INDIANA 4-H ELECTRIC

PURDUE UNIVERSITY | Extension - 4-H Youth Development

Electric and Electronic Skills and Knowledge Chart

Youth and their mentor/volunteer leader/instructor should use this chart as a guide when deciding appropriate skills and knowledge to incorporate in an electricity or electronics exhibit. **While this list is a guide, it is not meant to be an all-inclusive list.** Youth in Level 2 might feel comfortable attempting Level 5 skills, but it is unlikely that a beginner exhibitor will be able to successfully master Level 5 skills. Youth are encouraged to utilize several resources such as websites, print material, social media, and television shows when acquiring electricity/electronic skills and knowledge. Skills and knowledge learned from other types of resources can be demonstrated provided they are age/grade appropriate.

The "**X**" indicates **suggested level** to acquire respective skill or knowledge. Exhibits must include a minimum of 5 techniques from their level indicated in the chart below. They may include additional techniques from other levels as deemed appropriate, but will be evaluated for quality. For example, Level 3 exhibitors may use any techniques found in Level 1 or 2 but the exhibit must include a minimum of 5 Level 3 techniques, either demonstrated or explained.

Skills to be Attained	Level	1	2	3	4	5
	Grade	3	4	5	6	7-12
Utilizes safety equipment		X				
Demonstrate decision making		X				
Identify electrical parts		X				
Recognize potential dangers and how to avoid them		X				
Explain the concept of circuits - series and parallel		X				
Analyze function of electric parts		X				
Diagnose problems and make basic repairs		X	X			
Recognize electrical connection types and how to make them		X	X			
Identify tools and their use		X	X			
Recognize the relationship of electricity and magnetism		X	X			
Soldering techniques		X	X			
Understand volts		X	X			
Strip wire properly		X	X			
Recognize the polarity of components		X	X			
Learn how to read pictorial diagram		X	X			
Understand simple motors		X	X			
Understand battery voltages		X	X			
Identify diode rectification			X			
Define and measure ohms			X			
Clarify what components do			X			

Distinguish between alternating and direct currents		X			
Understand conductors and insulators		X			
Identify analog and digital multi-meter		X			
Use multi-meter, etc.		X			
Understand concept of transformer		X			
Applying a wire nut		X	X		
Understand amps and ampacity			X		
Differentiate wire - sizes, types, uses, and colors			X		
Identify a ground			X		
Identify a neutral			X		
Interpret circuits			X		
Read simple schematics			X		
Estimate budget			X		
Execute project planning			X		
Calculate circuit loads			X	X	
Understand voltage drop in a conductor			X	X	
Demonstrate mathematic concepts			X	X	
Understand plug configurations			X	X	
Use crimp-on terminals			X	X	
Measure wattage of lighting			X	X	
Identify polarized vs. Non-polarized plug configuration			X	X	
Understand direct and reflected glare			X	X	
Identify methods of lighting			X	X	
Identify bulb types			X	X	
Understand strain relief of cords			X	X	
Understand kilowatt hour consumption			X	X	
Identify circuit breaker concepts, overload devices			X	X	
Identify underwriters knot				X	
Identify and understand how outlets, switches, and lights work				X	X
Distinguish color of lighting				X	X
Analyze quality of lighting				X	X
Measure quantity of lighting				X	X
Understand electricity production - friction, heat, light, piezo, chemical, magnetic				X	X
Understand proper installation of outlets.				X	X
Understand proper installation of switches.				X	X
Understand proper installation of lighting.				X	X
Understand proper routing & fastening of wire.				X	X
Understand use & securing of conduit.				X	X
Understand bonding of metal components.				X	X
Design a complete branch or feeder circuit.					X

Demonstrate/utilize use of specialized tools. (Knockout kit, Conduit bender, Rotary cutter, Cat 5/5E Crimp tool, Fiber splicer, etc.)					X
Research career opportunities in electric and electronics					X
Identify renewable energy types and how they work					X
Explain electron theory					X
Understand primary vs secondary electricity uses					X
Exhibit awareness and understanding of bouncing voltage (loose neutral)					X
Understand electronics coding, motherboard creating, etc.					X
Understand motors and generators					X
Understand single phase vs three phase					X
Describe the difference between electric and electronic					X
Understand what inverters are and how they work					X
Identify ground rods and their purpose					X
Understand misdirected neutral current					X
Complete basic home wiring					X
Demonstrate mathematics for doing circuits - Boolean algebra					X
Design schematics					X
Repair small appliances					X
Understand National Electrical Code					X
Understand ground fault circuit interrupters; why and how it works					X
Understand arc fault circuit interrupters; why and how it works					X
Explore the concept of engineering; how parts and pieces come together to make a whole					X
Understand small appliance wiring					X
Utilize heat shrink tubing - insulation					X

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Electric and Electronic Exhibit Skills and Knowledge Sheet

Name _____ **Club/County**_____

Level: ☐1 ☐2 ☐3 ☐4 ☐5

(Projects must demonstrate/explain a minimum of five skills for the appropriate level from the Indiana 4-H Electric and Electronic Skills and Knowledge Chart)

Skills/Knowledge:

Note to judge - While the entire exhibit is to be evaluated and critiqued, special attention and consideration is to be given to the five skills or explanations of knowledge listed below.

1.

2.

3.

4.

5.

Other information about your project:

(include information such as safety equipment used, hazards identified, or wiring diagrams)