Vision Empower & XRCVC Teacher Instruction KIT Amazing Energy

Syllabus: Karnataka State Board Subject: Environmental Studies Grade: 5 Textbook Name: Environmental Studies- Text cum work book-English medium- Fifth standard Chapter Number & Name: 13.Amazing Energy

1. OVERVIEW

1.1. OBJECTIVE & PREREQUISITES

Objective

- To understand the meaning of work and energy.
- To understand different forms of energy and their uses.
- To know the significance of conservation of energy.

Prerequisite Concept

• Renewable and non- renewable resources, EVS- Grade 5, chapter 5: Natural Resources

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Kindly Note: Activities marked with * are mandatory

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2. LEARN

2.1 KEY POINTS

- Mechanical energy
 - Mechanical energy is a form of energy possessed by an object due to its position or motion. Mechanical energy is the sum of kinetic and potential energy in a system.
 - The form of mechanical energy that is possessed by objects which are in motion is called Kinetic energy. Example: A flowing river possesses kinetic energy at a certain speed because the water is moving from one location to the other.
 - The type of mechanical energy that is possessed by objects at rest, or due to their position, is called Potential energy. Example: When we stretch a rubber band, it stores some amount of potential energy inside it. Now, we

can easily say that a stretched rubber band will have elastic potential energy stored inside. As soon as the stretched band is set free, it quickly returns to its original shape and the elastic potential energy gets converted into kinetic energy.

- Stored energy of water: Hydro electric power is a renewable energy source which harnesses the power of moving water to produce electricity. As the water flows down through the dam its kinetic energy is used to turn a turbine. The generator converts the turbine's mechanical energy into electricity.
- Chemical energy: Chemical energy is produced by the chemical reaction that takes place in the substances. Batteries, biomass, petroleum, natural gas, and coal are examples of stored chemical energy.

2.2 LEARN MORE None

3 ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Interest generation activity Activity 1: Work

Materials Required: table, chair, books *Prerequisites:* food nutrients

- Ask the children how will they move/shift their table/chair/benches? As per their responses ask them to do the same.
- Either they will push, pull or might try to pick it. Then explain to them that all these examples/ways included pushes or pulls that caused things to move are known as forces.
- Ask them to complete an activity where they have to list down any 5 works they do. Did they feel tired after doing any of these works?
- Then explain to them that we use energy to do work. Less energy is required if we are doing some simple work for example, keeping a book on the table and more energy is required when we do some tough work, for example: lifting a very heavy block. Students can be engaged in such kind of work where in some activities less energy is required and in other
- We get the energy to do work from food. As the children had already read about nutrients, the teacher can add what nutrients you consume to get energy.

• Similarly energy is required to do any work. There are different forms of energy which we would learn in this lesson.

3.2 CONCEPT INTRODUCTION ACTIVITIES

Muscular energy

Activity 2: Muscular energy Materials Required: None Prerequisites: None

Activity Flow

- Ask them what energy they use when they run and walk?
- Explain to them that activities like walking, climbing, pulling, pushing etc., need muscular energy. This energy is released by chemical changes in our body.

Mechanical energy

Activity 3: Mechanical energy Materials Required: None Prerequisites: None

Activity Flow

- Explain mechanical energy and its two forms.
- Give them the example of both kinetic energy and potential energy.
- Example of kinetic energy: A flowing river possesses kinetic energy at a certain speed because the water is moving from one location to the other.
- Example of potential energy: When we stretch a rubber band, it stores some amount of potential energy inside it. Now, we can easily say that a stretched rubber band will have elastic potential energy stored inside.

Heat energy

Activity 4: Heat energy

Materials Required: None Prerequisites: None

- Ask them do they know how we get hot food, hot water?
- Ask them to do an activity of rubbing their palms rigorously for sometime and touch their cheeks. How do they feel?

- Explain to the children that in this activity their muscular energy gets converted into heat energy.
- Give them some other examples of heat energy:
 - When the burner of a stove top is very hot, it is a source of heat energy.
 Anything placed onto the stovetop and warmed, whether a pot of tea or a skillet for frying eggs, also become sources of heat energy.
 - A hot cup of steaming coffee contains heat energy.
 - Any fire, from the smallest match, to the fireplace, to the biggest forest fire ever, contains heat energy.

Solar energy

Activity 5: Solar energy

Materials Required: Model of a solar panel *Prerequisites:* None

Activity Flow

- Explain to the students that the Sun is the main source of all energy on the earth. The energy we get from the sun is called solar energy. Living organisms depend on solar energy for their survival. Plants prepare their food using sunlight. This process is called photosynthesis.
- Solar energy can be collected from the sun and used to heat buildings and to make electricity.
- Solar cells /solar panels can be used to generate electricity from sunlight. It is a device that converts light energy into electrical energy. When we use solar power, we don't use any of the Earth's resources like coal or oil. This makes solar power a renewable energy source. Show them the model of a solar panel.
- Solar cells convert sunlight directly into electricity by the so-called photovoltaic effect, by which certain materials are able to absorb light particles and generate an electric current. On the other hand, there are some panels or mirrors to absorb and concentrate the Sun's heat for electricity production.
- Benefits of solar energy:
 - Renewable
 - Non-polluting
 - Reduces use of fossil fuels.

Wind energy

Activity 6: Wind energy

Materials Required: model of a windmill *Prerequisites:* None

Activity Flow

- Wind power is energy, such as electricity, that is generated directly from the wind. It is considered a renewable energy source because there is always wind on the Earth and we aren't "using up" the wind when we make energy from it. Wind power also does not cause pollution.
- In order to make electricity from wind energy companies use large windmills called wind turbines. They are called wind turbines because they use turbine generators to generate electricity. While discussing this show them the model of a windmill.
- In order to create a lot of energy capable of powering thousands of homes, energy companies build large wind farms with lots of wind turbines. They usually build these in consistently windy places. Some companies build wind farms out in the ocean. These are called offshore wind farms.
- Wind turbines are really big structures. Wind turbines often have long blades that look like the petals of a flower. When the wind blows past the turbine, the blades turn. This turning is connected to parts inside the turbine which move another part called a generator. This changes the turning into electricity.
- A wind turbine works the opposite of a fan. Instead of using electricity to turn the blades to make wind, it uses the wind to turn the blades to make electricity.

Stored energy of water

Activity 7: Stored energy of water

Materials Required: Model of a hydroelectric power generating stations *Prerequisites:* None

Activity Flow

• Explain to the students that flowing water is a source of energy. In order to use water as a source of energy, a dam has to be built across a river and water must be stored in it (potential energy). Stored water is allowed to flow from a higher level to fall on turbines. Due to the force exerted by running water turbines rotate fast and produce electricity. These are called Hydro electric power generating stations.

Electrical energy

Activity 8: Electrical energy Materials Required: None Prerequisites: None

- Ask the students, where do you think we use electrical energy? (Television sets, computers, refrigerators, etc.)
- An example of electrical energy is power from a plug outlet.

- Explain to them that electrical energy is a type of kinetic energy caused by moving electric charges.
- The amount of energy depends on the speed of the charges the faster they move, the more electrical energy they carry. Tell the students to use electrical appliances carefully.

Bio gas

Activity 9: Bio gas

Materials Required: None Prerequisites: None

Activity Flow

- Explain to the students that biogas is a type of biofuel that is naturally produced from the decomposition of organic waste. When organic matter, such as food scraps and animal waste, break down in an anaerobic environment (an environment absence of oxygen) they release a blend of gases, primarily methane and carbon dioxide. Because this decomposition happens in an anaerobic environment, the process of producing biogas is also known as anaerobic digestion.
- Animal manure, food scraps, wastewater, and sewage are all examples of organic matter that can produce biogas by anaerobic digestion.

Fuel energy

Activity 10: Fuel energy

Materials Required: None *Prerequisites:* Natural resources

Activity Flow

- Fuel is the natural source of energy which is combustible, produces heat and usually gives out light. This can be converted into electrical energy, heat energy and mechanical energy. Example: firewood.
- Fuel, the natural resource must be used moderately to protect our environment.
- Change of energy from one form to another: Firewood is also a fuel. Burning of firewood gives heat. By using this heat energy it is possible to cook and do other works.

Conservation of energy

Activity 11: Conservation of energy Materials Required: None Prerequisites: types of energy

Activity Flow

- Ask students to name some items that run on electricity. And what items do they use in their daily routine?
- Tell students that electricity is helpful, but it's important to use only as much as we need. Conserving energy, or reducing the amount of energy we use, can help make our power plants work more smoothly, reduce costs, and most importantly, use less of our planet's resources.
- Explain that everyone can do something to reduce the amount of electricity they use. Often, these are simple things that can be done at school or at home.
- Two of the easiest things to do are to use washing machines, and dryers only when full, and unplug items that are not being used. Ask students to explain why those two energy tips are important.
- Further explain to them that some appliances, like refrigerators, need to be plugged in all the time in order to work. Other items, like laptops or cell phone chargers, don't always need to be plugged in as they use electricity even when they are turned off or not charging. These types of devices are called Vampire Electronics because they suck up energy!
- And you can ask from the students what other ways do they think we should follow to save/conserve energy.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

Activities at home in which different forms of energy are used:

-Electrical energy: TV, Video games, motors.

-Mechanical energy: running cars, a rolling bicycle.

-Solar energy: solar light, solar, cooker.

-Chemical energy: electric cell

4 EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Different forms of energy

Activity 12: Different forms of energy

Materials Required: None Prerequisites: Types of energy

- Ask the students to write different forms of energy which they have learnt in this lesson.
- Also ask them to add one or two examples from their daily lives in each form of energy.

4.2 IMPORTANT GUIDELINES*

Exercise Reading

It is very important that the children practice their learnings as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

Perform Textbook Activity

It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

Provide Homework

To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently

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