

Learning Aid: Electrical Wiring Kit

Recommended Lesson: *Lesson 3: Basic Wiring Skills*

Required Materials:

- *Trivia Questions*
- *Trivia Questions – Answer Key*
- *Basic Wiring Skills* slide presentation (slides 1-24, printed out)
- *Basic Wiring Skills Worksheet*
- *Basic Wiring Skills Quiz*

Steps:

FOCUS:

1. Fill out the *Trivia Questions* worksheet just get a general view of what you know about electrical wiring. This will be for review only.
2. After you fill out the trivia questions, look at the answers to see if you are right or what you may learn through this lesson.

LEARN:

1. Complete the *Basic Wiring Skills Worksheet* while going over the presentation slides 1-24.

REVIEW:

1. Optional discussion thoughts to consider individually or as a group:
 - a. Why do you think so many voltages are used in the power grid and home? Why isn't everything generated, transmitted, and consumed at 120 volts?
 - Transmitting power at a higher voltage and correspondingly lower current reduces the amount of power lost in transit (as heat, primarily) in wires stretching for miles between generation and consumption points.
 - This lost power would increase our power bills to cover the waste and also cause wear and tear and increased maintenance costs on the grid itself.
 - b. Why is the power distribution system within a home split into smaller branch circuits, instead of being on one large circuit with a single large breaker?
 - Having a single large breaker could allow some pretty large currents to flow without tripping the breaker, potentially damaging equipment.
 - Using smaller branch circuits with smaller current limits allows us to use smaller, cheaper wire in the home, reducing overall cost.
 - 12- and 14-gauge wire typically used would not be able to carry enough current to safely handle a single-circuit home.
 - Finally, splitting up the home into separately protected circuits limits the impact of failures so that a single overcurrent event doesn't turn off power to the entire home. Who wants their TV to go off just because someone plugged in an extra toaster in the kitchen?
 - c. Why are GFCI outlets recommended or mandated for some applications? Why do you think they aren't used everywhere in the home?
 - GFCI outlets protect against short circuits, where the circuit may be completed by a person or object instead of just through an appliance or electric tool.
 - GFCI outlets can save lives, particularly in wet environments such as bathrooms and kitchens.
 - GFCI outlets are considerably more expensive than regular outlets, however, and can occasionally turn off when not necessary, causing unwanted problems.
 - d. What are some advantages that the original electrician has over anyone else when troubleshooting a problem in a home? How might that affect the way you would approach doing your own wiring?
 - The original wirer knows how circuits are routed, where the wires are run, what is connected together, and where connections are made.
 - Things that an electrician can do to make troubleshooting easier on others include properly labeling a breaker panel, running wires neatly and in an organized manner, keeping junction boxes exposed so wires can be accessed later, and following code and established industry standards.
2. Complete the quiz to see how you have gained and retained knowledge of this lesson.

Trivia Questions

1. How many miles of high-voltage transmission lines keep the United States bright?
2. What is the number one cause of power outages?
3. In which state was the first commercial power grid located?
4. How many smaller grids is the whole electric grid of America based on?

Trivia Questions

1. How many miles of high-voltage transmission lines keep the United States bright?

More than 450,000 miles

2. What is the number one cause of power outages?

Severe weather (each year the economy is hit by \$18-\$33 billion)

3. In which state was the first commercial power grid located?

New York, in lower Manhattan

4. How many smaller grids is the whole electric grid of America based on?

3 – the Eastern, Western, and Texas Interconnections