



APEEJAY SCHOOL

(Affiliated to C.B.S.E.)

**GRAPHIC
NOVEL**



**ONLY ONE EARTH
HANDLE WITH CARE**

ACKNOWLEDGEMENT

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QR code for Electricity



1064CH12

QR code for Sources of Energy



1064CH14



To access the comic book and additional interactive digital content, download the DIKSHA app from Google Play Store on your Android smart phone or tablet and scan the QR code using DIKSHA app

DISCLAIMER

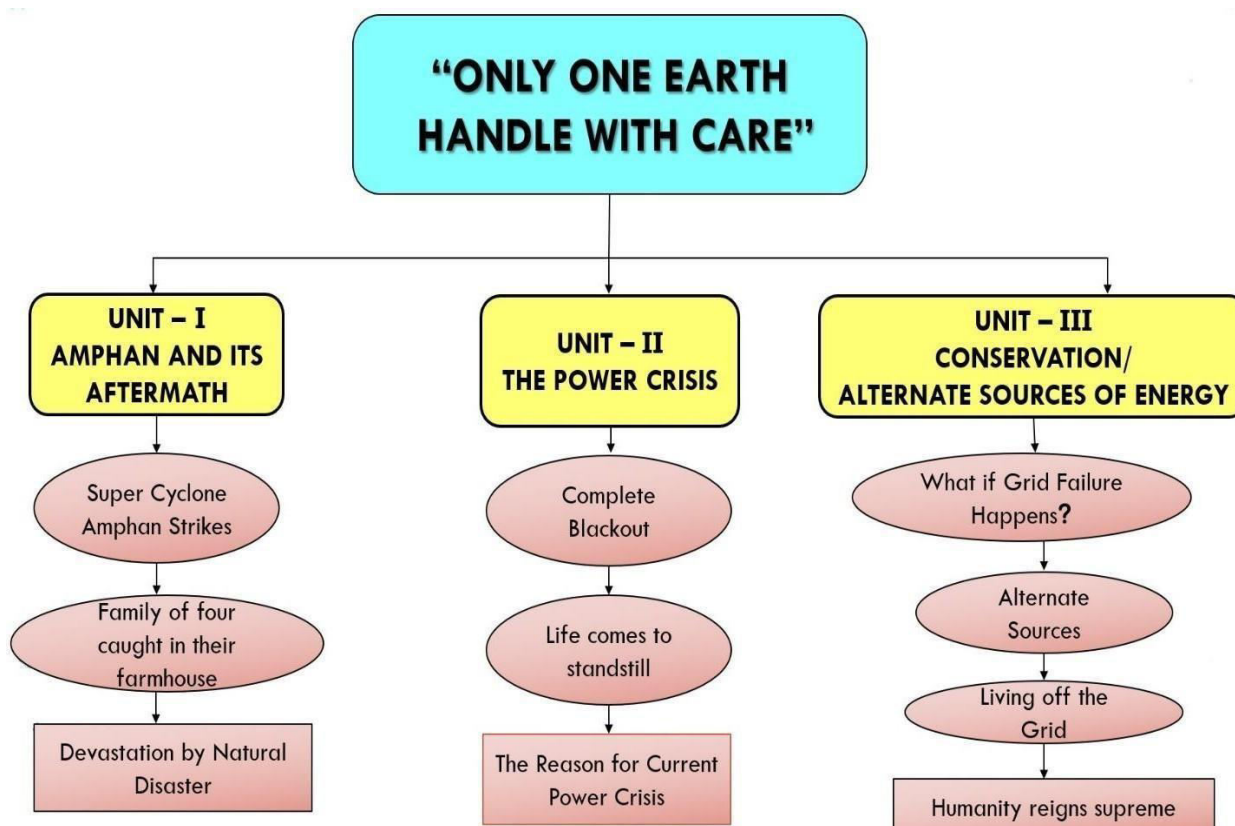
This book is published as an extra study material for better understanding of the concepts of electricity and household circuitry, keeping in mind the need to conserve electricity, at the backdrop of the present power crisis that the world is facing today.

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&

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FLOWCHART



Preface

This Graphic Novel – “Only One Earth -Handle with care “is an attempt to connect basic concepts of household electrical circuits with the present world and the technological boom that it has created and is precariously balanced on. The whole novel is written against the backdrop of the super -cyclone “Amphan “that struck our country and left a huge trail of destruction, and made a mere mockery of the various technological developments, as it brought lives and livelihoods to a complete screeching halt! It shook our very existence and woke up mankind to their over dependence on electricity and electronic gadgets and how it is important to conserve energy and also look for alternate sources of energy – far away from the conventional ones. Through the life experiences of a family of four - Mr & Mrs Dutta , their children -Sneha and Abhinash ,the story unfolds into how their retreat to their farmhouse ends up into a disaster, and how they slowly take charge of their lives in the aftermath of the disaster, at the same time emphasising the need to make people aware of the need to “ Live off the Grid”. With transport, communication, connectivity all gone haywire, they struggle through it all, to put back their own lives and the lives of the poor and the needy, back to order. This provides a telescopic view, to what we might all be staring at, in the near future, in a most picturesque way and to understand concepts of physics through a storyline that depicts real-life experiences. As the saying goes, "Life is the BESTTEACHER INDEED!".

Bhavani Ravishankar

Learning Outcome

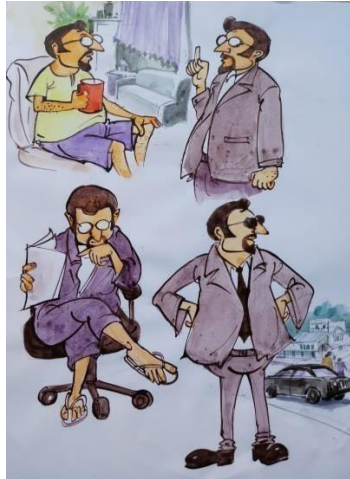
CLASS – X

SUBJECT – SCIENCE: - ELECTRICITY (UNIT 4) & SOURCES OF ENERGY (UNIT 5)

LEARNING OUTCOMES:

- 1) The basic concept of electric current as flow of charges.
- 2) The concept of electric circuit and what does it mean by series and parallel circuits.
- 3) The type of circuit used in household connections and its advantages.
- 4) Short circuiting and Overloading.
- 5) The safety devices like fuse, MCB and safety methods like earthing used in domestic households.
- 6) The concept of electrical energy.
- 7) The need to conserve energy for future.
- 8) The power crisis the present generation is facing and the reasons behind it.
- 9) The alternative sources of energy available.
- 10) Possible measures to conserve energy for a sustainable future.

CHARACTERS



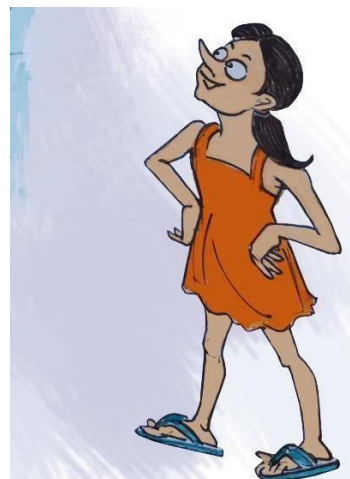
**Snehasish Dutta
(Father)**



**Lipika Dutta
(Mother)**



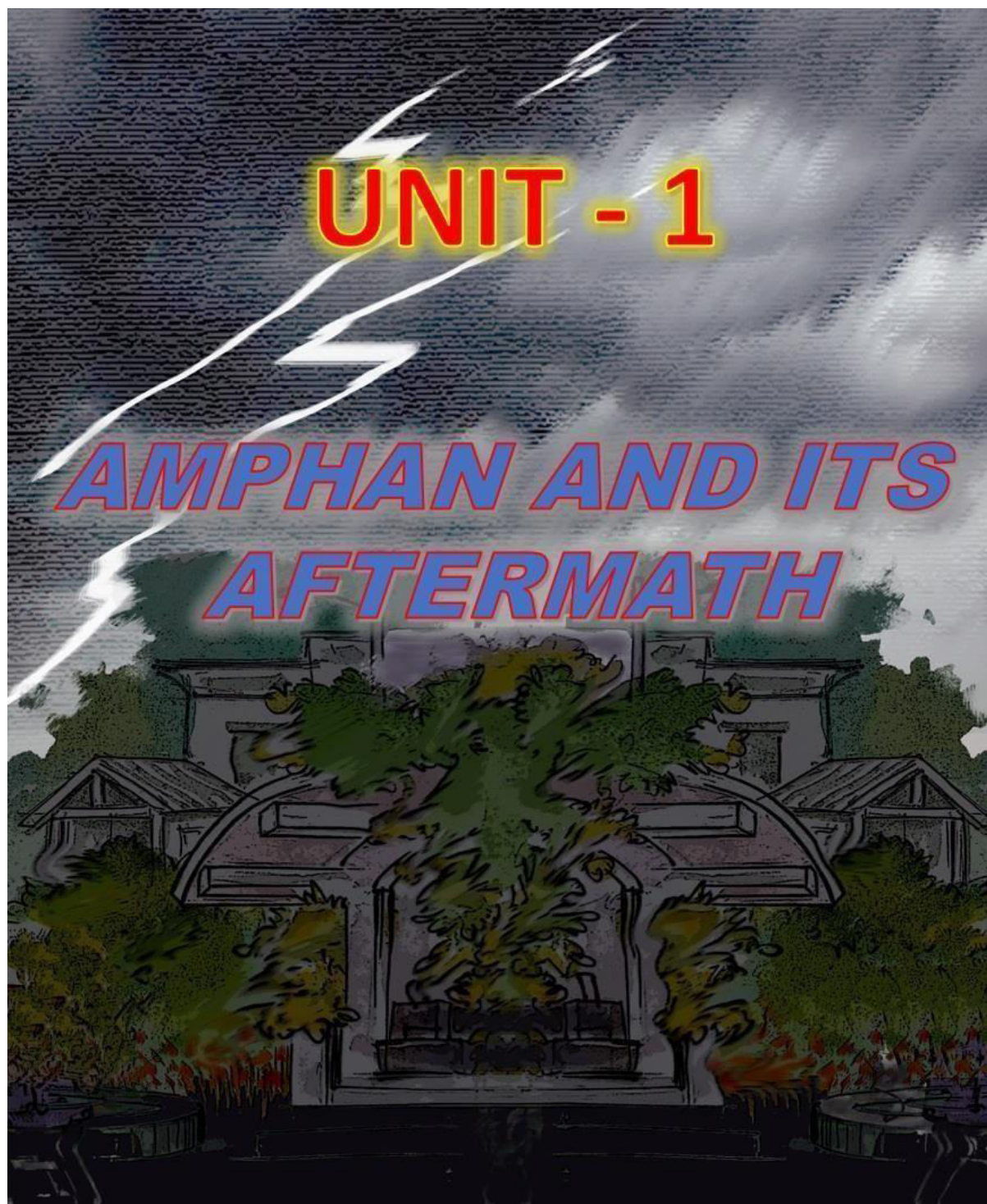
**Abhinash Dutta
(Son)**



**Sneha Dutta
(Daughter)**



Ramlal (Security Personnel)



Early morning Mr. Dutta and his family left for their farmhouse for a short retreat.



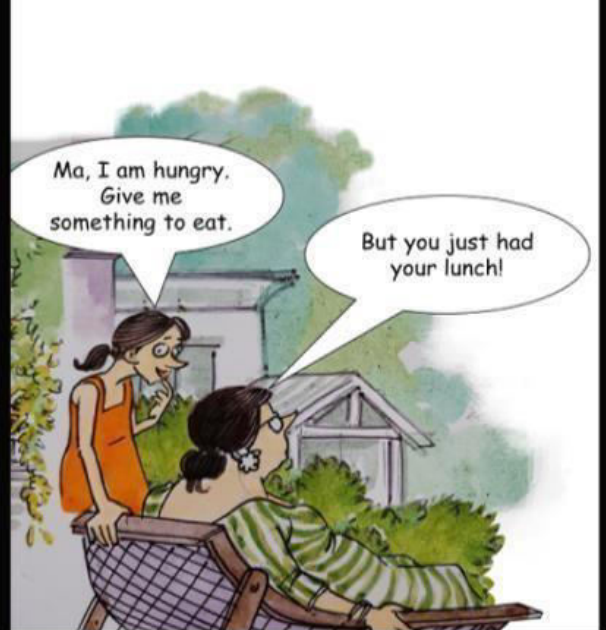
They reached the farmhouse in the afternoon and were welcomed by Ramlal, the security.



Their farmhouse is located in a serene place amidst greenery and a stream flowing by. The weather is pleasant with light showers.



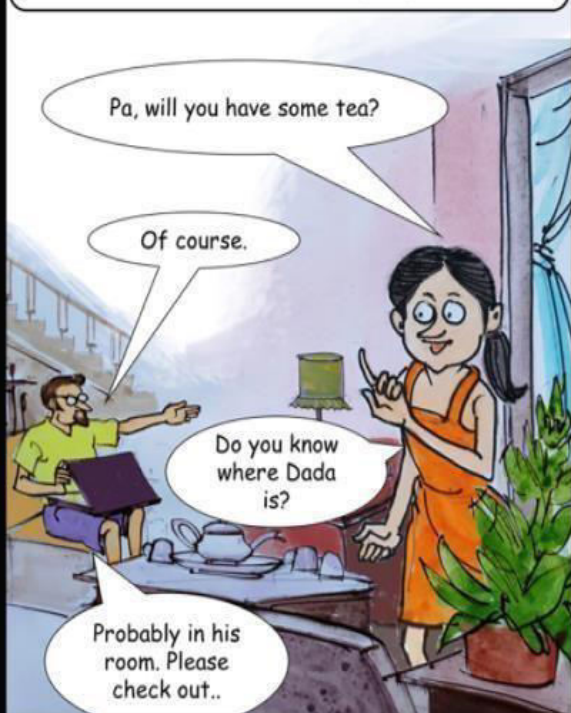
Lipika Dutta is relaxing on a reclining chair while Sneha enters from behind.



Lipika stands up and heads towards the door.



Father is sitting in the living room on a couch with his laptop.



Outside Abinash's Room. Sneha knocks.



What is it?

Want some tea?



No, don't disturb me
I am studying

In the Kitchen.



Everyone except
Dada will have tea.

Everyone is in the living room, sitting on the sofa, and watching news.



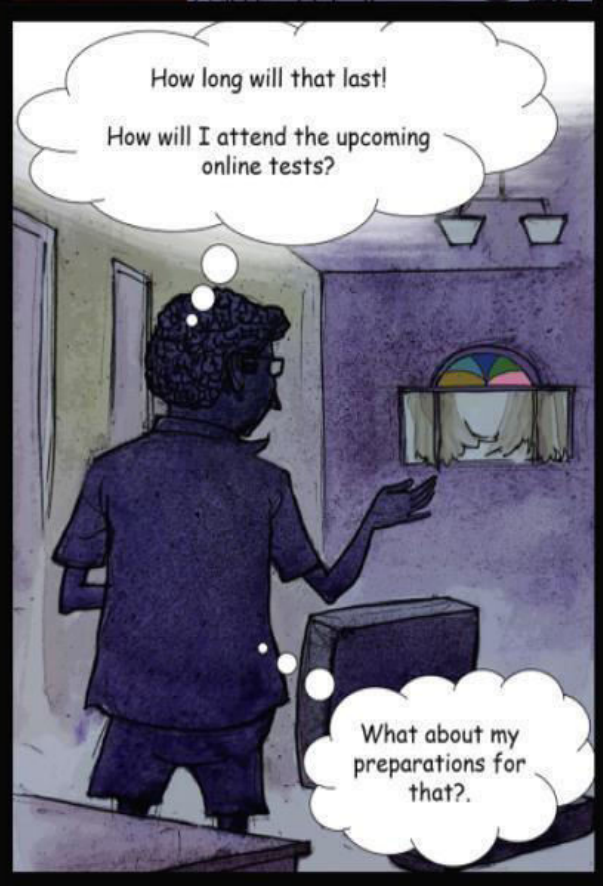
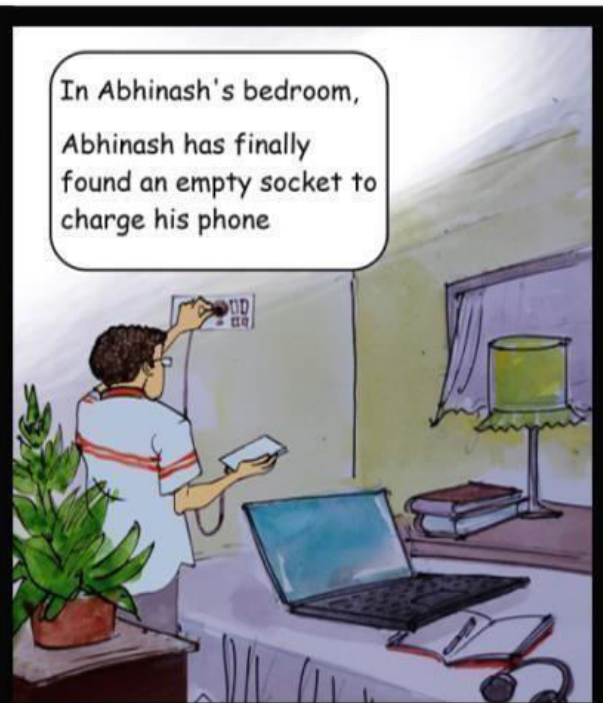
BREAKING NEWS:
Windspeed of about
200 km/hr is expected today
afternoon as Amphan makes a
landfall near Kolkata

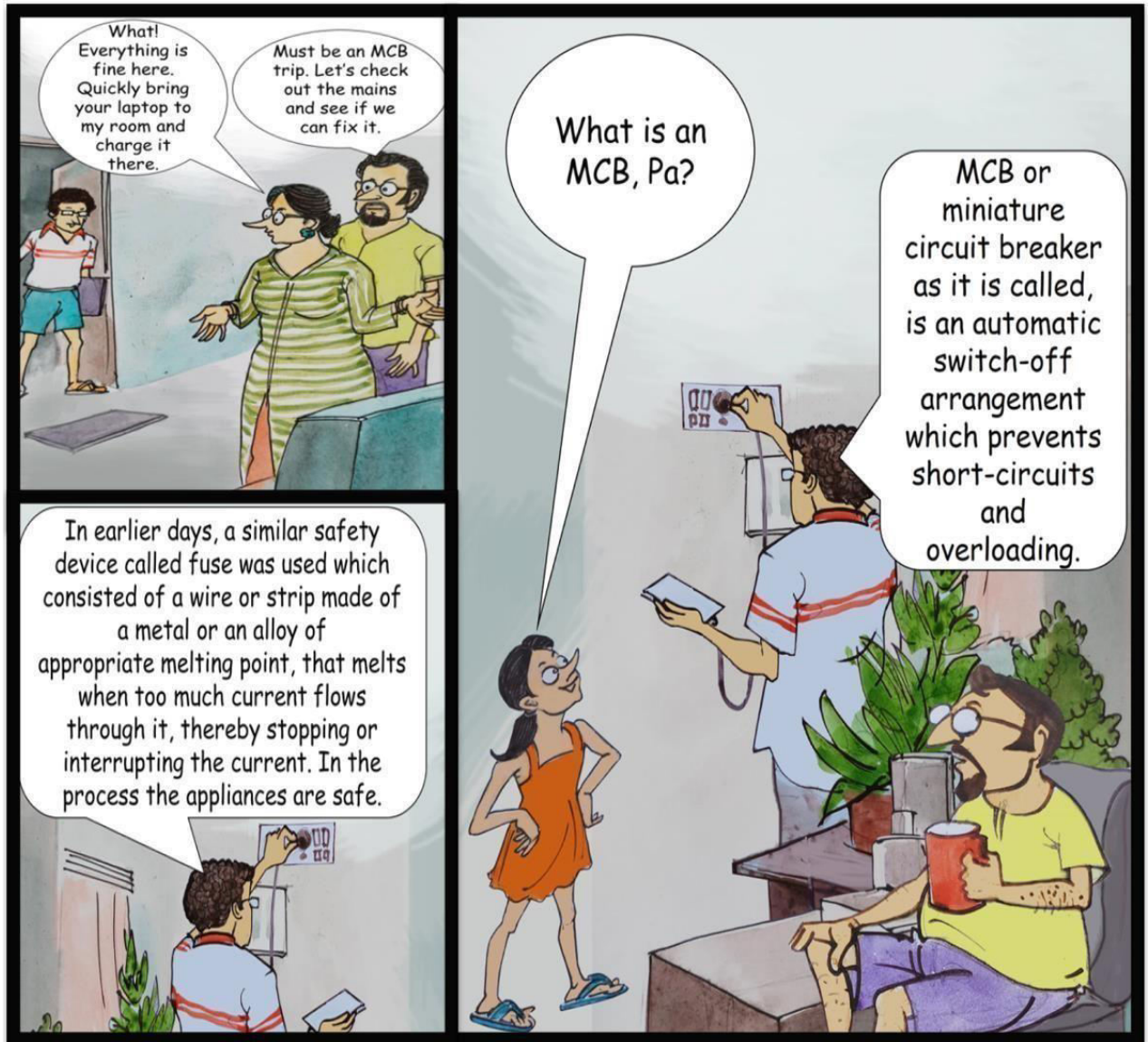
Urgh! Due to this 'Amphan' cyclone
there can be a grid failure and
power outage!





There is a blackout in Abhinash's bedroom, at five in the evening and outside it is raining relentlessly.







What does parallel and series connection mean?

More questions?! In a series circuit, all components are connected end-to-end, forming a single path for the current to flow. In a parallel circuit, all components are connected across each other, forming exactly two sets of electrically common points.

Why is parallel connection preferable in domestic circuits?

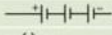
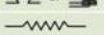
The reason why household circuits are in parallel is that if an appliance stops working or gets faulty, the other appliances are not affected.

The devices can be operated independently of each other. However, if they are connected in series, one faulty appliance breaks the circuit and hence all of them stop working. Also the potential difference remains same across each appliance in a parallel combination.

Let me show you the diagrams. You will understand better.

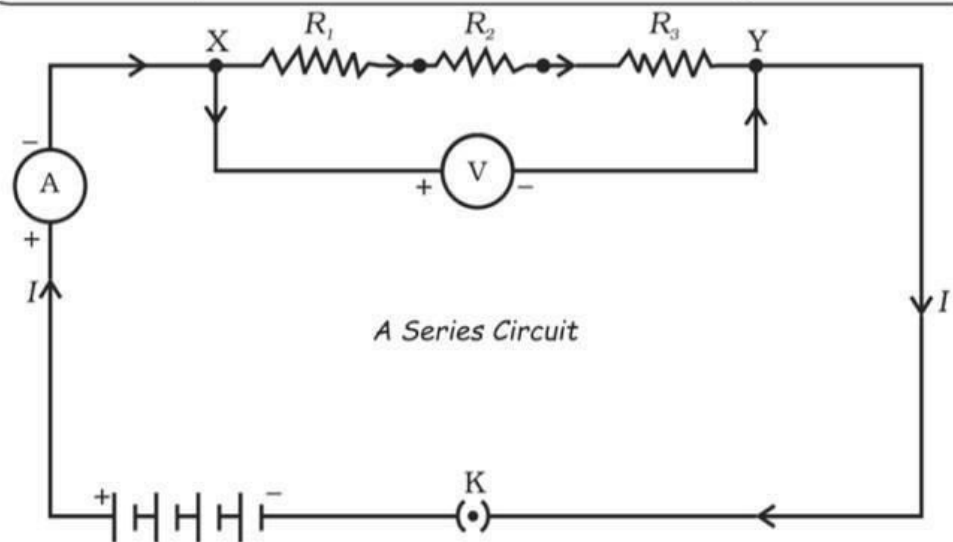
Okay!

Initially Abhinash draws a table of electrical components.

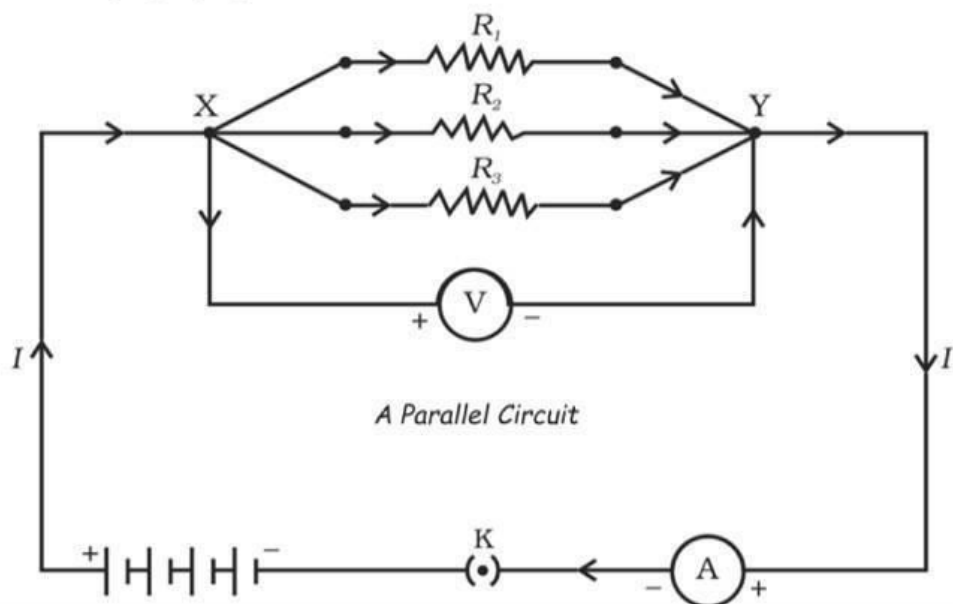
S. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open)	
4	Plug key or switch (closed)	
5	A wire joint	
6	Wires crossing without joining	
7	Electric bulb	
8	A resistor of resistance R	
9	Variable resistance or rheostat	
10	Ammeter	
11	Voltmeter	

These are the symbols of electrical components we use in the circuit.

Then Abhinash draws the diagrams of the series and parallel circuits and explains that since voltmeter has high resistance ideally no current should flow through it but in practical circuits a very minute current flows through it.



A Series Circuit



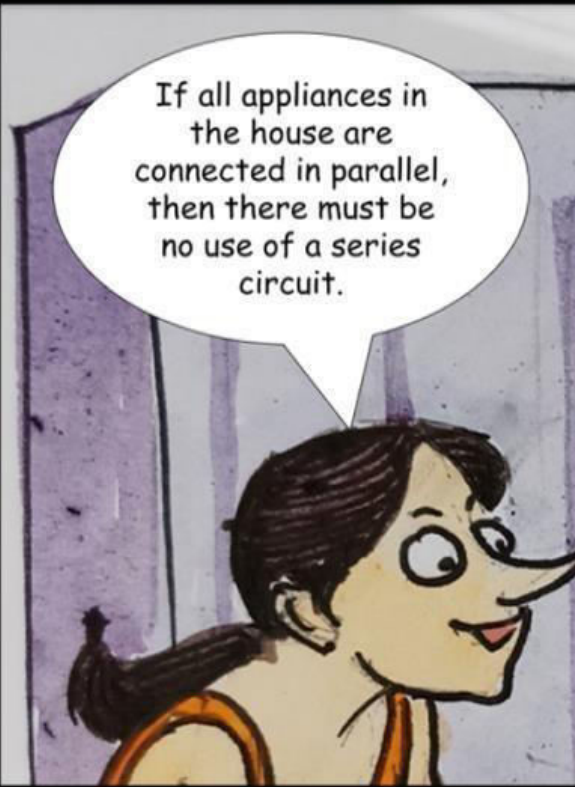
A Parallel Circuit



What is the meaning of resistance?



Resistance is a measure of opposition to the flow of current. According to Ohm's law it is defined as the ratio of voltage across a conductor to the net current flowing through it. In simple terms resistance is the opposing force to current just like friction is to motion of an object.

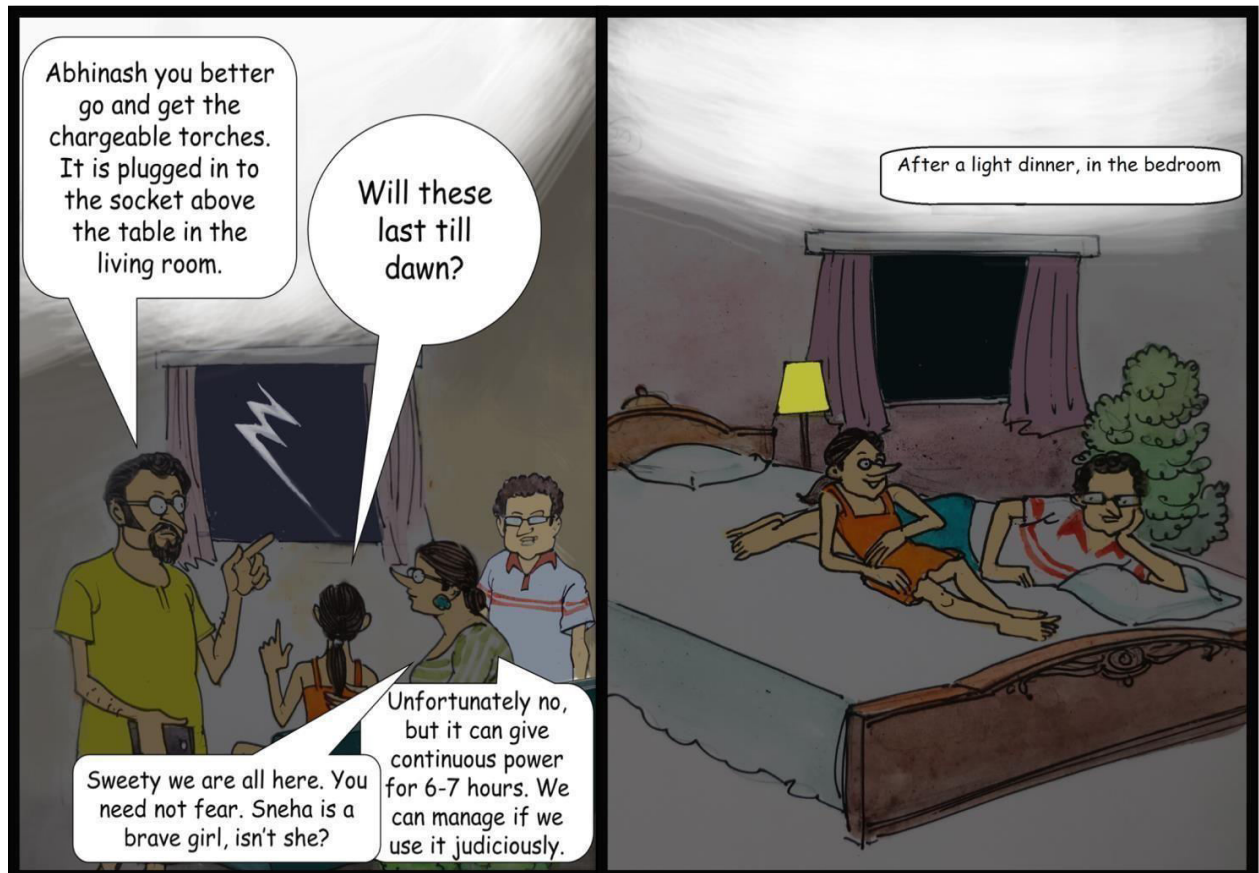


If all appliances in the house are connected in parallel, then there must be no use of a series circuit.



No. Appliances are indeed connected in parallel, but switches are connected to the live wire in series. When a switch is in series with a device, it controls the device, allowing us to switch it on and off. Also, MCB and fuse, both are connected in series. This is to ensure that the circuit breaks when the MCB gets switched off or when the fuse wire melts, thus stopping the flow of the current.







Next morning.....

Lipika, just stay here and keep an eye on the kids. Let me have a stroll and see how bad it is!



The only glass window had shattered and water had entered.

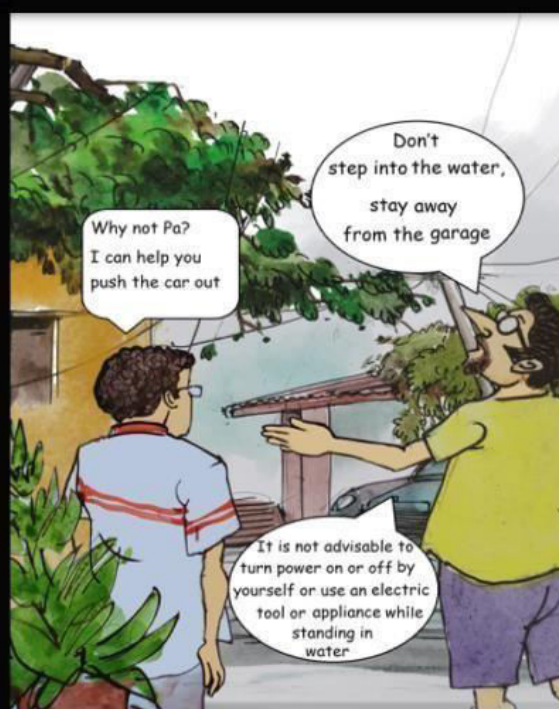
Everything that was on the floor soaked in the accumulated rain water.



We want to go with you, Pa.

It's worse than what I thought! God knows what happened to our car? Let me check the garage first.

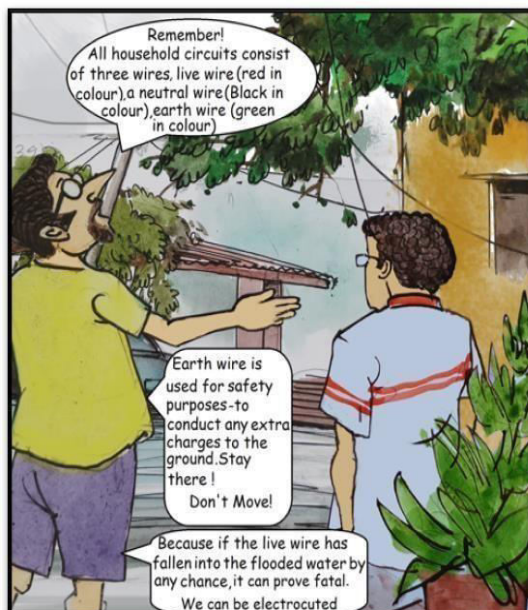
Let's all go!

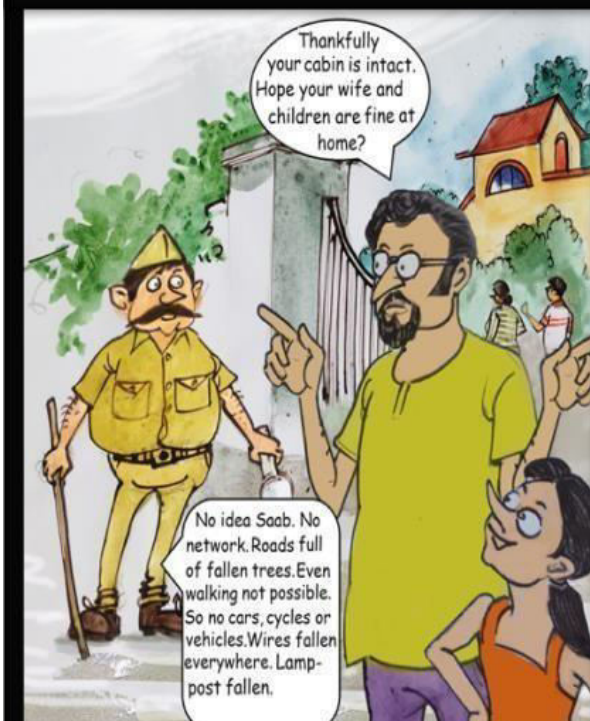


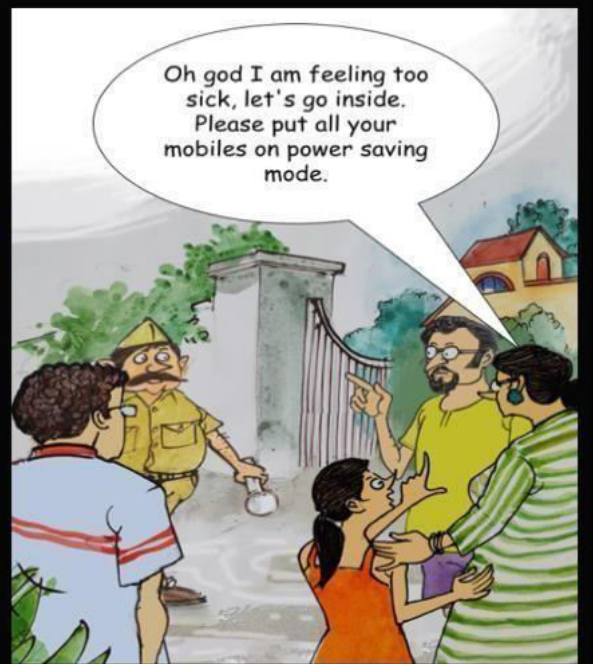
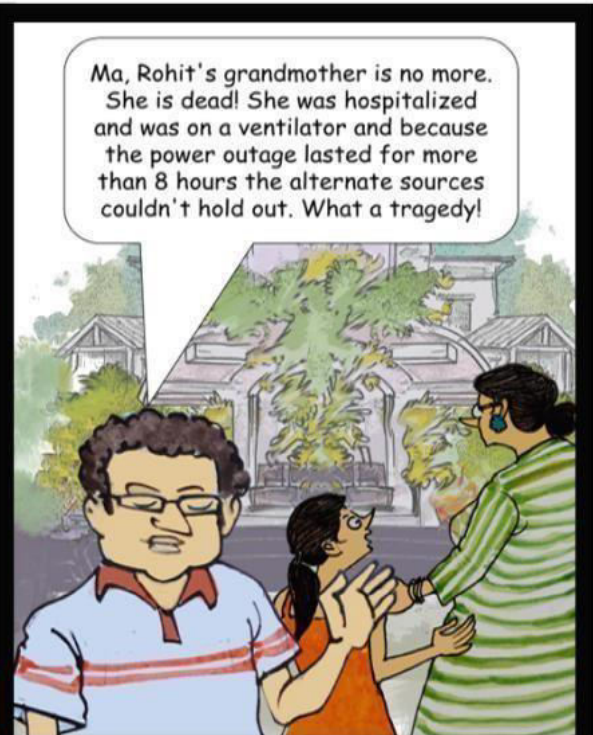
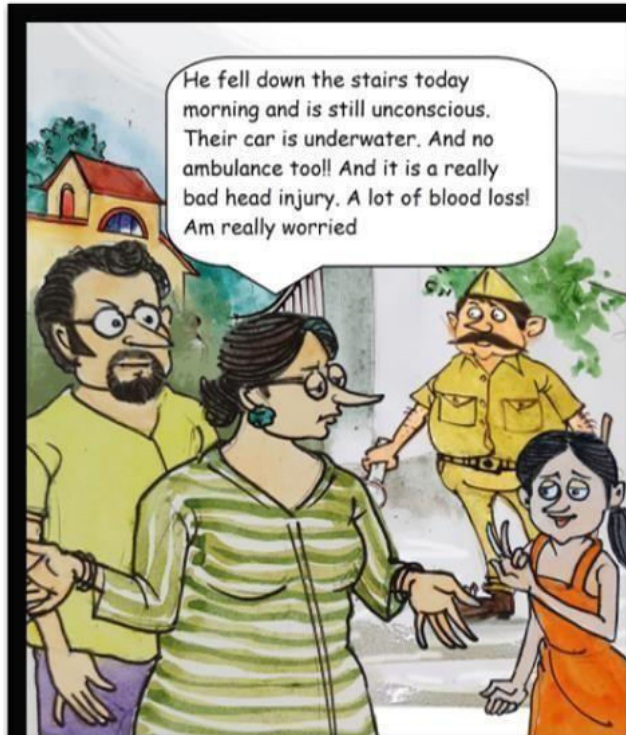
Why not Pa? I can help you push the car out

Don't step into the water, stay away from the garage

It is not advisable to turn power on or off by yourself or use an electric tool or appliance while standing in water



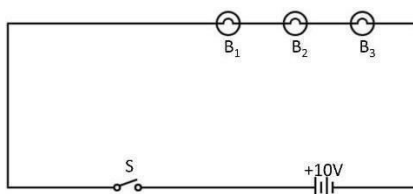




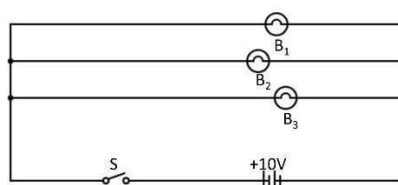
UNIT-1 (Objective Questions)

MCQ

1. Three bulbs B_1, B_2 and B_3 are connected in two circuits as follows:



A

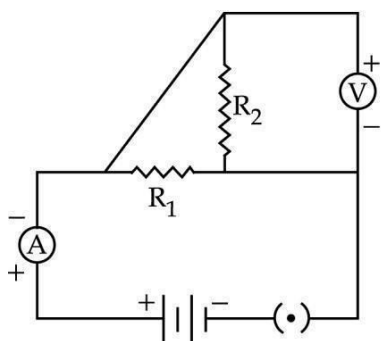


B

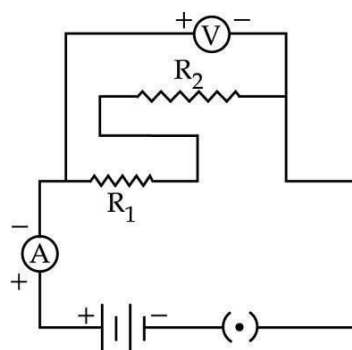
If B_2 gets fused, in which circuit B_1 and B_3 will still glow?

- a. A b. B c. Both A and B d. Neither A nor B

2.



A

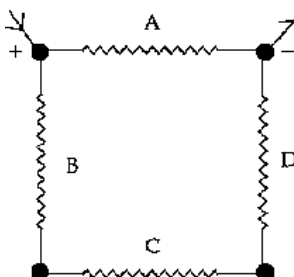


B

The resistors R_1 and R_2 are connected in:

- a. parallel in both circuits.
b. series in both circuits.
c. parallel in circuit A and in series in circuit B.
d. series in circuit A and in parallel in circuit B.

3. The diagram shows a network of four resistors which is connected to an electric source. Identify the resistors which are connected in series in this network.



- a. B, A and D b. B, C and D c. C, D and A d. A, B and C

Fill in the blanks:

1. A _____ and _____ path of electric current is called an electric circuit.
2. _____ are often used instead of fuse as it acts as a switch and can be reset.
3. Too many devices connected to a single socket can draw a _____ current from the mains which can heat up wires and even catch fire. This is called _____.

Match the following:

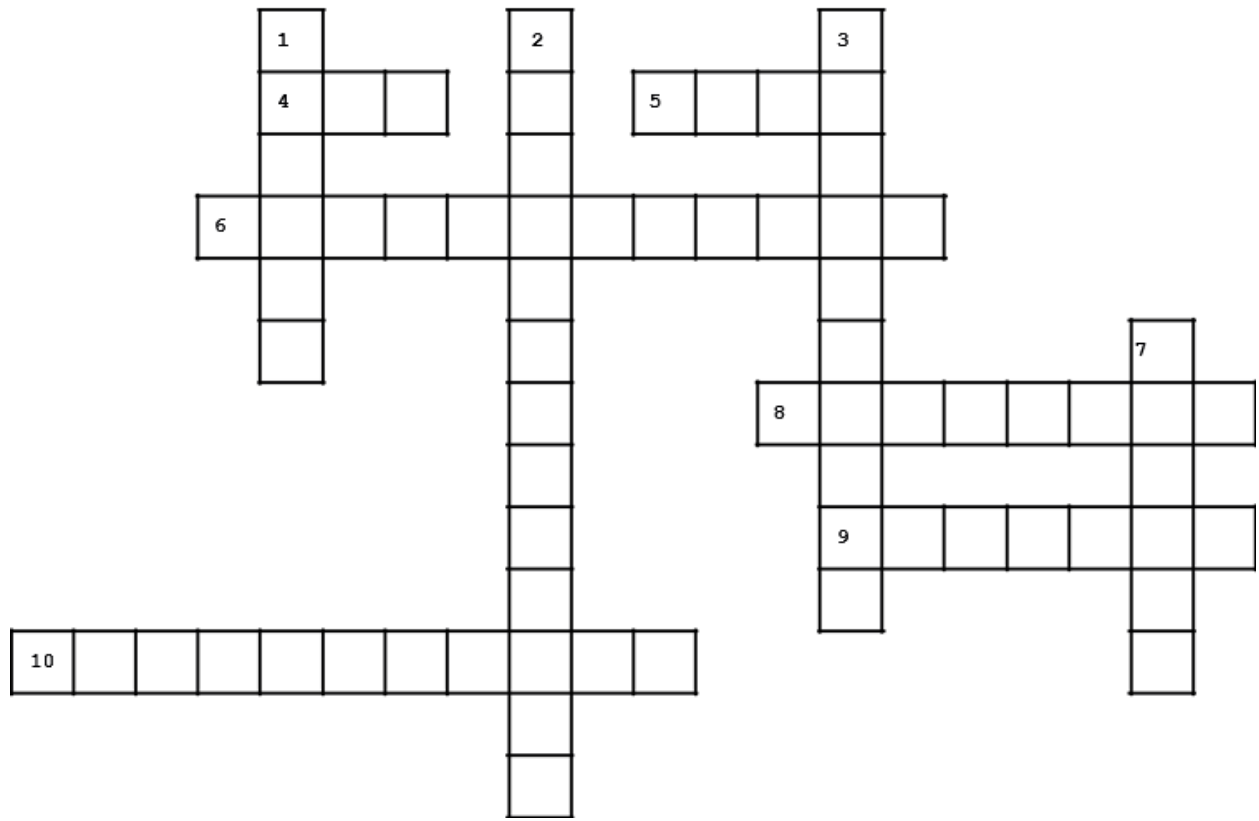
A		B	
1	Black	a	The ratio of voltage across a conductor to the net current flowing through it
2	Fuse	b	Preferred electric circuit for Household
3	Series Circuit	c	Neutral Wire
4	Parallel Circuit	d	A wire that melts when a large current flow through it, thereby breaking the circuit and stopping the flow of current
5	Resistance	e	Circuit in which current remains constant

For the following questions, two statements are given one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true but R is NOT the correct explanation of A
- (c) A is true but R is false
- (d) A is false and R is also false
- (e) A is false but R is true

1. Assertion (A): It is not advisable to turn power on or off by yourself for use an electric tool or appliance while standing in water.
Reason (R): Pure water is a bad conductor of electricity.
2. Assertion (A): All household circuits consists of a green wire called earth wire that acts as a safety measure.
Reason (R): Earth wire conducts the extra charges to the ground thereby preventing large currents to flow through the appliances.
3. Assertion (A): Short circuit is caused when suddenly the resistance in the circuit increases that heats up the wire and melts them, sometimes resulting in fire.
Reason (R): This happens when there is an accidental connection between two nodes which are intended to be at same voltages.

Unit-1 (Crossword)



Across

- 4. Modern safety device
- 5. Electrical safety device
- 6. Infinite current
- 8. Household circuits
- 9. Path of Electricity
- 10. too many plugins

Down

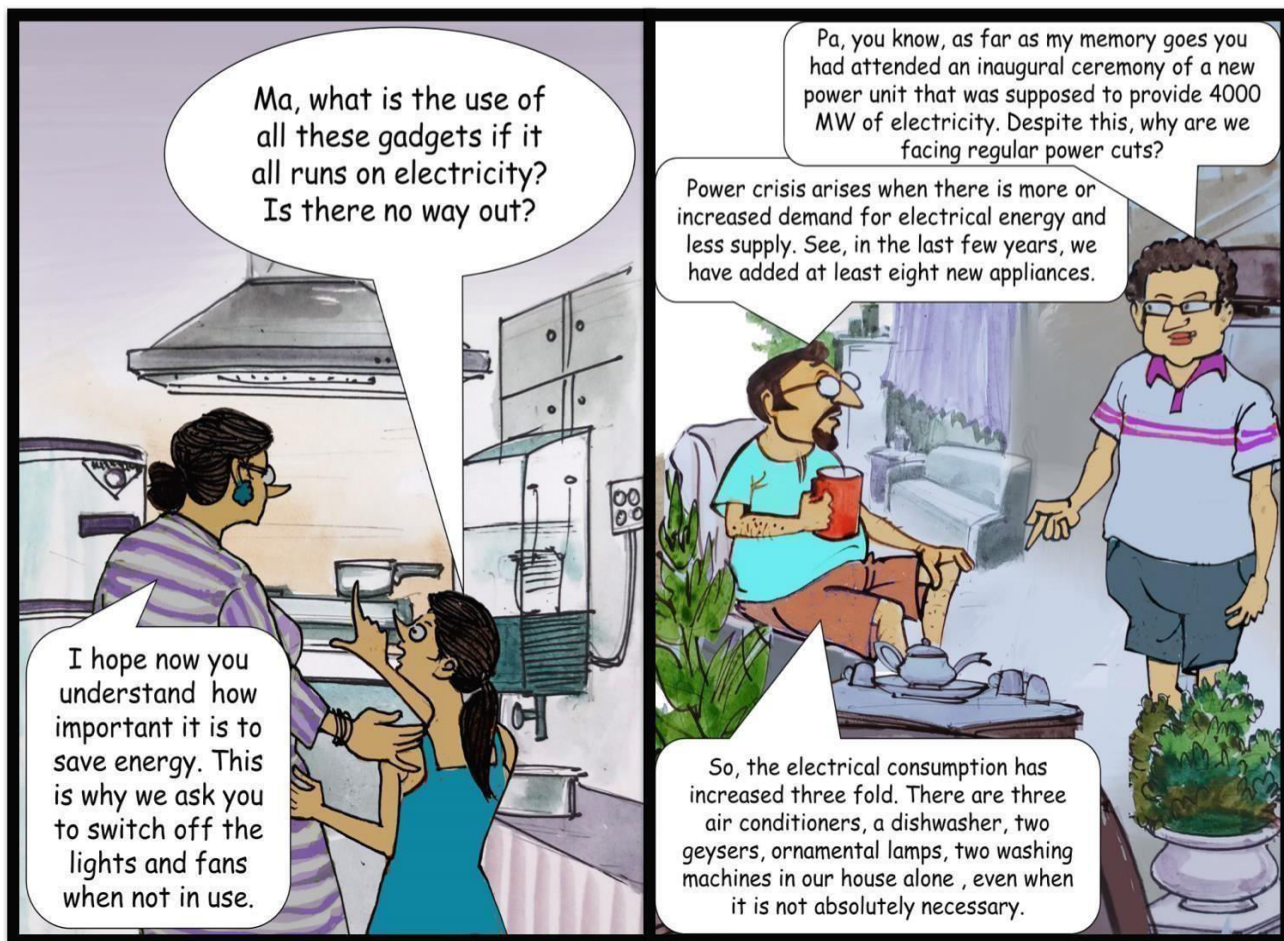
- 1. Name of the super cyclone
- 2. Instant death by electric shock
- 3. akin to friction
- 7. back-to-back connection

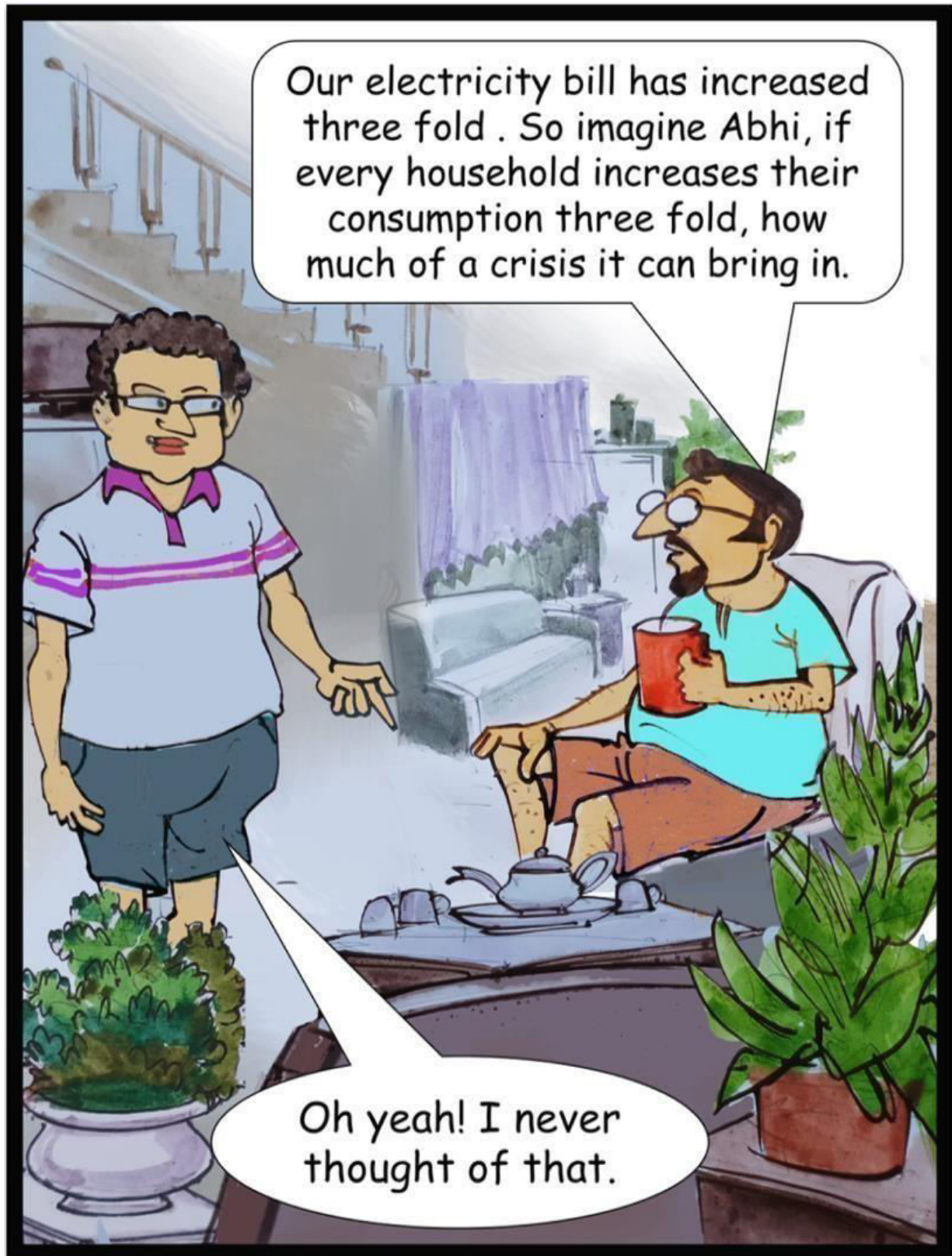












Then do you think electric cars which are going to be launched soon will add to this demand?

It's not just electric cars, come on! Think of the metro train, new railway routes and trains, battery operated two wheelers, three wheelers and what not? Electricity has reached 1,21,000 villages in the recent past.

Add to it the surge in the number of mobile phones, tabs, laptops and other online devices.

Also a number of new machinery and industries etc. etc.

But how do we save energy then, can't we just reduce the number of appliances in our home?

Yes, Sneha. Energy conservation is the answer. It means we should use our resources judiciously and get rid of our old and non-essential appliances.

Okay, the pot is boiling up now. Can you please get me some bread, tomatoes and cheese from the fridge?

Yes Ma

Snehashish, we ran out of vegetables. We're having a shortage of water and I have an important webinar to conduct day after tomorrow. It is really important for you to go out and check the E.O.(Electricity Office) and get some vegetables on the way.

Yes, I was planning to go with Ramlal after breakfast.

When was the last time we vacuumed the coils of our refrigerator?

I guess 6 months ago

We need to clean the coils otherwise it'll consume more energy than required.

Ramlal and Mr. Dutta are getting ready to leave for the market.

Be careful Pal

After you come back, we can play a board game.

Ok! but before it gets dark again, finish all your important tasks.





UNIT-2(Objective Questions)

MCQ

- Increased demand for electrical energy and less supply results in:
 - Energy Conservation
 - Conventional Sources
 - Power Crisis
 - Electrocution
- Which of the following is more energy efficient?
 - Incandescent Bulb
 - Fluorescent Tubelight
 - Halogen light bulb
 - LED
- Which of the following adds to the demand of electric power?
 - Handheld paper fans
 - Bicycle
 - Electric cars
 - Oil lamp

Fill in the blanks:

- To conserve energy, it is necessary to _____ the number of appliances we use.
- Online education in the time of pandemic has _____ demand of electrical energy.
- It is essential that we _____ our old appliances to reduce the _____ of energy.

Match the following:

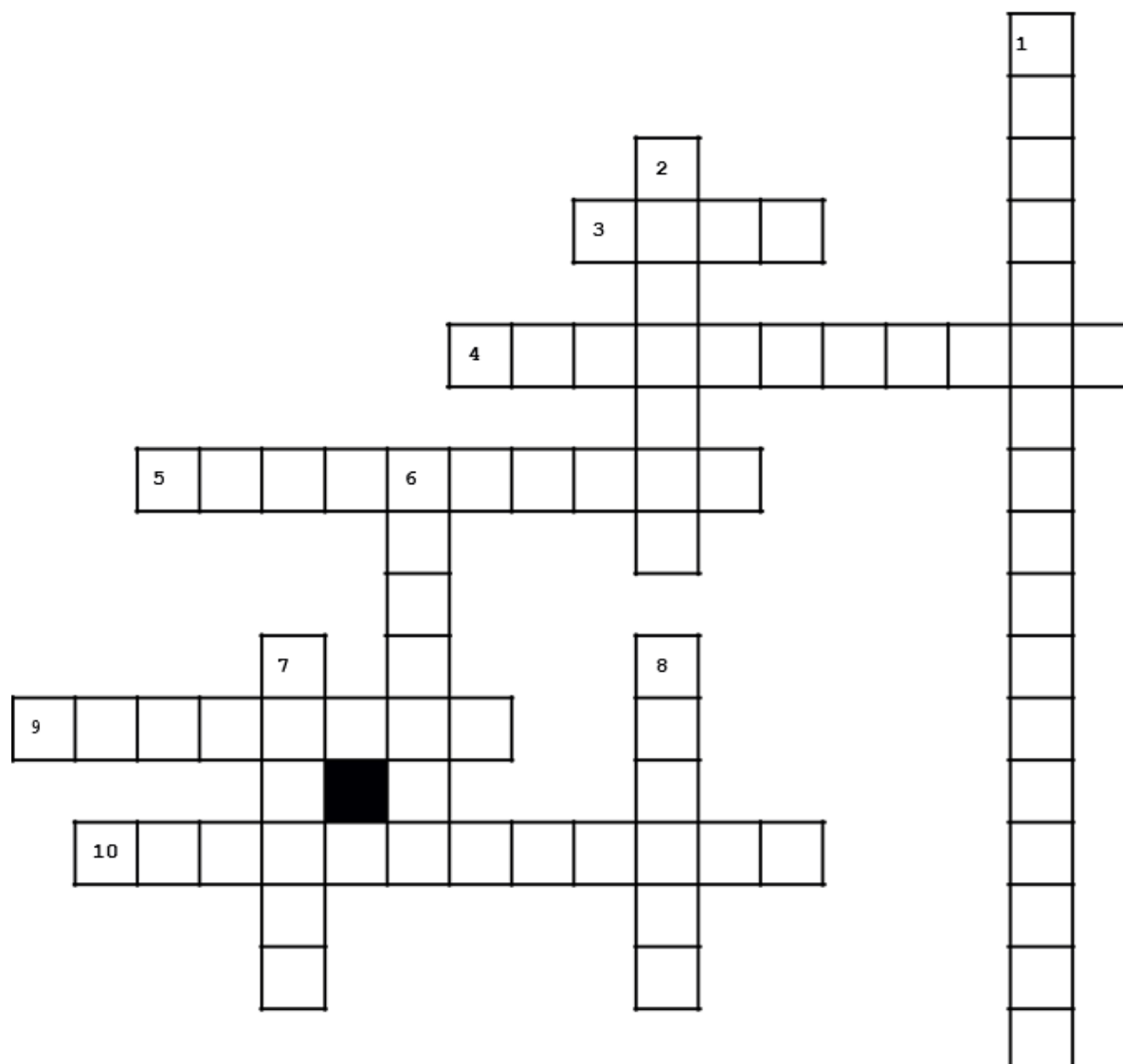
A		B	
1	Demand for Electrical Energy	a	Calculated on monthly consumption of electrical energy in a household or any organization
2	CFL	b	The effort made to reduce the consumption of energy by using energy more efficiently
3	Energy Conservation	c	Surge in use of electronic gadgets like mobiles, laptop etc.
4	Electric Bill	d	Compact light bulbs which are more energy efficient compared to incandescent bulbs.

For the following questions, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is NOT the correct explanation of A
- A is true but R is false
- A is false and R is also false
- A is false but R is true

- Assertion (A): We must switch off the electrical appliances when they are not in use.
Reason (R): Unnecessary use of electrical appliances will lead to higher consumption and more demand of electrical energy.
- Assertion (A): Keeping the coils in the refrigerator clean results in efficient use of energy.
Reason (R): Coils in the refrigerator cool and condense the refrigerant.
- Assertion (A): We should keep using old appliances instead of buying new ones.
Reason (R): Old appliances consume less energy and help in energy conservation.

Unit-2 Crossword



Across

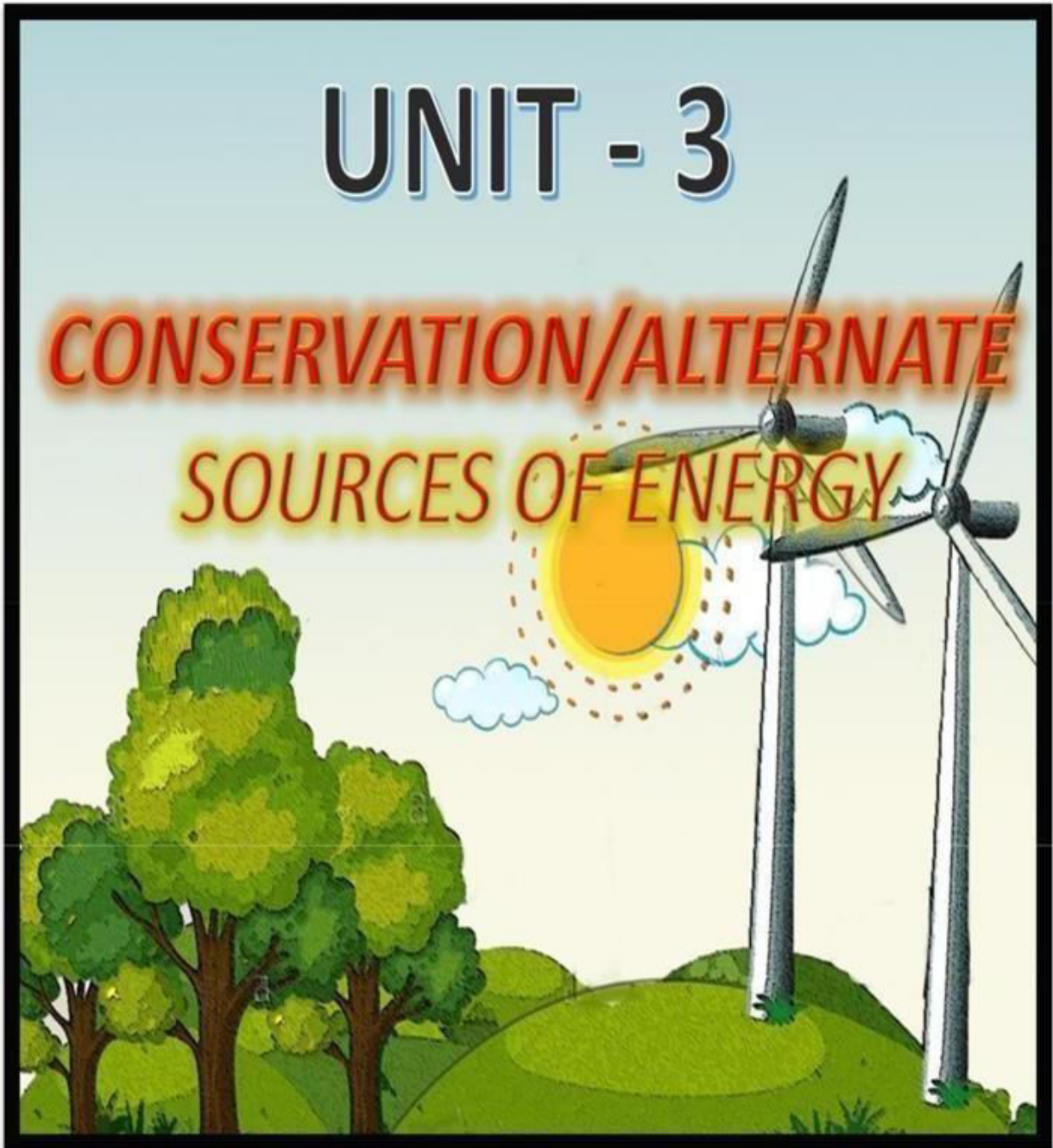
- 3. unit of power
- 4. major powerhouse trip
- 5. utensils cleaner
- 9. kerosene-lit lighting
- 10. saving to minimise resource wastage

Down

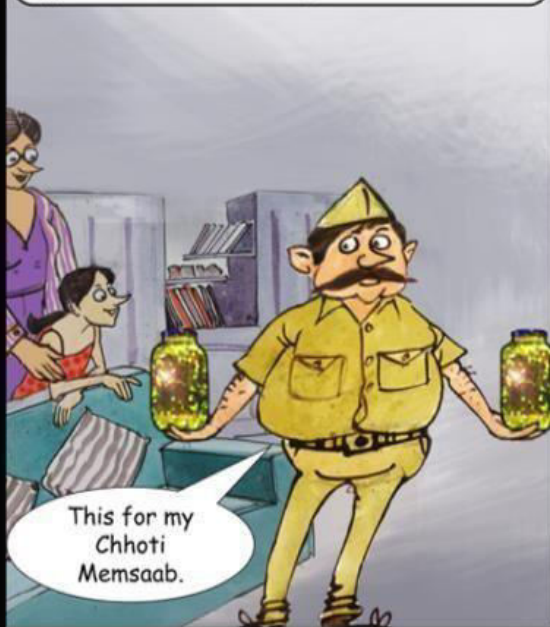
- 1. The EO
- 2. source of light during blackouts
- 6. online seminars
- 7. device to heat water
- 8. common communication device

UNIT - 3

CONSERVATION/ALTERNATE SOURCES OF ENERGY



Around 6 pm in the evening Ramlal enters with two transparent plastic jars containing a cluster of fireflies in each. Sneha hesitantly approaches Ramlal holding her mother's hand.



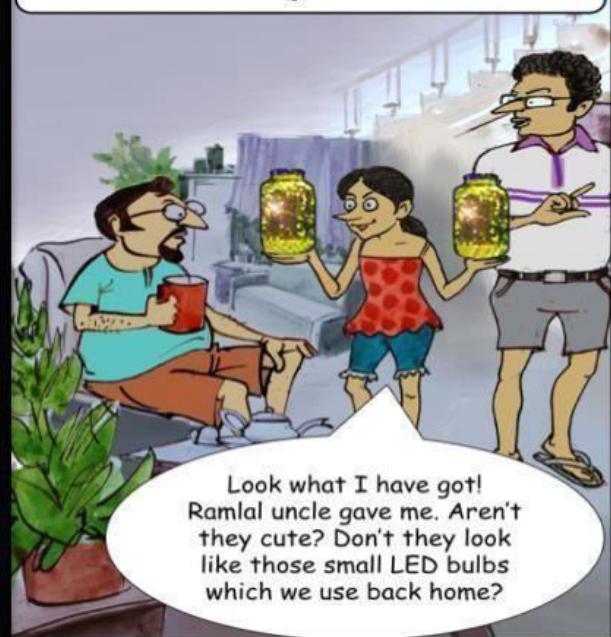
Ramlal gently extends the jars to Sneha.

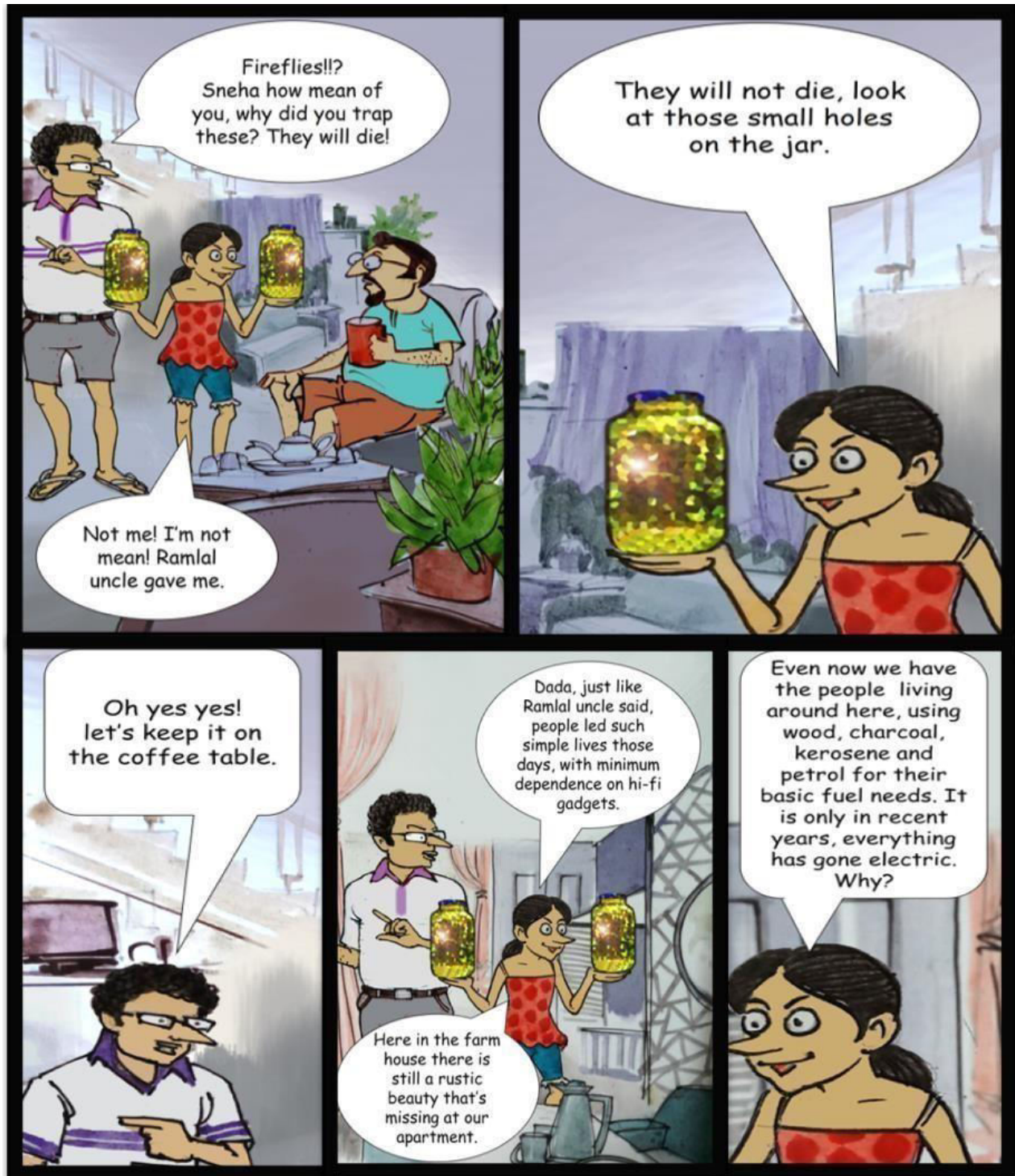


Thank you, Ramlalji. Sneha is very excited. Aren't you?



Sneha excitedly runs into the living room with the jars in hand.





Wood, charcoal, petrol etc. are termed as fossil fuels which have poor calorific value and cause a lot of pollution. Also these deposits are limited and fast depleting. So to balance the supply-consumption ratio we have to turn to renewable sources like solar, tidal etc.



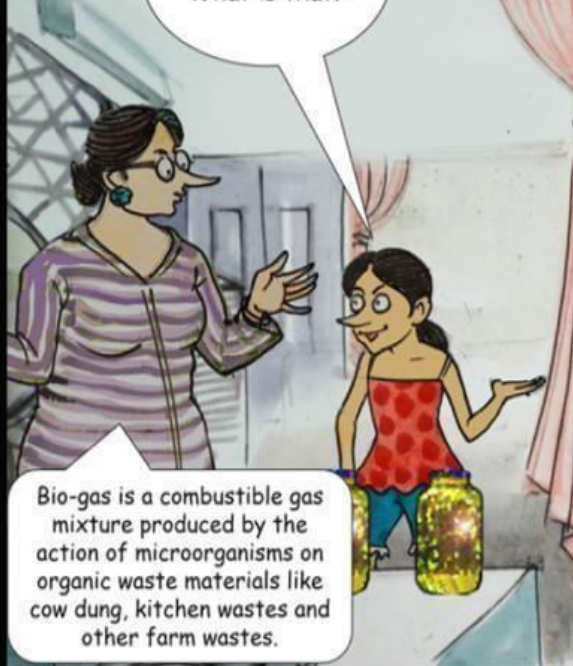
They place the jars on the coffee table and it looks very beautiful.

Ma, how are the people living in villages or around the farmhouse coping with this problem?



People near the farmhouse use biogas effectively as they rear cattle and all their organic wastes are used as well.

Bio-gas?
What is that?



Bio-gas is a combustible gas mixture produced by the action of microorganisms on organic waste materials like cow dung, kitchen wastes and other farm wastes.

Oh! Those people are so lucky to have such simple sources of energy. Of course, their needs are also simple.



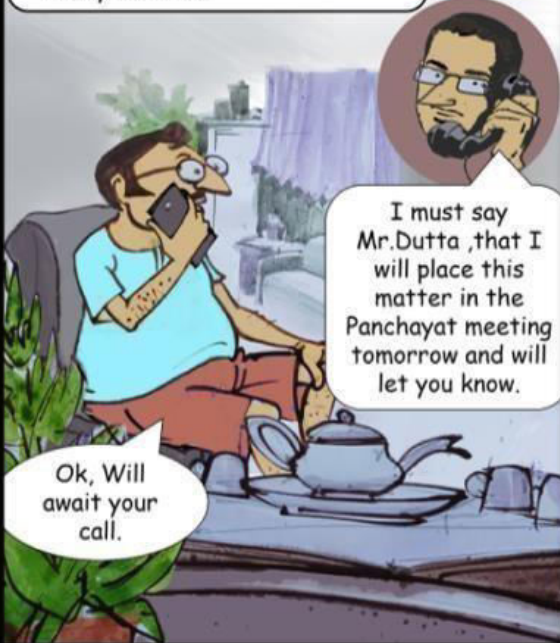
Not only do they use bio-gas, but also effectively use wind power. Have you seen those two tall windmills at a distance?







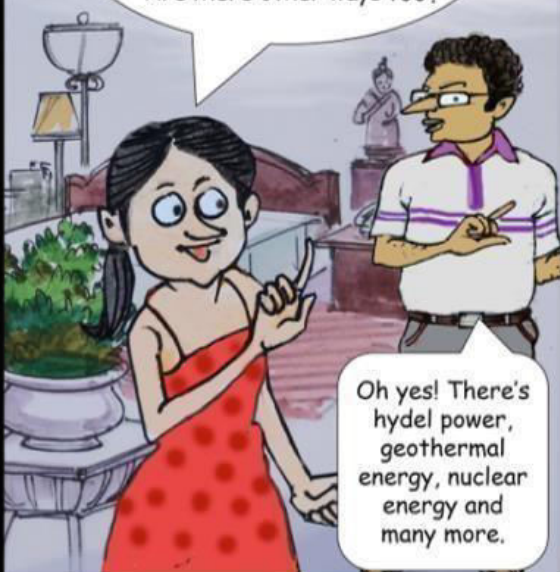
Dad calls up Mr. Banerjee and shares his idea. Mr. Banerjee really likes it.



Dinner's ready!!



Dada, you spoke about wind energy, solar energy, bio-gas and tidal energy this morning. Are there other ways too?



Yeah Yeah, we need to build a dam on a river to store water.

Then this water is released from the reservoir, flows through a kind of water wheels called water turbine, spinning it, the energy produced in this process is used to generate electricity.

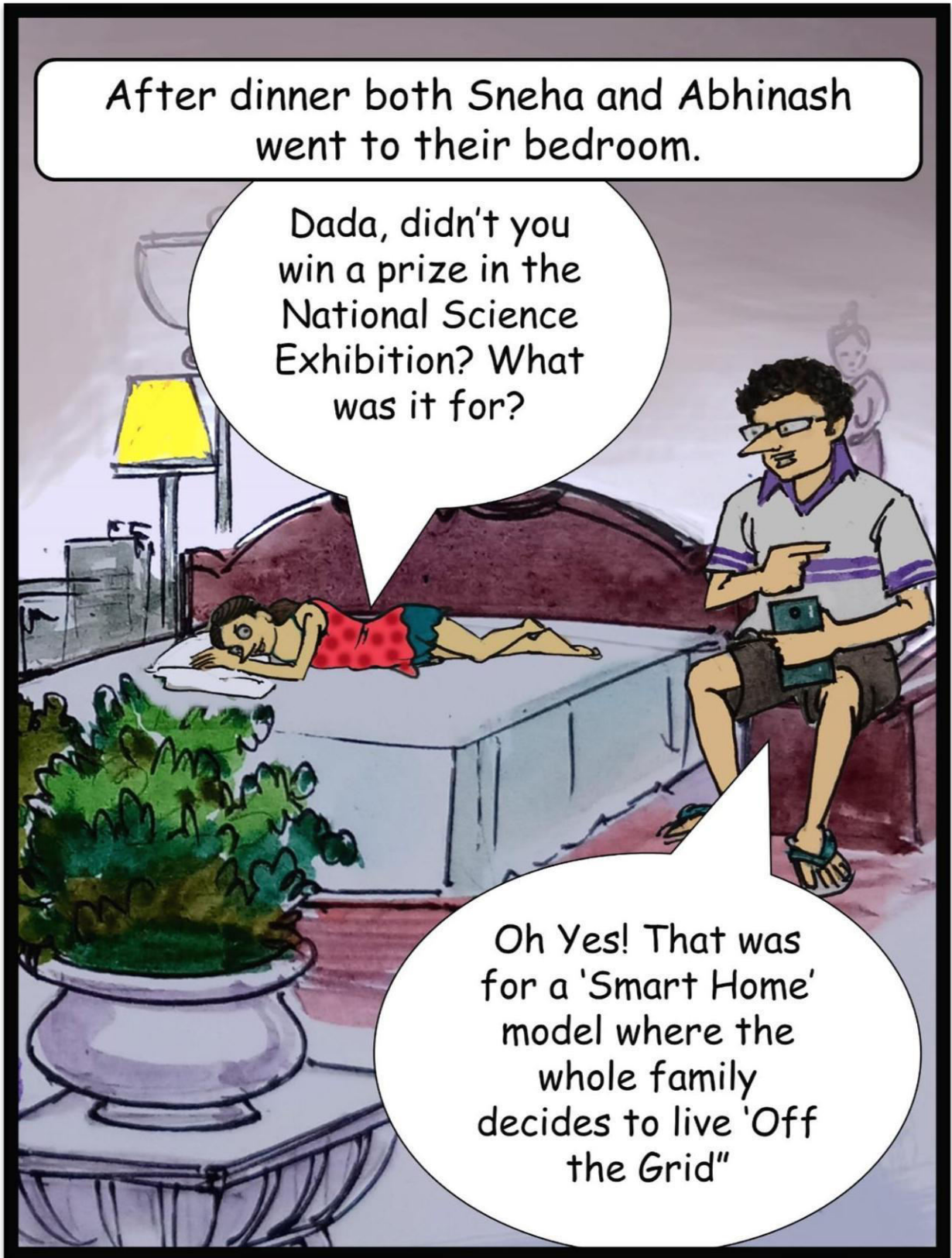


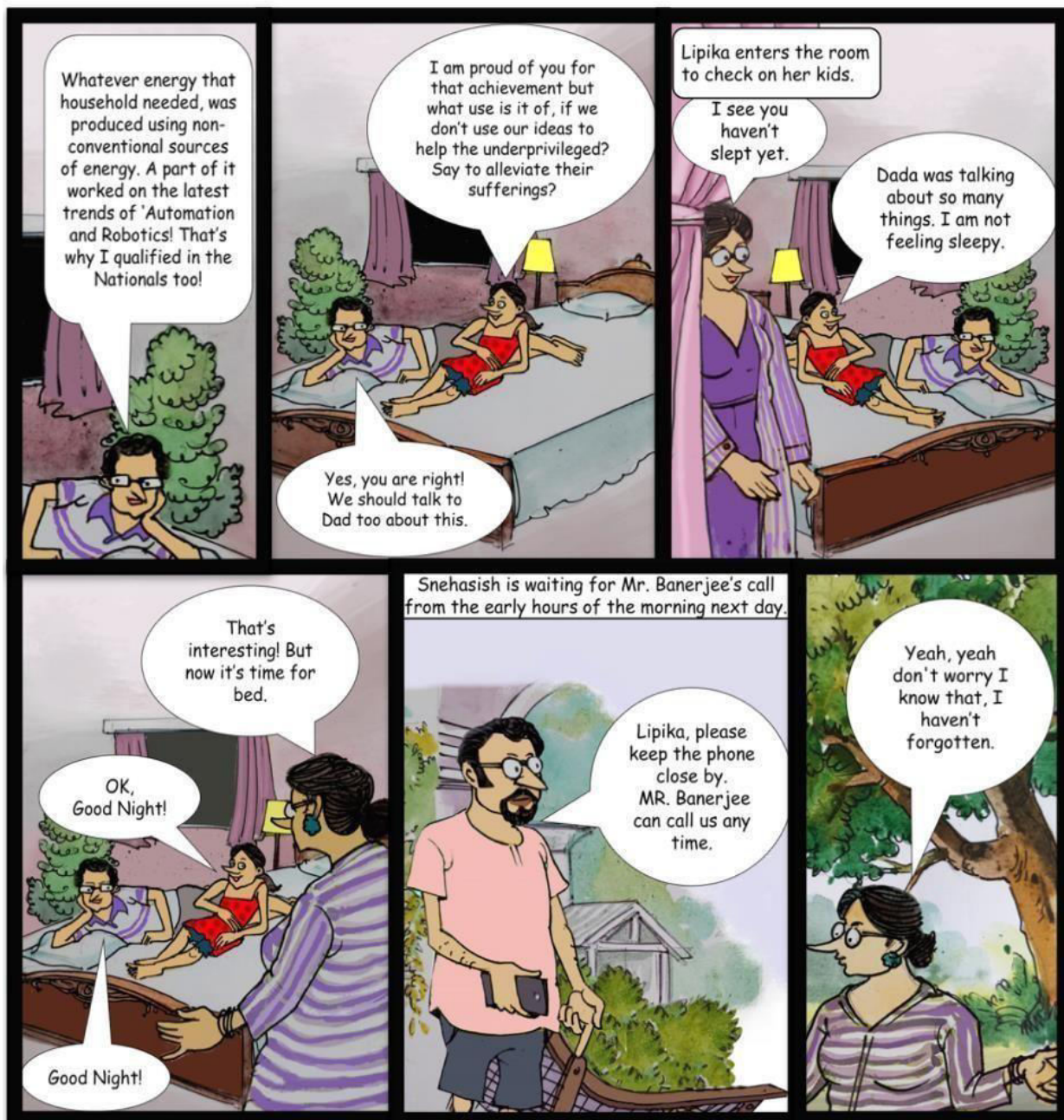


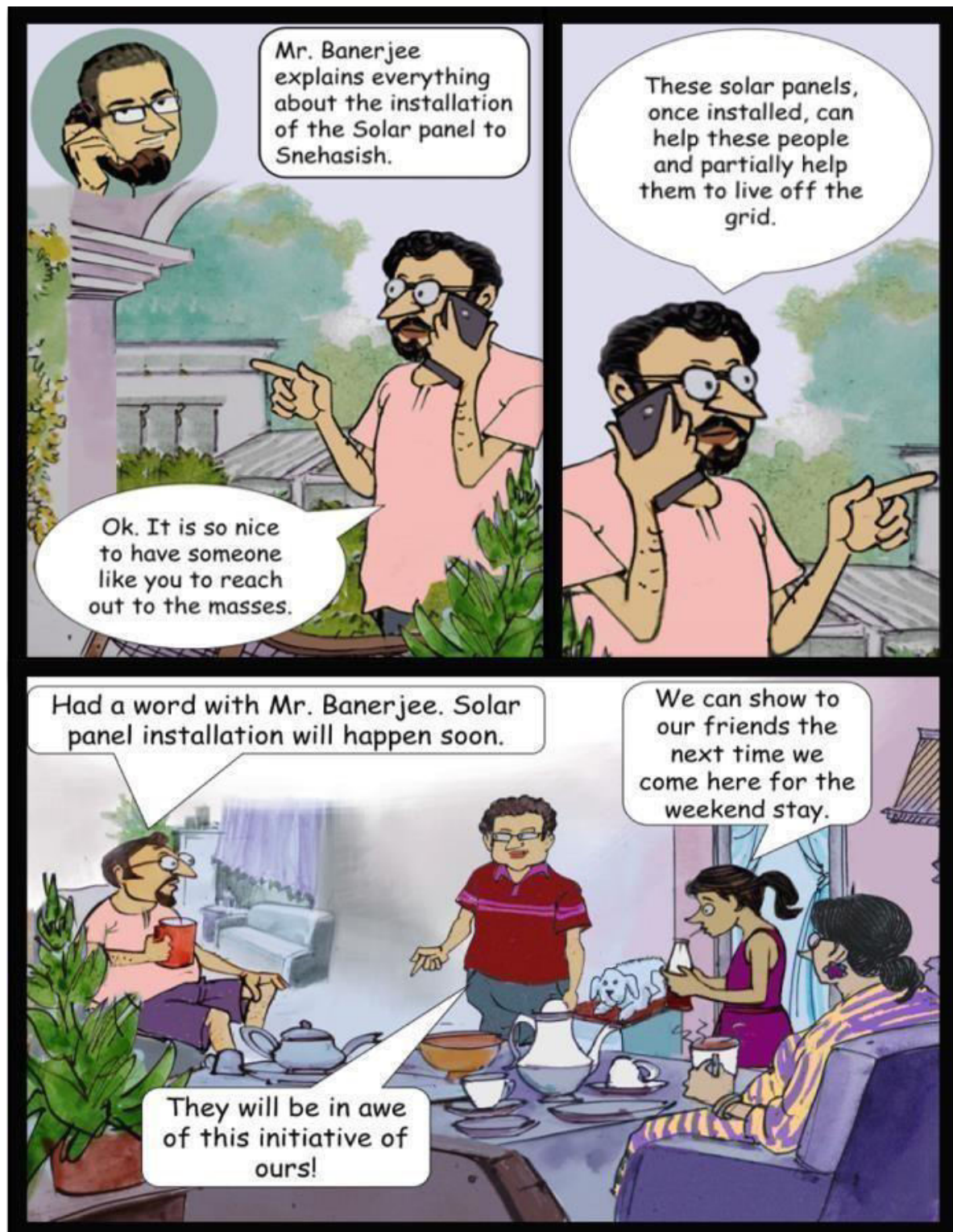
After dinner both Sneha and Abhinash went to their bedroom.

Dada, didn't you win a prize in the National Science Exhibition? What was it for?

Oh Yes! That was for a 'Smart Home' model where the whole family decides to live 'Off the Grid'

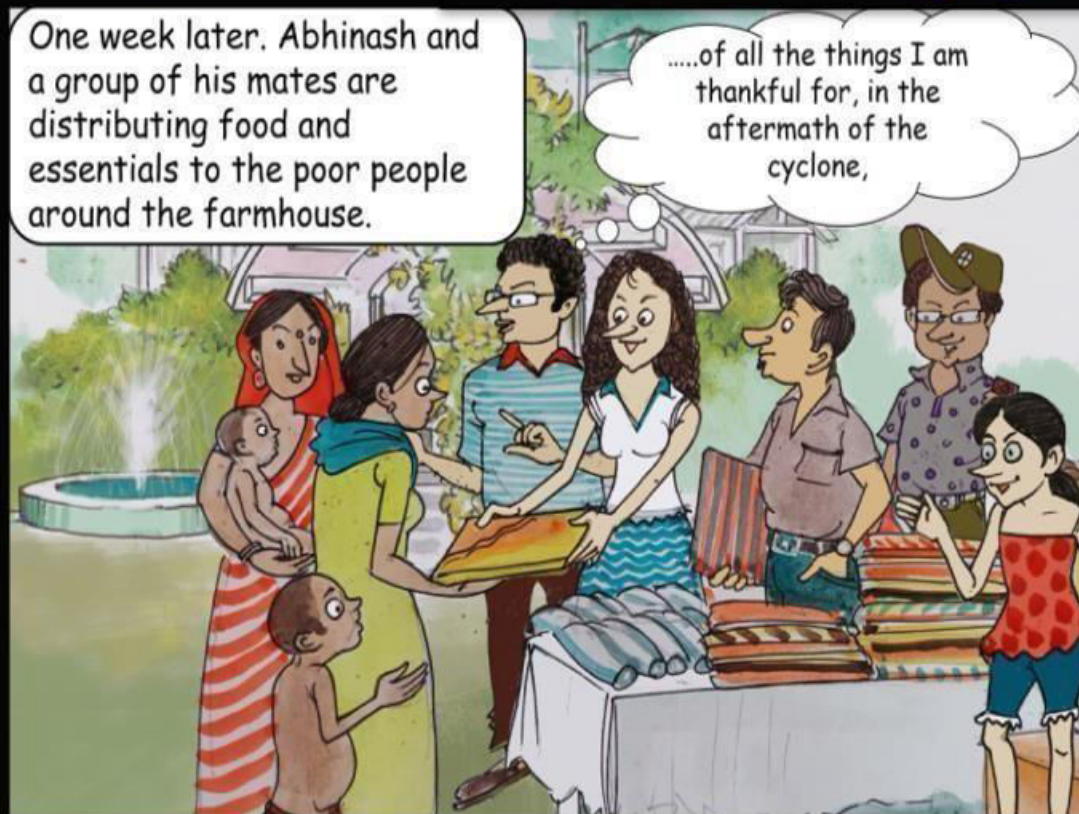


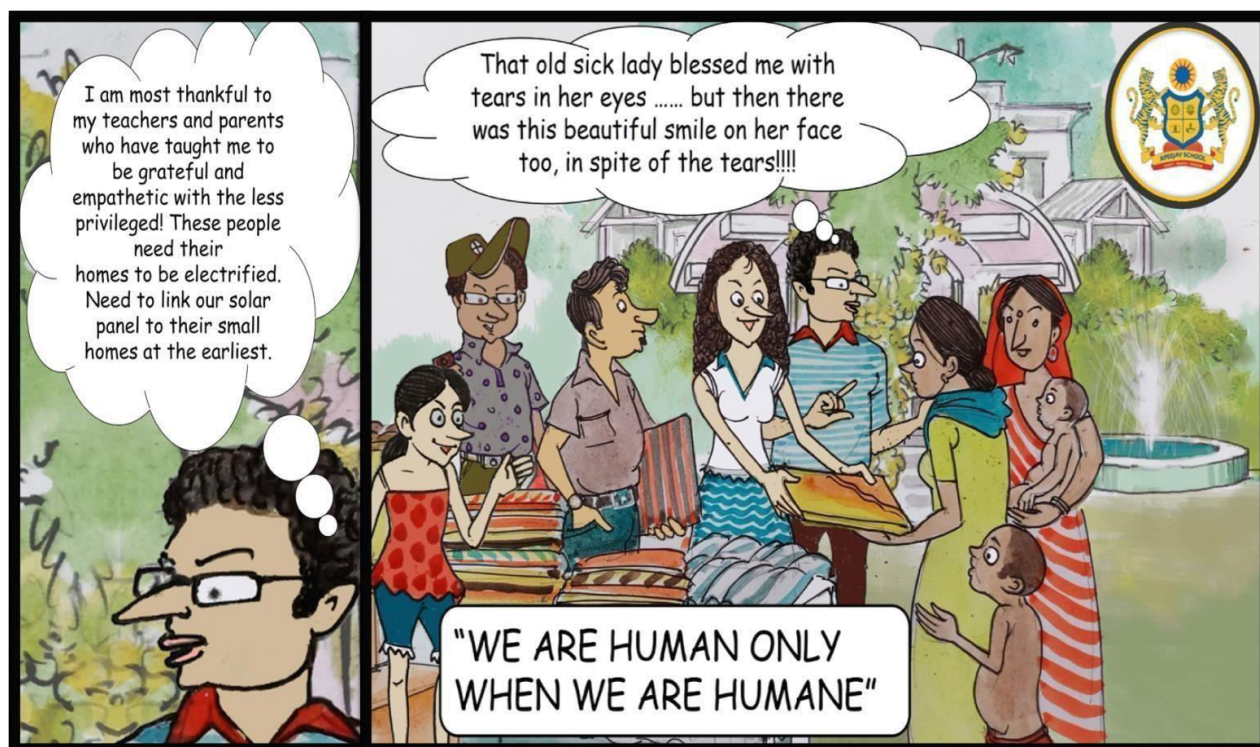






One week later, Abhinash and a group of his mates are distributing food and essentials to the poor people around the farmhouse.





UNIT – 3 (Objective Questions)

MCQ

- Which of the following appliances converts solar energy to electric energy?
a. MCB b. Windmill c. Turbine d. Solar Cells
- The energy obtained from water is called:
a. Hydroelectric Energy b. Tidal Energy c. Atomic Energy d. Geothermal Energy
- Which of the following is not a conventional source of energy?
a. Petroleum b. Coal c. Natural gas d. Solar Energy

Fill in the blanks:

- _____ is the energy obtained from tides in coastal areas.
- Biogas is a _____ gas mixture produced by action of microorganism on _____ waste.
- _____ energy is obtained from the hot rocks present inside the earth.

Match the following:

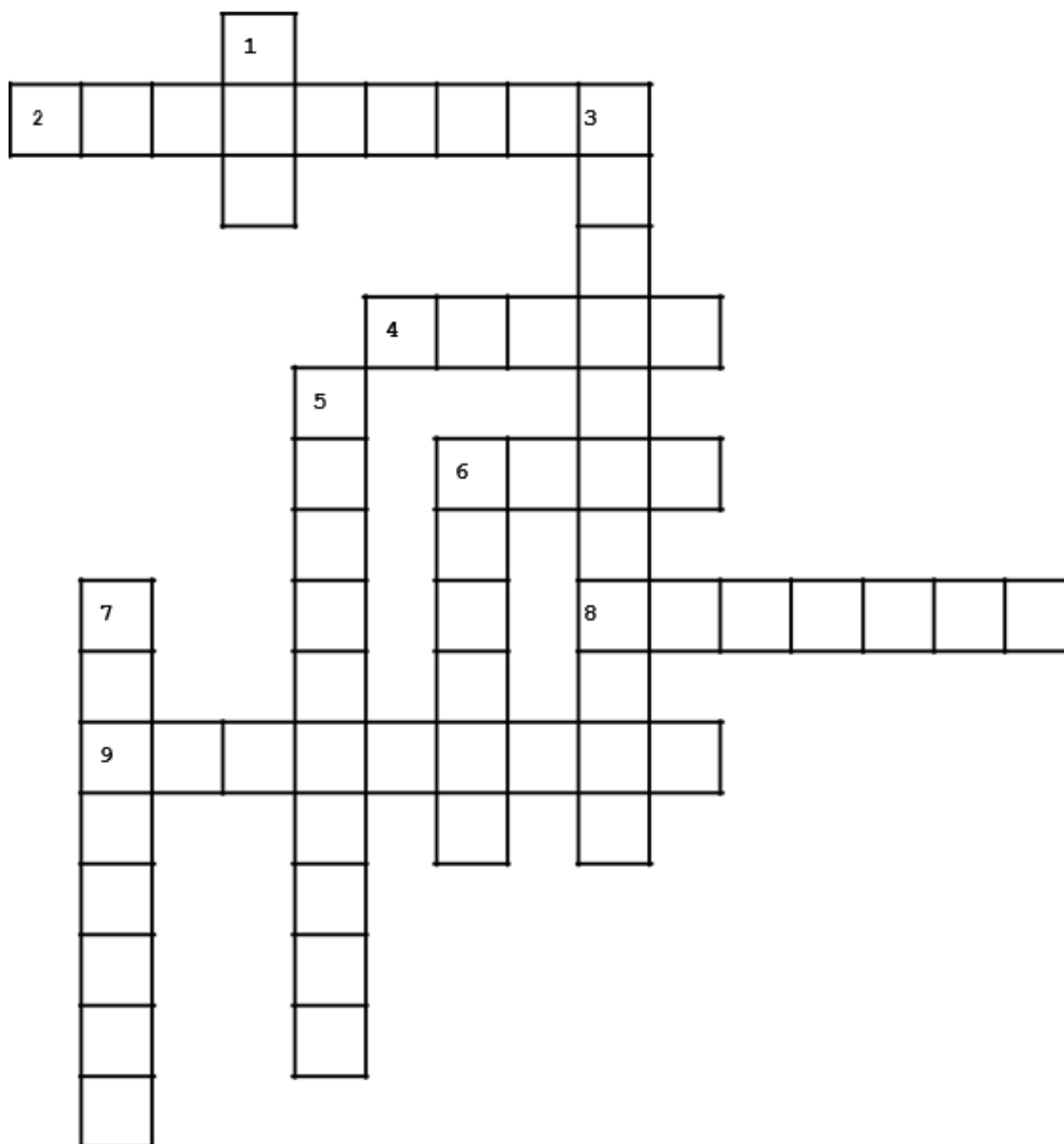
A		B	
1	BIPV	a	Wheel or rotor fitted with vanes made to revolve by fast moving water, air or any other fluid
2	Solar Panel	b	Requires high installation cost
3	Nuclear Energy	c	A type of solar cell that blends well into building structure.
4	Tidal Power	d	Consists of small units of solar cells
5	Turbine	e	Non-Conventional Source of Energy

For the following questions, two statements are given one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is NOT the correct explanation of A
- A is true but R is false
- A is false and R is also false
- A is false but R is true

- Assertion (A): Use of wind energy to produce electricity is limited in India.
Reason (R): Wind energy farms can be built in busy cities in small confined spaces.
- Assertion (A): Geothermal Energy is a conventional energy often used as a fuel.
Reason (R): Underground water in contact with hot rocks turn into steam at high pressure, which is drilled out to run turbines to produce electricity.
- Assertion (A): Solar Skins are a cost-effective solution to convert solar energy to electrical energy.
Reason (R): They fit designs into solar panel systems so that the sunlight falling on them is filtered to reach the solar cells beneath them which results in display of custom images and production of solar energy at the same time.

Unit-3 Crossword



Across

2. gift given by Ram Lal
4. energy from the ocean waves
6. modern type of photo voltaic cells
8. energy derived from fundamental particulate forces
9. can be replenished

Down

1. semiconductor light source
3. group of photo voltaic cells
5. energy from lava, hot springs and fumaroles
6. byproduct of anaerobic respiration on organic matter
7. rotating devices useful for generating power

Solutions

Unit 1

MCQ

1. b. B
2. c. parallel in circuit A and in series in circuit B
3. b. B, C and D

Fill in the blanks:

1. continuous, closed
2. MCB
3. Large, overloading

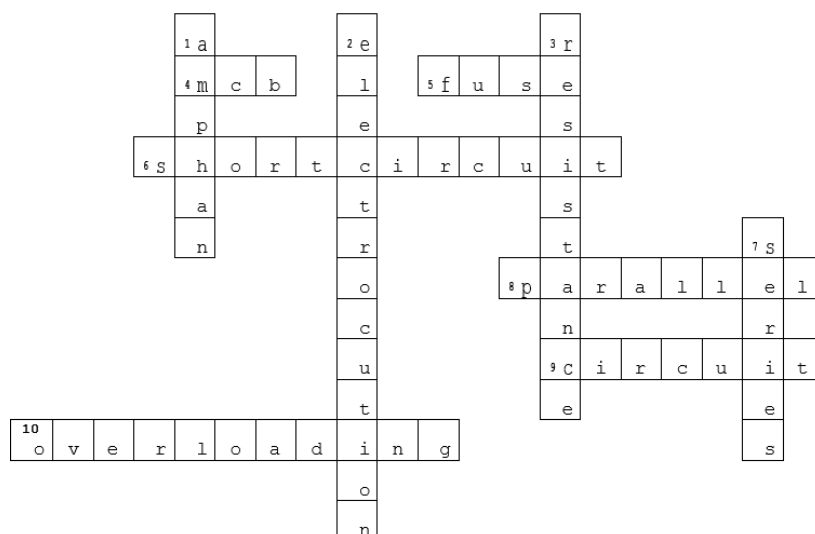
Match the following:

1. Black → c (Neutral Wire)
2. Fuse → d (A wire that melts when a large current flows through it, thereby breaking the circuit and stopping the flow of current)
3. Series Circuit → e (Circuit in which current remains constant)
4. Parallel Circuit → b (Preferred electric circuit for Household)
5. Resistance → a (The ratio of voltage across a conductor to the net current flowing through it)

Assertion-Reason:

1. (b) Both A and R are true but R is NOT the correct explanation of A
2. (a) Both A and R are true and R is the correct explanation of A
3. (d) A is false and R is also false

Unit-1(Crossword Solution)



Solutions

Unit 2

MCQ

1. c. Power Crisis
2. d. LED
3. c. Electric cars

Fill in the blanks:

1. reduce
2. increased
3. stop using, consumption

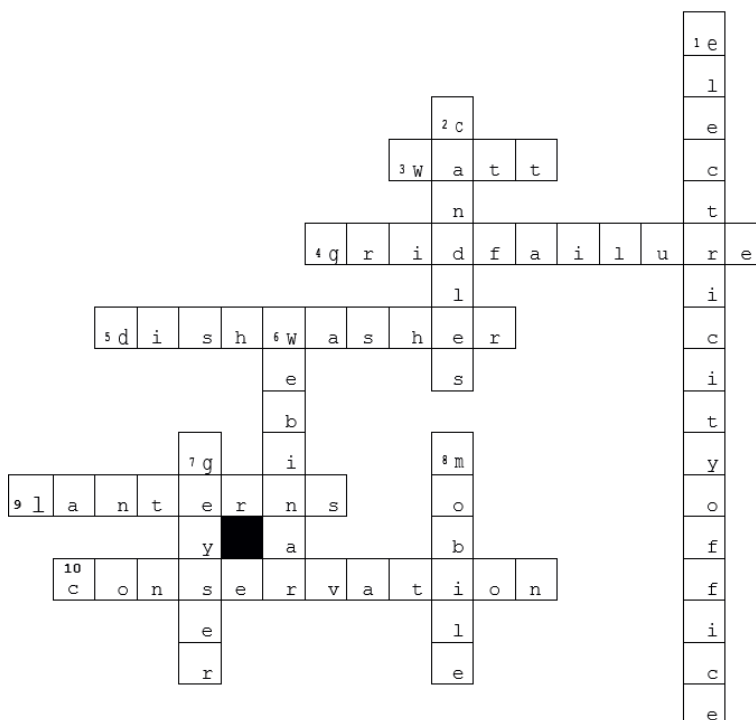
Match the following:

1. Demand for Electrical Energy → c (Surge in use of electronic gadgets like mobiles, laptops etc.)
2. CFL → d (Compact light bulbs which are more energy efficient compared to incandescent bulbs)
3. Energy Conservation → b (The effort made to reduce the consumption of energy by using energy more efficiently)
4. Electric Bill → a (Calculated on monthly consumption of electrical energy in a household or any organization)

Assertion-Reason:

1. (a) Both A and R are true and R is the correct explanation of A
2. (b) Both A and R are true but R is NOT the correct explanation of A
3. (d) A is false and R is also false

Unit-2(Crossword Solution)



Solutions

Unit 3

MCQ

1. d. Solar Cells
2. a. Hydroelectric Energy
3. d. Solar Energy

Fill in the blanks:

1. Tidal Energy
2. Combustible, organic
3. Geothermal

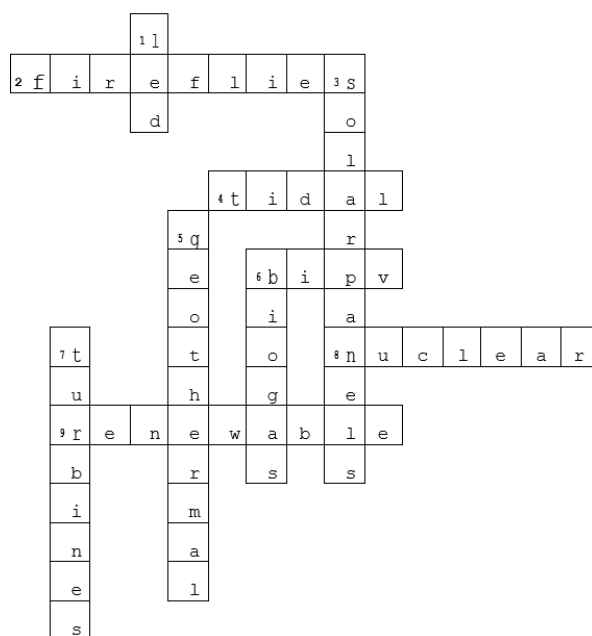
Match the following:

1. BIPV→c (A type of solar cell that blends well into building structure)
2. Solar Panel →d (Consists of small units of solar cells)
3. Nuclear Energy →e (Non-Conventional Source of Energy)
4. Tidal Power→b (Requires high installation cost)
5. Turbine→a (Wheel or rotor fitted with vanes made to revolve by fast moving water, air or any other fluid)

Assertion-Reason:

1. (c) A is true but R is false
2. (e) A is false but R is true
3. (a) Both A and R are true and R is the correct explanation of A

Unit-3(Crossword Solution)



Alternate pedagogies to the teaching of “Electricity- Consumption and conservation”

The topic of Electricity consumption and conservation, can also be better understood by the following alternate pedagogies. The aim is to enable every student to express their ideas in away that is most comfortable to them.

1. ART INTEGRATION:

Expressing thoughts and ideas through drawing, painting, poster-making, with short captions, helps children with innate aesthetic flair to send a strong message to the masses through the medium of linguistic, naturalistic and artistic talents. Not only is this practised at Apeejay Schools, but the Apeejay Anand Art competition, that is held every year on February 26th, at the Apeejay House grounds, is an extrapolation of this initiative that provides a platform to children/students from all sections of the society, to showcase their artistic skills on a given theme- Conservation, Happiness, Towards a Greener world, Vibrant colours of life etc. Here are some visuals.

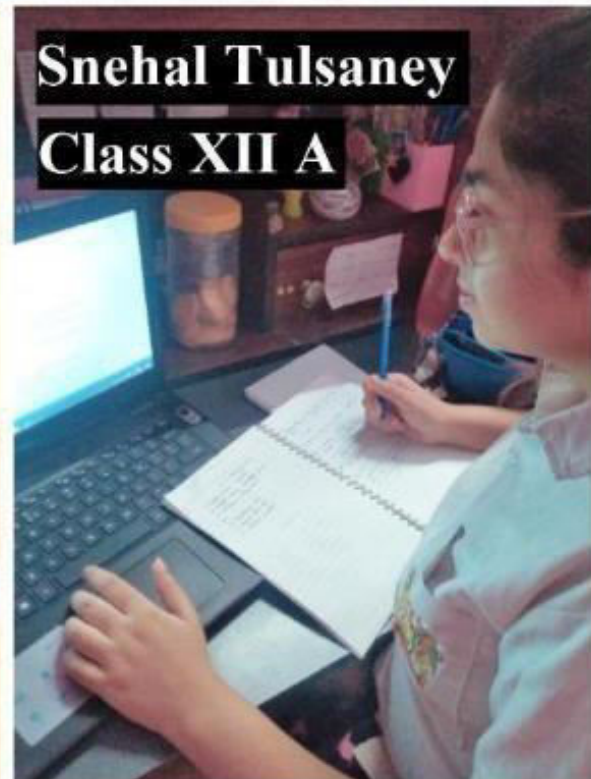


2. SCIENCE FAIRS/ EXHIBITIONS @ EXPERIENTIAL LEARNING.

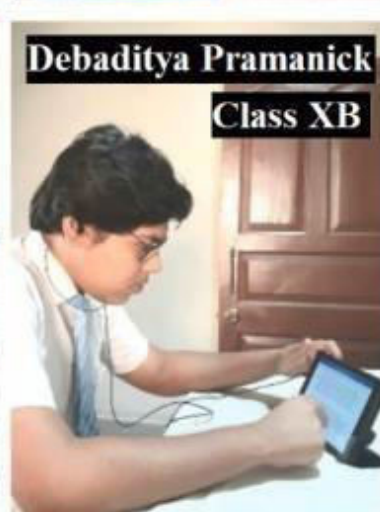
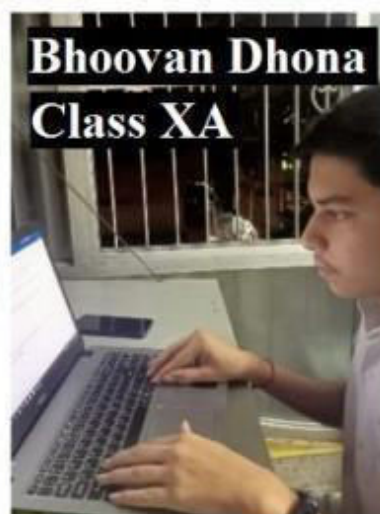
Science-Activity days, that is held class-wise every year, at Apeejay Schools have paved the way for students to showcase their talents using their psychomotor skills @experiential, hands-on learning. Theme based science model – making competitions have made children think of innovative solutions to everyday problems and share their experiences with students from other schools. The Regional CBSE Science Exhibitions hosted by Apeejay Schools every year has congregated many students across Eastern India and promote the fun way of learning science. Here are some visuals.



Creative Minds @ Work



Creative Minds @ Work



GLOSSARY

- **Electric Current:** Electric current is expressed by the amount of charge flowing through a particular area in unit time.
- **Resistance:** The ratio of voltage across a conductor to the net current flowing through it.
- **Voltage:** Voltage or potential difference between two points in an electric circuit carrying some current as the work done to move a unit charge from one point to the other.
- **Electric circuit:** A continuous and closed path of electric current.
- **Series Electric Circuit:** A closed continuous path formed by end-to-end connection of components such that the current that flows through each of the components is the same, and the voltage across the circuit is the sum of the individual voltage drops across each component.
- **Parallel Electric Circuit:** A closed branched path formed by connecting components across each other such that the current divides and only part of it flows through any branch. The voltage, or potential difference, across each branch of a parallel circuit is the same, but the currents may vary.
- **MCB:** An automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit. MCB can be reset and reused.
- **Fuse:** An electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby stopping or interrupting the current.
- **Live Wire:** A live wire is a wire carrying an electric current.
- **Neutral Wire:** Neutral wire is a circuit conductor that normally completes the circuit back to the source.
- **Earth Wire:** The Earth wire usually carries no current. It acts as a safety wire and connects the metal case of the appliance to the Earth. However, if something in the appliance goes wrong, or it is wired incorrectly, then the Earth wire may also carry the same current as the live wire.
- **Tidal Energy:** A form of hydro power which converts the energy obtained from tides into other useful energies (electricity).
- **Geothermal Energy:** Heat that is generated within the Earth. (Geo means "earth," and thermal means "heat" in Greek.) It is a renewable resource that can be harvested for human use.
- **Bio-gas:** Naturally occurring gas that is generated by the breakdown of organic matter by anaerobic bacteria and is used in energy production.
- **Wind Energy:** Energy obtained from winds that is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity.

- **Nuclear Energy:** Heat energy released due to nuclear reactions, which most frequently is then used in steam turbines to produce electricity in a nuclear power plant.
- **Solar Power:** Energy obtained from sun which is then converted to useful form of energy like electrical energy.
- **BIPV:** Building Integrated Photovoltaics (BIPV) system consists of integrating photovoltaics modules into the building envelope, such as the roof or the facade.
- **Solar Panel:** A device that converts light energy into electric current.

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From the Principal's desk



Dear Young Readers,

You read a line in a book and you read the same line written in a bubble floating out of a character's mouth. You feel the latter sketchy art to be more alive than the former classical, written expression. The proof lies in the increasing popularity of the Japanese Manga and the American Marvel graphic novels that had allured human minds to the world of dreams and madness in forms of comic strips. Pictures have always been powerful communicators since time immemorial, the proverbial Bison of the Spanish Altamira caves, has always been the magnum opus of our great ancestors; it spoke more than thousand words. We love cinema. In our younger days we have enjoyed our comic books. And sooner we found that our long and serious fictions, non – fictions and anthologies too adopted a new medium of expression through sketches and dialogue bubbles in graphic novels. Graphic novels are just not trendy, but extremely fascinating for their narrative style and 'epic geste'.

I have always been horrified by the discipline of sciences and convolutions of numbers. Literature had been my forte, my 'De La Grande Mephistopheles'. A book had always provided me with a 'Teni Da'-ian super excitement. I use this nonsensical term of the fictitious Bengali character 'Teni Da' to express my ineffable feelings about literature. So, I always imagined to have sciences and mathematics also in forms of poetry and stories. Till date, I remember the falling of the apple, but do not remember the law of gravitation properly. I can see Archimedes running out of his bathtub screaming, 'Eureka', but do not remember the laws of buoyant force.

It is the initiative and energy exuded by Mr. Sandeep Sethi (Director, Education, M.S.M.S II, Museum Trust), with a proposal to have a 'book of Physics' as a graphic novel. And Lo, my dormant desires woke with excitement to get my dream science book. The Apeejay School, Park Street and Apeejay School, Salt Lake were one of the many schools, that was given a chance by Mr. Sethi, to make a mark, by creatively reinventing, the language of the sciences, especially physics. Finally, we got a Physics Graphic Novel. Here it is! Turn the pages. I am sure, you will cherish the beautiful graphics, exciting images, engaging conversations, great characters, lovely stories, scary storms; everything so real, so picturesque!

The indomitable efforts of the Science teachers, Art teachers, Computer teachers and the English teachers have led to this fine piece of work.

Enjoy what I couldn't at your age!

Rita Chatterjee

Principal and Administrator, Apeejay Schools, Kolkata

A family of four- Mr and Mrs Dutta along with their children get stuck in their farmhouse when the super cyclone "Amphan" struck. Transport, communication, availability of essentials, comes to a screeching halt. How the family copes up with this crisis and how they put their lives back to order, along with those of the poor people in the neighbourhood is a real -life experience, that outlines the modern day's over- dependence on technology and the need to conserve for a sustainable future.



APEEJAY SCHOOL

(Affiliated to C.B.S.E.)

The Graphic novel through its three units of – 'Amphan and its aftermath,' 'The Power crisis' and 'Alternative sources of energy' takes us through the concepts of electricity, electrical devices, household circuits, negative effects of natural disasters and how they can affect our modern way of living greatly. It also makes the younger generation realise that it's their duty and responsibility to judiciously use and conserve energy for a sustainable future.