### Charging a Smartphone

**OBJECTIVES**
9th grade physical world concepts

*It is the year 2025, it has been a year since the accident happen, a year since humanity’s way of life changed. All technology stopped working because there is no electricity anymore. Some people say that there is a place on earth that everything is normal, but no one knows where.

You, one of the few surviving humans, still hold a smartphone that has long lost charge. One day, you find a note on the door of your house “the answers to everything are on the smartphone”

Your objective is to come up with a way to charge your smartphone and find the answer to everything.

The students will summarize their finding and demonstrate mastery of the following:

1. What method would you consider to be the most efficient to charge your smartphone?
2. How would you develop this method?
3. What scientific concept do you need for this method to work?

**PROCEDURES**

1. The students will pick a method that produces energy. The idea is for the student to use their experiences to come up with a solution.
2. The students will conduct research. They will find information that will help them better understand the method that they have chosen.
3. They will create a sketch of their idea, a drawing or schematic of the method they have chosen with labels detailing how the method works.
4. The students will consult with their peers about ways they can improve about their design.
5. The students will write a conclusion based on the method they have chosen and the information that they have gathered.

**MATERIALS**
- Lab (worksheet)
- Paper
- Pen or pencils
- Calculators
- Any other materials that the student thinks they might need (with the teacher’s discretion)
- Calculators
- Power supplies
- Ramps
- Wire
- Batteries
- Rules
- Karts with different masses

**ESSENTIAL QUESTIONS**
What is the relationship between the voltage of the battery and the mass of the cart?

- How would changing the angle of the ramp affect the performance of the cart?
- What would be the most efficient combinations for a kart?
- What do you think the relationship between the voltage of the battery and the weight of the kart are?
- What alternative source of power would you use to be more efficient in your kart?
- What else would you change on the experiment to make it more efficient?