

## Instructions

Read each question carefully. For Part A, choose the best answer for each multiple-choice question and complete the matching section. For Part B, write your answers in complete sentences. For Part C, use your knowledge of circuits to solve the problems, including drawing diagrams where required.

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### Part A: Objective Questions

Circle the letter of the best answer for questions 1-15.

1. What does the symbol of a circle with a cross (X) inside represent in a circuit diagram?
  - a) A switch
  - b) A battery
  - c) A bulb
  - d) A motor
2. Which of these provides the electrical energy for a circuit?
  - a) A wire
  - b) A switch
  - c) A resistor
  - d) A cell
3. In a circuit diagram, what does a simple, straight, unbroken line represent?
  - a) A switch
  - b) A wire
  - c) A resistor
  - d) A battery
4. What is the function of a switch?
  - a) To increase the power
  - b) To measure the current
  - c) To open or close the circuit path
  - d) To create light
5. A component represented by a zig-zag line is a:
  - a) Bulb
  - b) Motor
  - c) Resistor
  - d) Buzzer
6. What is a series of two or more cells connected together called?
  - a) A wire
  - b) A generator
  - c) A switch
  - d) A battery
7. For an electrical current to flow, the circuit must be:
  - a) Open
  - b) Made of plastic
  - c) Closed
  - d) In a straight line
8. The symbol 'A' inside a circle represents:
  - a) An ammeter
  - b) A battery
  - c) An alternate path

- d) An amplifier
9. A component that converts electrical energy into sound energy is a:
- a) Bulb
  - b) Resistor
  - c) Motor
  - d) Buzzer
10. Which symbol represents a single cell?
- a) A long line and a short line
  - b) A circle with an 'X'
  - c) A zig-zag line
  - d) Two long lines and two short lines
11. An open switch means the circuit is:
- a) Complete and working
  - b) Incomplete and not working
  - c) Short-circuited
  - d) Overloaded
12. What does the symbol of a circle with an 'M' inside represent?
- a) A meter
  - b) A magnet
  - c) A motor
  - d) A musician
13. To measure the voltage across a component, you would use a:
- a) Thermometer
  - b) Voltmeter
  - c) Ammeter
  - d) Ruler
14. Connecting wires are usually made from which material?
- a) Rubber
  - b) Glass
  - c) Copper
  - d) Wood
15. In a series circuit, how many paths can the electric current take?
- a) One
  - b) Two
  - c) Three
  - d) As many as there are components

**Match the component in Column A with its symbol description in Column B for questions 16-20.**

**Column A: Component**

16. Battery

17. Open Switch

18. Bulb

19. Wire

20. Resistor

**Column B: Symbol Description**

A. A circle with a cross inside it.

B. A straight line.

C. A break in the line with a connecting line angled upwards.

D. A zig-zag line.

E. A series of long and short parallel lines.

## Part B: Subjective Questions

Write a short answer for each of the following questions.

1. What is the difference between a cell and a battery in an electrical circuit?
  2. Why is it important for scientists and electricians to use standard symbols for circuit diagrams?
  3. Explain what happens to the flow of electricity when a switch is "closed".
  4. What is an "open circuit"? Will a bulb light up in an open circuit? Explain why or why not.
  5. What is the function of a resistor?
  6. Describe the energy transformation that occurs in a light bulb.
  7. Describe the energy transformation that occurs in a motor.
  8. Using words, describe the symbol for a buzzer.
  9. In a simple parallel circuit with two bulbs, why does the second bulb stay lit if the first one breaks?
  10. Draw the standard circuit symbol for a closed switch and an open switch. Label each drawing.
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## Part C: Problem Solving

Use your knowledge of circuits to answer the following questions.

1. You build a simple circuit with one battery, one switch, and one bulb. The bulb does not light up. List at least three possible reasons for this problem.
  2. A student wants to build a circuit that will make a noise and light up at the same time when they close a switch. The circuit will be powered by a single cell. Draw a circuit diagram for this setup.
  3. Look at a circuit containing a battery and two bulbs connected in series. What will happen to the second bulb if the first bulb burns out (the filament breaks)? Explain your answer.
  4. A student builds a circuit with a battery, an open switch, and a motor. Will the motor spin? Explain why.
  5. You are given one battery, two bulbs, and enough wires. Draw a circuit diagram where both bulbs light up, but if you unscrew one bulb, the other one stays on.
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## Answer Key

### Part A: Objective Questions

1. c) A bulb
2. d) A cell
3. b) A wire
4. c) To open or close the circuit path
5. c) Resistor
6. d) A battery
7. c) Closed
8. a) An ammeter
9. d) A Buzzer
10. a) A long line and a short line
11. b) Incomplete and not working
12. c) A motor
13. b) Voltmeter
14. c) Copper
15. a) One
16. **16.** E
17. **17.** C
18. **18.** A
19. **19.** B
20. **20.** D

### Part B: Subjective Questions

1. A cell is a single unit that provides electrical energy. A battery is made up of two or more cells connected together to provide more energy.
2. Using standard symbols allows anyone, anywhere in the world, to understand a circuit diagram. It is a universal language that prevents confusion.
3. When a switch is closed, it completes the circuit path. This allows electricity to flow from the power source through the components and back again.
4. An "open circuit" is an incomplete or broken path. A bulb will not light up because the electricity cannot flow all the way around the circuit.
5. A resistor is a component that limits or reduces the flow of electric current in a circuit.
6. A light bulb transforms electrical energy into light energy and heat energy.
7. A motor transforms electrical energy into mechanical energy (motion/kinetic energy) and some heat/sound energy.
8. The symbol for a buzzer looks like a small dome or a semi-circle with two lines coming out from the flat base for connections.
9. In a parallel circuit, there are multiple paths for the current. If one bulb breaks, the current can still flow through the other path to light up the second bulb.
10. **Closed Switch:** A straight line with a dot, a connecting line segment, and another dot. (---●---●---).  
**Open Switch:** A straight line with a dot, and a connecting line angled upwards, not touching the other dot. (---● / ●---)

### Part C: Problem Solving

1. Possible reasons include:
  - The switch is open.

- The bulb has burned out.
  - The battery is dead/drained.
  - A wire is loose or disconnected.
  - The components are not connected correctly.
2. The diagram should show the symbol for a single cell connected by wires to a closed switch, a bulb (circle with X), and a buzzer (dome shape), all in a single loop (series circuit).
  3. If the first bulb burns out, the filament inside it breaks. Since this is a series circuit, there is only one path for the current. The break in the filament creates an open circuit, so the current stops flowing and the second bulb will go out.
  4. No, the motor will not spin. The switch is open, which means the circuit is incomplete. Electricity cannot flow from the battery to the motor, so it will not turn on.
  5. The drawing must show a parallel circuit. The diagram should show a battery. The wires should split into two separate branches. One bulb should be on each branch. The branches then rejoin before connecting back to the other side of the battery.