

SPH3U

UNIVERSITY PHYSICS

ELECTRICITY & MAGNETISM

- ☞ Introduction
(P.498-501)

Cellphones?

In North America a cellphone, on average, is only used for about 18 months before the consumer buys another phone with newer features. What will you do with your old cellphone?



Cellphones?

*You may consider keeping your current cellphone for as long as it works. You may also take your phone to an "e-cycling" facility. **E-cycling** is the process of recycling or reusing parts of electronic devices. This helps to reduce the amount of waste and chemicals entering the environment from old electronics. However, e-cycling does have some costs associated with it – operating the facility, recovering useful parts, ... Some of these costs are then passed on to the consumer.*



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Cellphones?

PRACTICE

1. When you purchase an electronic device, your bill includes a surcharge to help pay for e-cycling the device. How do you feel about this surcharge?
2. Some of the chemicals in cellphones are arsenic, mercury, cadmium, lead, and brominated flame retardants. These materials are all toxic to humans and wildlife. What might you consider doing to prevent these chemicals from ending up in our landfills and waterways?
3. What responsibilities to the environment should manufacturers of cellphones have when designing cellphones?

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Overall Expectations

By the end of this unit, students will:

1. analyse the social, economic, and environmental impact of electrical energy production and technologies related to electromagnetism, and propose ways to improve the sustainability of electrical energy production;
2. investigate, in qualitative and quantitative terms, magnetic fields and electric circuits, and solve related problems;
3. demonstrate an understanding of the properties of magnetic fields, the principles of current and electron flow, and the operation of selected technologies that use these properties and principles to produce and transmit electrical energy.

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Big Ideas

Concepts that students should retain long after this course are:

- ▶ Relationships between electricity and magnetism are predictable.
- ▶ Electricity and magnetism have many technological applications.
- ▶ Technological applications that involve electromagnetism and energy transformations can affect society and the environment in positive and negative ways.

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Getting Started: Useful Concepts & Skills

CONCEPTS REVIEW

- The following diagram shows a simple electric circuit.
 - What are the four main parts of any electric circuit?
 - What are their functions?

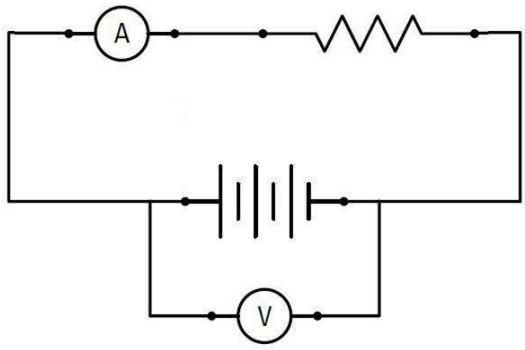


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Getting Started: Useful Concepts & Skills

CONCEPTS REVIEW

- What are ammeters and voltmeters used for?
 - Indicate, on the diagram below, how an ammeter and a voltmeter should be connected?

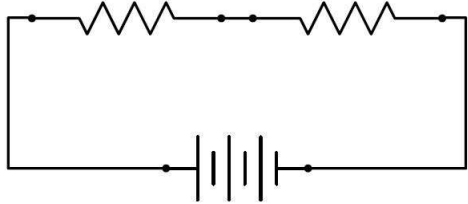


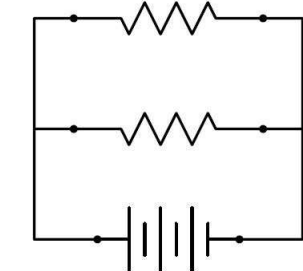
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 Getting Started: Useful Concepts & Skills


CONCEPTS REVIEW

3. The diagrams below show two types of electric circuits. What are they called? How can you tell?

(a) 

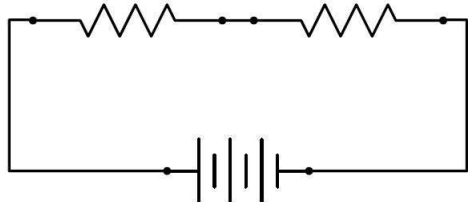
(b) 

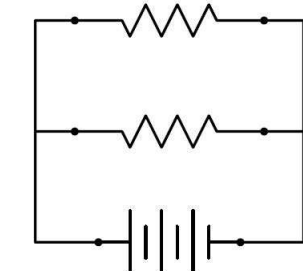
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CONCEPTS REVIEW

4. What are the properties of (i) electric current and (ii) electric potential difference in (a) a series circuit and (b) a parallel circuit?

(a) 

(b) 

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CONCEPTS REVIEW

5. Examine the graph of electric potential difference (V) versus electric current (I) in a circuit.

- According to the graph, how are electric potential difference and electric current related?
- What does the slope of the graph represent?
- What is the name of this law?


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Getting Started: Useful Concepts & Skills

CONCEPTS REVIEW

6. Which graph below best describes an electrical device that obeys Ohm's Law?

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 Getting Started: Useful Concepts & Skills

CONCEPTS REVIEW


7. Each diagram shows two bar magnets with poles close to each other.


(a) Will the magnets be attracted or repelled?


(b) State the law of magnetic poles.

(c) What are some substances that are attracted to magnets?


(d) What properties allow them to be attracted?

(a) 

(b) 

(c) 

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CONCEPTS REVIEW

8. List some conventional and alternative methods of electricity generation. Identify a benefit and a disadvantage (to the environment) for each method.


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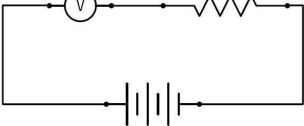
SKILLS REVIEW

9. There is something wrong with each circuit below. Identify the problem and suggest a way to solve it.

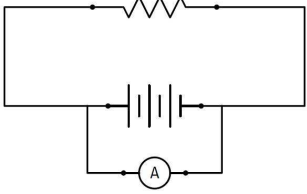
(a)



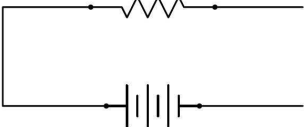
(b)



(c)



(d)



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SKILLS REVIEW


10. (a) Draw a circuit that contains a battery connected in series with a motor followed by two lamps connected in parallel with each other. Include switches to control each lamp independently.

(b) What would happen if both switches were closed?

(c) What would happen if both switches were open?

(d) What would happen if one switch was closed?

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SKILLS REVIEW

11. A student is performing an experiment involving electricity. A conductor gets very hot and starts to smoke. List some possible steps that the student could take to resolve the situation.

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Getting Started: Useful Concepts & Skills

SKILLS REVIEW

12. Some permanent magnets are very strong while others can pick up only a few metal paper clips.

- (a) How can magnets be safely stored?
- (b) What are some safety considerations when dealing with strong magnets?
- (c) List some equipment in the laboratory that can be damaged by strong magnets.

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