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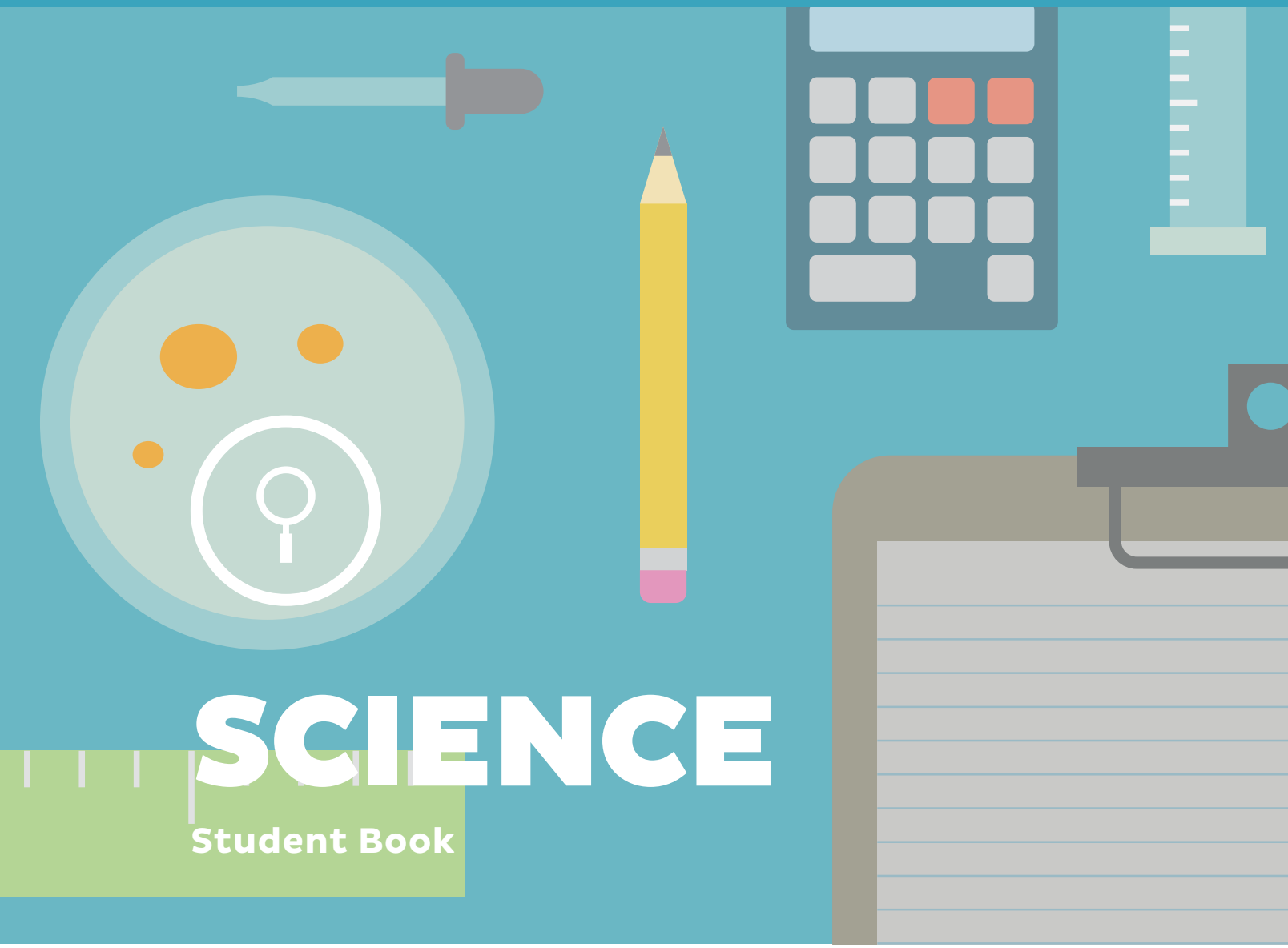

SCIENCE

Student Book

3rd Grade | Unit 9

Alpha Omega
PUBLICATIONS

SCIENCE 309
HEAT ENERGY

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Alpha Omega
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HEAT ENERGY

The heaven, even the heavens,
are the Lord's: but the earth
hath He given to the children of men.

—Psalm 115:16

Heat, light, and all the resources of Earth are a part of God's gift. You will need to learn as much as you can about the earth in order to save these resources for your children and their children.

This LIFEPAC® will help you to understand heat. You will find out where heat energy comes from and some things it can do. You will learn that heat energy is both good and bad for life on Earth.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have finished this LIFEPAC.

1. You will be able to tell about five things that cause heat energy.
2. You will be able to show what heat energy does to gases, liquids, and solids.
3. You will be able to list some benefits and problems of heat energy.

1. WHERE HEAT ENERGY COMES FROM

Did you ever rub your hands together when they were cold? Have you stood near a campfire on a chilly day? Perhaps you turned on the thermostat in your house to start the furnace. Did you ever put on a jacket or a sweater? Maybe you moved out of the shade into the sun.

If you did any or all of these things, you caused heat energy to go to work to make you warmer.

In this section of the LIFEPAC, you will learn where heat energy comes from. You will learn something about five causes of heat energy: friction, fire, electricity, your body, and the sun.

Vocabulary

Study these new words. Learning the meanings of these words is a good study habit and will improve your understanding of this LIFEPAC.

absorb (əb sôrb′). To take in.
ashes (ăsh′ ĭz). What is left after wood burns.
cinders (sĭn′ dərz). What is left after coal burns.
duct (dŭkt). A tube or pipe for carrying air or liquid.
dynamic electricity (dī năm′ ĭk ĭ lĕk trĭs′ ĭ te). A moving stream of electric energy.
energy (ĕn′ ər jē). Power or force.
friction (frĭk′ shən). Rubbing two things together to make heat.

fuel (fyōō′ əl). Something that can be burned to make a fire.
furnace (fûr′ nĭs). A place to make and hold a fire.
liquid (lĭk′ wĭd). Something that can be poured; like water.
natural (năch′ ər əl). Not made by man; God-given.
oxygen (ŏk′ sĭ jən). A gas we cannot live without.
perspire (pər spīr′). To have water come out of the skin when a person gets hot.
produce (prə dōōs′). To make.
product (prŏd′ əkt). Something that is made.
provide (prə vīd′). To give.
radiant (rā′ dē ənt). Sending out rays of light or heat.
resources (rē′ sôr sĭz). Things that meet the needs of people.
solid (sŏl′ ĭd). Not a liquid or a gas; hard to the touch.
static (stăt′ ĭk). A kind of electrical energy.
thermometer (thər mŏm′ ĭ tər). Something used to measure heat.
thermostat (thər′ mə stăt). Something used to control heat.
transparent (trăns pãr′ ənt). Can be seen through.

Note: *All vocabulary words in this LIFEPAC appear in* **boldface** *print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.*

Pronunciation Key: h**a**t, **ā**ge, c**ã**re, f**ä**r; l**e**t, **ē**qual, t**ė**rm; **i**t, **ī**ce; h**o**t, **ō**pen, **ô**rder; **oi**l; **ou**t; c**u**p, p**u̇**t, r**ü**le; **ch**ild; lo**ng**; **th**in; /ŦH/ for **th**en; /zh/ for mea**s**ure; /u/ or /ə/ represents /a/ in **a**bout, /e/ in tak**e**n, /i/ in penc**i**l, /o/ in lem**o**n, and /u/ in circ**u**s.

Ask your teacher to say these words with you.

Teacher check:

Initials _____ Date _____

Friction

One way you can make heat is to rub two surfaces together. This rubbing together is called friction. The friction you make when you rub your hands together warms your hands. Try it. Rub your hands together hard and fast. Do they feel warm? Hold your hands to your face. Can you feel the heat? Friction can make other things warm, too.

| Friction can also make fire if you rub two sticks together.

STUDY FRICTION

Learn how friction causes heat.

You will need these things:

wood
a nail
sandpaper
a hammer

Follow these directions. Check the boxes as you do each step.

☐ **1.** Rub the wood with sandpaper. Rub it hard.

1.1 How does the wood feel? _____

1.2 How does the sandpaper feel? _____

☐ **2.** Pick up the nail. Hold it in your hand.

1.3 Does it feel hot or cold? _____

☐ **3.** Pound the nail into the wood with the hammer. Hit it hard ten times. Feel the nail.

1.4 How does the nail feel now? _____

1.5 What caused the changes you felt in the wood, the sandpaper, and the nail? _____

☐ **4.** Think of a way friction could be used to start a fire. Tell about it. Use complete sentences.

(Continued on the next page)

1.6 _____

_____

_____

_____

_____

_____

_____

_____

_____

☐ **5.** Draw a picture showing how friction can start a fire.

Teacher check:

Initials _____ Date _____

Fire

Fire is another thing that makes heat. It causes heat energy to work in anything it is near. Fire is a useful tool that God has given.

People have been using fire for a very long time. The Bible tells us of bread, eaten by the people of those times. It was fire that heated the ovens to bake the bread.

Many people today use fire to cook their food.

Fire is useful for keeping warm, too. In very early times, fires were built to cook food and to keep the people warm.

In early America, homes had big fireplaces. The fireplaces were used both for cooking and for heating.

Today, people keep the heating fires in furnaces. The heat energy goes through **ducts** to heat the air in the homes. When people are cold, they can turn up the thermostat and get heat.

| Some pizza is baked using wood-fired ovens.

Answer *yes* **or** *no*.

1.7 _____ People in early America heated their homes with fire from a fireplace.

1.8 _____ Caves were heated by fire in a furnace.

1.9 _____ Fireplaces can be used for both heating and cooking.

1.10 _____ The air in today's homes is warmed by heat energy coming through ducts from a fire in a furnace.

Fire cannot burn by itself. It needs **fuel** and an invisible gas called **oxygen**. It also needs heat energy from something else to start the burning.

Fuel for a fire can be many things. Some fuels are solid. Wood and coal are **solid** fuels.

Other fuels are **liquid**. Oil and gasoline are liquid fuels.

Some gases are fuels. Many homes are heated by burning a special gas in a furnace. It is called natural gas. Another gas that burns is butane. It is a source of heat for stoves and furnaces.

Follow these directions. Write the names of fuels in the correct space on this chart.

1.11

SOLID FUEL	LIQUID FUEL	GAS FUEL

Remember that no fuel can burn without oxygen. Oxygen is a gas that can burn. It is in the air you breathe.

OBSERVE A FLAME

Show that fire needs oxygen to burn.

You will need these things:

3 candles in holders
1 quart jar
1 pint jar
matches
clock or timer

Follow these directions. Check the boxes as you do each step.

- ☐ **1.** Ask your teacher to light the three candles, or get permission to light them yourself. Be very careful.
- ☐ **2.** Place the pint jar over one lighted candle.
- ☐ **3.** Place the quart jar over another lighted candle.
- ☐ **4.** Observe what happens to the three flames in ten minutes.
- ☐ **5.** On this chart, tell about what happened to each flame.

1.12 What did you discover in each try?

candle under pint jar	
candle under quart jar	
uncovered candle	

(Continued on the next page)

☐ **6.** Why do you think the candle flames acted differently? Use complete sentences.

1.13 _____

_____

_____

_____

_____

_____

_____

_____

You have learned that fire needs two things to burn. They are fuel and oxygen.

When fuels are burned, **products** are left. The most important and useful product is heat. Other products are gases that get into the air. Some of these gases make the air dirty.

Burning solid fuels leaves solid products. When wood is burned **ashes** are left. **Cinders** are left from burning coal.

| The grey powder on the coals are cinders.

SELF TEST 1

Each answer = 1 point

Fill in the circle before the right answer.

1.01 Rubbing your hands together makes them warm. This cause of heat energy is called _____ .

O electricity O friction O transparent

1.02 Light energy is turned into heat energy when it is _____ .

O absorbed O transparent O radiant

1.03 The cause of heat energy most often used for cooking and heating is _____ .

O friction O the sun O fire

1.04 The electricity most often found in nature is _____ .

O fuel O static O dynamic electricity

1.05 In order to produce heat energy from fire, you must have _____ .

O fuel and oxygen
O fuel and friction
O oxygen and electricity

1.06 Light energy from the sun travels in waves. This energy is called _____ .

O heat energy O radiant energy O electricity

Answer *yes* **or** *no*.

1.07 _____ When you hit the nail with the hammer, friction made the nail warm.

1.08 _____ Early Americans used fireplaces to heat their homes and cook their food.

1.09 _____ When you burned the three candles, the uncovered one went out first.

1.010 _____ Natural gas is a liquid fuel.

1.011 _____ Static electricity can make sparks in your hair when you brush it.

1.012 _____ Dynamic electricity travels through wires.

1.013 _____ Your temperature is lower on a cold day.

1.014 _____ Exercise makes your body burn food faster.

1.015 _____ God created a great light called the sun.

1.016 _____ Light energy and heat energy are the same.

1.017 _____ When sunlight shines through a magnifying glass onto a paper, the paper will burn.

Use this list to finish the sentences.

oil	wood	natural gas	oxygen
gasoline	coal		

1.018 The solid fuels are a. _____ and b. _____ .

1.019 The liquid fuels are a. _____ and b. _____ .

1.020 The fuel that is a gas is_____ .

Draw lines to match, then write the letters on the lines.

1.021 _____ dynamic

1.022 _____ earth

1.023 _____ radiant

1.024 _____ Fahrenheit

1.025 _____ lightning

a. gift of God
b. waves
c temperature
d. electricity
e. static

Write the answers on the lines.

1.026 Name five causes of heat energy.

a. _____ b. _____

c. _____ d. _____

e. _____

Teacher check: Initials _____

Score _____ Date _____

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