Circuit Drawings and Wiring Diagrams

Description

Successfully performing electrical work requires the ability to read and interpret many different types of drawings and diagrams. Understanding circuit symbols and components is another one of the basic building blocks needed to become an electrician. If an electrician misinterprets a drawing or diagram when wiring a house, devices could be incorrectly installed or even missed altogether. Knowing how to properly take information from an electrical drawing or diagram and apply it to the real world is essential for electricians.

Lesson Outcomes

The student will be able to:

- Know the difference between a circuit drawing and a wiring diagram
- Understand some basic symbols for schematic drawings and wiring diagrams
- Produce a wiring diagram
- Understand the difference between different types of diagrams
- Know how to draw a basic floor plan with electrical symbols

Assumptions

Students will have been introduced to electrical equipment and terminology. In addition, they will understand:

- Basic electrical circuits and theory
- Branch circuit wiring
- A basic top view floor plan

Terminology

Block diagram: a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks.

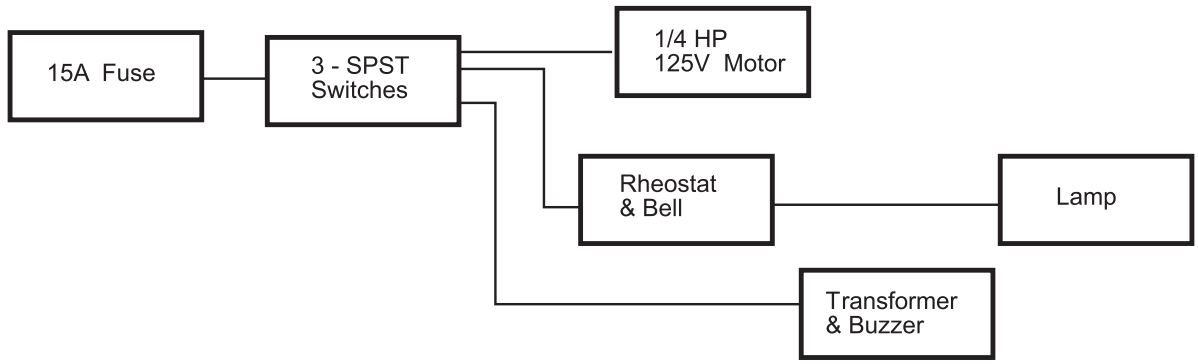


Figure 1—Block diagram

Circuit drawing (diagram): a simplified conventional graphical representation of an electrical circuit.

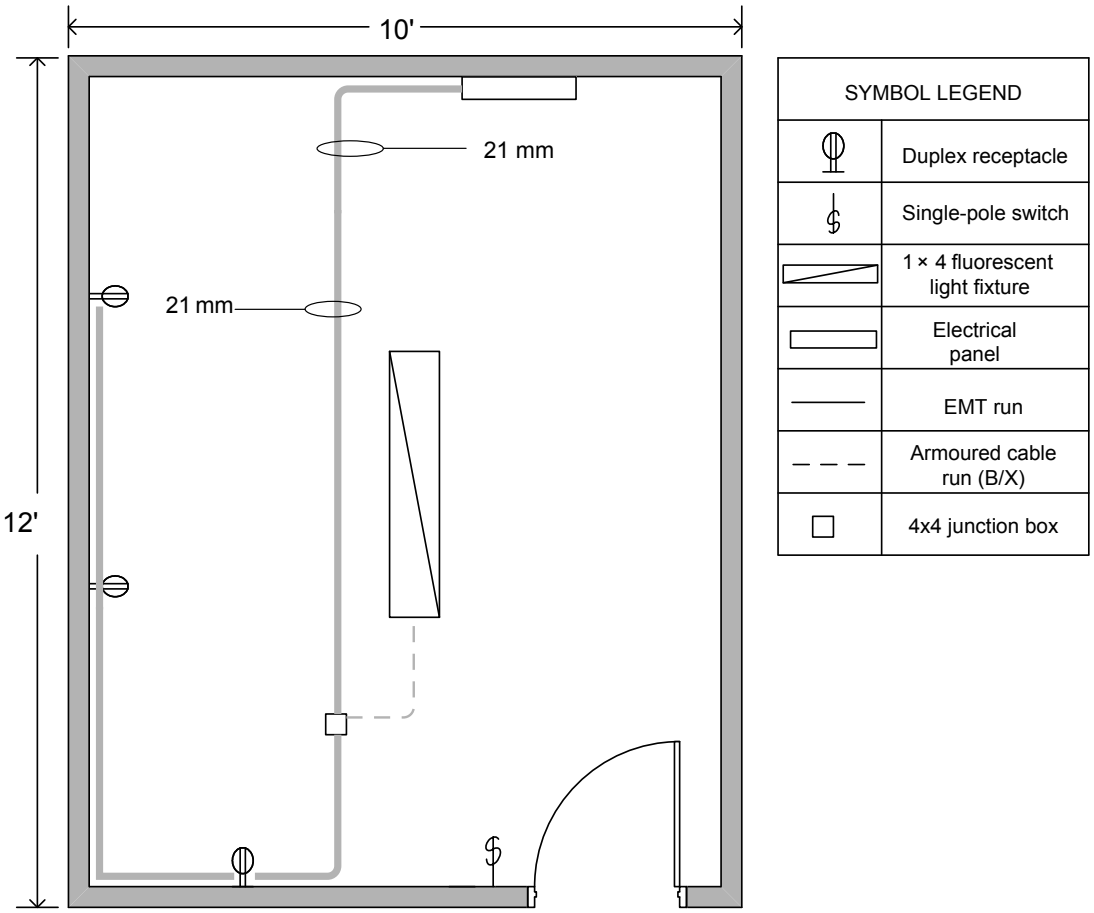


Figure 2—Circuit drawing

Line diagram: a one-line diagram or single-line diagram is a simplified notation for representing an electrical system. The one-line diagram is similar to a block diagram except that electrical elements such as switches, circuit breakers, transformers, and capacitors are shown by standardized schematic symbols.

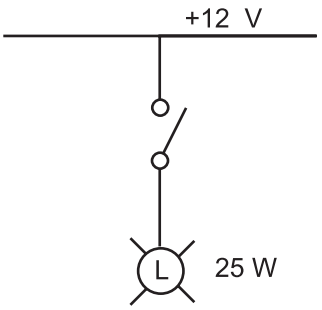


Figure 3—One-line diagram

Pictorial diagram: a diagram that represents the elements of a system using abstract, graphic drawings or realistic pictures.

Schematic diagram: a diagram that uses lines to represent the wires and symbols to represent components. It is used to show how the circuit functions.

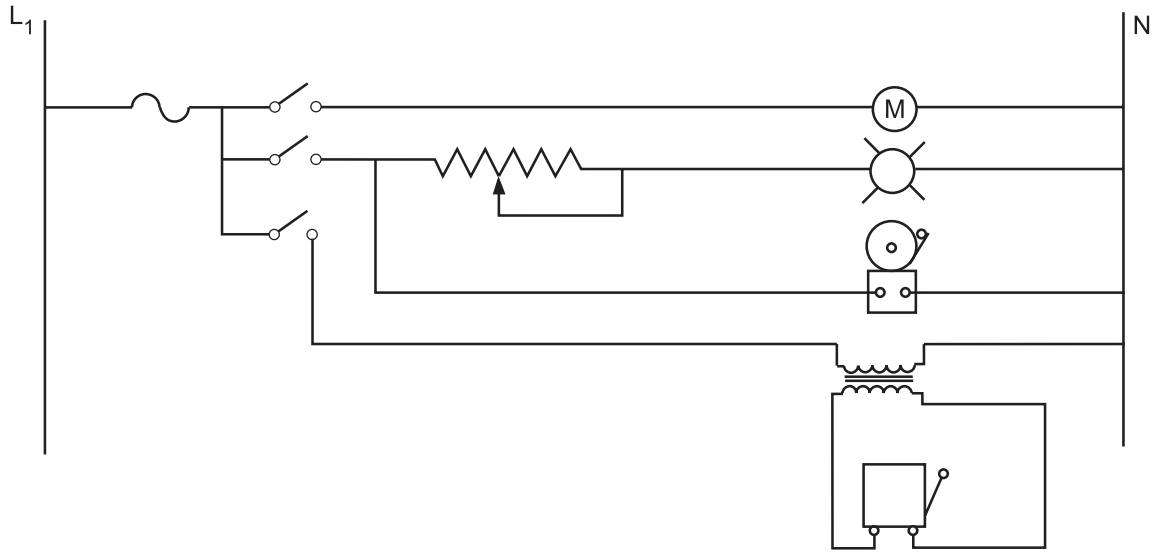


Figure 4—Schematic diagram

Wiring diagram (or pictorial): a simplified conventional pictorial representation of an electrical circuit. It shows the components of the circuit as simplified shapes, and how to make the connections between the devices. A wiring diagram usually gives more information about the relative position and arrangement of devices and terminals on the devices.

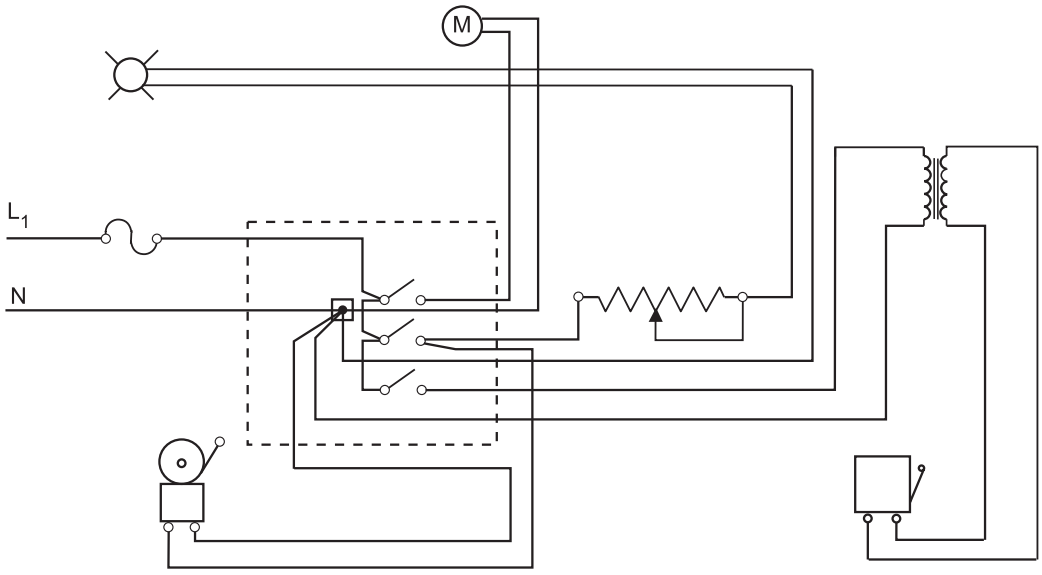


Figure 5—Wiring diagram

Estimated Time

2–3 hours

Recommended Number of Students

20, based on *BC Technology Educators' Best Practice Guide*

Facilities

Classroom, or technology education shop

Tools

Pencils, rulers, erasers

Materials

Blank paper, photocopies of standard floor plans

Optional

Drafting table, T square, 90° triangle

Resources

Attached drawing and wiring diagram

Activity 1: Drawing Circuits

1. Using the basic electrical floor plan and the symbol chart on the following pages, explain the electrical symbols to the students.
2. Give students a standard photocopy of a floor plan (see the end of this Activity Plan) that includes a kitchen and have them draw one or two 12-device circuits using electrical symbols and paths for circuits as shown in the floor plan drawing (Figure 5).

   Note: Page 59 in the *Electrical Code Simplified Book* will help students to understand how many devices are permitted per circuit and their electrical symbols.
3. Have students draw two outlets that require separate circuits for a fridge and a dishwasher that go directly back to panel (homerun shown as a short line directed toward the panel with an arrow on it).
4. Have students draw a legend of symbols for their drawing.

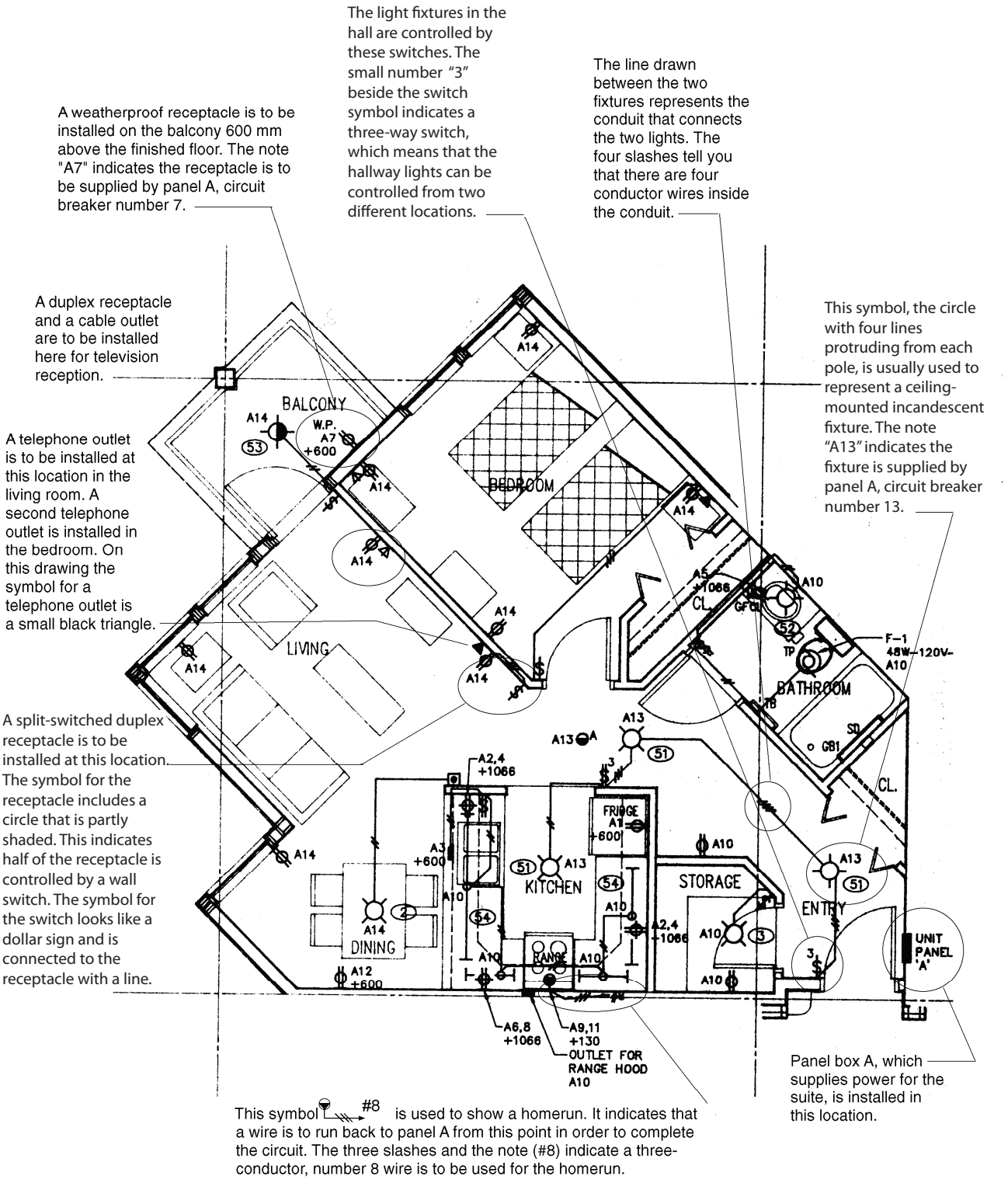


Figure 6—Floor plan of a typical suite showing power and lighting details

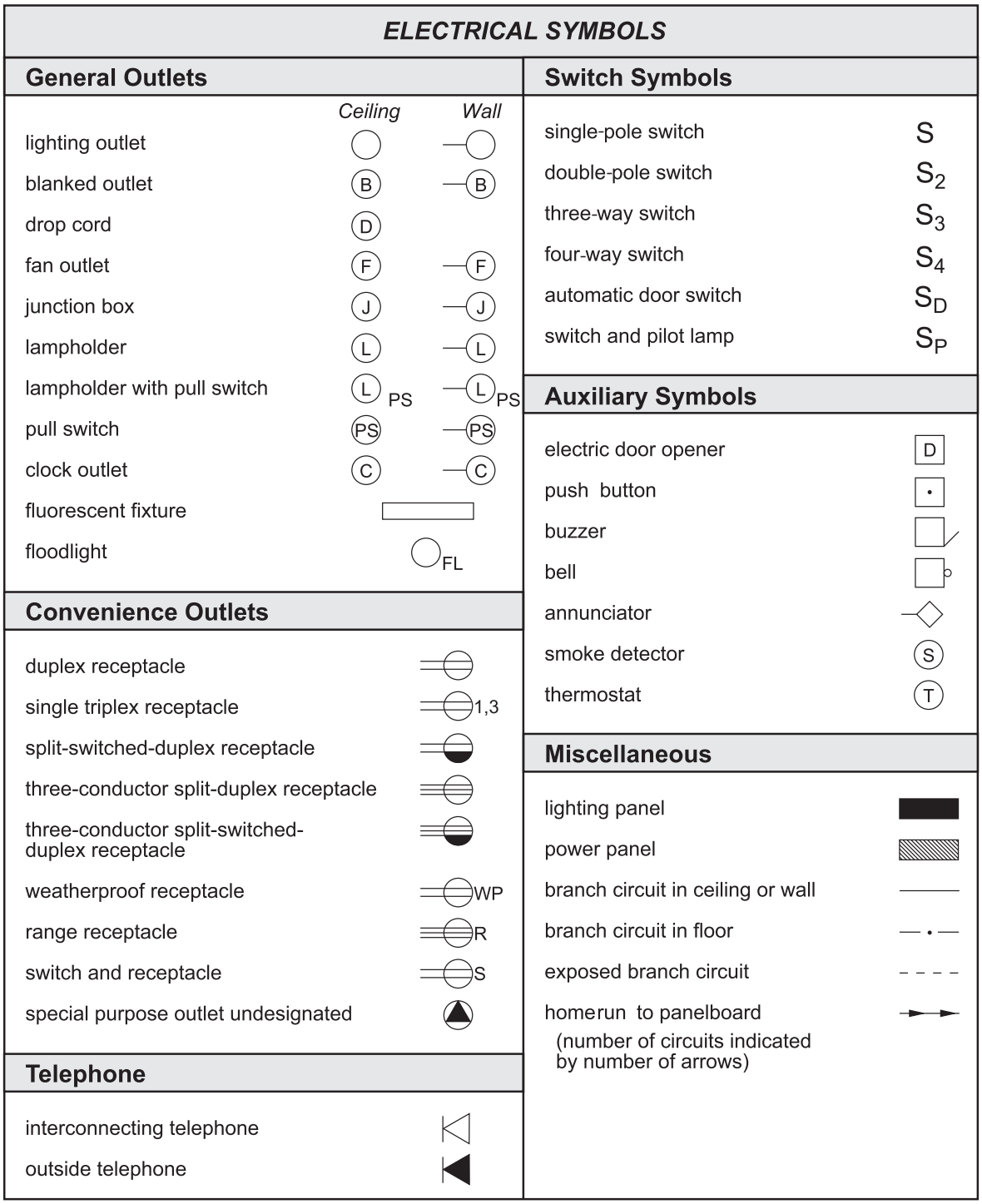


Figure 7—Common electrical symbols

Activity 2: Basic Wiring Diagram

- Have students produce a basic wiring diagram.
- The wiring diagram will show the circuit students will wire in **Wiring Devices** and **Wiring a Wall Section**.
- The diagram should show incoming power feeding a receptacle.
- From the receptacle the cable feeds a switch.
- From the switch the cable feeds a light.

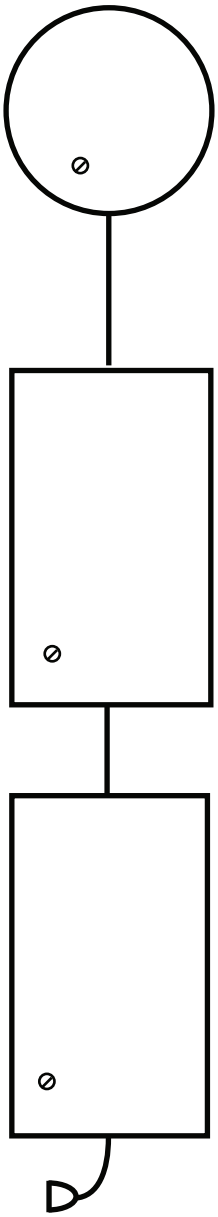
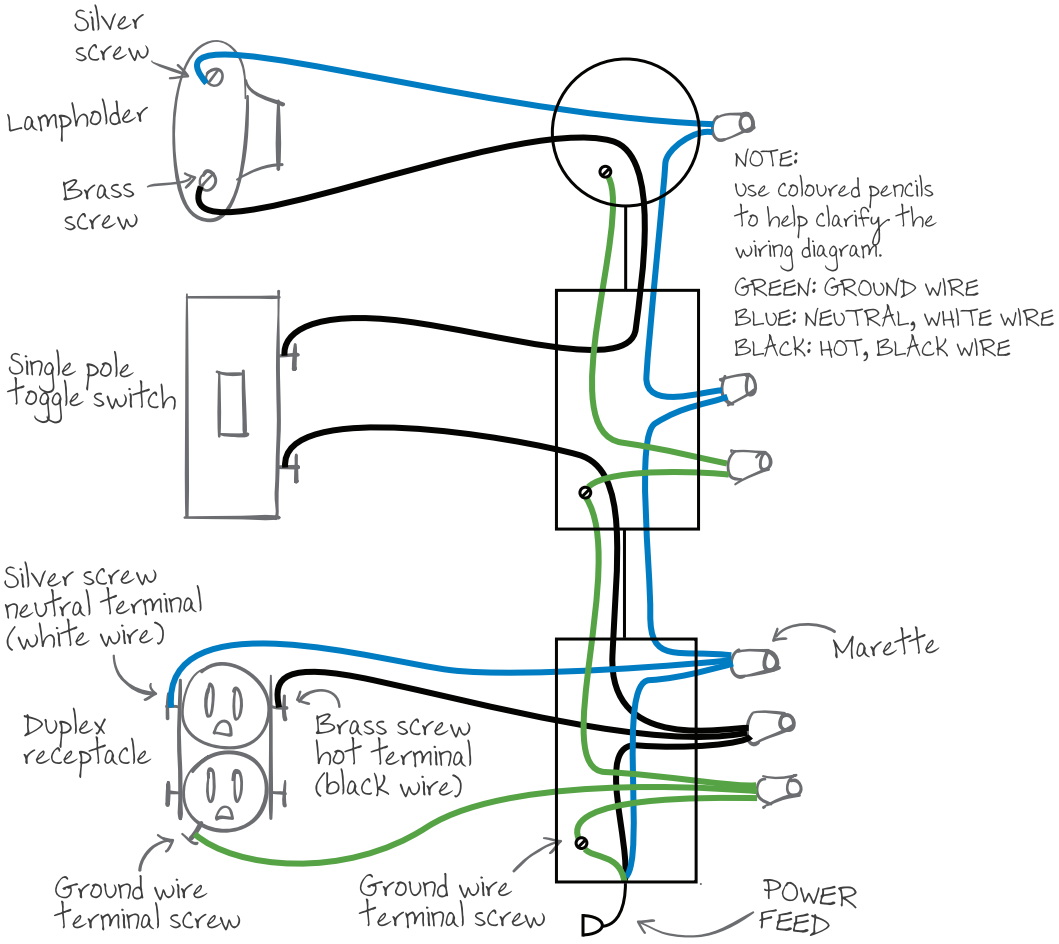


Figure 8—Basic Wiring Diagram

Wire one duplex outlet and one switch controlling one light, fed from the outlet.



Evaluation Guidelines

The student:

- Understands basic types of electrical drawings
- Can produce a floor plan that displays understanding
- Knows the difference between a circuit drawing and a wiring diagram
- Draws and understands a wiring diagram

Extension Activity

Draw more wiring diagrams that include more devices in different configurations.

Example: Wiring from a switch box running two lights. The circuit could be more complicated if the student understands the concepts.

Plan for Main Floor of House