

# **Electrical Safety**

BC Hydro



**Special Topics**



# Table of Contents



<b>Introduction .....</b>	<b>5</b>
Background .....	7
Overhead Transparency Masters.....	9
 <b>Primary Module .....</b>	 <b>25</b>
Getting Started .....	27
Activities .....	29
Resources	
Safety Signs .....	31
Safety Crossword Puzzle .....	43
Activity Pages .....	49
 <b>Intermediate Module.....</b>	 <b>53</b>
Getting Started .....	55
Activities .....	57
Resources	
Safety Review .....	67
Home Outage Preparation Checklist .....	71
 <b>Secondary Module.....</b>	 <b>73</b>
Getting Started .....	75
Activities .....	77
Resources	
Are You As Smart As A 9th Grader? .....	79
 <b>Community Presentation.....</b>	 <b>85</b>
Getting Started.....	87
Activities .....	89



# Introduction



## Key Objective

This section is intended to address a variety of electrical safety issues that are relevant to the fire service but not included in the core “Getting to Know Fire” Curriculum. Through participation in safety presentations, participants learn to recognize electrical hazards and make informed decisions that will enable them to work and play safely at school, at home, and in the community.

## Importance of Electrical Safety

Electrical distribution equipment (i.e., wiring, switches, outlets, cords and plugs, fuse and circuit breaker boxes, lighting fixtures and lamps) are the leading causes of home fires and fire deaths. The following statements taken from recent reports on electrical accidents in Canada, illustrate the need to provide electrical safety education in the schools:

- Electrical related deaths, more frequent among school age children, are more likely the result of high voltage and lightning strike, while emergency department visits, more frequent among younger children, are more likely the result of low voltage accidents.
- After electricians, children make up the demographic most likely to be affected by an electrical injury.
- Electrical cords and extension cords cause almost two-thirds of electrical burn injuries to children ages 12 and under.
- Electrocuting incidents rise sharply June, July and August as parents and their children spend more time doing yard work.
- Human error is the most probable cause of electrocution.

# Introduction



## Activity Delivery

The activities can be modified to meet the needs of the students. The photographs are included here even though they are used in all of the presentations. They can be made into overheads. Each activity is followed by its own support materials. Some of the materials needed, such as electrical appliances and high voltage wires, you may already have in your school visit toolbox. The teacher may be able to prepare the overheads and photocopies ahead of time. Please review the lesson to determine what is needed.

The electrical safety modules are organized as follows:

- Primary (Kindergarten to Grade 3)
- Intermediate (Grades 4 – 7)
- High school (Grades 8 – 12)
- Community (adult audience)

## Additional Information

BC Hydro has many useful print and on-line resources available. The BC Hydro website provides a landing page for various safety topics: [bchydro.com/safety/](http://bchydro.com/safety/)

Please refer the participants to the BC Hydro website for more information.

Website	<a href="http://bchydro.com">bchydro.com</a>
Phone number	1-800-BC HYDRO (1-800-224-9376)

**BChydro** 

FOR GENERATIONS

# Background



## Where's the Ground?

No matter where it starts, electricity will try to reach the ground. Lightning can incinerate a huge cedar tree as the electricity follows a path to the ground. If you are standing near the tree you may also become a path.

Electricity will follow any available path. The better the conductor, the faster and more powerful the current. Touching a live wire at a service drop on the outside of a house can make your body a sizzling path for electricity to reach the ground.

## You Don't Have Time

Electricity travels at the speed of light. At 299,800 km per second, you aren't given the slightest warning; there is no time to react. The current in a light bulb, found inside your fridge, is enough to kill you.

## Ripple Effect

If anything makes contact with a high voltage power line, such as a tree or an uninsulated boom on a truck, or if a broken power line falls to the ground or lands on a vehicle, electricity will flow to the ground, then spread out in concentric circles like the ripples in a pool of water.

Voltage is very high at the point where electricity makes contact with the ground. The level of intensity decreases as the distance increases from the point of contact. Zero voltage is approximately 10 metres (33 feet) from the point of contact.

## Step Potential

Due to the difference in voltage as one moves towards or away from the source of electricity it is possible to "step" between high and low voltage differences. As the human body is usually a better conductor of electricity than the ground the electricity can flow between the feet through the body with sometimes devastating results. This is referred to as "step potential."

## Touch Potential

Trees can be very conductive. If a tree comes into contact with a high voltage power line and a person is touching the tree, or touching a ladder leaning against the tree, there will be a high to low voltage difference between the person and the ground. This will force electrical current to flow through them to the ground and may easily result in serious injury or worse. This is referred to as "touch potential."

# Background



## Shuffle or Hop

If the ground becomes energized, you can avoid shock by keeping your feet close together and taking short, shuffling steps, never allowing the heel of one foot to move beyond the toe of the other, until you are clear of the energized area, approximately 10 metres (33 feet). Alternately, you can hop with both feet together, again to a minimum distance of 10 metres (33 feet).

## Electrical injuries

Injuries can occur through direct contact with the electrical energy or when the electricity arcs (jumps) through a gas (such as air) to a person who is grounded. High voltage contact burns can burn internal tissues while leaving only very small injuries on the outside of the skin. Muscle contractions, or a startle reaction, can cause a person to fall from a ladder, scaffold or aerial bucket. The subsequent fall or drop of a piece of equipment fall can cause serious injuries. Injuries are classified in 3 ways:

1. Electrocution (fatal)
2. Electric shock
3. Burns

## Using the Photographs (Overheads)

The photographs (overheads) are meant to prompt discussion so expect students to be eager to share their ideas. On the back of each pair of photographs are questions and answers. Each electrical hazard is accompanied by a situation or context. While specific dangers vary, depending on where you are and your age, the general concerns are very similar for everyone.

Here are a few activity options:

- A. Ask students to turn to a partner and name the hazard.
- B. Have students discuss where in the photograph would you find the specific hazard.
- C. Ask students to guess what other electrical hazards may exist in the photo.
- D. Have students tell the class the safe action plan/decision to be made.
- E. Ask students the questions on the back of the photograph pages.

## Electrical Safety | 1. Overloaded Outlets

**BChydro**   
FOR GENERATIONS



### Questions

**Q1** How many plugs can go into one outlet?

**Q2** Can other things go in outlets?

**Q3** Is there a correct way to pull out a cord from the wall?

### Answers

**A1** Each outlet has a rating that, if exceeded, can cause fires. Christmas trees are often lit by strings of lights that are connected to the same outlet. Not only does the overloaded outlet create a stronger current or a short circuit, the tree branches gradually dry out, causing fires when in contact with hot (overloaded) cords.

**A2** Do not put anything into an outlet except a plug.

**A3** When disconnecting an appliance, pull the plug, not the cord, as you can break wires inside the cord without knowing the cord is damaged.



### Questions

**Q1** Where should I put cords?

**Q2** What should I do if someone is electrocuted?

**Q3** Can I use old cords?

### Answers

**A1** Do not place a cord under a carpet, through a doorway or anywhere that it could be stepped on or crushed. If a wire is frayed or broken, there is an electrocution hazard.

**A2** If the child in the photograph is electrocuted and you touch her, you will also become a victim. First turn off the power at the main breaker panel.

**A3** Never use cords or plugs that show wear or damage. They can cause shocks or fires.

## Electrical Safety | 3. Downed Power Lines

**BC Hydro**   
FOR GENERATIONS



### Questions

**Q1** Where does electricity go when power lines touches something?

**Q2** What do I do if I am standing close to a downed power line?

### Answers

**A1** If anything makes contact with a high voltage power line, such as a tree or an un-insulated boom on a truck, or if a broken power line falls to the ground or lands on a vehicle, electricity will flow to the ground, then spread out in concentric circles, like the ripples in a pool of water.

The voltage is very high at the point where electricity makes contact with the ground. The level of intensity decreases as the distance increases from the point of contact. Zero voltage is approximately 10 metres (33 feet) from the point of contact.

Stay at least 10 metres back from any downed wire, as the ground around the line could be “energized.” Even if there are no sparks, the power lines can be energized. If you see a line on the ground CALL BC HYDRO IMMEDIATELY!

**A2** Electricity flowing along power lines can move from the wire to whatever is nearby, including people. If the ground becomes energized, you can avoid shock by keeping your feet close together and taking short, shuffling steps. Do not allow the heel of one foot to move beyond the toe of the other until you are clear of the energized area; approximately 10 metres (33 feet). Alternatively, you can hop with both feet together, to the minimum safe distance.

### **The reason you need to shuffle:**

Due to the difference in voltage as you move towards or away from the source of electricity, it is possible to “step” between high and low voltage differences. This is referred to as “step potential.” As the human body is usually a better conductor of electricity than the ground, the electricity can flow between the feet through the body—with devastating results.



### Questions

**Q1** Is it dangerous if trees touch power lines?

**Q2** Can I tell if the tree is dangerous?

### Answers

**A1** Trees can be very conductive. If a tree comes into contact with a high-voltage power line and a person is touching the tree or a ladder leaning against the tree, there will be a high-to-low voltage difference between the person and the ground. This is referred to as “touch potential.” This will cause electrical current to flow through them to the ground and may easily result in serious injury or death.

**A2** Even if there are no sparks, the branches and trunks can be “energized!” Trees near or touching power lines are hazardous. Do not climb them.



### Questions

**Q1** Is it safe to be around the fenced places where the hydro lines come from?

**Q2** What are those metal boxes with danger signs?

### Answers

**A1** Please stay away from substations. The substations contain a huge amount of electricity. Any equipment or pet that ends up inside a substation should be left alone. Call the local BC Hydro office and ask for trained personnel to help you.

**A2** The pad mount transformers are metal boxes (with BC Hydro logos on them) anchored to the ground. They are common in new subdivisions and function in the same way as the transformer on a power pole. Children should not sit on them or play around them.



### Questions

**Q1** What happens if someone touches a hydro line?

**Q2** Does lightning have electricity?

**Q3** Why do birds not get electrocuted on the wires?

**Q4** What happens if a kite touches a wire?

### Possible Answers

**A1** Electricity will follow any available path. Touching a live wire at a service drop on the outside of a house can make your body a sizzling route for electricity to reach the ground.

**A2** No matter where it starts, electricity will try to reach the ground. Lightning can incinerate a huge cedar tree as the electricity follows a path to the ground. If you are standing near the tree you may also become a path.

**A3** Birds can perch on a power line because there is no difference in energy on the one power line. However, if the bird touches another power line or anything else that is less or more energized (i.e. the ground, another power line), it could be electrocuted.

**A4** As overhead power lines are not insulated, kites, balloons, remote controlled airplanes, etc. can conduct electricity through the string to the ground (and through you).

### Remember:

You don't have to touch a power line to be electrocuted. If you come within three metres of a power line the energy can arc towards you and take a path to the ground.



### Questions

- Q1** Is it safe to plug in things by the bathroom sink?
- Q2** If something is not turned on can it still be dangerous?
- Q3** What are the little buttons on some of the outlets?

### Answers

- A1** In the bathroom, there is a risk of shock from electrical devices falling into water. Do not (under any circumstances) touch hair dryers, razors, or curling irons if they slip into water. Children should not use electrical devices in the bathroom without supervision.
- A2** Everything plugged in has power flowing to it. Even if a radio is not turned on, it can kill you if it falls into water.
- A3** The small electrical switches built into the bathroom and exterior outlets are called ground fault protectors. If too much electricity flows through the protector, it shuts off the power in the outlet.



### Questions

**Q1** Are there safety considerations when using electric lawnmowers?

**Q2** What can happen to you if you get electrocuted?

**Q3** It looks like the lines coming into my house are safe to touch.

**Q4** Can I prune trees near power lines if I am careful?

### Answers

**A1** If you use an electric lawn mower, only cut the grass when it's dry and keep your extension cords away from water. Do not use a two-pronged extension cord outdoors. The third prong completes a ground circuit, helping keep you safe.

**A2** Injuries can occur through direct contact with the electrical energy or when the electricity arcs (jumps) through a gas (such as air) to a person who is grounded. High-voltage contact burns can damage internal tissues while leaving only very small injuries on the outside of the skin. Muscle contractions, known as a startle reaction, can cause a person to fall from a ladder, scaffold or aerial bucket. The subsequent fall or drop of a piece of equipment can cause serious injuries. Injuries are classified in 3 ways:

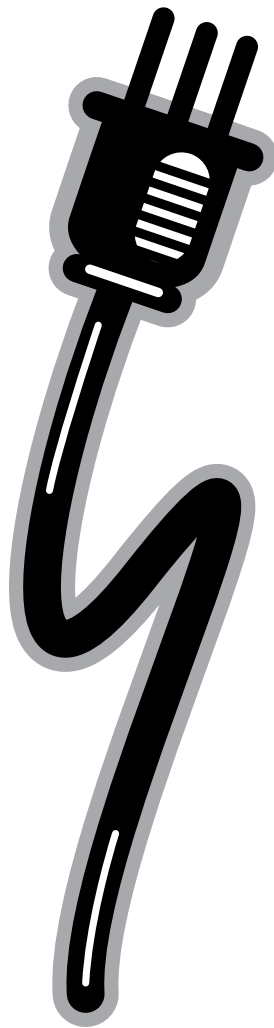
1. Electrocution (fatal)
2. Electric shock
3. Burns (internal and external)

**A3** Not all overhead wires entering houses and buildings are insulated and therefore cannot protect you from an electric shock. When there is weatherproofing material around them, but this can become brittle and crack. Be aware of overhead power lines when moving ladders around your house.

**A4** Never prune trees that grow next to power lines because electricity can move through the tree or jump towards you if you are within three metres.

# **Electrical Safety**

## **K-Gr 3 Module**





# Getting Started (K–Gr 3)



## Objectives

- ✓ Identify a variety of possible electrical hazards
- ✓ Identify wires that are unsafe to touch
- ✓ Identify common home electrical appliances that could be hazardous
- ✓ Describe the safe handling of electrical items in school and at home
- ✓ Explain what to do when observing a possible hazard at home
- ✓ Identify electrical hazards in the community

## Preparation

- Photocopy *Safety Crossword Puzzle*
- Prepare 6 overhead transparencies (from masters)
- Ask teacher to have an overhead projector available
- Photocopy *Think Ahead* colouring page
- Paper and pencils

## Overview

Activity #1	Safety Signs
Activity #2	Wires Around You
Activity #3	Safety Situations
Activity #4	Top Ten Safety Rules
Activity #5	Safety Crossword
Activity #6	Electrical Equipment
Activity #7	Fun Book pages
Activity #8	It Happened To Me

## Background Information

Your presentation is important and is a part of the school curriculum. The following safety principles are currently taught in BC schools:

- **Name guidelines for safety at home**
  - Don't touch electrical outlets, stovetops or play with matches
  - Have a family evacuation plan
- **Discuss guidelines for safety at school**
  - Name some playground rules
  - Know who to ask for help, earthquake procedures,
  - Practice fire drill procedures
- **Discuss standard hazard symbols and their meanings**
  - Poison, flammable materials, danger
  - Explain why it's important to avoid items with these symbols

# Getting Started (K–Gr 3)



- **Discuss safety guidelines in the community**
  - Wear seat belts and helmets
  - Do not give out personal information
  - Know how to access help

## **Activity Management**

- Establish a signal to get the students attention
- You may encourage questions during the presentation or ask that students hold their questions until you call for them.

# Activity 1 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 1: Safety Signs</b></p> <ul style="list-style-type: none"> <li>• Show the signs, have students turn to a partner and ask each other if they recognize any of the safety signs or symbols. Students should be able to identify the stop sign but may be challenged by the others.</li> <li>• Discussion prompters: <ul style="list-style-type: none"> <li><i>What safety signs or symbols do you know?</i></li> <li><i>What safety signs are in your community?</i></li> </ul> </li> <li>• Explain the hazard represented by each sign. Ask what is the purpose of the signs.</li> <li>• Clarify that symbols appear on some signs so that you don't have to be able to read to understand the hazard.</li> <li>• Ask students if they know any other signs/symbols. Have them come to the board to draw and explain them.</li> </ul>	5 min	Safety Signs pages 31, 33











## Activity 2 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 2: Wires Around You</b></p> <ul style="list-style-type: none"> <li>• Provide the students with different types of wires and electrical cables. Let them hold each of the samples.</li> <li>• Possible questions: <ul style="list-style-type: none"> <li>– Do you recognize any of these wires?</li> <li>– Do you know which ones are inside wires (extension cords, appliance cords, etc...)?</li> <li>– Which ones are outside wires (those attached to power poles)?</li> <li>– Are all wires dangerous?</li> </ul> </li> <li>• Explain that you can't see electricity so you don't know if a wire is safe just by looking at it. Reinforce that any wire found on the ground outside your home should never be touched. Always find an adult to ask for help.</li> </ul>	10 min	Wires and cables



## Activity 3 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 3: Safety Situations</b></p> <ul style="list-style-type: none"><li>• Show a selection of overhead safety situations.</li><li>• For each situation, ask the students to identify the hazard and what they could do to stay safe.</li><li>• Ask the questions listed on the back of the photo pages.</li></ul>	10 min	Overheads pages 9–24



## Activity 4 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 4: Top Ten Electrical Safety Rules</b></p> <ul style="list-style-type: none"> <li>• Ask students which things in the home and school use electricity.</li> <li>• Have the students turn to a partner and brainstorm what they think should be the top 5 electricity rules for staying safe. Students can write down their ideas.</li> <li>• Explain that they get a point for each of their rules that match the list.</li> <li>• Write the “Top Ten” Electrical Safety rules on the black board: <ul style="list-style-type: none"> <li>– Don’t put your finger in an outlet.</li> <li>– Keep forks out of toasters.</li> <li>– Don’t go near trees that touch power lines.</li> <li>– Don’t fly kites near power lines.</li> <li>– Stay away from power lines lying on the ground.</li> <li>– Never pull a plug out by the cord.</li> <li>– Stay away from sub stations.</li> <li>– Stay away from the big, metal boxes with warning signs.</li> <li>– Never use anything with a cord or plug around water.</li> <li>– Watch for warning signs.</li> </ul> </li> <li>• Partner groups compare their lists to the poster.</li> <li>• Ask the students which of their rules matched the list.</li> <li>• Encourage students to obey all safety rules.</li> </ul>	10 min	Paper, pencil/pen, blackboard



## Activity 5 (K–Gr 3)

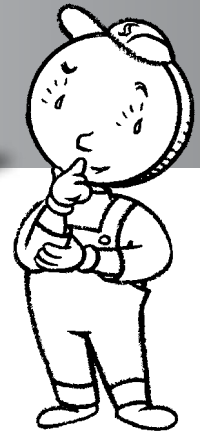


Activity	Time	Resources
<p><b>Activity 5: Safety Crossword</b></p> <ul style="list-style-type: none"><li>• Introduce electrical safety and the crossword activity.</li><li>• Hand out the crosswords.</li><li>• Depending on the grade level the answers can be written on the chalkboard or students can refer to the words listed to the left of the puzzle.</li></ul>	10 min	Crossword page 41



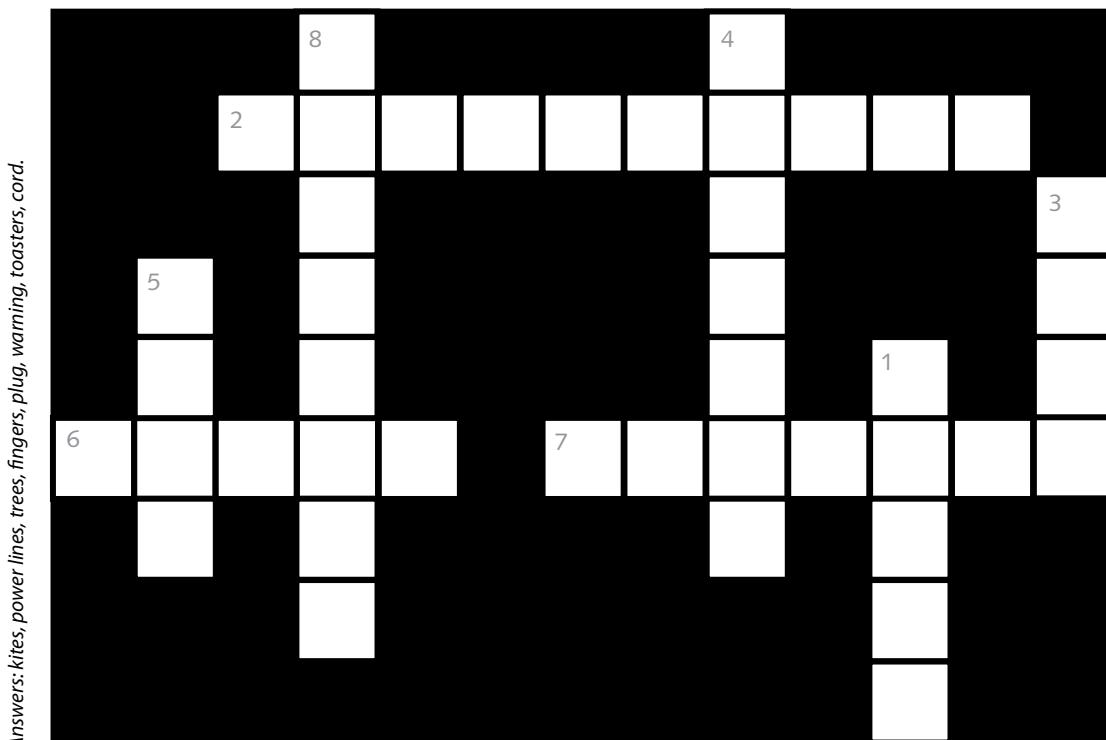
# Safety Crossword

Can you figure out which words are missing from each safety rule?



**Print** each word in the correct sentence. Then **find** where the word belongs in the crossword puzzle.

1. Never fly \_\_\_\_\_ near power lines.
2. Stay away from broken or fallen \_\_\_\_\_ .
3. Never pull a \_\_\_\_\_ out by a cord.
4. Never put your \_\_\_\_\_ in an electrical outlet.
5. Never use anything with a \_\_\_\_\_ or plug near water .
6. Never climb \_\_\_\_\_ near power lines.
7. Obey \_\_\_\_\_ signs.
8. Keep metal objects out of \_\_\_\_\_ .



Answers: kites, power lines, trees, fingers, plug, warning, toasters, cord.



## Activity 6 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 6: Electrical Equipment</b></p> <ul style="list-style-type: none"> <li>• Introduce electrical safety.</li> <li>• Show the students the firefighters equipment especially designed to stay safe around electricity. Emphasize that even adults have to be extremely careful around electrical wires.</li> </ul> <p>Note: The equipment may have already been demonstrated in the fire safety presentation.</p> <p>POSSIBLE STUDENT RESPONSES/QUESTIONS:</p> <ul style="list-style-type: none"> <li>– <i>Does it hurt when electricity touches you?</i></li> <li>– <i>I put my tongue on a battery once.</i></li> <li>– <i>How does electricity start fires?</i></li> <li>– <i>How do you turn off the power to the lines on the poles?</i></li> </ul>	5 min	Firefighter's equipment



## Activity 7 (K–Gr 3)



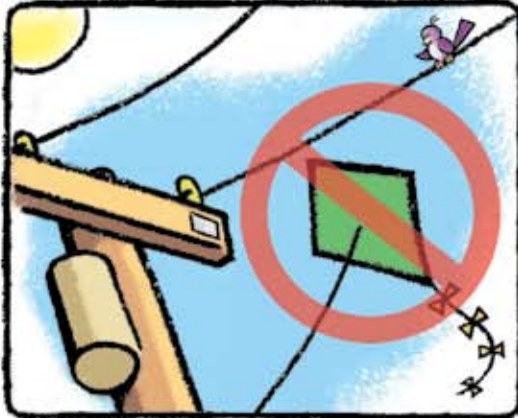
Activity	Time	Resources
<p><b>Activity 7: Fun Book pages</b></p> <ul style="list-style-type: none"> <li>• Introduce electrical safety.</li> <li>• Hand out the colouring sheets.</li> <li>• Circulate and answer questions while the students complete the activity.</li> <li>• Students may work with a partner.</li> </ul>	5 min	<p><i>Think Ahead!</i> activity sheet pages 49–50</p>



# Think Ahead!

## Be safe around power!

Why are the two scenes below dangerous? Can you find nine differences between the two pictures?



Have you ever wondered why birds that sit on power lines don't get electric shocks? It's because the wire is the only thing they are touching! Electricity always flows from high energy areas to areas with less energy. If the bird touched anything else (another wire, the power pole, the ground, etc.) the electricity would electrocute the bird as it passes through.

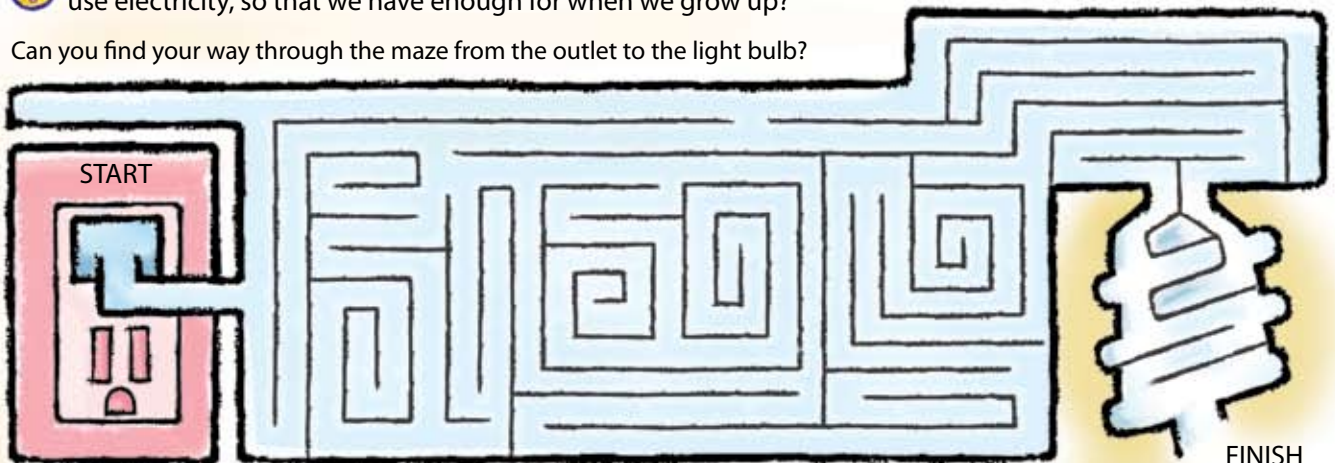
**Colour  
Smarty!**

# A-mazing Electricity!



Did you know that we need to be careful about how we use electricity, so that we have enough for when we grow up?

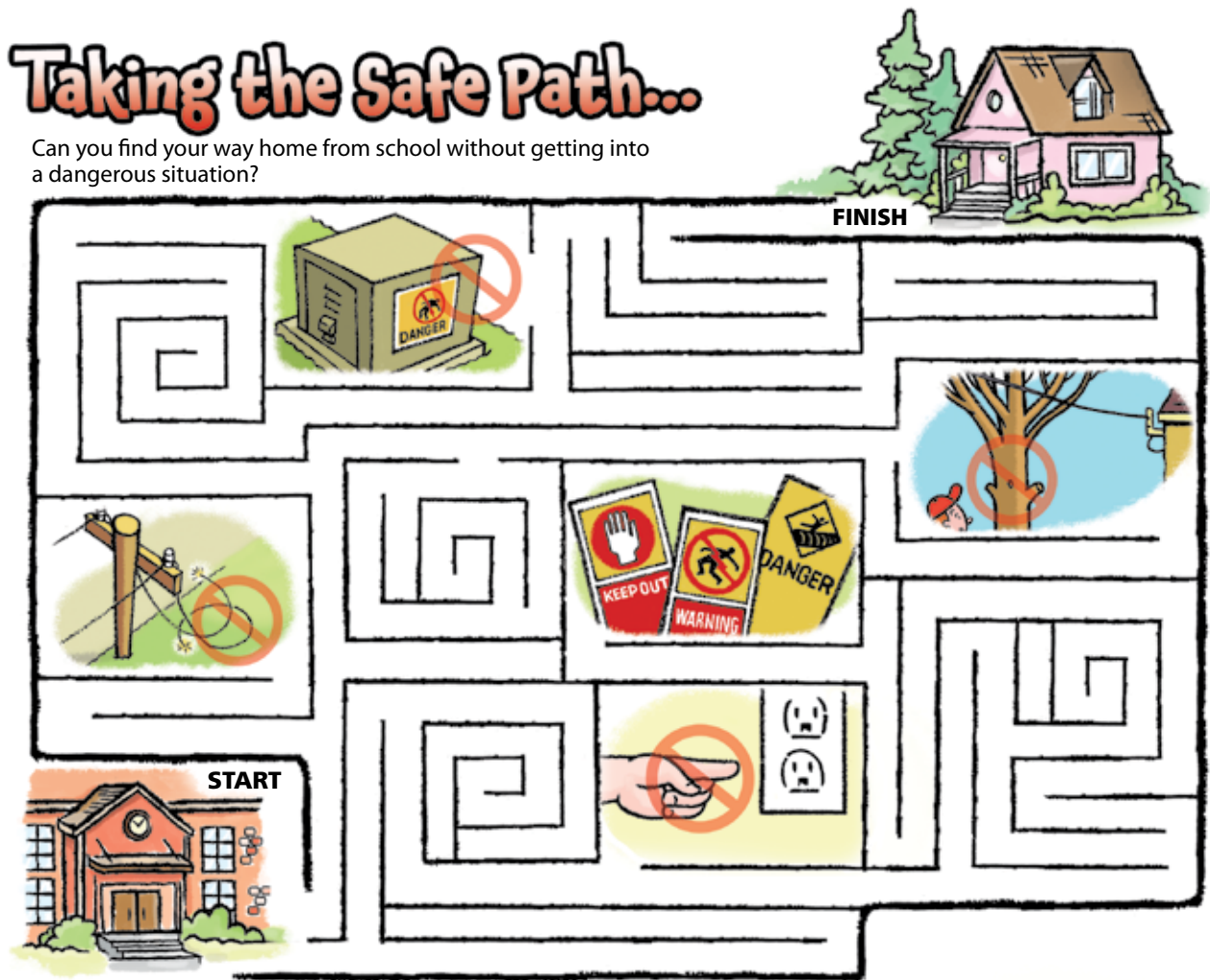
Can you find your way through the maze from the outlet to the light bulb?



Answers to Think Ahead: Never fly a kite near power lines! Differences: Sun, cloud, tree, kite colour, kite string, kite tail, grey box on pole, cylinder on pole, wire.

# Taking the Safe Path...

Can you find your way home from school without getting into a dangerous situation?



Did you know you don't have to touch a power line to be electrocuted. Electricity can arc or jump across open air so you should always keep at least 3 metres back from power lines, to avoid being electrocuted.

## Safety Sketch

Draw yourself involved in an activity that's a safe distance from power lines.



Colour Smarty!

## Activity 8 (K–Gr 3)



Activity	Time	Resources
<p><b>Activity 8: It Happened To Me</b></p> <ul style="list-style-type: none"><li>• Ask the students for any questions or stories about electrical safety.</li><li>• The students will be excited to see you and may ask questions about your job and the dangers you face at work. Emphasize that firefighting is a team-based occupation: cooperating and helping each other is a big part of putting out fires and staying safe.</li></ul>	5 min	



# **Electrical Safety**

## **Gr 4-7 Module**





# Getting Started (Gr 4–7)



## Objectives

- ✓ Articulate a *Think Ahead* approach to personal safety
- ✓ Identify electrical hazards in the community
- ✓ Identify a variety of possible hazardous electrical situations in school
- ✓ Identify common home electrical appliances that could be hazardous
- ✓ Describe the safe handling of electrical items in school and at home
- ✓ Explain what to do when observing a possible hazard at home

## Preparation

- Photocopy Home Outage Preparation Checklist brochures
- Prepare overhead transparencies (created from supplied masters)
- Photocopy Safety Review activity sheet
- Ask teacher to have an overhead projector available

## Overview

Activity #1	What You Know
Activity #2	Safety Situations
Activity #3	Making a Decision
Activity #4	Handling Appliances
Activity #5	Safety Review
Activity #6	Power Outage Preparations

## Background Information

Rather than create an endless list of rules, it is more meaningful/empowering to teach a general *Thinking Ahead* approach; one in which children recognize potentially hazardous situations, then decide to act safely. For example, you are walking to school and you find some downed power lines. *Thinking Ahead* means that you already realize they could be dangerous; you've been taught that electricity moves outwards, along the ground (in circles) when high voltage lines contact the ground. So you decide to not go near the wires.

The situations portrayed on the overheads are typical to most children's experiences at school, in their homes and around the community. Encourage discussion when viewing the overheads! Students may have stories to share so use this as an opportunity to reinforce a *Thinking Ahead* approach.



## Activity Management

- Establish a sign that indicates when you want the student's attention. Ask the teacher what she/he uses when working with a large group. This is especially useful when refocusing the students on what you have to say after they have been working in small groups.
- The students may be familiar with general electrical concepts, as electricity is a grade 6 science topic. If this is the situation ask about what safety concepts they remember from their previous classes.

# Activity 1 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 1: What You Know</b></p> <ul style="list-style-type: none"> <li>• Ask students what they know about electrical safety.</li> <li>• Ask the following questions: <ul style="list-style-type: none"> <li><i>Q1 Have you ever seen a downed power line?</i></li> <li><i>Q2 What do you know about hydro electricity?</i></li> <li><i>Q3 Have you had any electrical safety as part of a science unit?</i></li> </ul> </li> </ul> <p><b>Answers</b></p> <p><i>A1 Students will have a few stories to share. Give them 30 seconds to explain then ask them to tell the rest at the end of the session.</i></p> <p><i>A2 Responses will vary. There may be some misconceptions about electrical power that you can address immediately or in the context of the activities.</i></p> <p><i>A3 The grade 6 Science curriculum has a unit on Electricity. Some students may remember some of the guidelines for handling bulbs and batteries safely.</i></p>	5 min	



## Activity 2 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 2: Safety Situations</b></p> <ul style="list-style-type: none"><li>• Show the overhead situations, asking students the following:<ol style="list-style-type: none"><li>1. Explain the hazard</li><li>2. Describe the decision-making process they might experience</li></ol></li><li>• Ask the questions listed on the back of the photo pages.</li></ul>	10 min	Overheads pages 9–24



## Activity 3 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 3: Making a Decision</b></p> <ul style="list-style-type: none"> <li>• Have the students turn to a partner and explain what they think are the steps to staying safe in any hazardous situation.</li> <li>• As a whole group, debrief the thinking/decision-making processes that are generic to any situation. <ul style="list-style-type: none"> <li>– <b>Step 1</b> What is the potential hazard? Am I in immediate danger?</li> <li>– <b>Step 2</b> What are my options to avoid the hazard?</li> <li>– <b>Step 3</b> Can I find an adult to remedy the situation?</li> </ul> </li> </ul>	5 min	



## Activity 4 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 4: Handling Appliances</b></p> <ul style="list-style-type: none"> <li>• Divide the class into groups. Give each group a common home appliance. Allow the groups 2 minutes to brainstorm the possible hazards of the appliance.</li> <li>• The groups change appliances on your signal and repeat the brainstorm. If time allows, rotate groups through all 7 appliances.</li> <li>• Assemble the appliances at the front of the class. Ask the students a few questions about the appliances: <ul style="list-style-type: none"> <li>– What are the possible hazards?</li> <li>– What happens to the electricity when the appliance is working?</li> </ul> </li> </ul> <p>POSSIBLE HAZARDS:</p> <ul style="list-style-type: none"> <li>– <i>Hair dryer falls into a sink</i></li> <li>– <i>Something is stuck in the toaster</i></li> </ul>	15 min	Appliances



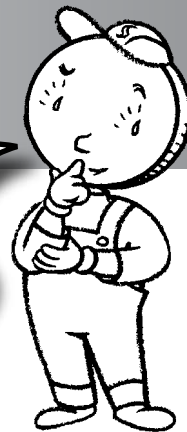
## Activity 5 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 5: Safety Review</b></p> <ul style="list-style-type: none"> <li>• Introduce electrical safety.</li> <li>• Hand out the <i>Safety Review</i> activity.</li> <li>• Students complete the <i>Safety Review</i>, working with a partner if they find the vocabulary is challenging.</li> <li>• Go over the answers with the whole class.</li> </ul>	10 min	<i>Safety Review</i> handout page 67



# Safety Review



Read over the page with a partner.  
Discuss which words best fit in the blanks. Fill in the blanks using a pencil.  
If you finish early, check your answers with another group. The answers are  
at the bottom, but choose wisely because not all  
of them will fit the blanks!

1. \_\_\_\_\_ and \_\_\_\_\_ don't mix!
2. Don't climb \_\_\_\_\_ near sub stations.
3. Never \_\_\_\_\_ an outlet with too many plugs.
4. Don't fly kites near \_\_\_\_\_ .
5. Never pull a \_\_\_\_\_ out by the cord.
6. When power lines are on the \_\_\_\_\_ , electricity spreads out in a circle.
7. In the bathroom, keep all electrical things away from the \_\_\_\_\_ and  
the \_\_\_\_\_ .
8. Don't climb \_\_\_\_\_ near power lines.
9. \_\_\_\_\_ to avoid hazardous situations.
10. If a power line falls on a \_\_\_\_\_ , stay inside until help arrives.

---

## Answers:

Bathtub  
Water  
Sink  
Toilet  
Plug  
Fences

Think ahead  
Ground  
Power lines  
Overload  
Outlet  
Trees

Cords  
Car  
Transformer  
Electricity  
Light switch



## Activity 6 (Gr 4–7)



Activity	Time	Resources
<p><b>Activity 6: Power Outage Preparations</b></p> <ul style="list-style-type: none"> <li>• Introduce the <i>Home Outage Preparation Checklist</i> brochure.</li> <li>• Have students work with a partner to find something on the brochure that...               <ol style="list-style-type: none"> <li>a. surprises them</li> <li>b. makes them think about their own home</li> <li>c. might be new information for their parents</li> </ol> </li> <li>• Highlight the section <i>Basic Emergency Kit Essentials</i>.</li> <li>• Ask students if their families have preparations/plans for fire, power outage or earthquakes. Emphasize the importance of having a safety plan.</li> <li>• Students take the checklist home to discuss with their parents.</li> </ul>	10 min	<i>Home Outage Preparation Checklist</i> pages 71–72



# Your Home Outage Preparation Checklist



## Before an outage

- ☐ Ensure BC Hydro has your current phone number so we can quickly match it to your customer account in case you need to call during an outage. This can be done online at **bchydro.com/contact** or by phoning **1 800 BCHYDRO (1 800 224-9376)**.
- ☐ Draw up a emergency preparedness plan and share it with everyone in your household.
- ☐ Check emergency equipment periodically (flashlights, radios, generators, etc.) to make sure they are in working order.
- ☐ Protect sensitive electrical equipment (computers, DVD players, televisions, etc.) by installing surge protectors or other power protection devices.
- ☐ Draw up a list of important local telephone numbers including; police, fire, poison control centre. Include the BC Hydro phone number: **1 888 POWERON (1 888 769-3766)** to report an outage. Post the list near every telephone in your home.
- ☐ Contact your regional health authority if you or someone you know has special needs during an outage (i.e., is dependent upon electronic life-support systems). If you rely on life-sustaining equipment, be prepared to be self-reliant by having adequate backup in the event of a power outage. If power is out for a longer period, it's important to have a contingency plan, such as moving to a hospital or area that has power.

## Basic Emergency Kit Essentials

Store the kit in a designated place known to everyone in your household. Basic supplies should include:

- |   |  |
|---|--|
| <input type="checkbox"/> Flashlight(s)  | <input type="checkbox"/> Non-perishable and ready-to-eat foods                         |
| <input type="checkbox"/> Battery-powered clock and radio                                | <input type="checkbox"/> Bottled water: three-day supply (2 litres per person per day) |
| <input type="checkbox"/> Extra batteries  | <input type="checkbox"/> Manual can opener   |
| <input type="checkbox"/> Corded telephone   | <input type="checkbox"/> Warm clothing and blankets                                    |
| <input type="checkbox"/> First aid kit, including extra prescription medicine if needed | <input type="checkbox"/> Supplies for those with special needs                         |
|   | <input type="checkbox"/> Games, cards and books to entertain everyone                  |
|   | <input type="checkbox"/> Copy of your preparedness plan                                |

## During an outage

- ☐ **Never go near or touch a fallen power line.** Treat it as though it is live. Stay at least ten metres (33 feet) away at all times and do not attempt to remove debris surrounding the line.
- ☐ **Determine whether the outage is limited to your home.** If your neighbour's power is still on, check your circuit breaker panel or fuse box. If your neighbour's power is off, call BC Hydro at **1 888 POWERON (1 888 769-3766)** to report the outage.
- ☐ **Turn off electrical appliances.** Appliances start up automatically upon restoration of service; turning them off will prevent injury, damage or fire.

*continued on next page*

## Your Home Outage Preparation Checklist

- ☐ **Look up outage information.** Use a laptop running on a battery or call someone with Internet access whose power is on, to access outage information by region at [bchydro.com/outages](http://bchydro.com/outages).
- ☐ **Never use a camp stove, barbecue, or propane or kerosene heater indoors.** A build-up of carbon monoxide gas in unventilated areas can be deadly.
- ☐ **Use candles only with caution and in proper candle holders. Never leave burning candles unattended.** They are a potential fire hazard. Use flashlights instead.
- ☐ **Turn off all lights except one inside your home and one outside.** The inside light lets you know and the outside light BC Hydro crews know when the power is back on.
- ☐ **Refrigerators and freezers.** Keep the doors of your refrigerator and freezer closed to keep your food as fresh as possible. Check carefully for signs of spoilage.
  - ☐ Frozen food – Cover the freezer with blankets, quilts or sleeping bags to further insulate the freezer and keep help food frozen longer.
  - ☐ Refrigerated food – To avoid losing the cold air in your refrigerator, don't open doors unnecessarily. You might also try placing bags of ice in the refrigerator, or place food on ice in a cooler or ice chest. Again, if in doubt, throw it out.
- ☐ **Monitor radio.** Listen to local news radio stations to check for updates.
- ☐ **Help children remain calm.** How you react to a power outage gives children clues on how to act. When talking with children about an outage, be sure to present a realistic picture about what has happened and the expected outcome. Encourage children to participate in games, arts, crafts and reading.
- ☐ Anticipate traffic delays – Use extreme caution when driving. Intersections should be treated as four-way stops when traffic lights are out. Anticipate long traffic delays in areas where the power is out.

### After an outage

- ☐ Occasionally, after restoration, even after your power has come back on, a momentary outage may occur as part of the restoration effort.
- ☐ Give the electrical system a chance to stabilize. Turn on the most essential appliances first, and wait 10 to 15 minutes before reconnecting the others.
- ☐ Check to make sure your refrigerator and freezer are back on. Check all frozen foods to determine the extent of thawing. Check your freezer guide to determine whether food can be safely refrozen. If in doubt, throw it out.
- ☐ Remember to reset your clocks, automatic timers, and alarms.
- ☐ Restock your emergency cupboard so the supplies will be there when they are needed again.
- ☐ Pull out your emergency kit once a year and make sure it still fits the needs of your household. Replace batteries with fresh ones.

# **Electrical Safety**

## **Gr 8-12 Module**





# Getting Started (Gr 8–12)



## Objectives

- ✓ Articulate a *Think Ahead* approach to personal safety
- ✓ Identify electrical hazards at school, at home and in the community
- ✓ Review the *Home Outage Preparation Checklist*
- ✓ Discuss relevant electrical hazards in the workplace

## Preparation

- Photocopy *Home Outage Preparation Checklist* brochures
- Prepare overhead transparencies (created from supplied masters)
- Ask teacher to have an overhead projector available.
- Photocopy *Are You as Smart as a 9th Grader?*

## Lesson Overview

- |             |                                   |
|-------------|-----------------------------------|
| Activity #1 | Are You as Smart as a 9th Grader? |
| Activity #2 | Safety Situations                 |
| Activity #3 | Power Outage Preparations         |

## Background Information

Preventing accidents is about recognizing hazards and taking responsible action to avoid being injured. Explain that the same approach is taken when learning how to drive. Students are taught to drive defensively, thinking ahead and being proactive to avoid dangerous situations.

The situations portrayed on the overheads are typical to most students' experiences at school, in their homes and around the community. Encourage discussion when viewing the overheads! Students may have stories to share so use this as an opportunity to reinforce a *think ahead* approach. This means recognize potentially hazardous situations, then deciding to act safely.



### Activity Management

- Establish a sign that indicates when you want the student's attention. Ask the teacher what she/he uses when working with a large group. This is especially useful when refocusing the students on what you have to say after they have been working in small groups.
- The students may be familiar with general electrical concepts, as electricity is a grade 9 science topic.
- Prior to the session, discuss with the teacher which aspects of electrical safety may be most relevant to the students. For example, if a number of the students are working part time, link safety to their work sites.
- Make sure you set aside time to answer questions.

## Activity 1 (Gr 8–12)



Activity	Time	Resources
<p><b>Activity 1: Are You as Smart as a 9th Grader?</b></p> <ul style="list-style-type: none"> <li>• Introduce electrical safety.</li> <li>• Challenge the students to determine if the statements on the quiz are true or false. Some of these are worded to challenge their logic.</li> <li>• Have students complete the questions individually, then meet with one or two partners to reach consensus on statements that they have answered differently.</li> <li>• Students give themselves a point for each correct answer and a bonus point if they were right <b>and then</b> convinced someone else to change their answer (when they met to compare their quizzes).</li> <li>• Discuss the answers as a class.</li> </ul>	15 min	<p><i>Are You as Smart as a 9th Grader?</i> pages 79–80</p>



# Are You as Smart as a 9th Grader?

The following statements are based on a grade 9 science unit. Check true or false for each of the following then compare your answers with a partner

- | <b>T</b>                 | <b>F</b>                 |  |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Lightning striking the ground is, in many ways, similar to a spark traveling from your finger to a doorknob.                              |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Humans conduct electricity.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. A lightning bolt is 20 cm (8 inches) wide.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Touching a source of 300,000 volts will kill a person instantly.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Electrical current is a bigger determinant of danger than voltage.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Substations increase the power in the overhead lines that travel to your home.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. The electrical boxes on the ground in newer housing areas are like transformers on hydro poles.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. 125 volts of electricity, in the usual household outlet, is no more dangerous than the equivalent number of batteries connected together. |
| <input type="checkbox"/> | <input type="checkbox"/> | 9. Electricity travels only inside transmission lines, high off the ground.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 10. Trees offer good protection during lightning storms.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 11. Electricity will not travel through the air.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 12. Electricity spreads out in a circular pattern once a high-voltage line touches the ground.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 13. If a hair dryer falls in the water, it is safe to pull it out as long as your feet are dry.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 14. Electricity only occurs inside a toaster when the appliance is turned on.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 15. It is safe to touch ladders to overhead wires if you are grounded.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 16. All energized power lines give off a humming sound.  |
| <input type="checkbox"/> | <input type="checkbox"/> | 17. If a power line falls on your car, you should step out slowly.   |
| <input type="checkbox"/> | <input type="checkbox"/> | 18. The breaker panel controls all electricity entering your house.  |

# Are You as Smart as a 9th Grader?

## Answer Key

1. True, they are both types of static electricity.
2. True. A large percentage of a human is water.
3. False. A lightning bolt is approximately five cm wide.
4. False. A Van DeGraph generator creates thousands of volts, yet is safe to touch.
5. True. A relatively low amperage can kill you.
6. False. Substations reduce or step down the amount of power.
7. True. They are called pad-mounted transformers.
8. False. The North American household supply carries 15 amps.
9. False. The electric current also travels around the wire.
10. False. Trees attract lightning.
11. False. Electricity can arc through air.
12. True. This circular pattern can extend 10 metres (33 feet) from the source.
13. False. If a hair dryer falls into water, don't touch it.
14. False. As soon as an appliance is plugged in, it contains electricity. It doesn't need to be turned on.
15. False. The electrical current in the wires will take any conductor to reach the ground, including you.
16. False. Some high-voltage power lines can be heard when it's raining, but they often carry electricity without causing a sound.
17. False. Don't step out of the car (refer to information sheet).
18. True. However, only the main breaker box controls power to the whole house, some houses have sub-panels that control only a portion of the electrical circuits.

## Activity 2 (Gr 8–12)



Activity	Time	Resources
<p><b>Activity 2: Safety Situations</b></p> <ul style="list-style-type: none"> <li>• Introduce electrical safety.</li> <li>• Have the students sit with a partner.</li> <li>• Show the overhead situations for approximately 30 seconds each.</li> <li>• Students briefly tell their partner what they would do in response to each situation.</li> <li>• Ask the questions listed on the back of the photo pages.</li> <li>• Acknowledge that the students are very capable of problem solving many hazardous situations.</li> <li>• Summarize the safest options for each situation, always with the objective of recognizing and avoiding electrical hazards. If you are in a position to help someone, think carefully: don't become the second victim!</li> </ul>	15 min	Overheads pages 9–24



## Activity 3 (Gr 8–12)



Activity	Time	Resources
<p><b>Activity 3: Power Outage Preparations</b></p> <ul style="list-style-type: none"> <li>• Handout and briefly review the <i>Home Outage Preparation Checklist</i> brochure.</li> <li>• Emphasize that they may be the care taker/babysitter for younger siblings in the absence of a parent...so being prepared is a smart and easy thing to do.</li> <li>• Ask if anyone can think of unique power outage preparations for their specific workplace. Do they face electrical hazards beyond those in a typical home?</li> <li>• Highlight the section <i>Basic Emergency Kit Essentials</i> to emphasize what students should be prepared to do in case of a power outage.</li> <li>• Students take the checklist home to discuss with their parents.</li> </ul>	10 min	<p><i>Home Outage Preparation Checklist</i> brochure pages 71–72</p>



# **Electrical Safety Community Presentation**





# Getting Started (Community)



## Objectives

- ✓ To identify common electrical hazards at home and in the community
- ✓ To review the Home Outage Preparation Checklist
- ✓ To discuss relevant electrical hazards in the workplace
- ✓ To provide materials/ references to help build safety awareness in the home

## Preparations

- Photocopy *Home Outage Preparation Checklist* brochures
- Prepare overhead transparencies (created from supplied photograph pages)
- Ask an overhead projector available.
- Pens and pencils
- Photocopy *Are You as Smart as a 9th Grader?*

## Presentation Overview

Activity #1	<i>Are You as Smart as a 9th Grader?</i>
Activity #2	Safety Situations
Activity #3	Power Outage Preparations
Activity #4	Working Around the Home

## Background Information

The session will vary depending on the needs and geography of the community. There may be a greater need for awareness of downed power line safety in some areas or an emphasis on being prepared for longer outages in more remote towns. Use the following activities in a way that makes the presentation most relevant to the audience.

The **overheads** can be used for a variety of purposes:

1. To introduce electrical safety topics.
2. As an introduction to various hazards.
3. To summarize the points presented.

There is more information available on-line at [bchydro.com/safety](http://bchydro.com/safety) (eg. Relating to power outages, pruning near power lines). The *Home Outage Preparation Checklist* is included in this resource and can be prepared as a photocopy. The intermediate activities, *Safety Review*, *Fun Book* pages and the *Crossword Puzzle*, could also be photocopied if younger children attend the presentation. The overall intent is to provide relevant, practical information, to build safety awareness, and to respond to questions and concerns from the residents.



## Using the photographs

The photographs (reproduced as overheads) are meant to prompt discussion so expect participants to be eager to share their ideas. Each electrical hazard is accompanied by a situation or context. While specific dangers vary, depending on where you are and your age, the general concerns are very similar for everyone.

Here are a few activity options:

- A. Ask participants to turn to a partner and name the hazard.
- B. Have participants discuss where in the photograph would you find the specific hazard.
- C. Ask participants to guess what other electrical hazards may exist in the photo.
- D. Have participants tell the group the safe action plan/ decision to be made.
- E. Ask the questions on the back of the photo pages.

## First steps

- Introduce yourself, your commitment to safety and your job as a firefighter.
- Emphasize the need for safety education:
  - In 2006 the Electrical Safety Authority found defects in 25% of do-it-yourself home electrical installations (source: *ESA*).
  - Faulty cords and plugs are the leading causes of indoor fires during the holiday season (source: *Canadian Association of Fire Chiefs*).
  - A recent survey found that, of those familiar with the term GFCI, 44% rarely, if ever, test them. Testing ground fault circuit interrupters (GFCIs) once a month takes less than a minute (source: *Electrical Safety Foundation International, US*).

# Activity 1 (Community)



Activity	Time	Resources
<p><b>Activity 1: Are You as Smart as a 9th Grader?</b></p> <ul style="list-style-type: none"> <li>• Challenge the participants to determine if the statements on the quiz are true or false. Some of these are worded to challenge their logic.</li> <li>• Have participants complete the questions individually, then meet with one or two partners to reach consensus on statements that they have answered differently.</li> <li>• Discuss the answers as a whole group. Encourage questions from the audience!</li> </ul>	10 min	<p><i>Are You as Smart as a 9th Grader?</i> pages 79–80</p>



## Activity 2 (Community)



Activity	Time	Resources
<p><b>Activity 2: Safety Situations</b></p> <ul style="list-style-type: none"> <li>• Show the overhead situations for approximately 30 seconds each.</li> <li>• Ask the questions listed on the back of the photo pages.</li> <li>• Summarize the safest options for each situation, always with the objective of recognizing and avoiding electrical hazards. If you are in a position to help someone, don't become the second victim!</li> <li>• Acknowledge that adults are often capable of mitigating many hazardous situations, but should always contact BC Hydro or the fire hall if in doubt or if power lines are involved.</li> </ul>	15 min	Overheads pages 9–24



## Activity 3 (Community)



Activity	Time	Resources
<p><b>Activity 3: Power Outage Preparations</b></p> <ul style="list-style-type: none"> <li>• Handout and briefly review the <i>Home Outage Preparation Checklist</i> brochure.</li> <li>• Emphasize that being prepared is a smart and easy thing to do.</li> <li>• Ask if anyone can think of unique power outage preparations for their specific workplace. Do they face electrical hazards beyond those in a typical home?</li> <li>• Highlight the section <i>Basic Emergency Kit Essentials</i>.</li> <li>• There is more information available on-line at <a href="http://bchydro.com/safety">bchydro.com/safety</a> (eg. Relating to power outages, pruning near power lines).</li> </ul>	10 min	<p><i>Home Outage Preparation Checklist</i> pages 71–72</p>



## Activity 4 (Community)



Activity	Time	Resources
<p><b>Activity 4: Working Around the Home</b></p> <ul style="list-style-type: none"> <li>• Outline the BC One Call procedures. <ul style="list-style-type: none"> <li>– Call to find out if and where it is safe for you to dig. Your call is free, regardless of where you live in B.C.</li> <li>– Every time you dig in the ground you run the risk of loss of life or damage to property. You could hit a buried cable, conduit, gas, or oil pipeline.</li> <li>– In the Lower Mainland, phone 604-257-1940. Elsewhere in B.C., phone toll-free 1-800-474-6886. More information is available on the BC One Call website.</li> </ul> </li> <li>• Allow for questions from participants.</li> <li>• Encourage participants to visit the BC Hydro website for further information. Leave the contact information on the overhead:  Website bchydro.com  Phone number 1-800-BC HYDRO (1-800-224-9376)  To report an outage or electrical emergency, call 1-888 POWERON (1-888-769-3766).</li> </ul>	15 min	