Electricity Unit
Lesson 6 of 7

Electrical Tools and Symbols

Created: 12/2025 by the National FFA Organization

Description of Lesson: This lesson introduces students to electrical tools and symbols and is a supplement to the National FFA Agricultural Technology and Mechanical Systems Career Development Event (CDE). These lessons are designed to be used in order.

Student Learning Objectives:

After completing these activities, students will …

1. Identify common electrical symbols.
2. Draw basic electrical symbols and use them to create simple circuit diagrams.
3. Explain the purpose of using standardized symbols in electrical diagrams.

Suggested Grade Level:

Grades 9 and 10 (This lesson is written so instructors can scale up or down based on class needs.)

Suggested Time: 60 minutes (*Time requirements may vary based upon student understanding and class schedule.)

Resources/References:

1. Video: Simple Circuits, https://www.youtube.com/watch?v=Ij4dVhprZlw

Related Resources:

1. SAE Idea Cards, https://FFA.box.com/s/0j0438zo941eymcncgpqabh5iqzzlrpg

Equipment and Supplies Needed:

1. A copy of the “Watt’s That Symbol” worksheet for each student

Vocabulary:

1. Ammeter
2. Battery
3. Cell
4. Diode
5. Fuse
6. Lamp/Bulb
7. LED
8. Resistor
9. Switch
10. Variable Resistor
11. Voltmeter

Cross-Curricular Connections:

Science
Sketch and interpret electrical diagrams.

Name: _____

SAE and FFA Connections

1. Agricultural Technology and Mechanical Systems CDE, https://FFA.box.com/s/lm54vln05kzwexi6nx5rzajzrc1d5dxx
2. Agricultural Proficiency Area: Agricultural Mechanics Design and Fabrication, FFA.org/participate/awards/proficiencies/
3. Foundational SAE Connections: Agricultural Literacy

Student Activity Sheets:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

https://ffa.box.com/s/vc59g4o8ez78p5965ftn4p1fw9y5sv1q (Word)
https://ffa.box.com/s/1t2b5xddhsje7voprzqg77dpyowv24ao (PDF)
https://docs.google.com/document/d/1FeDRzIuMEXw5BXCELNX20NqgnP9dQ4cggs1EkPtJDnY/copy (Google)

These Activities Are Aligned to the Following Standards:

AFNR Performance Element

- PST.04. Plan, build and maintain AFNR structures.

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PG-J.Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking and coping.

Common Career Technical Core

- AG-PST4 Plan, build and maintain AFNR structures.

Common Core – Reading: Informational Text

- CCSS.ELA-Literacy.RI.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Common Core – Speaking and Listening

- CCSS.ELA-Literacy.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grades 9-10 topics, texts and issues, building on others' ideas and expressing their own clearly and persuasively.
- CCSS.ELA-Literacy.SL.9-10.4 Present information, findings and supporting evidence clearly, concisely and logically such that listeners can follow the line of reasoning and the organization, development, substance and style are appropriate to purpose, audience and task.

Common Core – Science & Technical Subjects

- CCSS.ELA-Literacy.RST.9-10.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon or concept; provide an accurate summary of the text.
- CCSS.ELA-Literacy.RST.9-10.4 Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- CCSS.ELA-Literacy.RST.9-10.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

AFNR Career Ready Practices

- CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.
- CRP.04. Communicate clearly, effectively and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.07. Employ valid and reliable research strategies. Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies.
- CRP.08. Utilize critical thinking to make sense of problems and persevere in solving them. Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem and devise effective plans to solve the problem.

Partnership for 21st Century Skills

- Information Literacy

Name: _____

- Initiative and Self-Direction
- Productivity and Accountability

Lesson Plan:

1. **Bell Ringer:** Why do you think people invented electrical symbols instead of drawing realistic pictures of batteries, bulbs and wires?

2. **Introduction:** *Electricity can seem complicated, but electricians and engineers use a special "language" of symbols to make it easier. These simple drawings represent batteries, switches, lamps and more. Just like letters make up words, these symbols come together to form circuit diagrams. Today, you'll learn how to recognize and draw common electrical symbols, then use them to design your own circuits.*

3. **Activity:** Each student needs a copy of the worksheet "Watt's That Symbol?"
    a. **Part 1:** Have students watch the video available at https://www.youtube.com/watch?v=Ij4dVhprZlw, and answer the questions on their student activity sheets as they watch.

    b. **Part 2:** Have students use the symbols they learned to draw the circuits in the space provided and then answer the reflection questions.

4. **Follow-up:** Have students compare their sketches with classmates and make corrections as needed.

5. **Optional – Extended Learning Opportunities (Not factored into time requirement):**
    a. Have students draw diagrams for lights in the school or their rooms at home.

6. **Exit Ticket:** How can using symbols make electrical diagrams easier to understand?

Aligned to the following standards:
PST.04; PL-A.; PG-J.; CCSS.RI.9-10.1; CCSS.SL.9-10.1; CCSS.SL.9-10.4; CCSS.RST.9-10.2; CCSS.RST.9-10.4; CCSS.RST.9-10.9; CRP.02; CRP.04; CRP.07; CRP.08

Name: _____

Watt's That Symbol?

Part 1

Directions:

Watch the video available at https://www.youtube.com/watch?v=Ij4dVhprZlw, and answer the questions below as you watch.

Vocabulary Pre-Check:

Before you watch, circle whether you already know what these words mean.

Battery: YES/NO

Switch: YES/NO

Resistor: YES/NO

Lamp/Bulb: YES/NO

Ground: YES/NO

Circuit: YES/NO

Guided Notes:

Fill in the blanks as you watch the video:

1. A _____ is a picture that shows how electricity flows in a circuit.

2. A _____ is needed to provide power in the circuit.

3. A _____ can turn the circuit on and off.

4. A _____ makes light when current flows through it.

5. A _____ reduces or limits the amount of current in a circuit.

6. The _____ symbol shows a safe path for electricity to flow into the earth.

Name: _____

Draw the Symbols:

In the boxes below, draw each symbol as shown in the video. Label each drawing with its name and a description of its function.

Symbol Name	Picture	Purpose
Diode		
Battery		
Fuse		
Lamp/Bulb		
Variable Resistor		
Switch (Open)		
Resistor		
LED		
Ammeter		
Cell		
Switch (Closed)		
Voltmeter		

Name: _____

Part 2

Directions:

Use the symbols you learned to draw these circuits in the space provided and then answer the reflection questions.

1. A battery connected to a lamp with a switch

2. A battery connected to two lamps in series

3. A battery connected to two lamps in parallel

4. Lamp with resistor

5. Motor with battery and switch

6. Classroom lights

Reflection Questions:

1. Why do you think it's important that electrical symbols are the same worldwide?

2. Imagine someone misread a symbol on a wiring diagram. What problems could that cause?

Aligned to the following standards:
PST.04; PL-A.; PG-J.; CCSS.RI.9-10.1; CCSS.SL.9-10.1; CCSS.SL.9-10.4; CCSS.RST.9-10.2; CCSS.RST.9-10.4; CCSS.RST.9-10.9; CRP.02; CRP.04; CRP.07; CRP.08

Name: _____

KEY: Watt's That Symbol?

Part 1

Directions:

Watch the video available at https://www.youtube.com/watch?v=Ij4dVhprZlw, and answer the questions below as you watch.

Vocabulary Pre-Check:

Before you watch, circle whether you already know what these words mean.

Battery: YES/NO

Switch: YES/NO

Resistor: YES/NO

Lamp/Bulb: YES/NO

Ground: YES/NO

Circuit: YES/NO

Guided Notes:

Fill in the blanks as you watch the video:

1. A __circuit diagram_____ is a picture that shows how electricity flows in a circuit.

2. A __battery_____ is needed to provide power in the circuit.

3. A __switch_____ can turn the circuit on and off.

4. A ___lamp or bulb_____ makes light when current flows through it.

5. A __resistor_____ reduces or limits the amount of current in a circuit.

6. The ___ground_____ symbol shows a safe path for electricity to flow into the earth.

Name: _____

Draw the Symbols:

In the boxes below, draw each symbol as shown in the video. Label each drawing with its name and a description of its function.

Symbol Name	Picture	Purpose
Diode	See video.	Allows current to flow in only one direction, blocking it the other way
Battery	See video.	Provides electrical energy to a circuit (two or more cells joined together)
Fuse	See video.	Protects a circuit by breaking if too much current flows
Lamp/Bulb	See video.	Converts electrical energy into light
Variable Resistor	See video.	Adjusts the resistance in a circuit to control current flow (like a dimmer)
Switch (Open)	See video.	Breaks the circuit so no current flows
Resistor	See video.	Limits the flow of current in a circuit
LED	See video.	A diode that gives off light when current flows through it
Ammeter	See video.	Measures the amount of current flowing through a circuit
Cell	See video.	A single unit that provides electrical energy (One cell is like one “piece” of a battery.)
Switch (Closed)	See video.	Completes the circuit so current can flow
Voltmeter	See video.	Measures the potential difference (voltage) across two points in a circuit

Name: _____

Part 2

Directions:

Use the symbols you learned to draw these circuits in the space provided and then answer the reflection questions.

1. A battery connected to a lamp with a switch

   Answers will vary.

2. A battery connected to two lamps in series

   Answers will vary.

3. A battery connected to two lamps in parallel

   Answers will vary.

4. Lamp with resistor

   Answers will vary.

5. Motor with battery and switch

   Answers will vary.

6. Classroom lights

   Answers will vary.

Reflection Questions:

1. Why do you think it's important that electrical symbols are the same worldwide?

   Answers will vary.

2. Imagine someone misread a symbol on a wiring diagram. What problems could that cause?

   Answers will vary.