

Circuit Schematics

Automotive Service Technician, Electrician

Grades

- Grade 9

Learning objective

Read and draw schematic diagrams for electrical circuits.

Concepts

- Electrical circuits
- Schematic diagrams
- Circuit symbols
- Basic circuit components

Description and Trades Connection

In this lesson, students will learn to read and draw schematic diagrams for electrical circuits using standard symbols. Through demonstrations and hands-on practice, students will develop a solid understanding of circuit components and their real-world applications.

Understanding and creating schematic diagrams are important skills for trades such as electricians and automotive technicians. These professionals rely on schematics to troubleshoot and repair electrical systems, ensuring they function safely and efficiently. By learning to read and draw schematics, students gain practical skills that are directly applicable to diagnosing and fixing electrical issues in various trades. This hands-on experience with circuit symbols and diagrams prepares students for real-world tasks they may encounter in future careers.

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Scan to access video demonstrations, activities, classroom resources and more at learninginnovation.ca/k-12STEM

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Curriculum connections

Science 9, Unit D: Electrical Principles and Technologies

Outcome 2: Describe technologies for transfer and control of electrical energy

- describe, using models, the nature of electrical current; and explain the relationship among current, resistance and voltage
- investigate toys, models and household appliances; and draw circuit diagrams to show the flow of electricity through them

Circuit Schematics

Procedure

Preparation

Review how to use the automotive window motor box, the digital clamp meter or multimeter, as well as concepts of current, voltage, and resistance as needed.

Helpful videos:

- [Window motor box overview](#) [4:10] (Lethbridge Polytechnic, 2023)
- [How to use a digital clamp meter or multimeter](#) [12:29] (Lethbridge Polytechnic, 2025)

Feel free to show these videos to students as well (and revisit as needed).

Lesson Activities (30 minutes total)

Introduction (5 minutes):

- Begin by asking students if they have ever seen a circuit diagram or schematic. Discuss what they think these diagrams represent.
- Explain that today, they will learn how to read and draw schematics, which are essential for understanding and designing electrical circuits.
- Discuss this lesson's trades connection (included in the preamble to this lesson guide).

Demonstration of Schematics and Symbols (10 minutes):

- Show students a simple circuit diagram on the whiteboard or paper.
- Show the symbols used for common components such as resistors, batteries, and switches. Refer to this video if needed (for yourself or to show students):
 - [How to draw symbols for circuit components easily / electric components symbols \(youtube.com\)](#)
- Demonstrate how to draw a basic circuit using these symbols.
- Use the automotive window motor box to show a real-world application, but do not let students handle it yet. Highlight the components and their corresponding symbols in the schematic.

Time

30 minutes

Materials

- Whiteboards or large sheets of paper
- Whiteboard markers or pencils
- Example circuit diagrams
- Automotive window motor box (*included in kit*)
- 120v Power Cord (*included in kit*)
- A fused 12v battery pack (*included in kit*)

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Procedure

Lesson Activities (continued)

Student Practice (5 minutes):

- Provide students with example circuit diagrams and have them practice drawing these on their whiteboards or paper.
- Encourage them to label each component and ensure their diagrams are neat and accurate.
- Walk around the room to provide guidance and answer any questions.

Conclusion (5 minutes):

- Recap the key points of the lesson, emphasizing the importance of understanding schematics and symbols in electrical circuits.
- Ask students to share their diagrams and discuss any challenges they faced.
- Possible discussion questions:
 - Why is it important to use standardized symbols in circuit diagrams?
 - How might understanding schematics help in real-world applications like automotive repair?

Extension (5-10 minutes): Using whiteboards or paper, have students draw specific circuit diagrams to reinforce their understanding. For example, ask them to create a parallel circuit that includes three loads and two switches. Have one switch control all three loads simultaneously, while the second switch controls only one of the loads independently.

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Assessment and online resources

Assessment suggestions

- Have students rate their understanding of schematics and symbols.
- Use an exit slip asking students to draw a simple circuit diagram and label its components.
- Collect and review students' practice work to assess their grasp of the concepts.

Online resources

- [Automotive Window Kit - Lethbridge Polytechnic STEM Website](#) (Lethbridge Polytechnic, 2023)
- [Window motor box overview](#) (Lethbridge Polytechnic, 2023)
- [How to use a digital clamp meter or multimeter](#) (Lethbridge Polytechnic, 2025)
- [How to draw symbols for circuit components easily / electric components symbols](#) (Manjula Kalyan, 2022)