

Selina Solutions For Class 9 Physics
Chapter 9 – Current Electricity

Exercise-9(A)

Name one d.c. source and one a.c. source.

Solution:

d.c source – cell

a.c. source – mains

1. Distinguish between d.c. and a.c.

Solution:

The differences between d.c. and a.c are as follows:

D.C	A.C
Direct current(d.c) is a current of constant magnitude flowing in one direction	Alternating current (a.c.) is the current which reverses its magnitude and direction with time
It has zero frequency	It generates a frequency
Produced from battery or cell	Produced mainly by generators
It does not travel safely over a long distance and loses much energy compared to a.c.	It travels safely over a long distance without losing much energy

2. What is an electric cell?

Solution:

It is an electric device that converts chemical energy into electrical energy when it sends current in a circuit.

3. What transformation of energy takes place when current is drawn from a cell?

Solution:

When current is drawn from a cell, chemical energy is converted into electrical energy.

4. Name the constituents of a cell.

Solution:

A cell constitutes of the following:

- Two electrodes
- An electrolyte in a vessel

5. State the two kinds of cell. Give one example of each.

Solution:

The two kinds of cells are as follows:

- Primary cell – example: simple voltaic cell
- Secondary cells or accumulators – example: Li-H battery

6. What is a primary cell? Name two such cells.

Solution:

A primary cell provides current as a result of irreversible chemical reaction. They are the ‘use and throw’ type of cells and cannot be recharged as the cells are discarded after use when the entire chemical energy contained in it is converted into electrical energy.

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Two primary cells are – Simple voltaic cell, Leclanche cell

7. What is a secondary cell? Name one such cell.

Solution:

Secondary cells or accumulators, providing current as a result of a chemical reaction. The chemical reaction is reversible in these cells and hence can be recharged after using. One such cell is a Lead accumulator.

8. State three differences between primary and secondary cells.

Solution:

The three differences between a primary and a secondary cell is as follows:

Primary cell	Secondary cell
In a primary cell, chemical reactions are irreversible	In a secondary cell, chemical reactions are reversible
When current is drawn from a primary cell, chemical energy is converted into electrical energy	When current passes in a secondary cell, electrical energy is converted into chemical energy, when current is drawn from it, chemical energy is converted into electrical energy
Primary cell cannot be recharged	Secondary cell can be recharged

9. What do you understand by the term current? State and define its S.I. unit.

Solution:

Current is the rate of flow of charge across a cross-section normal to the direction of flow of current. The S.I. unit of current is coulomb per second which is called ampere and denoted by A. Current is a scalar quantity.

If 1 ampere current flows through a conductor, it means that 6.25×10^{18} electrons pass in one second across that cross section of conductor.

10. How much is the charge of an electron?

Solution:

The charge of an electron is -1.6×10^{-19} coulomb.

11. n electrons flow through a cross section of a conductor in time t. If charge on an electron is e, write an expression for the current in the conductor.

Solution:

The expression for current (I) in a conductor is as follows:

$$I = \frac{ne}{t}$$

Where: n is the electron flow, t is the time taken for electron flow, e is the charge on an electron e

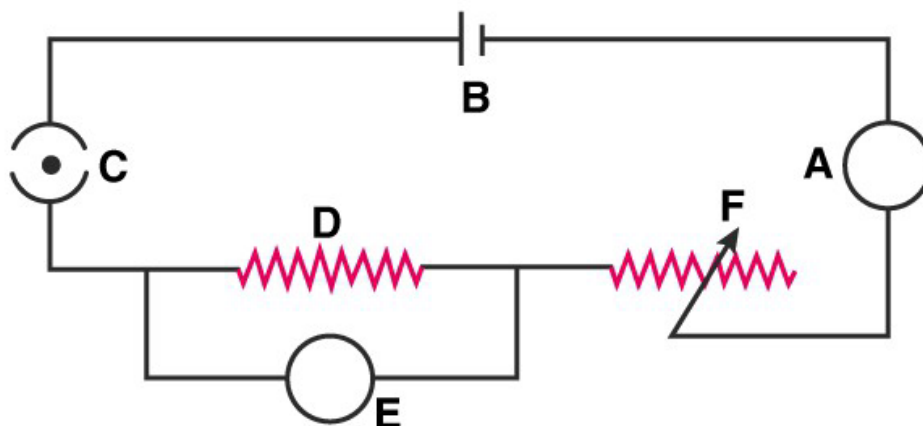
12. Name the instrument used to control current in an electric circuit.

Solution:

The instrument used to control current in an electric circuit is a Rheostat.

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13. In the electric circuit shown in the figure, label the parts A, B, C, D, E, and F. State the function of each part. Show in the diagram the direction of flow of current.



Solution:

The diagram shows the direction of flow of current and the labeling - A, B, C, D, E, and F

The function of each part is as follows:

A – A is the Ammeter, which measure the flow of current in the circuit

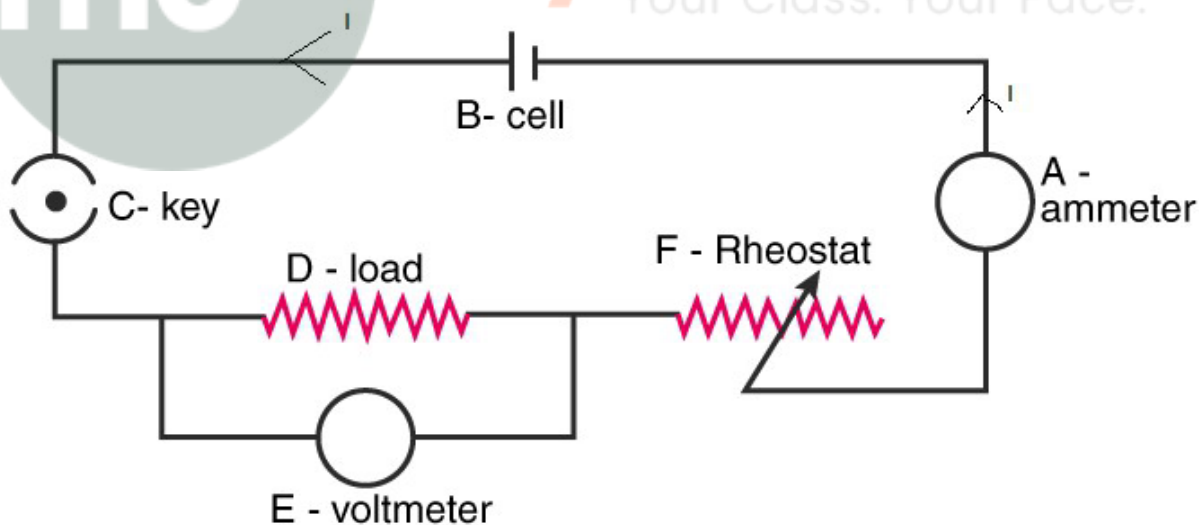
B – Cell: acts as a source of direct current for the circuit

C – key: Key puts the current, on and off in the circuit

D – Load: load is an appliance connected in a circuit which can be a combination of different electrical components or a resistance (bulb).

E - Voltmeter: It measures the potential difference between two points of a circuit.

F – Rheostat: it controls the flow of current in a circuit



14. What is the function of a key (or switch) in an electric circuit?

Solution:

The function of a key or a switch is to put on or off current in a circuit.

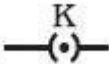

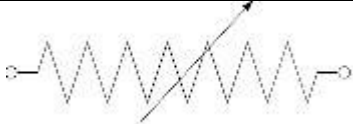


15. Write symbols and state functions of each of the following components in an electric circuit:

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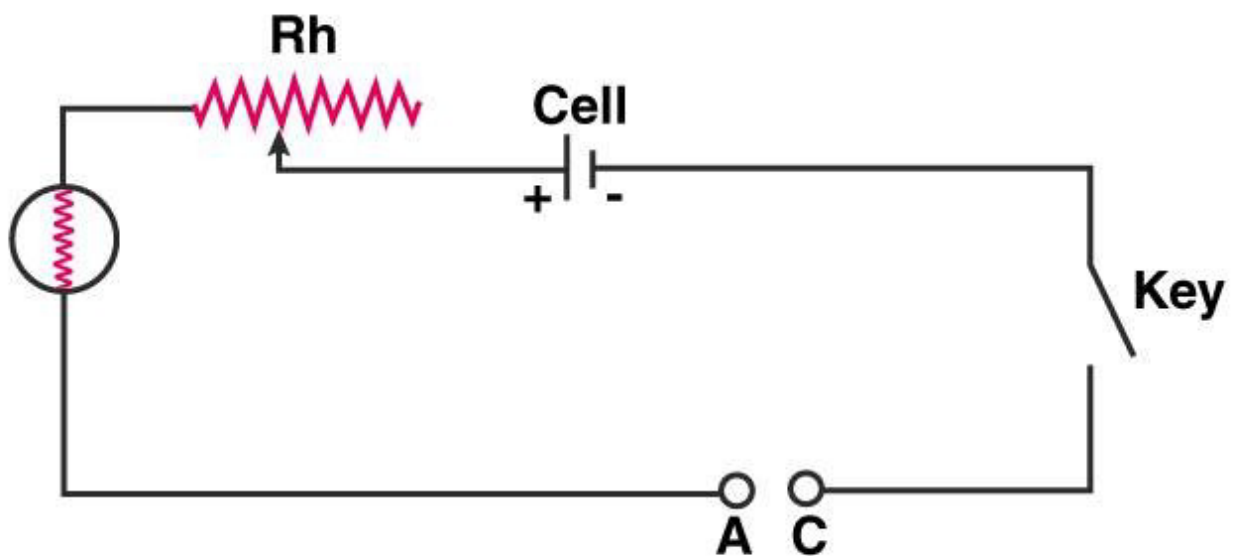
- (i) Key,
- (ii) Cell,
- (iii) Rheostat,
- (iv) Ammeter, and
- (v) Voltmeter.

Solution:

The table below states the symbols and functions of the components:

Components	Symbol	Function
Key		Switches current on or off in the circuit
Cell		Acts as a source of direct current for the circuit
Rheostat		it controls the flow of current in a circuit
Ammeter		Measures the flow of current in the circuit
Voltmeter		Measures the potential difference between two points of a circuit

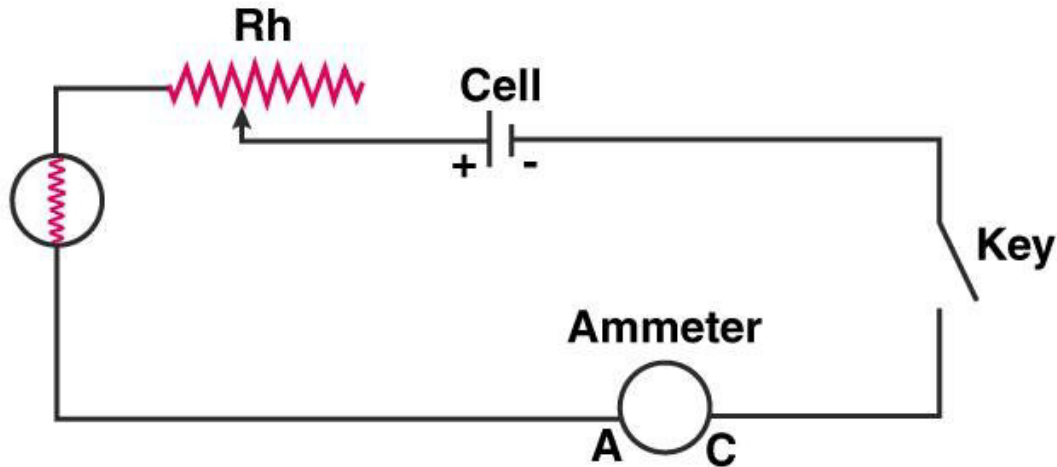
16. (a) Complete the circuit given in figure by inserting between the terminals A and C, an ammeter. (b) In the diagram mark the polarity at the terminals of ammeter and indicate clearly the direction of flow of current in the circuit, when the circuit is complete. (c) Name and state the purpose of Rh in the circuit.



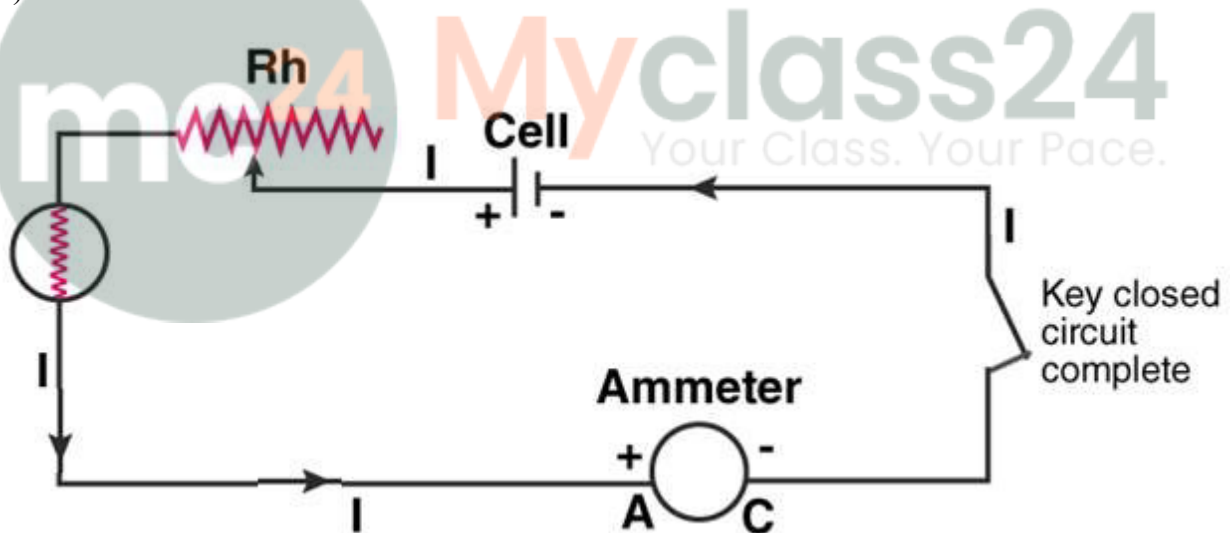
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Solution:

(a) The circuit is as follows:



(b) The circuit is as follows:



(c) Rh is the rheostat. Rheostat controls the flow of current in a circuit.

17. What are conductors and insulators of electricity? Give two examples of each.

Solution:

Conductors – they are the substances which allow the current to flow through them easily. They have a large number of free electrons and they offer a very small resistance to the current flow. Two examples of conductors of electricity are impure water and mercury. Some others are copper, aluminum etc.

Insulators – they are the substances which do not allow current to flow through them. They have no

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electrons and offer a very high resistance to the current flow. Example – Cotton, rubber.

18. Select conductors of electricity from the following:

Copper wire, silk thread, pure water, acidulated water, human body, glass, mercury.

Solution:

The conductors of electricity are as follows:

- Copper wire
- Acidulated water
- Human body
- Mercury

19. State two differences between a conductor and an insulator of electricity.

Solution:

The two differences between a conductor and an insulator of electricity are as follows:

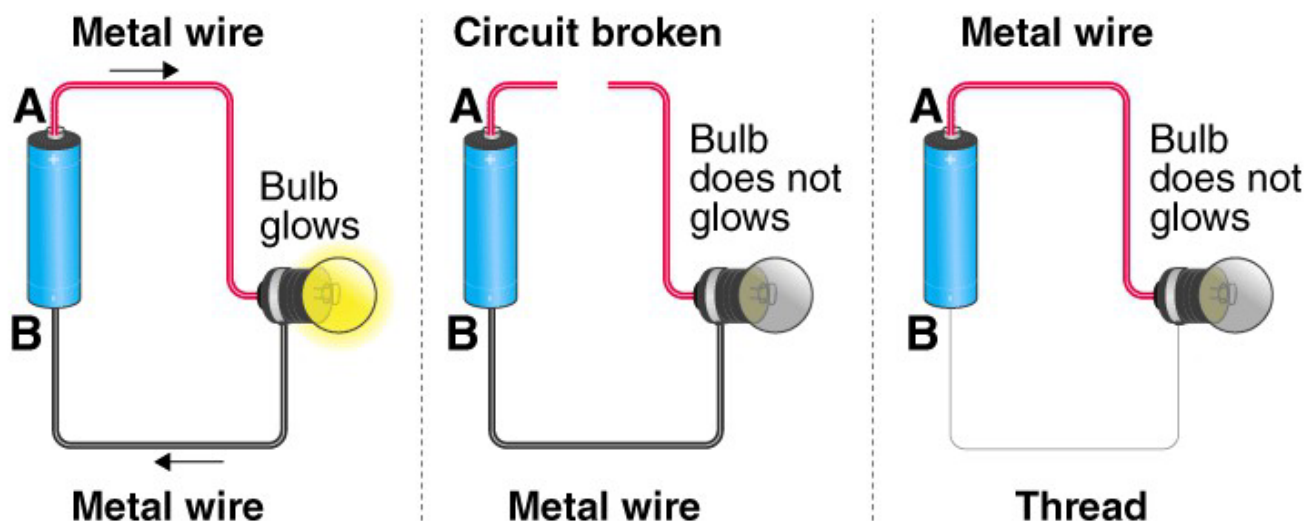
1. Insulators do not conduct electricity but conductors allow the current to flow through them
2. Insulators have no free electrons and offer a very high resistance to current flow but conductors have a large number of free electrons and offer a very small resistance to current flow.

20. Distinguish between a closed circuit and an open circuit, with the use of suitable labelled diagram.

Solution:

The differences are as follows:

Closed circuit	Open circuit
A circuit is closed when each part of it is made of a conductor(allowing current to pass through it) and on plugging in the key or if it is complete, current flows in the circuit	An open circuit does not allow current to flow through it, which could occur if: any of its component is not made of a conductor or the key is not plugged in or the circuit is broken.



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21. Write the condition required for a circuit to be a closed circuit.

Solution:

For the circuit to be closed, every part of the circuit should be a conductor.

Multiple choice type:

1. A cell is used to:

- (a) Measure current in a circuit
- (b) Provide current in a circuit
- (c) Limit current in a circuit
- (d) Prevent current in a circuit

Solution:

- (b) Provide current in a circuit

A cell converts chemical energy into electrical energy when it sends current in a circuit.

2. The unit of current is:

- (a) Ampere
- (b) Volt
- (c) Ohm
- (d) Coulomb

Solution:

- (a) ampere

Current is the flow of electrons. S.I. unit of current is coulomb per second which is called ampere.

3. The insulator of electricity is:

- (a) Copper
- (b) Acidulated water
- (c) Human body
- (d) Silk

Solution:

- (d) Silk

Copper, acidulated water, human body conduct electricity, silk does not conduct electricity.

Numericals:

1. A charge 0.5C passes through a cross section of a conductor in 5s. Find the current.

Solution:

Given: charge = 0.5 C, time = 5s, current=?

We know that;

$$\begin{aligned}\text{Current} &= \text{charge/time} \\ &= 0.5 / 5 \\ &= 0.1 \text{ A}\end{aligned}$$

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2. A current of 1.5A flows through a conductor for 2.0s. What amount of charge passes through the conductor?

Solution:

Given: current = 1.5A, time = 2s, charge = ?

We know that:

$$\text{Current} = \text{charge/time}$$

$$\Rightarrow \text{Charge} = \text{current} \times \text{time}$$

$$\Rightarrow \quad = 1.5 \times 2$$

$$\Rightarrow \quad = 3 \text{ C}$$

3. When starter motor of a car is switched on for 0.8s, a charge 24 C passes through the coil of the motor. Calculate the current in the coil.

Solution:

Given: Time = 0.8s, charge = 24C, current = ?

We know that:

$$\text{Current} = \text{charge/time}$$

$$= 24/0.8$$

$$= 30\text{A}$$



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