Name:

Electricity & Magnetism

Date:

How Can I Solve a Problem Using an Electrical Device?

Discover: Solve a Problem

Question

How can I solve a problem using an electrical device?

Resources

- Magnetic Kit Items: battery holder, 2 lamps and 2 lampholders, connecting wires, buzzer, switch(es), motor, propeller,
- Other items: 2 AA batteries or solar cell
- Optional: Various common home materials such as tape, thin elastic band, scissors, pencil and paper, cardboard, string, or toy building kits (Exact materials depend on the design or device you intend to build, digital camera, or scanner
- Websites:

  PhET Simulation or Yenka Software

Instructions

1 Using what you have learned about electric circuits, loads, and power sources, you will design a device that solves a problem. Choose **one** of the following problems.

> **Problem 1: Pet Feeder**
>
> You must meet the needs of someone who wants help feeding his or her cat. You are to design an automatic feeder. The feeder should drop food automatically when the pet steps on a switch.

> **Problem 2: Baby Mobile**
>
> You must entertain a baby—and be a friend to baby-sitters! Design a pretty mobile that spins hanging toys in front of a baby when someone presses a switch.

> **Problem 3: Car Reading Lights**
>
> A big family has two children who like to read on long car trips, but not always at the same time. To help them—and to keep peace in the car, design a lighting circuit with 2 lamps. They need separate switches, and they all must glow brightly if they are used at the same time. Oh, yes! Mom or Dad wants a master switch to turn all the lamps off (and on!).

> **Problem 4: Water Alarm**
>
> Design a circuit that lets you know when an appliance such as a washing machine overflows. A buzzer will sound when the water level rises too high in the container.

2 You can choose several methods to design a device:

Method A: Use Electricity Kit items. Include items from around the home if you wish.
Method B: Draw a circuit diagram using paper and pencil.
Method C: Design a simulation for the device using the PhET simulator or Yenka software.

If you choose Method A, you can use a digital camera.
If you choose Method B, you could use digital camera or scanner.
If you choose Method C, you can screen capture your image or save your Yenka file for sharing.

3 Design your problem-solving electric device using the method you chose.

4 Test your problem-solving electric device. If it does not work the way you want, make changes and repeat the testing. Repeat as many times as you wish until the device performs the way you want.

5 Provide an explanation of how your solution works. The explanation may be written or oral.

Problem-Solving Rubric

	Excellent 5	Proficient 4	Satisfactory 3	Limited 2
Effective Design /5	• *Effective* design, uses multiple loads with a parallel circuit, and is *innovative* and *efficient*.	• *Functional* design, uses multiple loads with a parallel circuit, and is *practical.*	• *Basic* design, uses multiple loads and is *feasible*.	• *Impractical* design, lacks either multiple loads or a working circuit, and is *ineffective.*
Explanation /5	• *Detailed* explanation is *precise* and uses *accurate* circuit terminology.	• *Reasonable* explanation is *thoughtful* and uses *logical* circuit terminology.	• *Basic* explanation is *simple* and uses *mostly accurate* circuit terminology.	• *Haphazard* explanation is *vague* and uses *inaccurate* circuit terminology.
Presentation /5	• Presentation or demonstration is exceptionally *well organized* and shows all parts *effectively* and *precisely*.	• Presentation or demonstration is *logically organized* and shows all parts *accurately*.	• Presentation or demonstration is *clearly organized* and shows most parts *generally*.	• Presentation or demonstration is *disorganized* and shows parts *imprecisely*.

Written Explanation

Total: /15 marks

Save Your File

Save your Table to your Electricity Notebook folder. Name your file with your name (jsmith) in this format: (yournamehere)sc5-2-3-problem-solving. Submit your completed assessment to the submission folder. Also include your photo, video, or diagram of your device.