GRAND VALLEY POWER

Empowering Lives with Hometown Service

A Touchstone Energy® Cooperative

HIGH VOLTAGE ELECTRIC DEMONSTRATION

Electrical Safety

LESSON PLAN

Grade: 2nd - 8th grade

Subject: Science

Date:

Topic: Electrical Safety

Lesson Time: 30-40 minutes

Lesson Description:

This course is taught from the knowledge, experience, and expertise of employees at Grand Valley Power. Organized in 1936, Grand Valley Power is the first rural not-for-profit electric cooperative in Colorado. Serving over 18,000 members within the Mesa County area, Grand Valley Power is dedicated to empowering lives with hometown service with safe, affordable and reliable electricity. The main objective of this lesson is to educate youth on electrical safety hazards and the emergency procedures that follow during an electrical related accident. For more information, visit **gvp.org** or **gvp.org/safe-kids** for additional safety resources.

Materials Needed:

- High Voltage Electric Demonstration Video
- Electrical Safety Word Search
- High Voltage Demo Safety Expert Quiz
- OPTIONAL: Electrical Safety Coloring Sheets

Learning Objectives:

- Define the basics of electrical safety terms.
- Identify and recognize common electrical safety hazards.
- Establish a clear understanding of what to do in an electrical safety emergency.

Structure / Activity:

Step 1: Teacher will introduce the activity by turning on and off the classroom lights while asking students "How do you think the lights turn on and off?" Students will respond by stating, "Electricity."

Step 2: Teacher will distribute the Electrical Safety Word Search to students and allow ten minutes to complete the activity. Teacher can encourage students to collaborate during this activity.

Step 3: Teacher will then review words in the Electrical Safety Word Search with students by defining the key terms.

Step 4: After students have developed a foundation of the electrical safety terms, teacher will then play the Grand Valley Power High Voltage Electric Demonstration video.

Step 5: Students will then test their knowledge by completing the High Voltage Demo Safety Expert Quiz. Teacher will allow 10-15 minutes to complete this assessment.

Step 6: Teacher will then allow students to self-grade their safety expert quiz. Teacher will review the correct answer and explanation to each question.

Step 7: The electrical safety activity is now complete. OPTIONAL - Teacher can distribute electrical safety coloring sheets to students for additional safety resources.

Assessment:

Students will be assessed on their new learning by completing the High Voltage Demo Safety Expert Quiz.

INSTRUCTOR KEY TERMS

Step Potential - The voltage difference between the feet of a person near an energized, grounded object.

Energized - An object that is electrically connected to a source of voltage.

Circuit(s) - A conductor or a system of conductors through which electric current flows.

Electricity - Electricity is the flow of electrical energy from one place to another.

Conductor - An object that allows the flow of electricity to move in one or multiple directions.

Direct Current - An electric current that flows in only one direction through a circuit, as from a battery.

Cooperative - A business or organization that is owned, controlled, and jointly operated by its members.

Structure - A term commonly used to describe electrical equipment such as utility poles.

Arc - The result of an electrical current flowing through the air between two conductors. An arc is the visible flash or bolt seen between two objects.

Lineworker - A trade professional who build, maintain and repair overhead and underground electrical power lines.

Insulator - An object or material that prevents or limits the direct flow of electricity.

GVP - An abbreviated term for Grand Valley Power.

Transformer - A device that raises or lowers the voltage or force of electricity.

Voltage - The difference in electrical potential between any two conductors or between a conductor and ground. Copper wiring is the most widely used electrical conductor.

Power - The rate at which energy is transferred. Electrical energy is usually measured in watts. Also used for a measurement of capacity.

Transmission Line - A set of conductors, insulators, supporting structures, and associated equipment used to move large quantities of power at high voltage, usually over long distances between a generating or receiving point and major substations or delivery points.

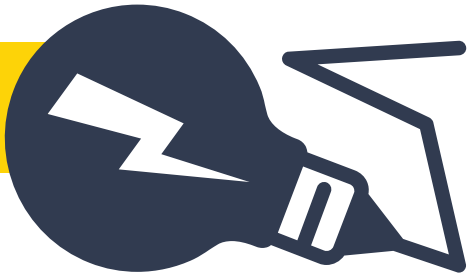
Load - The power and energy requirements of users on the electric power system in a certain area or the amount of power delivered to a certain point.

Kilowatt - A unit of power, usually used for electric power or energy consumption (use). A kilowatt equals 1000 watts.

Definitions sourced from: www.eia.gov/kids/glossary.php

ELECTRICAL SAFETY

WORD SEARCH



Name: _____ Date: _____

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

Step Potential
Energized
Circuit
Electricity
Conductor
Current
Cooperative
Structure
Arc
Lineworker
Insulator
GVP

gvp.org/safe-kids

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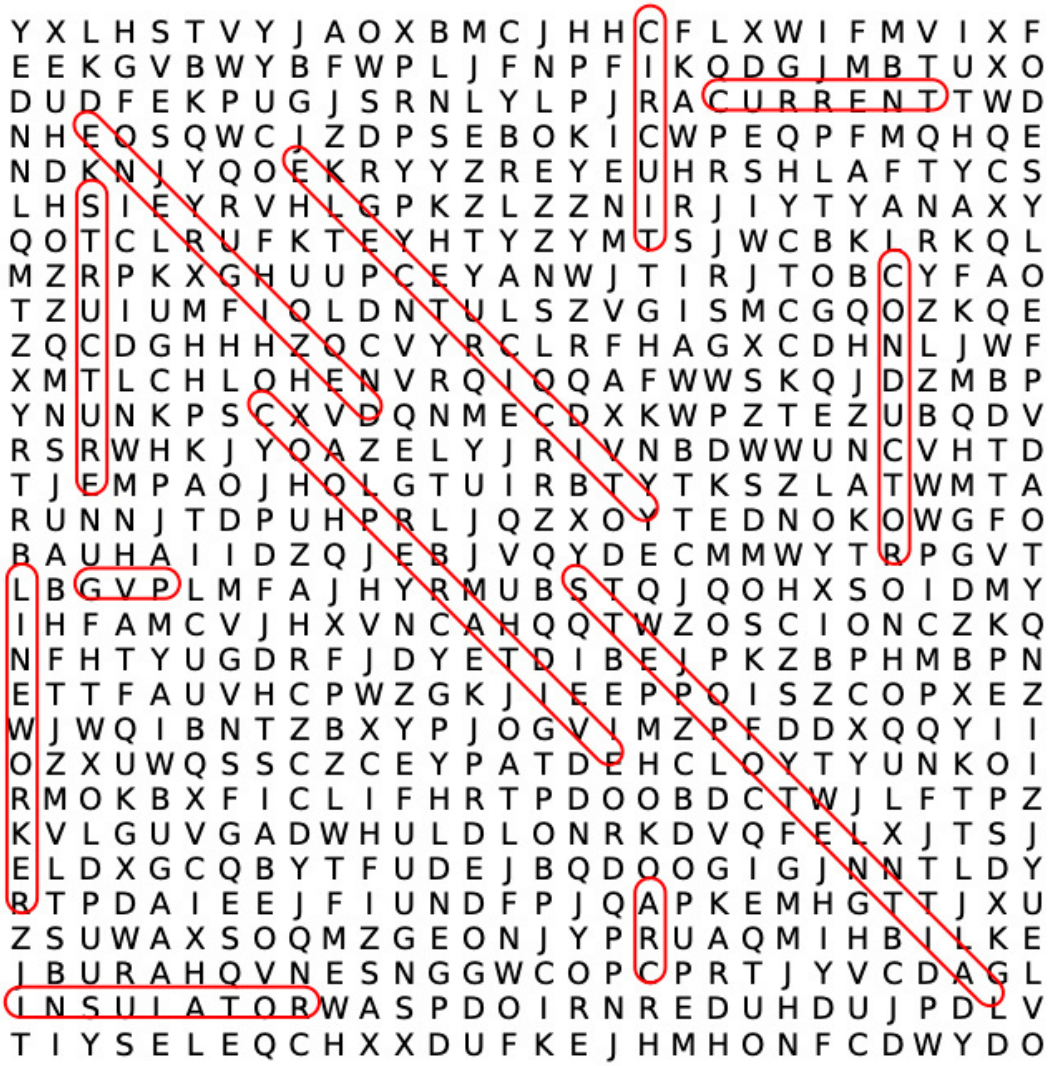
ELECTRICAL SAFETY WORD SEARCH

INSTRUCTOR ANSWER KEY



Step Potential	Electricity	Cooperative	Lineworker
Energized	Conductor	Structure	Insulator
Circuit	Current	Arc	GVP

gvp.org/safe-kids

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HIGH VOLTAGE DEMO

SAFETY EXPERT QUIZ

Hello, electrical safety experts and welcome to Grand Valley Power's high voltage demonstration. Today, you and your classmates have learned a lot about how you can stay safe around electrical equipment. Now it's time to put your knowledge to the test! Use your new learning to help you answer the following questions by filling in the blank or circling true or false.

Name: _____ Date: _____

1. True or False. It's almost always best to stay in your vehicle and wait for help if you encounter a downed powerline. Call 9-1-1 and wait until utility and safety professionals say it's safe to exit. _____ T/F

2. Fill in the blank. _____ potential is the danger present when two parts of your body (usually your feet) are in two different voltage zones. This concept is commonly compared to throwing a rock into a pond.

3. True or False. It's safe to fly kites near or around overhead powerlines as long as the kite flies below the powerlines. _____ T/F

4. Fill in the blank. _____ are materials that an electric charge can pass through easily.

5. True or False. It's safe to trim trees or bushes that are located next to electrical equipment without the help of a professional. _____ T/F

6. Fill in the blank. Call _____ or _____ to report and help remove a kite from a power line.

7. True or False. Birds can stand on a powerline without harm because they are only contacting one power line. _____ T/F

8. Fill in the blank. Lineworkers wear _____ equipment to help protect them from an electrical shock.

9. True or False. The best way to exit a vehicle that has come into contact with a downed powerline is to simply step out of the car and walk away. _____ T/F

10. Fill in the blank. Trees are considered to be great conductors of electricity because they create a _____ to ground.

SCORE: _____ /10

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HIGH VOLTAGE DEMO

SAFETY EXPERT QUIZ

INSTRUCTOR ANSWER KEY

1. True or False. It's almost always best to stay in your vehicle and wait for help if you encounter a downed powerline. Call 9-1-1 and wait until utility and safety professionals say it's safe to exit. _____ T/F
   - **ANSWER: TRUE.** If your vehicle comes into contact with energized electrical equipment, call 9-1-1 and wait for emergency officials or utility professionals to declare that the scene is safe.

2. Fill in the blank. _____ potential is the danger present when two parts of your body (usually your feet) are in two different voltage zones. This concept is commonly compared to throwing a rock into a pond.
   - **ANSWER: Step** potential is the danger present when two parts of your body (usually your feet) are in two different voltage zones. This concept is commonly compared to throwing a rock into a pond.

3. True or False. It's safe to fly kites near or around overhead powerlines as long as the kite flies below the powerlines. _____ T/F
   - **ANSWER: FALSE.** Kites and model airplanes should be flown only during good weather conditions in large open areas, like an open park or a wide field. Keep kites away from overhead power lines or other electrical equipment, such as substations. If a kite gets stuck in a tree near power lines, do not climb up to get it. Electricity can travel down kite strings or wires. Contact your electric utility for assistance.

4. Fill in the blank. _____ are materials that an electric charge can pass through easily.
   - **ANSWER: Conductors** are materials that an electric charge can pass through easily.

5. True or False. It's safe to trim trees or bushes that are located next to electrical equipment without the help of a professional. _____ T/F
   - **ANSWER: FALSE.** Never trim trees near power lines - leave that to the professionals. Never use water or blower extensions to clean gutters near electric lines. Contact a professional maintenance contractor.

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HIGH VOLTAGE DEMO

SAFETY EXPERT QUIZ

INSTRUCTOR ANSWER KEY

6 Fill in the blank. Call _____ or _____ to report and help remove a kite from a power line.

- **ANSWER:** Call **Grand Valley Power** or **9-1-1** to report and help remove a kite from a power line.

7 True or False. Birds can stand on a powerline without harm because they are only contacting one power line. _____ T/F

- **ANSWER: TRUE.** Birds can safely stand on a powerline because they are not touching the ground or another conductor. Electricity is always looking for the nearest path to ground which is why birds are safe to stand on a powerline. However, if a bird with large wings contacts a powerline and a large tree, they will experience an electrical shock because they have completed the path to ground.

8 Fill in the blank. Lineworkers wear _____ equipment to help protect them from an electrical shock.

- **ANSWER:** Lineworkers wear **personal protective** equipment to help protect them from an electrical shock.

9 True or False. The best way to exit a vehicle that has come into contact with a downed powerline is to simply step out of the car and walk away. _____ T/F

- **ANSWER: FALSE.** If you must get out because of fire or another danger, jump clear of the vehicle without touching it and the ground simultaneously. Then hop with feet together –don't run or stride. Electricity spreads through the ground in ripples, like a stone dropped in water. The voltage is highest in the ring closest to the vehicle and decreases with distance. Hop with feet together, so one foot won't be in a higher voltage zone than another, which could make you a conductor for electricity.

10 Fill in the blank. Trees are considered to be great conductors of electricity because they create a _____ to ground.

- **ANSWER:** Trees are considered to be great conductors of electricity because they create a **path** to ground.

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AMERICA'S ELECTRIC COOPERATIVES

Spring Safety Coloring Sheet

Energy Explorers

Spring Safety Tip:
Never climb a tree that has power lines running through it! Always avoid playing near electrical utility equipment.