Indiana 4-H 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
Utilizes safety equipment		Х				
Demonstrate decision making		Х				
Identify electrical parts		Х				
Recognize potential dangers and how to avoid them		Х				
Explain the concept of circuits - series and parallel		Х				
Analyze function of electric parts		Х				
Diagnose problems and make basic repairs		Х	Х			
Recognize electrical connection types and how to make ther	n	Х	Х			
Identify tools and their use		Х	Х			
Recognize the relationship of electricity and magnetism		Х	Х			
Soldering techniques		Х	Х			
Understand volts		Х	Х			
Strip wire properly		Х	Х			
Recognize the polarity of components		Х	Х			
Learn how to read pictorial diagram		Х	Х			
Understand simple motors		Х	Х			
Understand battery voltages		Х	Х			
Identify diode rectification			Х			
Define and measure ohms			Х			
Clarify what components do			Х			
Distinguish between alternating and direct currents			Х			
Understand conductors and insulators			Х			
Identify analog and digital multi-meter			Х			
Use multi-meter, etc.			Х			
Understand concept of transformer			Х			
Applying a wire nut			Х	Х		
Understand amps and ampacity				Х		
Differentiate wire - sizes, types, uses, and colors				Х		
Identify a ground				Х		
Identify a neutral				Х		
Interpret circuits				Х		
Read simple schematics				Х		
Estimate budget				X		
Execute project planning				X		

Calculate circuit loads	Х	Х	
Understand voltage drop in a conductor	Х	Х	
Demonstrate mathematic concepts	Х	Х	
Understand plug configurations	Х	Х	
Use crimp-on terminals	Х	Х	
Measure wattage of lighting	Х	Х	
Identify polarized vs. Non-polarized plug configuration	Х	Х	
Understand direct and reflected glare	Х	Х	
Identify methods of lighting	Х	Х	
Identify bulb types	Х	Х	
Understand strain relief of cords	Х	Х	
Understand kilowatt hour consumption	Х	Х	
Identify circuit breaker concepts, overload devices	Х	Х	
Identify underwriters knot		Х	
Identify and understand how outlets, switches, and lights work		Х	Х
Distinguish color of lighting		Х	Х
Analyze quality of lighting		Х	Х
Measure quantity of lighting		Х	Х
Understand electricity production - friction, heat, light, piezo, chemical,		Х	Х
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.		Х	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.)			Х
Research career opportunities in electric and electronics			Х
Identify renewable energy types and how they work			Х
Explain electron theory			Х
Understand primary vs secondary electricity uses			Х
Exhibit awareness and understanding of bouncing voltage (loose neutral)			Х
Understand electronics coding, motherboard creating, etc.			Х
Understand motors and generators			Х
Understand single phase vs three phase			Х
Describe the difference between electric and electronic			Х
Understand what inverters are and how they work			Х
Identify ground rods and their purpose			Х
Understand misdirected neutral current			Х
Complete basic home wiring			Х
Demonstrate mathematics for doing circuits - Boolean algebra			Х
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	Х
Explore the concept of engineering; how parts and pieces come	Х
together to make a whole	
Understand small appliance wiring	X
Utilize heat shrink tubing - insulation	X
Public Speaking	X
Audio/Video Presentation	
Planning/Organizing	X
Editing	X
Communication Skills	Х
Demonstrate/utilize use of specialized tools. (Knockout kit, Conduit	X
Personarch career expertunities in electric and electronics	X
Identify renewable energy types and how they work	X
	X
	X
Enderstand primary vs secondary electricity uses	
exhibit awareness and understanding of bouncing voltage (loose neutral)	^
Understand electronics coding, motherboard creating, etc.	X
Understand motors and generators	Х
Understand single phase vs three phase	Х
Describe the difference between electric and electronic	Х
Understand what inverters are and how they work	Х
Identify ground rods and their purpose	Х
Understand misdirected neutral current	Х
Complete basic home wiring	Х
Demonstrate mathematics for doing circuits - Boolean algebra	Х
Design schematics	Х
Repair small appliances	Х
Understand National Electrical Code	Х
Understand ground fault circuit interrupters; why and how it works	Х
Understand arc fault circuit interrupters; why and how it works	Х
Explore the concept of engineering; how parts and pieces come	Х
together to make a whole	
Understand small appliance wiring	X
Utilize heat shrink tubing - insulation	X
Public Speaking	X
Audio/Video Presentation	
Planning/Organizing	X
Editing	X
Communication Skills	Х