LECTURE: THE UNIT THAT DIDN'T MAKE IT

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Va. SOL:

PH.13 The student will investigate and understand how to diagram and construct basic electrical circuits and explain the function of various circuit components. Key concepts include
a) Ohm's law;
b) series, parallel, and combined circuits; and
c) circuit components including resistors, batteries, generators, fuses, switches, and capacitors.

Topic/Concept

Lecture - Using a gravitational PE analogy to understand the unit of electrical potential.

Materials

- 100 g mass, 1000 g mass, assorted objects of unknown mass, 1 m tall counter top, meter stick

Safety Considerations

None

Presentation

Lecture with Q&A to develop understanding of the concept of electrical potential and the unit of the Volt.

How the physics is demonstrated

In this lecture I begin by constructing a chart that I use several times in class. The chart has the following headings:

Concept	**Symbol**	**Unit**	**Unit abbreviation**	**other?**
I begin with review of something they are very familiar with, mass and force				
mass	*m*	*kilogram*	*kg*	*no - fundamental*
force	*f*	*Newton*	*N*	*kgm/s^2*

I then move on to fill in the chart and review the concepts of energy. Since at this point of the year I have already taught force and energy, these are filled in by student response to my questions. After completing the energy row the class and I discuss the concepts of gravitational potential energy of objects sitting on my desk (1 m high). The first two objects are standard 100g, 1000g masses. This line of discussion then leads to asking what the energy of another object, say a stapler is. We discuss why we don't know and what we'd need to know to

answer the question. All review. I then explain to the class that I have developed an new concept to take care of this problem – the energy per kg of the objects – the gravitational potential of the objects. The lesson proceeds as I develop and fill in the rows for gravitational potential. I explain that this is so important and catches on so well that people name the unit after me and eventually refer to gravitational potential as 'Jacksonage'. I then go through the process of reviewing concept of charge and developing the concept of electrical potential in a parallel manner to the fictitious 'jacksonage'

Construction and Tips Regarding the Demonstration

None – two masses and assorted junk that is always on my desk.

Sources & References

To the best of my knowledge, this is original.