Book Name - Natural Science and Technology 5-B CAPS Developed and funded as an ongoing project by the Sasol Inzalo Foundation in partnership with Siyavula and volunteers

Chapter-1: Stored energy in fuels.

Questions:

What are fuels?

What is required to burn fuels?

how can we safely burn fuels?

how can we prevent fires and what must we do if there is a fire?

What are fuels?

What do you understand about the term fuel? Discuss this word with your partner and write down your own definition below.

Choose one of the foods that you will eat for lunch today and draw a food chain including this food and ending with you. any food chain starting with the Sun and ending with a person the learner.

Content:

There are a few different definitions for fuel. There are three main categories that you can use to investigate fuels. Some fuels can be burnt to create heat and light.

Wood is often collected and burnt to give us heat and light. On a cold evening it is wonderful to sit around a fire to tell stories and warm yourself with friends.

Wood comes from plants specifically trees. Plants use light energy from the Sun as well as carbon dioxide and water to grow. Plants take the energy and store it in their leaves roots and all parts of the plant. Wood also contains this energy stored by plants. burning wood allows us to change this stored energy into light and heat which is useful to us.

Coal is a type of fossil fuel that is also burnt to provide us with heat that we can use. The heat from coal can be used to cook our food and warm our houses.

Fossil fuels like coal were made from prehistoric plants. The plants took up energy from the Sun and stored it in their bodies. Millions of years ago the earth was mostly covered by water. The plants that died sank to the bottom of the water. Over millions of years the layers of plants were covered by layers of sand and compressed by the weight of the sand. The plant material was buried deeper and deeper under the ground where it is much hotter than on the surface of the earth. Over millions of years the plant remains changed into fossil fuels.

These fuels get their name fossil fuels because they are made from plants and animals that lived a very long time ago.

Natural gas and oil are also examples of fossil fuels. Scientists have realised that tiny sea organisms also died sank to the the bottom of the ocean and were buried under the sand. Over millions of

years many layers of dead sea animals got buried like this. Over millions of years the dead sea animals changed into oil and natural gas.

Wax in a candle is burnt to provide light. by burning the candle the stored energy in the wax is released as light and heat energy.

Paraffin is also a fuel that contains stored energy. Paraffin is burnt in paraffin lamps and paraffin stoves to provide us with useful energy in the form of light and heat.

Gas is another fuel that can be burnt to release stored energy in the form of heat and light. We can use gas heaters to keep warm and gas stoves to cook food and boil water. Natural gas is odourless and colourless and it is also known as clean gas because unlike other fossil fuels it doesnt produce harmful byproducts when it burns.

Humans and animals need energy to live. We get our energy from the food that we eat.

Food contains stored energy that our bodies can change into useful energy that we need when we run jump breathe learn and do everything else that we do.

The energy value of food is often shown on the packaging of foods that we buy. The energy of food is measured either in calories cal or in joules j. a snack such as a packet of chips gives you thousands of joules of energy. Therefore we rather talk about kilojoules kj of energy when talking about the energy in food.

The energy value of a food tells us how much energy that food is worth to our bodies as fuel. An average adult man needs about kcal or kj per day. children and adults that are not very active need less energy. People that are very active need more energy. These numbers are just to give us an idea of the amount of energy your body needs as fuel everyday. it is important to eat a balanced diet.

Some fuels are energy sources for engines and power station

fuels can also be used to give us other forms of useful energy. Petrol or diesel is used in cars and trucks to make them go. The stored energy in the fuel is changed into movement energy of the car or truck. Petrol and diesel are made from fossil fuels.

Energy from the Sun is stored in the plants and animals which eat the plants. Their remains turned into fossil fuels over millions of years which are then mined and used to make petrol and diesel to fuel cars.

coal is not only burnt in our homes for cooking and keeping us warm. it can also be used to make electricity. a power station is a large factory where the coal is burnt in large amounts to produce electricity.

Burning fuels, We have learnt that burning fuels provides us with energy that we can use. What does a fuel need to be able to burn? it requires some energy to start burning fuel. fuel needs oxygen to burn. fuel usually gets oxygen from the air around it. There are other gases present in air as well but they do not burn.

Fire safety - We have spoken a lot about fire and burning in this chapter so far. fire is a major source of heat energy for many people whether it for keeping warm cooking food or for some other purpose. although fire is very useful it is also very dangerous great care is needed when using fire. fire is a threat in our communities.

DID YOU KNOW? Some plants even need fire to survive an example is Fynbos. This is a group of plant species found only in South africa. The seeds of Fynbos plants need smoke and heat to germinate.

There are a few safety rules that everybody should know.

Never play with matches and lighters. Make sure that matches and lighters are kept out of reach of young children who do not know how to use them properly.

in case of fire stay away. if there is a fire in your home do not hide rather go outside as soon as possible.

Know the number of the local fire department and phone in case of emergency.

have an escape plan for your home and practice it with your family. have a meeting place outside so that you will know everyone is safe in the event of a fire.

Chapter-2: Energy and Electricity.

Questions:

What do cells and batteries do?

What is an electric circuit?

Where does energy come from in a power station?

how does electricity get from a power station to where it is needed?

how can we use electricity safely?

Coal is not the only source of energy for power stations there are also other types of power stations. find out what these are and write down what source of energy they each use.

Content:

Cells and batteries: batteries come in all shapes and sizes. batteries are needed for many different purposes. Most torches radios calculators cell phones some toys and even cars pacemakers and hearing aids need batteries to work. Batteries are useful because they store chemical energy. When the battery is connected in an electrical appliance and the appliance is switched on the stored energy in the battery is transferred to the appliance in the form of electrical energy to make it work. An electric circuit is a system that consists of different parts. We call these parts the components of the circuit. for example batteries light bulbs and connecting wires are components that can make up a circuit. When these components are connected the right way electricity will be transferred from one component to another. in this example the electricity would be transferred from the batteries through the connecting wire to the bulb and back through the wire to the batteries to complete the circuit. The chemical energy from the battery is transferred to electrical energy in the wires then electrical energy is transferred into heat and light energy in the bulb. Batteries are actually made up of smaller parts known as cells that store chemical energy. Two or more cells connected end to end are called a battery. We will mostly refer to them as batteries but keep in mind that cell is the scientific term for what most people call a battery in everyday life. One cell stores a small amount of energy. if we need to store a lot of energy we use a battery. a car needs a lot of energy to start its engine. One cell does not have enough stored energy. Therefore a car battery has six cells that are connected end to end inside the battery case. in this case there is six times more energy stored in the battery than in a single cell. This gives the car enough energy to start the engine.

Mains electricity: a battery has stored energy which can provide electrical energy. however our homes schools shops and factories cannot run on batteries. We use electricity for many different things every day. The main source of electrical energy is from power stations. We call this mains electricity. Power stations need a source of energy Power stations use different ways to generate electricity. a power station needs a source of energy. in South africa most of our power stations burn coal to use the energy stored in coal to generate electricity.

Electricity is transferred in a huge circuit to our homes from a power station electricity is transferred through transmission lines held up by pylons. The transmission lines are part of the circuit that connects the power stations to where we need to use the electricity. The transmission lines carry large amounts of electricity to substations in cities and towns. from a substation electricity is carried

in smaller amounts to an electricity box for our home. from the electricity box electricity travels through wires to the plug points and light fittings in our homes.

Safety and electricity: We use electricity every day. electricity can be dangerous so it is important that we use it safely. electricity can give you an electric shock. an electric shock can hurt you badly or even kill you. high voltage is very dangerous. Look out for warning signs. Electricity can cause fires and injuries even death. here are some rules for using electricity safely.

Do not put anything into an outlet except a plug.

Do not pull on the cord to unplug an appliance hold the plug and pull.

Dry your hands before you plug in or unplug a cord.

if a plug is broken or a cord is cut or worn do not use it.

Do not plug too many cords into one outlet.

Keep appliances away from water. Do not use a hair dryer if there is water nearby.

if there is an electrical storm with lightning turn off and disconnect electrical appliances like the TV and computer.

Never touch any power lines.

Some power lines are buried underground. if you are digging and find a wire do not touch it.

Do not fly a kite or climb a tree near a power line.