Electrifying Medicine

Curriculum-Linked Education Program
Teacher's Kit

This Teacher's Kit offers supplementary materials for ***The Skin You're In*** Education Program. It is designed to be used in your classroom before and after your program booking. We hope it will help you and your students make the most of your visit to the Museum of Health Care.

Please make use of the activities included in this kit as appropriate to your schedule and objectives. If you have any questions about the materials included here or the upcoming visit, please do not hesitate to contact the Museum.

Thank you very much, and we look forward to working with you and your class.

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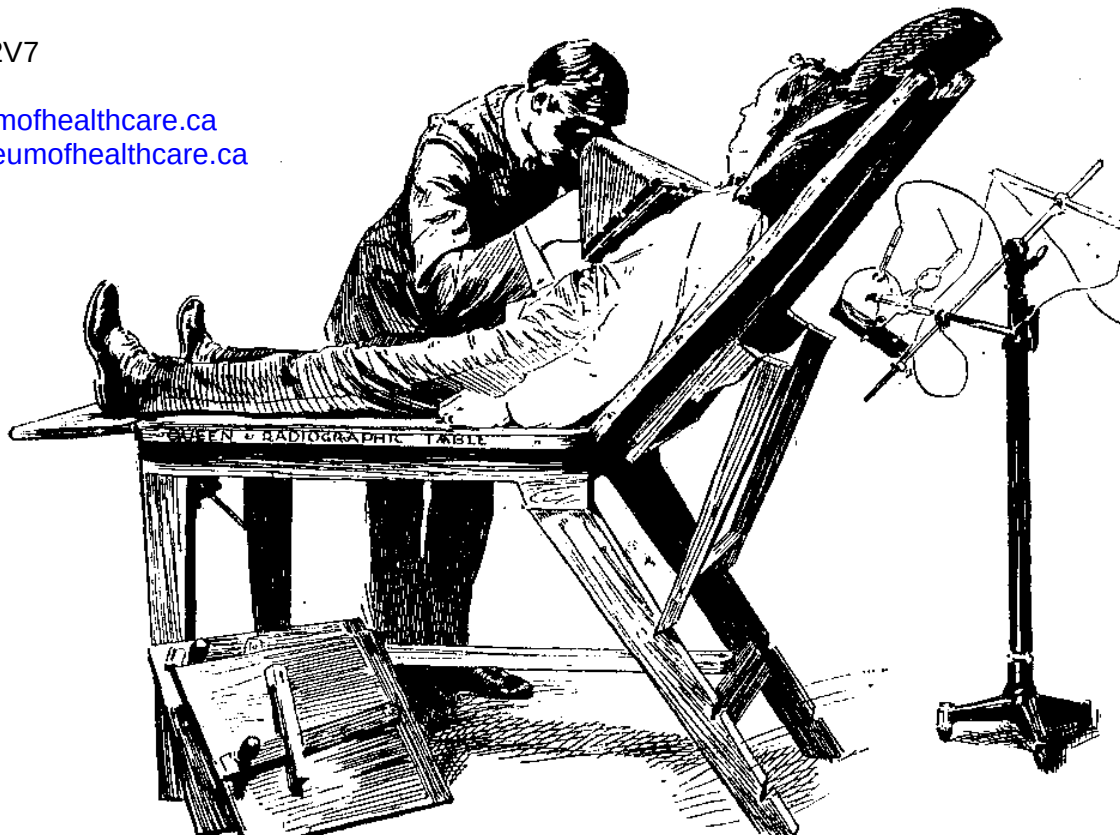


Table of Contents

Curriculum Links

Science and Technology:
Strand: Electricity and Electrical Devices
Topic: Understanding Matter and Energy

Fundamental Concepts: Energy and System and Interactions

Big Ideas: 1) Electrical energy can be transformed into other forms of energy
2) Other forms of energy can be transformed into electrical energy

Overall Expectations

C2 Investigate the characteristics of static and current electricity
C3 Demonstrate an understanding of the principles of electrical energy and its transformations into, and from, other forms of energy

Specific Expectations

C2.3 Use scientific inquiry/experimentation skills to investigate the characteristics of static electricity
C2.6 Use appropriate science and technology vocabulary, including *current, battery, circuit, transforms, static, electrostatic,* and *energy*, in oral and written communication
C3.1 Distinguish between current and static electricity
C3.2 Use the principles of static electricity to explain common electrostatic phenomena
C3.3 Identify materials that are good conductors of electricity and good insulators
C3.6 Explain the function of the components of a simple electrical circuit
C3.7 Describe series circuits and parallel circuits, and identify where each is used

Pre-Visit Class Discussion

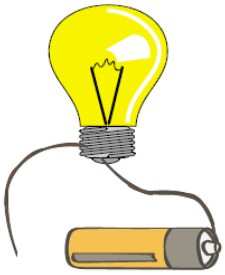
1. How do you use electricity in your life? Can you imagine your life without electricity? What impact would this have on your life? (Think about communication, transportation, heat and light)

2. How does technology help us practice medicine today? What are some examples of medicine-specific electrical objects or tools?

3. Changing one form of energy into another: Fill in the blanks

Electrical Device	Changes Electrical Energy Into
Light bulb	
Radio	
Radio Controlled Car	

4. Check off the items you would use to complete this circuit in order for the light bulb to turn on:



- ☐ Metal knife
- ☐ Rubber band
- ☐ Wooden toothpick
- ☐ Plastic spoon
- ☐ Metal nail
- ☐ String of metal paper clips

Adapted from
edu.gov.mb.ca/K12/cur/science/found/5to8/6c3.pdf

Pre-Visit Class Discussion – Answer Sheet

1. Can you imagine your life without electricity? What impact would this have on your life? (Think about communication, transportation, heat and light)

Answers will vary. May include: no computer, no lights, no phones.

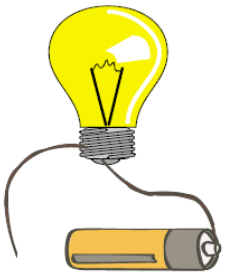
2. How does technology help us practice medicine today?

Answers will vary. May include: electric tools, i.e. drills, x-rays, lights for the hospital, more advanced tools for diagnosis, CAT scans, PET scans

3. Changing one form of energy into another: Fill in the blanks

Electrical Device	Changes Electrical Energy Into
Light bulb	Light/Heat
Radio	Sound
Radio Controlled Car	Motion

4. Check off the items you would use to complete this circuit in order for the light bulb to turn on:



- √ Metal knife
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edu.gov.mb.ca/K12/cur/science/found/5to8/6c3.pdf

Glossary

Charge	characteristic of an object made of atoms with an unequal number of protons and electrons
Circuit	an electrical path in which a current returns to its source
Conductor	a material that allows electricity to move easily through it
Current	the flow of electric charges through a wire or other conductor
Electrons	tiny particles in atoms that carry electricity
Electrical Energy	energy produced by the movement of electrons
Generator	a machine that produces an electric current by rotating a coil of wire in a magnetic field
Insulator	a material that will not allow the flow of electrons to move easily through it
Neutron	a particle in an atom with a neutral charge
Parallel Circuit	allows more than one path for an electric current to follow
Proton	a tiny particle in an atom with a positive charge
Repel	to move apart, as in object with same electric charge

Series Circuit contains a single path for electric current to follow

Static Electricity	electric charges built up on the surface of an object
Switch	a device used to complete or interrupt an electric circuit
Volt	a unit to measure electrical force

http://www.opg.com/education/teachers/modules/D1.2%20Grade

Electrifying Medicine In-Museum Program Information

Description

This program will utilize the Grade 6 Science and Technology curriculum's section "Understanding Matter and Energy." In particular, the program will focus on electricity and electrical devices. Students will learn about current and static electricity by examining their properties and applications with an emphasis on their historical and contemporary use in health care. The program also includes a focused discussion of x-rays.

Educational Outcome

At the end of the visit, participants will be able to:

- Describe the difference between current and static electricity
- Understand and explain the different components of a simple electrical circuit.
- Identify what materials make good electrical conductors and insulators
- Discuss the development and current use of batteries in health care
- Explain common electrostatic phenomena i.e. why your hair sticks to a balloon after rubbing it
- Describe the use of the electrostatic generator to highlight the historical usage of electricity in medical treatments
- Explain the discovery and significance of x-rays in medicine

Length

- 60-minute program with *Current and Static Electricity* sections
- 90-minuite program with added *X-Ray section* and take-home activity
- 30-minute program with *X-Ray section* and take home activity

Program Buzz Words

Circuit	Energy
Electron	X-Ray
Series Circuit	Parallel Circuit
Conductor	Insulator
Power Source	"The Load"
Pacemaker	Galvanization
Battery	Fluoroscope
Electrostatic Generator	Voltage

Post-Museum Visit Activities

1. **X-Ray Craft**—give each student a black piece of paper, glue and toothpicks. Then show everyone an x-ray (an arm, chest, hand etc.) Have the students create their own x-ray using the materials given.
   X-Ray Examples:

   Hand: http://farm6.staticflickr.com/5127/5327224133_bf0f021a1b_z.jpg

   Chest:http://4.bp.blogspot.com/zxG6etLATNA/UT0IUpATISI/AAAAAAAACzE/CH83E9uvX6Y/s320/xray+1.jpg

   Arm: http://tltcl.files.wordpress.com/2012/05/broken_arm_x_ray.jpg

2. **Hula-Hoop Game**—have students form a circle by holding hands. Over one student place a hula-hoop. The aim of the game is to get the hula-hoop around the entire circle without the student breaking the circle.
   The circle represents a circuit, the arms are the conductors, the bodies are the resistors, the speed at which the hoop moves is the voltage, and hula hoop represents the electricity itself

3. Program **Word Search** and X-ray **Colouring Page** (see attached)

4. **Testing Static Electricity Experiments**—from the program (see attached)

Testing Static Electricity Experiments:

For each experiment, answer the questions below and draw a diagram of what you observed.

*Some or all experiments may have been practiced at the Museum

Experiment #1

Blow up a balloon and rub it on your hair. Use the principles of static electricity to explain what happened. Use the following terms or symbols in your explanation: attract, repel, +,-.

Experiment #2

Rub the balloon on your hair. Place it above the small pieces of paper from the envelope. What happens to the pieces of paper? Why?

Experiment #3

Rub the balloon on your hair. Blow a bubble, and move the balloon around the bubble. Describe what happens.

Experiment #4

Blow up two balloons and rub both on your hair. Attach each balloon to a string and hold them beside each other. Then place a piece of paper between them. Was there any change? Describe why.

Electrifying Medicine Word Search!

X F L U O R O S C O P E R R Z U R D C L
N O I T A Z I N A V L A G P R X D U K L
W E E E K M V R N M A E R H B S J Y Z K
P L B Z E S C H E R Y B G V T L R G Q P
A E L A C H S P T S H A U A A E K T K L
C C E S P E V W I N V J I P T V P F L E
E T C B F N C J Y D C Q L T D L L M N O
M R R E W A O W M F R I A N F E O I X N
A I U T T D N Y E F E B S O D V C V R U
K C O H A V D F T J J X Q K G I C P Y L
E I S C R D U D Q B R R J U D V I Y A N
R T I T Q C O Q M E A F E L U B Q N K
Z Y R T E E T V G H L Y M K E T N I J O
Z S E A F J O U B H E U O Y J F K O Q E
Q H W T A S R C I R C U I T A H W V N E
G S O S C X U A G J T Z Z S T A A O P Y
X V P J T M M N C T R G D A D Z O H F G
E Z G L I G K B A K O B P A Z M W I Z I
W C B D G C G F R O N L X S K E D T L O
V L Z W A Z W N V E N E B P G E V J L B

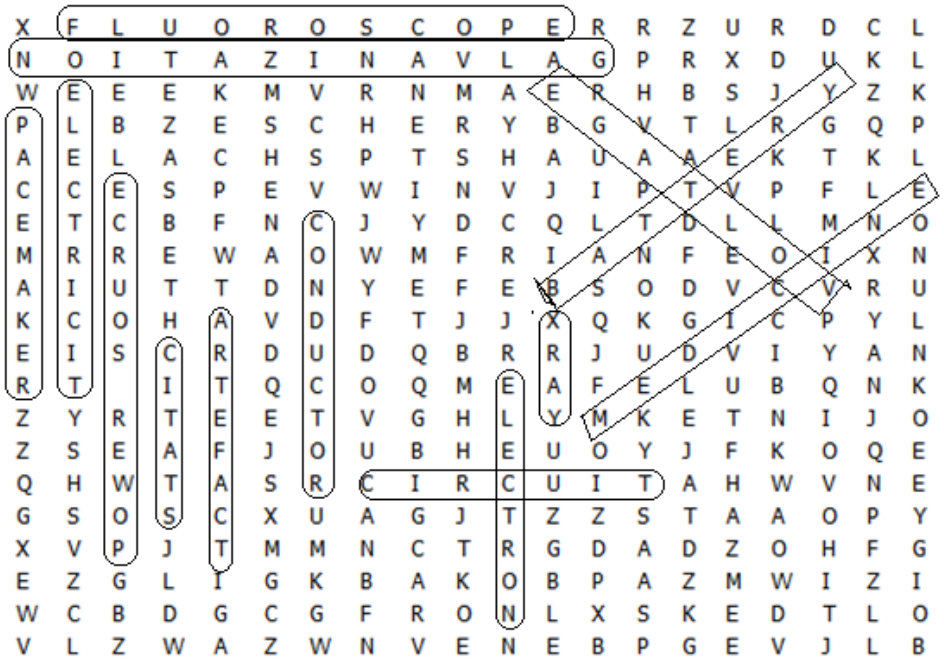
CIRCUIT CONDUCTOR VOLTAGE POWER SOURCE

BATTERY MEDICINE ELECTRON GALVANIZATION

ELECTRICITY STATIC XRAY ARTEFACT

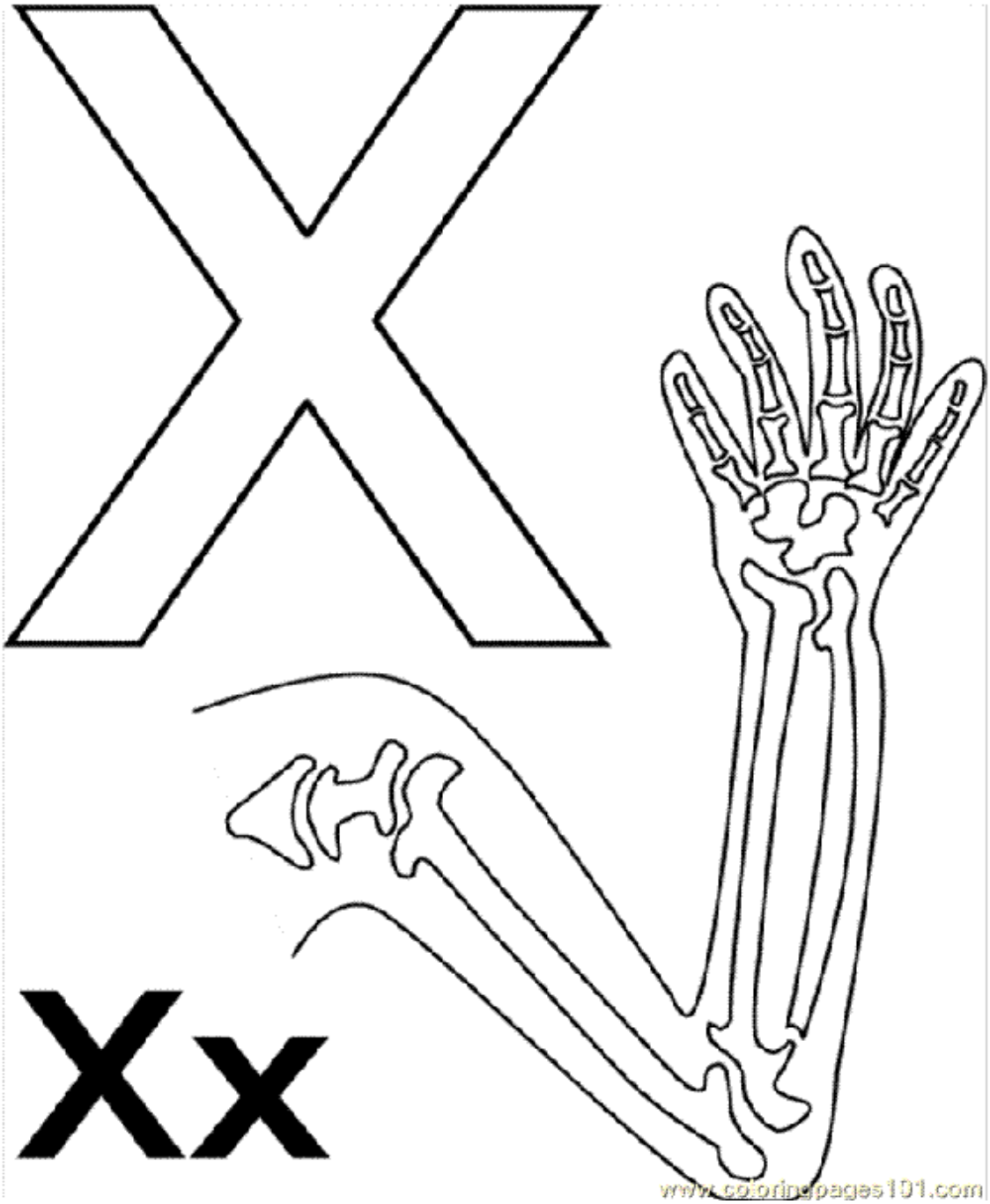
PACEMAKER FLUOROSCOPE

Electrifying Medicine Word Search!



CIRCUIT	CONDUCTOR	VOLTAGE	POWER SOURCE
BATTERY	MEDICINE	ELECTRON	GALVANIZATION
ELECTRICITY	STATIC	XRAY	ARTEFACT
PACEMAKER	FLUOROSCOPE		

X-Ray Colouring Sheet



Self Evaluation and Reflection

Name: _____

Learning Skills
N - need improvement S - satisfactory work G - good work E - excellent work

Independent Work
- ❑ worked well without supervision N S G E
- ❑ followed rules and instructions independently N S G E

Initiative
- ❑ responded to a new situation or challenge N S G E
- ❑ showed interest in the activity and a willingness to learn N S G E

Use of Information
- ❑ asked questions to clarify meaning and ensure understanding N S G E

Cooperation
- ❑ showed positive relationships with other participants N S G E
- ❑ helped others N S G E
- ❑ shared in cleaning duties after an activity N S G E

Conflict Resolution
- ❑ resolved conflicts in socially accepted ways N S G E
- ❑ assisted others to resolve conflicts appropriately N S G E

Class Participation
- ❑ willingly worked with a new grouping N S G E
- ❑ took responsibility for my share of the work N S G E
- ❑ encouraged others to participate N S G E

Problem Solving
- ❑ applied successful strategies to new problem situations N S G E

What I did best during this activity	**What I need to improve on and how I will achieve that goal**
What I liked best about the activity and why I liked it	**What I would change about the activity if given the opportunity**
Something new I learned	**What I would like to learn more about**

Teacher Resources

Electroscope Experiment
http://wow.osu.edu/experiments/Electricity/Electroscope

Museum of Health Care—Electrostatic Generator
http://museumofhealthcare.wordpress.com/2012/01/03/collections-corner-electrostatic-generator/

http://artefact.museumofhealthcare.ca/?p=185

Pacemakers
http://www.innovationanthology.com/news.php?id=632

Difference Between Current and Static Electricity
http://www.differencebetween.net/science/difference-between-current-and-static-electricity/