:* What is electricity and how does it move?

  | **Relationship that this central focus has to the overarching big idea/question for the unit**The central focus for today ties into the overarching idea of how science can help us design art that lights up because it will set the students up with a base level of knowledge for understanding what electricity is and how it moves. This will allow them to understand how their microbits work during the third session.  |
| **Student objectives (outcomes):***.*Students will be able to:* Build a working circuit and be able to explain how the circuit works to light up the light bulb.
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| **Timeline of Activities for the Day** |
| \**Provide a breakdown of how long each activity will take, who will lead the segments of the activities, when breaks will occur or other transition points, etc.**\*Identify by highlighting in blue the portion of the lesson you team wants video-recorded each week. This should be ~45 mins*9:30-9:45→ Teacher introductions, set up classroom norms, and complete an icebreaker 9:45-10:15→ Introduction to the unit and focus question, first try for circuit activity 10:15-10:30→ Bathroom and Snack Break10:30-10:45→ Demonstration on floor and discussion of how electricity flows through a circuit 10:45-11:00 → Rebuild the circuits with their new understanding of how circuits work(Record first 15 minutes) 11:00-11:30→ Conductors vs. Insulators 11:30-12:00→ Creation of chart and wrap up discussion  |
| **Learning Plan (First three E’s of the 5E model)***Any of these phases can be repeated should you have more than one activity to describe OR a complex activity with multiple iterations of some phases.* |
| **ENGAGE/EXPLORE*** We will start by giving students two pieces of insulated wire, a battery, a lightbulb, and tape. We will then ask them to find a way to make the lightbulb light up, with no other guidelines or instructions. They will do this activity with a partner.
	+ Teacher will circulate and ask probing questions:
		- Why did you put \_\_\_\_\_\_\_\_ there?
		- What do you think the positive and negative sides of the battery mean?
		- Is that significant for your lightbulb to light up?
		- What is happening when your lightbulb lights up? How do you know>
* After students are given time to explore and hopefully get the lightbulb to light up, we will ask them to share their ideas with the whole class, and explain how they were able to connect the lightbulb to the battery and make it light up.
	+ Tell the class your process. Did you get it on the first try, or did you have multiple tries to get it to light up?

 **EXPLAIN*** After this attempt to make the lightbulb light up, ask the whole class to join us in a circle sitting down in the room. We will explain that us teachers represent the battery and they represent a wire conductor. The students will be sitting with their knees touching to represent a closed circuit. An object like a ball or book will be handed out to each student. The objects represent electrons inside a wire conductor. Explaining that a wire conductor is full of electrons.
* Students will then be explained that all batteries have a positive end that will be represented by their left hand and the negative end will be represented by their right hand. Students will pass their “electron” to the person on their right, and will continue to pass the electron to the person on the right. Explaining that because electrons share the same negative charge, they repel one another, which keeps them moving in the same direction. Making the point that the flow of electrons through a conductor is called an electrical current.
	+ Ask students:
	+ Why is it necessary for our circle to be closed? What does that represent?
	+ Where does this energy come from? How do you know?
	+ What would happen if we broke the circle?
	+ What does this tell us about the circuits you built before?

 **ELABORATING/EXTENDING Understanding*** After the demonstration, students will be sent back to their tables to figure out how to make the lightbulb light up using the information that they have just learned about wire conductors. Teachers will go around and ask open-ended questions to ensure that students understand why the circuit is lighting the lightbulb
	+ Where is the electricity coming from?
	+ Where do you think the electrons are flowing to and from?
	+ With what you know, what can you tell me about the positive and negative sides of the battery?
	+ How come the lightbulb will not light up if you break the flow of electricity?
* After they have successfully created a circuit to light the bulb, hand out some sort of a non-conductor (for example, straws) and have them try to make the circuit light up the lightbulb with this material
	+ After they realize that this is not possible, a discussion will be started about the difference between conductors and insulators.
* To conclude this lesson, students will now have a great understanding of what is needed to make electricity flow to light up a lightbulb. So, we will have students help teachers create a chart that outlines what is needed to make a circuit to work.
	+ This chart will include things like the source of energy (battery), connections (wires), and output device (lightbulb).
	+ This will be used for the next time when the circuits begin to increase in complexity.

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| **Assessment Evidence (\*This is the Evaluation Phase of the 5E approach)** |
| **Performance Task(s):*** Students will create circuits with insulated wires, lightbulbs, tape, and batteries.
 | **Other Evidence:*** Oral questions during classroom discussions, and listening in on table/partner group discussions.
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| **Materials + Quantity:*** 20 pieces of insulated wire
* 10 batteries
* 10 light bulbs
* 2 rolls of tape
* 20 Balls
* Non-conductors (straws, yarn, fabric, etc.)
* Conductors (copper, iron, silver, rubber, etc.)
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| **Required Accommodations/Modifications:*** Gear up→ if the students are done with the activities, we will go around and create our own broken circuits using their materials, and give them back, and have the students figure out a way to complete the circuit and make it work. This introduces the next week’s activities.
* Gear down→ If students are struggling to make the light bulbs we will rearrange groups in order to have students who are getting it to assist the students who are not quite getting it. If the majority of students are not getting it we will make this more of a whole group activity where we will do a demonstration with the circuit.
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| **Additional Modifications for Individual Students:*** N/A
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