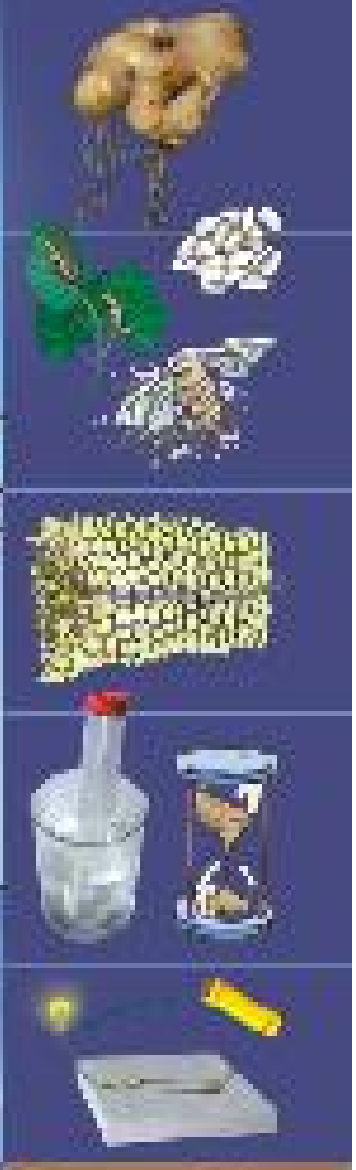
पुधना International School
Shree Swaminarayan Gurukul, Zundal

CLASS – VII
SCIENCE(SEM-2)
SAMPLE COPY
(November month)

SCIENCE

TEXTBOOK FOR CLASS VII



SCIENCE

CLASS VII

NCERT

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Chapter – 13
Motion and Time

Key words:

- **Motion:** The action or process of moving or being moved.
- The distance moved by an object in a unit time is called its speed.
- Speed of objects help us to decide which one is moving faster than the other.
- The speed of an object is the distance travelled divided by the time taken to cover that distance. Its basic unit is mere per second (m/s).
- Periodic events are used for the measurement of time. Periodic motion of a pendulum has been used to make clocks and watches.
- Motion of objects can be presented in pictorial form by their distance-time graphs.
- The distance-time graph for the motion of an object moving with a constant speed is a straight line.

- **Types of Motion:**
  (i) **Uniform motion:** An object moving along a straight line with a constant speed is said to be in uniform motion. The average speed is the same as the actual speed.
  (ii) **Non-Uniform motion:** If the speed of an object moving along a straight line keeps changing, its motion is said to be non-uniform.

- **Speed:** It is the distance covered by an object in a unit time. Basic unit of speed is m/s.

  Speed=Total distance coveredTotal time takenSpeed=Total distance coveredTotal time taken

- **Distance-Time Graph:** Motion of objects can be presented in pictorial form by their distance-time graphs. The distance-time graph for the motion of an object moving with a constant speed is a straight line.

VERY SHORT ANSWER QUESTIONS

1. A simple pendulum is oscillating between two points A and B as shown in Figure 13.5. Is the motion of the bob uniform or non-uniform?

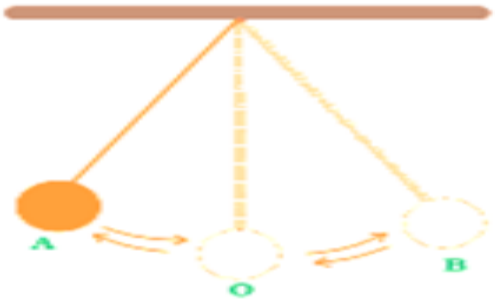


Fig. 13.5

Ans: The motion of the bob isNon-uniform motion as the object is changing its motion.

2. Paheli and Boojho have to cover different distances to reach their school but they take the same time to reach the school. What can you say about their speed ?

Ans: Paheli and Boojho travelled at different speed due to which they reached at the same time even on travelling through different paths.

3. If Boojho covers a certain distance in one hour and Paheli covers the same distance in two hours, who travels in a higher speed ?

Ans: Boojho travels in a higher speed because he covered the distance in 1 hour but Paheli covered the same distance in 2 hours. Paheli take double time than Boojho to travel the same distance.

SHORT QUESTION ANSWERS

1. The average age of children of Class VII is 12 years and 3 months. Express this age in seconds.

Ans: average age= 12 years 3 months

= 12 × 365 + 3 × 30
= 4380 + 90
= 4470 days

= 4470 × 24 × 60 × 60 s
= 386208000 s

2. A spaceship travels 36,000 km in one hour. Express its speed in km/s.

Ans: 1 hr = 60 min.

1 min. = 60s.

1 hr = 3600 s.

Distance = 36000 km.

Speed = 36000/3600 km/s

= 10 km/s

3. Starting from A, Paheli moves along a rectangular path ABCD as shown in Figure 13.7. She takes 2 minutes to travel each side. Plot a distance-time graph and explain whether the motion is uniform or non-uniform.

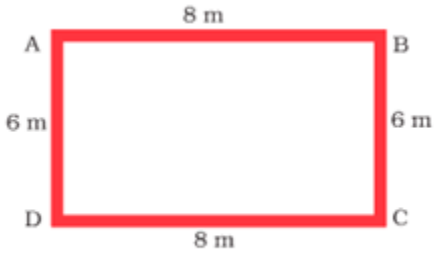
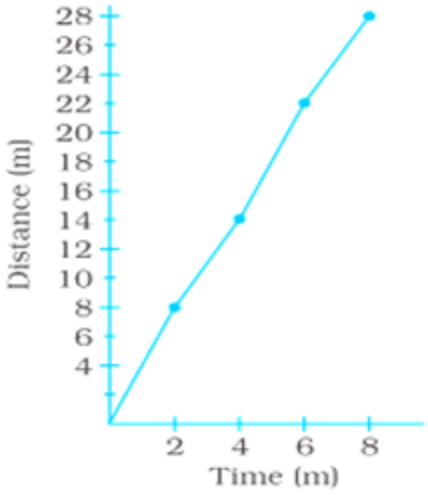


Fig 13.7

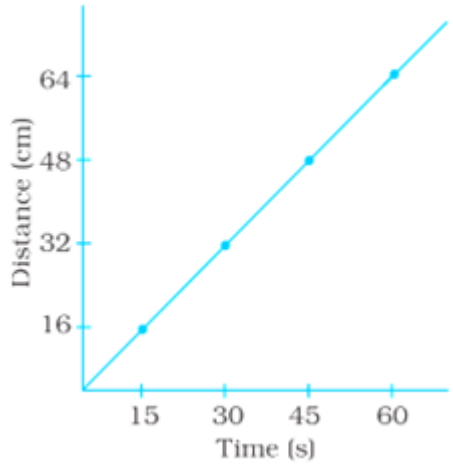
Ans: Since the distance covered per unit time for the entire distance covered is not the same, So the motion is non-uniform.



4. Plot a distance-time graph of the tip of the second hand of a clock by selecting 4 points on x-axis and y-axis respectively. The circumference of the circle traced by the second hand is 64 cm.

Ans:

Time (s)	x	15	30	45	60
Distance (cm)	y	16	32	48	64



LONG ANSWER QUESTIONS

1. Given below as Figure 13.8 is the distance-time graph of the motion an object.

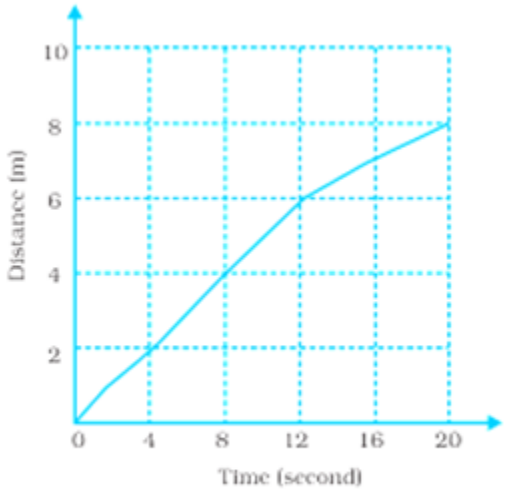


Fig. 13.8

(i) What will be the position of the object at 20s?
(ii) What will be the distance travelled by the object in 12s?
(iii) What is the average speed of the object?

Ans: (i) The position of the object is 8 m from the starting point at 20s.
(ii) The distance travelled by the object in 12s is 6 m.
(iii) The average speed of the object is 0.4 m/s.

2. Distance between Bholu's and Golu's house is 9 km. Bholu has to attend Golu's birthday party at 7 o'clock. He started from his home at 6 o'clock on his bicycle and covered a distance of 6 km in 40 minutes. At that point, he met Chintu and he spoke to him for 5 minutes and reached Golu's birthday party at 7 o'clock. With what speed did he cover the second part of the journey? Calculate his average speed for the entire journey.

Ans: He started at 6'O clock and travelled for 40 minutes i.e. at 6:40, he travelled 6 km out of 9 km. There he waited for 5 minutes and again started i.e. he resumed his journey at 6:45, therefore he travelled remaining 3 km in 15 minutes.

Time = 15 minutes = 0.25 hr.

Distance = 3 km.

Speed = 3/0.25 km/hr. = 12 km/hr.

Average speed = 9/1 km/hr. = 9 km/hr.

3. Boojho goes to the football ground to play football. The distance time graph of his journey from his home to the ground is given as Figure 13.9.

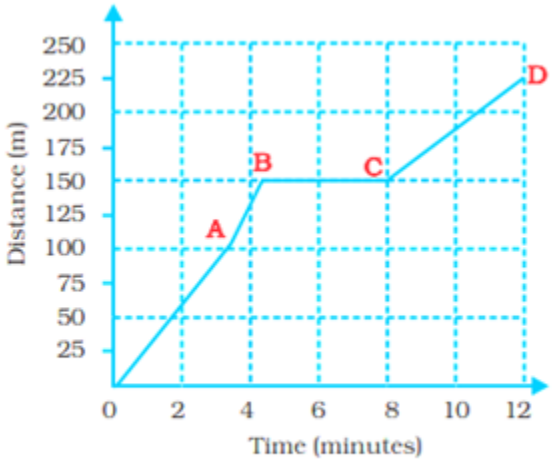


Fig. 13.9

(a) What does the graph between point B and C indicate about the motion of Boojho?
(b) Is the motion between 0 to 4 minutes' uniform or nonuniform?
(c) What is his speed between 8 and 12 minutes of his journey?

Ans: (a) Boojho is at rest, i.e. his speed is zero
(b) Non-uniform

(c)225−15012−8225−15012−8 = 754754= 18.75 m/minute

TEXTUAL EXERCISE

Question 1. Classify the following as motion along a straight line, circular or oscillatory motion.
(i) Motion of your hands while running.
(ii) Motion of a horse pulling a cart on a straight road.
(iii) Motion of a child in merry-go –round.
(iv) Motion of a child on a see-saw.
(v) Motion of the hammer of an electric bell.

(vi) Motion of a train on a straight bridge.

Answer: Classification of motion
(i) Oscillatory motion
(ii) Straight line
(iii) Circular motion
(iv) Oscillatory motion
(v) Oscillatory motion
(vi) Straight line.

Question 2. Which of the following are not correct?

(i) The basic unit of time is second.
(ii) Every object moves with a constant speed.
(iii) Distance between two cities is measured in kilometers.
(iv) The time period of a given pendulum is not constant.
(v) The speed of a train is expressed in m/h.

Answer: (ii), (iv) & (v).

Question 3. A simple pendulum takes 32 s to complete 20 oscillations. What is the time-period of the pendulum.

Answer: Number of oscillations = 20
Total time taken = 32 s
We know that time period of a given pendulum is the time taken by it to complete one oscillation.
Thus, Time period =Total time taken Number of oscillations=Total time taken Number of oscillations =32 s 20 = 1.6 s=32 s20 = 1.6 s

Question 4. The distance between two stations is 240 km. A train takes 4 hours to cover this distance. Calculate the speed of the train.
Answer: The distance b/w two stations = 240 Km
Time taken to cover this distance = 4 Hr
Now Speed =DistanceTime =240 km4 hr=60 km/h=DistanceTime =240 km4 hr=60 km/h
Therefore, speed of the train will be 60\km/h

Question 5. The odometer of a car reads 57,321.0 km when the clock shows the time 8.30 AM. The odometer reading was changed to 57,336.0 km. calculate the speed of the car in km/min during this time. Express the speed in km/h also.

Answer: Initial reading of odometer = 57321.0 Km
Final reading of odometer = 57336.0 Km
Total Distance covered = Final reading of odometer - Initial reading of odometer
= 57336.0 - 57321.0 = 15.0 Km

Initial Time = 8:30 AM
Final Time = 8:50 AM
Total time taken = Final time - Initial time = 8:50 - 8:30 = 20 min
We Know that, Speed
= distance coveredTime takendistance coveredTime taken = 1520=0.75 Km/min1520=0.75 Km /min
Speed in Km/h = 0.75×60=45 Km/h0.75×60=45 Km/h

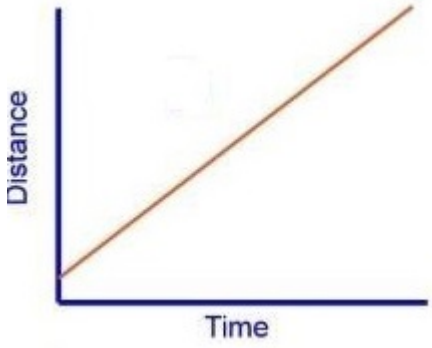
Question 6. Salma takes 15 minutes from her house to reach her school on bicycle. If the bicycle has a speed of 2 m/s, calculate the distance between her house and the school.

Answer: Speed of bicycle = 2 m/s
Total time taken = 15 min = 15×60=900 s15×60=900 s
We know that,
The distnace covered = Speed×Time takenSpeed×Time taken = 2×900=1800 m2×900=1800 m = 1.8 Km
Distance b/w house and school is 1800 m or 1.8 Km

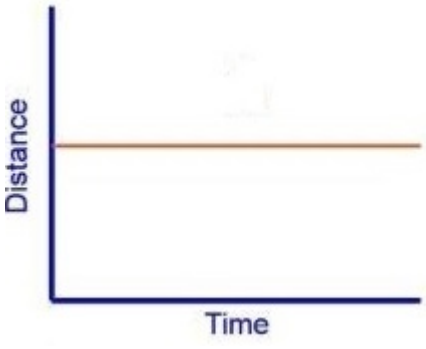
Question 7. Show the shape of the distance-time graph for the motion in the following cases:
(i) A car moving with a constant speed.
(ii) A car parked on a side road.

Answer:

(i)



(ii)



Question 8. Which of the following relations is correct?
(i) Speed = Distance x Time.
(ii) Speed = DistanceTimeDistanceTime
(iii) Speed = TimeDistanceTimeDistance
(iv) Speed = 1Distance×Time1Distance×Time
Answer: (ii) Speed = DistanceTimeDistanceTime

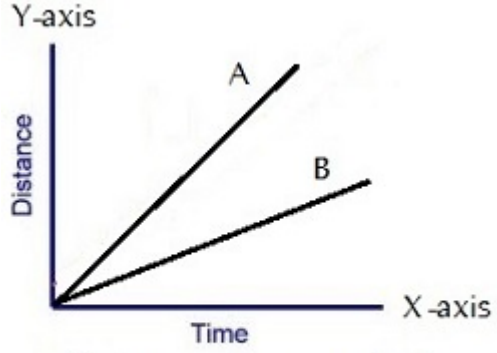
Question 9. The basic unit of speed is:
(i) Km/min
(ii) m/min
(iii) km/h
(iv) m/s
Answer: (iv) m/s.

Question 10. A car moves with a speed of 40 km/h for 15 minutes and then with a speed of 60 km/h for the next 15 minutes. The total distance covered by the car is :
(i) 100 km
(ii) 25 km
(iii) 15 km
(iv) 10 km
Answer: (ii) 25 km

Question 11. Suppose the two photograph, shown in Fig. 13.1 and Fig.13.2, had been taken at an interval of 10 seconds. If a distance of 100 meters is shown by 1 cm in these photograph, calculate the speed of the blue car.

Answer: Speed = 100 m/10s = 10 m/s

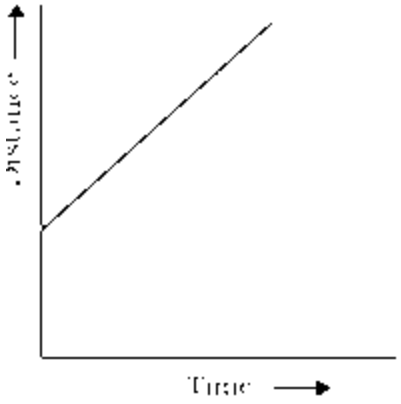
Question 12. Fig. 13.5 shows the distance-time graph for the motion of two vehicles A and B. which is one of them moving faster?



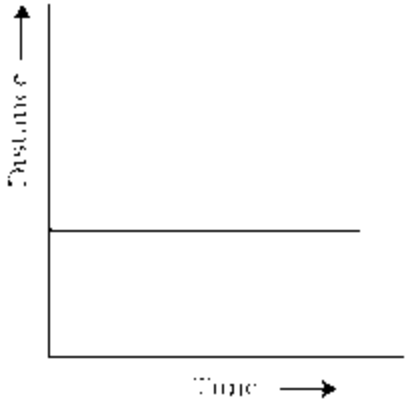
Distance - time graph for the motion of two cars

Answer: Vehicle A is traveling longer distance in lesser time as compared to Vehicle B. So, vehicle A is moving faster.

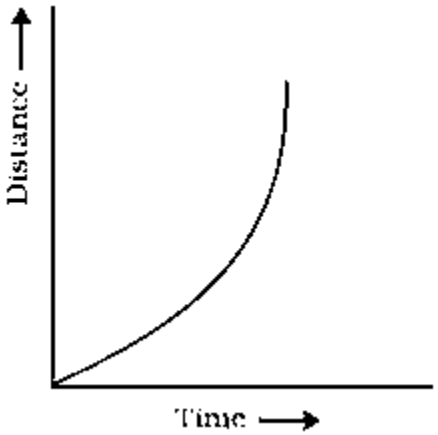
Question 13. Which of the following distance time-graph a truck moving with speed which is not constant.

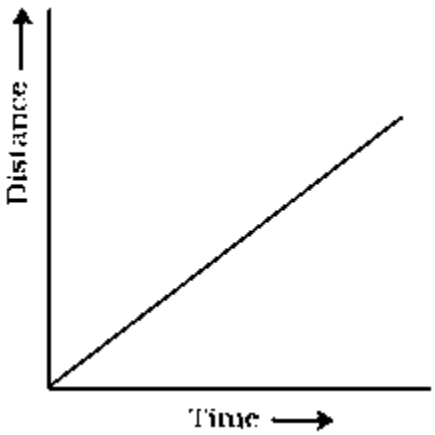


(ii)



(iii)





Answer: (iii)

Chapter – 14
Electric Current and its Effects

Key words:

- **Electric Current:** Flow of electrons through a conductor.
- It is convenient to represent electric components by symbols. Using these, an electric circuit can be represented by a circuit diagram.
- When an electric current flows through a wire, the wire gets heated. It is the heating effect of current. This effect has many applications.
- Wires made from some special materials melt quickly and break when large electric currents are passed through them. These materials are used for making electric fuses which prevent fires and damage to electric appliances.
- When an electric current flows through a wire, it behaves like a magnet.

- **Electric Circuit:** A complete pathway of the flow of electric current.
- **Component of Electric Circuit:** Component of electric circuit are following :

1. **Cell:** Provides energy for the current to flow.
2. **Bulb:** Lights ups when an electric current flows through it.
3. **Switch:** Keeps the circuit off or on.
4. **Connecting wires:** Help to conduct the electric current and complete the circuit.

- **Effects of Electric Current**:

1. **Heating Effect**: The wire gets hot when an electric current passes through it. This is the heating effect of the electric current. Electric heater contains a coil of wire called element which becomes red hot when current passes through it. The amount of heat produced in a wire depends on its material, length and thickness.

   Fuse: It is a safety device which prevents damage to electric circuit. It is made by inserting a short wire into porcelain or insulating material.

   MCB: Stands for Miniature Circuit Breakers. These are switches which automatically turn off when current in a circuit exceeds the safe limit.

2. **Magnetic Effect**: When electric current passes through a wire, it behaves like a magnet.

This is the magnetic effect of the electric current. This was first observed by Hans Christian Oersted.

A current carrying coil of an insulated wire wrapped around a piece of iron is called an electromagnet.

- **Electromagnet:** An electromagnet is a coil of wire wound on a soft iron core, used to separate magnetic material from the junk. Doctors use tiny electromagnets to take out small pieces of magnetic material that have accidentally fallen in the eye. Many toys also have electromagnets inside them.

VERY SHORT ANSWER QUESTIONS

1. Which property of a conducting wire is utilised in making electric fuse ?
Ans: The property of a conducting wire which is utilised in making electric fuse is low melting point.

2. Name the device used these days in place of electric fuses in electrical circuits.
Ans: Miniature Circuit Breaker (MCB).

3. Fill in the blanks:

(i) Our body is a _____ of electricity.
(ii) An electric cell produces electricity from the _____ in it.
(iii) In an electric circuit a fuse is a _____ to prevent possible fire.
(iv) A combination of two or more cells is called a _____.

Ans: (i) conductor (ii) chemicals stored (iii) safety device (iv) battery

4. Unscramble the following words:

(i) TBTAYER (ii) SFEU
(iii) HTRCO (iv) HICWTS

Ans: (i) BATTERY
(ii) FUSE
(iii) TORCH

(iv) SWITCH

5. Paheli does not have a night lamp in her room. She covered the bulb of her room with a towel in the night to get dim light. Has she taken the right step? Give one reason to justify your answer.
Ans: No, she had not taken the right step. The towel may burn due to the heat produced by the bulb. Besides, it will also result in wastage of electric energy.

6. Why are compact fluorescent lamps (CFLs) preferred over electric bulbs ?Ans: CFLs produce very less heat in compare to electric bulbs. So CFLs do not waste electricity in the form of heat energy.

7. Why is an electric fuse required in all electrical appliances ?
Ans: The fuse is a safety device used in an electrical circuit to prevent a large amount of current flowing through a circuit. When large current passes through the circuit, the fuse wire gets heated up and melts away. As a result, the circuit is broken and further damage to the electrical appliances is prevented.

SHORT ANSWER QUESTIONS

1. Can we use the same fuse in a geyser and a television set ? Explain.

Ans: No, we cannot use the same fuse in a geyser and a television set because a geyser and a television set require different amount of current. Therefore the fuse used in these will be of different ratings.

2. Name two electric devices for each where (i) heating effect of current is used and (ii) magnetic effect of current is used.

Ans: Devices where heating effect of current is used – Geyser, room heater.
Devices where magnetic effect of current is used – Electric bell, Cranes to lift magnetic material.

3. Why do we cover plug pin holes which are within the reach of children with cello tape or a plastic cover when not in use ?

Ans: We cover plug pin holes which are within the reach of children with cello tape or a plastic cover when not in use because child may put his/her fingers into the socket and he/she may get an electric shock which could be fatal.

4. Boojho made an electromagnet by winding 50 turns of wire over an iron screw. Paheli also made an electromagnet by winding 100 turns over a similar iron screw. Which electromagnet will attract more pins ? Give reason.

Ans: Paheli's electromagnet will attract more pins because Paheli made an electromagnet which has more number of turns of wire on it and thus a stronger electromagnet than Boojho's electromagnet which has less number of turns of wire on it

LONG ANSWER QUESTIONS

1. Your teacher has shown you the following activity.

Fig. 14.3

Activity: Teacher has wound a long insulated piece of wire around an iron nail in the form of a coil. Free ends of the wire are connected to a cell through a switch as shown in the Figure 14.3. The current is switched on and some pins are placed near the ends of the nail. Write down any three questions that come to your mind about this activity.

Ans: Some of the questions can be :-

(i) Why does the nail attract the pins ?
(ii) What will happen if we connect more cells in the circuit ?
(iii) What will happen if we use some other material like a straw in place of the nail ?
(iv) What will happen if we wrap the wire on the nail more tightly ?

2. Paheli took a wire of length 10 cm. Boojho took a wire of 5 cm of the same material and thickness. Both of them connected the wires as shown in the circuit given in Figure 14.4. The current flowing in both the circuits is the same.

(i) Will the heat produced in both the cases be equal ? Explain.
(ii) Will the heat produced be the same if the wires taken by them are of equal lengths but of different thickness? Explain.

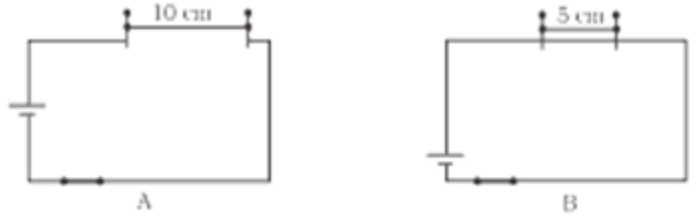


Fig. 14.4

Ans:(i) No, the amount of heat produced in both the cases will not be equal. Amount of heat produced in a wire depends upon the length of the wire.
(ii) No, the amount of heat produced in the wire is not same because amount of heat produced in the wire also depends upon the thickness of the wire.

3. How does the magnetic effect of electric current help in the working of an electric bell ? Explain with the help of a diagram.

Ans: An electric bell is the direct application of electromagnets. It consists of the following parts which are fitted on a flat wooden or plastic board. The main components are :-

• Electromagnet

• Armature

• Gong

• Switch

• Contact screw

• Strip spring

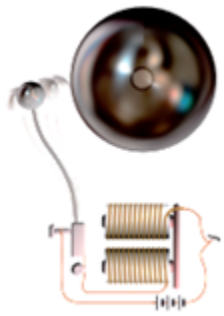
• Hammer

WORKING OF A AN ELECTRIC BELL

Step 1: When the switch is pressed, the circuit is complete and a current flows through the electromagnet.

Step 2: The electromagnet attracts the armature towards itself. The hammer attached to it strikes the gong and produces a ringing sound. At the same time the circuit gets broken, the current stops flowing and the electromagnet loses its magnetism.

Step 3: The spring pulls the armature back such that contact is established again and the circuit gets completed. This keeps repeating, with the hammer striking the gong repeatedly, thereby producing a ringing sound as long as the switch gets pressed.



3. Draw the symbols of the following circuit components.

(i) electric cell
(ii) switch in off position
(iii) electric bulb
(iv) battery

Ans:

TEXTUAL EXERCISE

Question 1. Draw in your notebook the symbols to represent the following components of electrical circuits. Connecting wires, switch in the OFF position, bulb, cell, switch in ON position and battery.

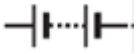
Answer: Connecting wires ———

Switch in the OFF position 

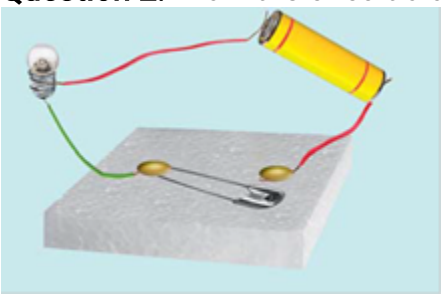
Bulb 

Cell 

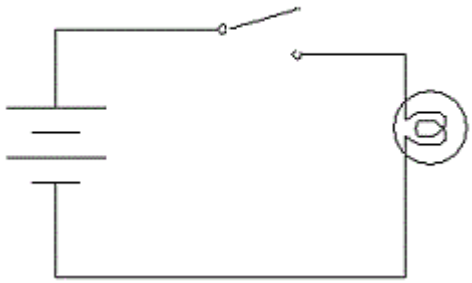
Switch in ON position

Battery 

Question 2. Draw the circuit diagram to represent the circuit shown in Fig. 14.3.



Answer:



Question 3. Fig. 14.4. Shows four cells fixed on a board. Draw lines to indicate how you will connect their terminals with wires to make a battery of four cells.

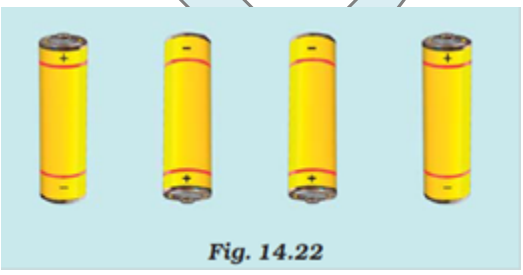
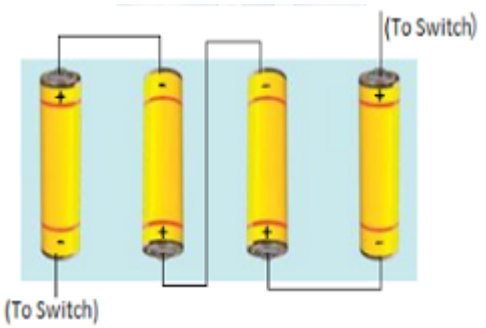


Fig. 14.22

Answer:



Question 4. The bulb in the circuit shown in Fig. 14.5 does not glow. Can you indicate the problem? Make necessary changes in the circuit to make the bulb glow.

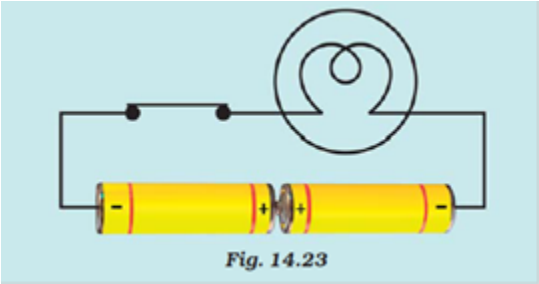
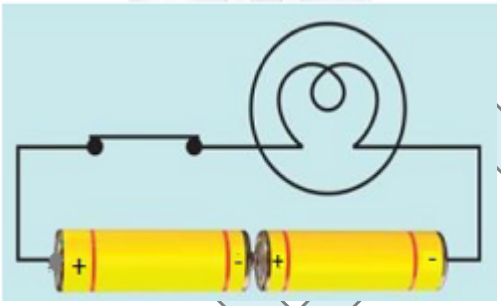


Fig. 14.23

Answer: In the given circuit, the positive terminals of both the batteries are joined together so there is no flow of current and hence the bulb didn't glow.
Suggested changes: The current flows from positive terminals therefore the positive terminals of cell will be connected to negative terminal of the cell and vice versa.



Question 5. Name any two effects of electric current.

Answer: (i) Heating effect

(ii) Magnetic effect

Question 6. When the current is switched on through a wire, a compass needle kept nearby gets deflected from its north-south position. Explain.

Answer: When the current flows through a circuit produce magnetic field around it which deflect the needle of the compass kept nearby as it is also a piece of magnet.

Question 7. Will the compass needle show the deflection when the switch in the circuit shown by Fig. 14.24 is closed?.

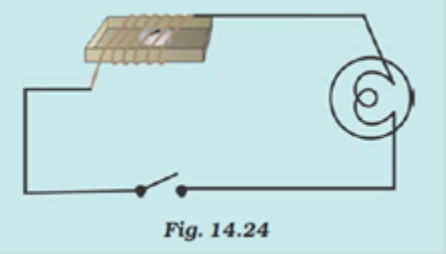


Fig. 14.24

Answer: No, the circuit is not having any source of electricity. Therefore, there will be no flow of electric current through and thus there will be no magnetic effect and neither the deflection of the needle.

Question 8. Fill in the blanks

(a) Longer line in the symbol for a cell represents its ---------- terminal.

(b) The combination of two or more cells is called a----------.

(c) When a current is switched ON in a room heater, it ----------.

(d) The safety device based on the heating effect of electric current is called a ----------.

Answer: Fill in the blanks

(a) Longer line in the symbol for a cell represents its **positive** terminal.

(b) The combination of two or more cells is called a **battery**.

(c) When a current is switched ON in a room heater, it **produces heat**.

(d) The safety device based on the heating effect of electric current is called a **fuse**.

Question 9. Mark 'T" if the statement is true and 'F' if it is false:

(a) To make a battery of two cells, the negative terminal of one cell is connected to the negative terminal of other cell. (T/F)

(b) When the current through the fuse exceeds a certain limit, the fuse wire melts and breaks. (T/F)

(c) An electromagnet does not attract a piece of iron. (T/F)

(d) An electric bell has an electromagnet. (T/F)

Answer: (a) F (b) T (c) F (d) T

Question 10. Do you think an electromagnet can be used for separating plastic bags from a garbage heap? Explain.

Answer: No, electromagnets attract only the magnetic material like iron. So, it

cannot be used for separating plastic from garbage.

Question 11. An electrician is carrying out some repairs in your house. He wants to replace a fuse by a piece of wire. Would you agree? Give reasons for your response.

Answer: Replacing the fuse with metal piece should be dangerous as fuse wire have very low melting point. In case of metal piece the melting point will be high and circuit will be not prevented in case of overloading or overheating.

Question 12. Zubeda made an electric circuit using a cell holder shown in Fig. 14.4, a switch and a bulb. When she put she switch in the ON position, the bulb did not glow. Help Zubeda in identifying the possible defects in the circuit.

Answer: Possible defect:
(i) Bulb may have fused.
(ii) Rubber band of cell holder may not be tight and connections are loose.
(ii) Terminals of the cells may not be in the correct positions.

Question 13. In the circuit shown in Fig. 14.25

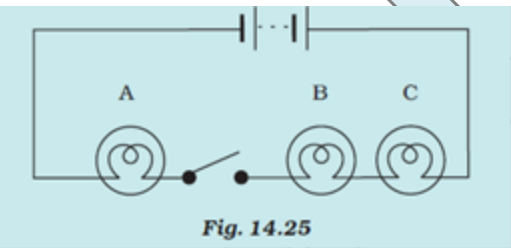


Fig. 14.25

(i) Would any of bulb will glow when the switch is in the 'OF' position?

(ii) What will be the order in which bulb A, B, C will glow when switch is moved to the 'ON' position?

Answer: (i) No, none of the bulb will glow when the switch is in the 'OFF' position.
(ii) All the bulbs will glow at once because connections are ok.