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JA Electrical Volunteer Guide

JA Electrical introduces students to the importance and value of trades careers within their communities. Your role is to lead small groups in a simulation that teaches students how electricity travels from a power plant to their home. You will introduce the activity, demonstrate each step, and help them understand how this process connects to careers in the trades.

Before the session begins, **please review**:

- **JA Electrical Facilitator Guide**
- **JA Electrical Volunteer Training PowerPoint**
- Practice running the station and completing the sequence.

Instructions to Read Aloud (Bolded Sections)

Welcome to JA Electrical!

Today, you're going to explore how electricity travels from a power plant all the way to your home and learn about the people who make it happen: electricians.

Electricians work in many different places to keep our lights on and our communities running.

Can you name a few places where electricians might work?
(Homes, schools, office buildings, hospitals, construction sites)

Now, take a look at the Electrical Jobs banner. These are just a few of the many careers in electrical work.
Do any of these jobs look interesting to you? Have you heard of any of them before?

Think About This

What do you think our community would be like without electricians?
What wouldn't work? What might feel difficult or unsafe?

When Storms Knock the Power Out

Imagine a big storm just hit your neighborhood and the power goes out.

Let's see what happens.

Have a student flip the light switch.

Nothing happens because turning power back on takes a lot of important steps.

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Electricity starts at a power plant, where it is made. Then it travels a long way through transmission and distribution lines through the substation to reach homes and buildings.

Do you ever see tall metal towers? They carry high-voltage electricity over long distances.

As electricity gets closer to homes, the voltage becomes lower and safer. This banner shows how that happens step by step. Point out the banner and how the voltage decreases.

So, what do you think it takes to turn the power back on after a storm?
Who do you think fixes the problem?

Electric companies first figure out where the problem started, and then electricians step in to fix it safely.

Student Activity: It's Your Turn! Restore the Power.

Today, you're going to become electricians.

Your job is to work as a team to restore power to a home after a storm.

Each of you will be responsible for one part of the system.
Just like in real life, electricians must complete each step in the correct order for everything to work.

I'll explain each task and ask for volunteers to take on different roles in the system.
Remember, teamwork matters! If one step is missed or out of order, the power won't turn on. You'll also learn how the voltage changes along the way.

Let's get started and bring the lights back on!

1. **Generating Power at the Power Plant - Hand Crank**
    - **You must be cranking the ENTIRE time. Speed does not matter, but do not stop.**
    - **(4) red lights and (2) yellow lights will turn on from bottom to top.**
    - **The sequence begins once ALL lights are on.**
    - **Who would like to work in the Power Plant?**

2. **Turning Keys**
    - **Turn keys from left to right in order to activate power to energize the transmission power lines.**
    - **Press the green start button.**
    - **All (6) lights must be one for power to start.**
    - **If an error message plays, reset and try again.**
    - **Who would like to turn on the keys?**

3. **Plug in Power Line Connections (Wires)**
    - **Power lines transmit power through the substation all the way to your home.**
    - **Power line wires must be connected in order.**
    - **(2) short wires and (2) long wires from transmission to the substation.**
    - **Substations regulate voltage in the power grid to ensure safe delivery to distribution lines thoughout your community.**
    - **Students must wait until the previous set of lights is activated.**
    - **Follow the lights to know when it's your turn.**
    - **Who would like to connect the lines** (2-3 volunteers needed)**?**

4. **Circuit Breaker**
    - **Flip the labeled switch labeled "Light".**
    - **Flip the light switch to complete the sequence.**
    - **Who would like to flip the switches?**

Encourage students to switch roles as time allows.

Lightbulbs (as time allows)

Now we are going to compare how much power different lightbulbs use. We will look at incandescent, fluorescent, and LED bulbs. Which type do you think is used most today and why? (LED because it uses the least power)

Ask for a student volunteer to demonstrate.

1. **Turn on the light switch for ONE light bulb at a time.**
2. **Begin turning hand crank until it lights up.**
3. **Once it lights, STOP cranking and turn the switch off.**
4. Repeat steps for all (3) lightbulbs.
    - **Which one was easiest to power? Why?**
    - **LED uses less power and is easier to light up, incandescent takes more power to light up.**
5. Let the other students try it out if time allows.

Wrap-Up Discussion

Training and Certification:

- **High school diploma or GED**
- **Technical school or community college**
- **Apprenticeship**
- **Successful licensing exam completion**
- **National average pay is $70,000**

What would our community look like without electricians?

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What skills do you think are needed? Teamwork, physical stamina, mathematical/blueprint skills, problem solving, detail-oriented, etc.

What surprised you most about how much work it takes to restore power?
Trades careers play a crucial role in our communities. Electricians and other skilled tradespeople keep our homes, schools, and workplaces running safely. These careers make a real difference.

*Reset the station for next group by turning keys back, removing connections, and flipping circuit breaker switches off.