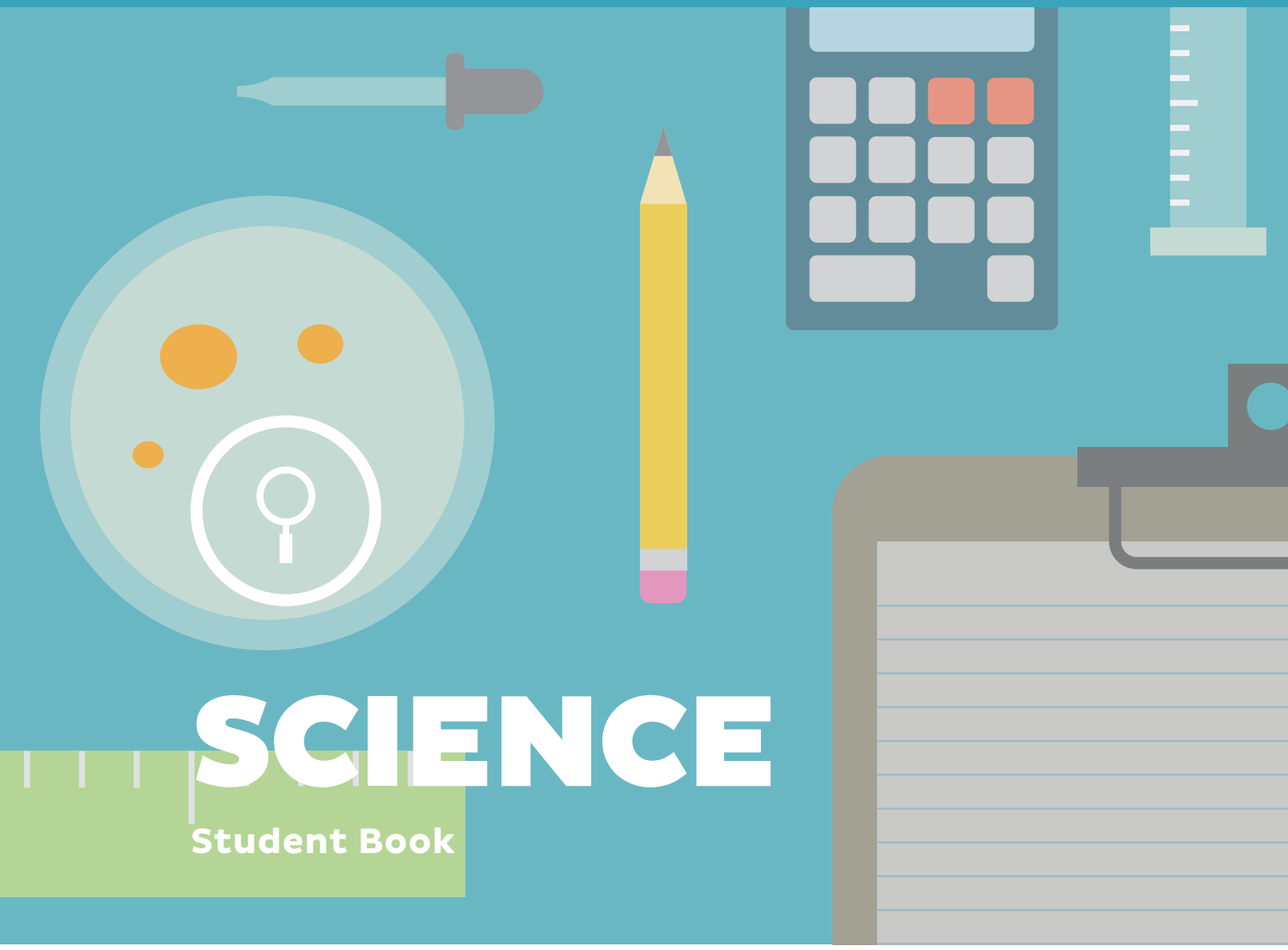
LIFEPAC®



SCIENCE

Student Book

4th Grade | Unit 6

Alpha Omega
PUBLICATIONS

SCIENCE 406
PROPERTIES OF MATTER

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Alpha Omega
PUBLICATIONS

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PROPERTIES OF MATTER

On the second day of creation, God separated the water from the sky, and on the third day He separated the water from the land. Without water, life would no longer exist on earth. God's gift of water sustains His creation.

There are hundreds of references to water in the Bible. In Psalm 1, the writer speaks of how water brings life to a tree planted by a stream. He explains that God's Word is like that life-giving water.

Blessed [is] the man that walketh not in the counsel of the ungodly, nor standeth in the way of sinners, nor sitteth in the seat of the scornful. But his delight [is] in the law of the LORD; and in his law doth he meditate day and night. And he shall be like a tree planted by the rivers of water, that bringeth forth his fruit in his season; his leaf also shall not wither; and whatsoever he doeth shall prosper.

(Psalm 1:1–3)

Studying and following God's Word produces positive effects in the lives of people and how they care for His creation.

In this LIFEPAC® you will learn more about this basic material that is necessary for life: water. You will learn about the three basic states (or forms) of water: solid, liquid, and gas. You will also learn about various uses of water. In the second section, you will learn more information about the basic building blocks of all matter, including water.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAC. Each section will list according to the numbers below what objectives will be met in that section. When you have completed this LIFEPAC, you should be able to:

1. Tell the freezing point and boiling point of water on the Fahrenheit and the Celsius thermometers.
2. Name the three different states of water.
3. Describe the wisdom of God in making water.
4. Describe the wide variety of uses of water.
5. Tell about water when it is dew, rain, snow, ice, or glaciers.
6. Name some materials that are soluble in water and some that are insoluble in water.
7. Name the three states of matter and give an example of each.
8. Describe matter, molecules, and atoms.
9. Tell what elements and compounds are.

1. WATER

Water is one of the most important materials in the world. Without water, life on earth would no longer exist. Next to the air you breathe, water is most important. People can live longer without food than without water. We know our bodies need water every day to stay healthy.

In this section of the LIFEPAC, you will study water. You will learn that water can be a solid, a liquid, or a gas. You will also discover that water is useful when used with other materials.

Water is not only used for drinking. Water is also used by hydroelectric power plants to produce energy. Water supplies the energy needed to turn turbines that produce electricity. Water is also used in power plants to cool large equipment.

Raw materials are shipped from one place to another on rivers, lakes, and oceans. Finished goods are also shipped through waterways.

Water is also used for our basic needs Water is used for washing clothes, cleaning dishes, and taking baths. Most people use about 70 gallons of water a day.

God created water to satisfy our physical thirst as well as to keep our bodies clean. However, we also have spiritual needs. Only Christ can keep us from a spiritual drought. Believing that Jesus came to die for your sins and is your Savior will quench your spiritual dryness. Jesus said in John 4:14, *But whosoever drinketh of the water that I shall give him shall never thirst; but the water that I shall give him shall be in him a well of water springing up into everlasting life.*

Scripture also speaks of how God cleanses from our sins, much like how a bath or shower cleanses our bodies: *Behold, thou desirest truth in the inward parts: and in the hidden [part] thou shalt make me to know wisdom. Purge me with hyssop, and I shall be clean: wash me, and I shall be whiter than snow. (Psalm 51:6–7)*

Not everyone will begin this study with the same understanding of water. List some ways that water is important to you.

Write some things you would like to learn about water in this LIFEPAC.

_____

_____

_____

_____

_____

_____

Objectives

Review these objectives. When you have completed this section, you should be able to:

1. Tell the freezing point and boiling point of water on the Fahrenheit and the Celsius thermometers.
2. Name the three different states of water.
3. Describe the wisdom of God in making water.
4. Describe the wide variety of uses of water.
5. Tell about water when it is dew, rain, snow, ice, or glaciers.
6. Name some materials that are soluble in water and some that are insoluble in water.

Vocabulary

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

Celsius (sel' sē us): A temperature scale, also called centigrade (see below), named after its inventor, Anders Celsius.

centigrade (sen' tu grād): A temperature scale divided into 100 degrees between water's freezing point and boiling point.

condense (kun dens'): To change from a gas or vapor into a liquid.

dew point (doo' point): The temperature at which water vapor in the air begins to change into liquid water droplets.

dissolve (di zolv'): To make something break apart by putting it into a liquid.

evaporate (e vap' u rāt): To change from liquid to gas.

expand (ek spand'): To take up more space.

Fahrenheit (far' un hīt): A temperature scale with 32° as water's freezing point and 212° as its boiling point.

glacier (glā' shur): A huge amount of ice moving on land.

hydroelectric (hī' drō i lek' trik): Something that produces electricity by water power.

iceberg (īs' berg): A floating mountain of ice found in the oceans.

insoluble (in sol' yu bul): A material that will not dissolve in another material.

saturated solution (sach' u rā tud su loo' shun): A solution that contains as much dissolved matter as can be dissolved.

soluble (sol' yu bul): A material that can be dissolved in another material.

solution (su loo' shun): A mixture formed when one material is dissolved in another material.

solvent (sol' vunt): A material that can dissolve other materials.

steam (stēm): Vapor arising from a heated material.

suspension (su spen' shun): A condition that happens when one material will not dissolve in another.

turbine (tur' bun): A rotary engine turned by the impact of a fluid such as steam or water.

vapor (vā' pur): Gas formed from a material that is usually in liquid or solid form.

wood alcohol (wud al' ku hôl): A cleaning liquid.

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**ă**re, f**ä**r; l**e**t, **ē**qual, t**ėr**m; **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 take**n**, /i/ in penci**l**, /o/ in lemo**n**, and /u/ in circ**u**s.

Water as a Solid

Normally, we think of water as a liquid; however, water changes with temperature changes. Water can be a solid, a liquid, or in a gas form. When water freezes, it is a solid—ice. At room temperature, water is liquid. When heated, water becomes a gas—**steam**.

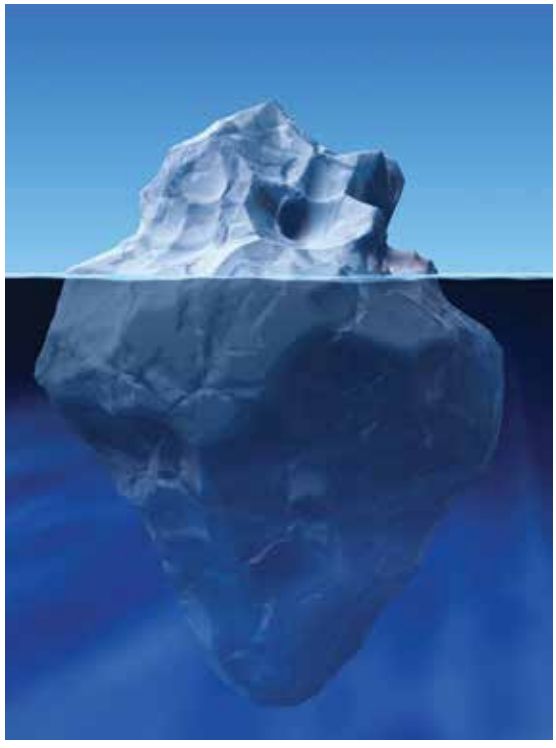
Freezing water **expands**, taking up more space. You may be surprised to learn that ice is lighter than water. Because it is lighter, ice floats in liquid water. In cold winter months, ice forms on top of streams, ponds, and some lakes. Because ice floats, animals and plants in streams and ponds are able to survive the freezing winter months. Animals escape below the ice to the liquid water nearer the bottom of the pond or stream where plants remain alive.

A **glacier** is a large ice formation on land. These huge ice formations can move down the slope of a mountain or across a land area. The word *glace* means *ice*. People can see a large glacier in Montana's Glacier National Park.

Sometimes, large chunks of ice break away from land and move out into the oceans. These floating mountains of ice are **icebergs**. The word *berg* means *mountain*. An iceberg is an "ice mountain." Only about one-tenth of an iceberg is above the surface of the ocean. The rest of the iceberg is under the ocean's surface.

Two types of thermometers are used for measuring the temperature of water. The first is known as the **Fahrenheit** thermometer. This thermometer was named for Gabriel Daniel Fahrenheit (1686-1736), a German scientist

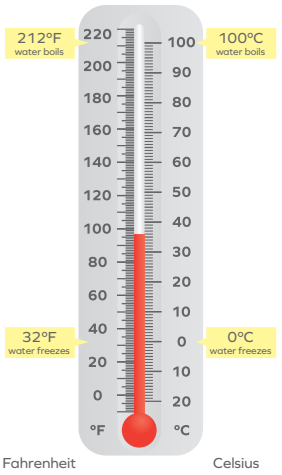
| A glacier



| An iceberg

born in Poland. The second is the **centigrade** thermometer. The centigrade scale is also called the **Celsius** scale. The Celsius scale was named for its inventor Anders Celsius, a Swedish scientist who developed this scale in 1742. When using the term Celsius scale, the name must be capitalized.

The freezing point of water is 32 degrees on the Fahrenheit thermometer, written as 32° F. It is 0 degrees on the Celsius thermometer, written as 0° C. The boiling point of water is 212° on the Fahrenheit thermometer (212° F). On the Celsius thermometer, the boiling point is 100° C.



ICE AND WATER
E-406.A

View 406
Water as a Solid:
Grade 4 Science experiments video

These supplies are needed:

a plastic bowl large enough to hold 3 or 4 cups of water
2 or 3 ice cubes (these must be cubes or chunks of ice for floating)

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

☐ **1.** Fill the plastic bowl with 2 or 3 cups of cold tap water.
☐ **2.** Place the ice cubes in the bowl.

1.1 Does the ice float? _____

1.2 How does the floating ice keep fish and other animals from getting crushed to death in winter by freezing lakes and ponds? _____

_____

_____

EXPANSION OF WATER E-406.B

View 406 Water: Solid versus Liquid Grade 4 Science experiments video

These supplies are needed:

small paper cup
enough crushed ice to fill the cup

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

- ☐ **1.** Fill the paper cup completely full of crushed ice. Set the cup aside.
- ☐ **2.** Place the cup in the warmest spot, perhaps near a sunny window.
- ☐ **3.** Wait for the ice in the cup to melt. Do not spill the ice or water. Save all of the melted water.
- ☐ **4.** Check the cup of ice that you left to melt.
- ☐ **5.** Record the amount of water as soon as the ice has completely melted.

1.3 Is the cup full of water? _____

1.4 Why or why not? _____

_____

1.5 Why does ice float?_____

_____

_____

Do these activities.

1.6 Draw an iceberg and a glacier. On a clean sheet of paper, you are to make two separate drawings. Space your drawings so that you can get two on a page. Use about half the sheet for each drawing. First, draw an iceberg. Make a white mountain of ice floating on a blue ocean. Make the sky above also blue. Label your drawing: Iceberg—a Floating Mountain of Ice. Next, make a drawing of a glacier on this same sheet of paper. Make a white mountain of ice with green grass around it. You can make the sky blue. Label your drawing: Glacier—a Huge Mountain of Ice on Land.

Teacher check:

Initials _____ Date _____

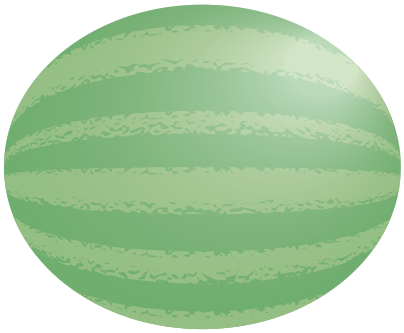
Water as a Liquid

Water has been on earth since the beginning of creation (Genesis 1:6). Water is all around you in the air, in the soil, and in the leaves and trunks of trees. Did you know that your body is $^{7}/_{10}$ (seven-tenths) or 70% water?

Water is also in the food you eat. A cucumber is over $^{9}/_{10}$ (nine-tenths) water; lean meat is $^{6}/_{10}$ (six-tenths) water; and cheese is $^{4}/_{10}$ (four-tenths) water.

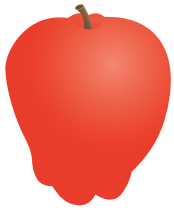
The chief sources of our water come from rain and melting snow. Water that falls in the form of rain, snow, and sleet comes originally from oceans, lakes, and streams. When the sun warms the oceans, lakes, and streams, water **evaporates**. Water **vapor** rises into the air, forming clouds. As water vapor cools, it turns into a liquid. The cooled water vapor leaves the clouds, returning to earth through rain, snow, sleet, and sometimes hail.

Water in its liquid form is not pure. Liquid water picks up something from what it touches. Raindrops pick up tiny pieces of other materials as they fall to earth.

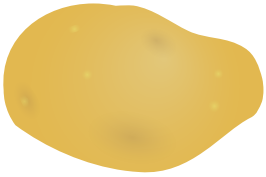


watermelon: $\frac{9}{10}$

milk: $\frac{9}{10}$

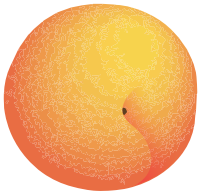


apple: $\frac{8}{10}$



potato: $\frac{8}{10}$

egg: $\frac{7}{10}$



peach: $\frac{9}{10}$

| Amount of Water In Some Food

These tiny pieces of materials captured by the rain go into the soil and are used by plants as food. In the plants, water acts as a delivery system, moving the food to all parts of the plants. The roots take water from the soil. Small tubes carry the water from the roots through the stems and to the leaves.

Just as in a plant, water works as a delivery system for humans and animals. Water dissolves food into nutrients so it can be used by the body. Water carries nutrients to all parts of the bodies of people and animals. Your blood is about 50 percent water and carries food to all parts of the body. Water also cleanses the inside of the body by carrying off body wastes.

All living things need water. It keeps plants, animals, and people alive. God provides life-giving water to the earth.

SELF TEST 1

Fill in the blanks using words from the Word Bank (each answer, 4 points).

snow	expands	ice	suspension
blood	iceberg	glacier	dew
0° Celsius	100° Celsius		

1.01 A(n) _____ is a large mountain of ice in the ocean.

1.02 Ice moving on land is called a(n) _____ .

1.03 Water freezes at _____ .

1.04 _____ is a form of frozen water vapor.

1.05 _____ is water in solid form.

1.06 _____ is cooled water vapor.

1.07 _____ carries nutrients throughout the human body.

1.08 Oil or sand added to water creates a(n) _____ .

1.09 Water boils at _____ .

1.010 When something _____ , it takes up more space.

Circle the letter of the correct answer (each answer, 3 points).

1.011 Water freezes at 32° on the _____ scale.

a. Fahrenheit b. Celsius c. Centigrade

1.012 Freezing water _____ .

a. contracts b. evaporates c. expands

1.013 _____ floats because it is lighter than water.

a. Oil b. Sugar c. Salt

1.014 A(n) _____ plant produces electricity through water power.

a. gasoline b. hydroelectric c. coal

1.015 A(n) _____ substance can be dissolved in another material.

a. soluble b. material c. expander

1.016 A(n) _____ is a mixture in which one material is dissolved in another.
a. material b. solution c. nutrient

1.017 A material that does not dissolve in another is called _____ .
a. soluble b. sugar c. insoluble

1.018 Chief sources of water include _____ and melted snow.
a. icebergs b. glaciers c. rain

1.019 Water may be a solid, liquid, or _____ .
a. invisible b. gas c. soluble

1.020 You can _____ a liquid so that it dissolves additional material.
a. freeze b. cool c. heat

Write *true* or *false* (each answer 3 points).

1.021 _____ Wood alcohol is a good solvent.

1.022 _____ Two types of thermometers are Fahrenheit and Celsius.

1.023 _____ Because ice sinks, animals struggle to live in lakes during the winter months.

1.024 _____ Water is pure in liquid form.

1.025 _____ Foods contain little or no water.

1.026 _____ The Bible describes Jesus as living water.

1.027 _____ Oil dissolves in water.

1.028 _____ Sugar dissolves in water.

1.029 _____ Water is delivered to plants through bees.

1.030 _____ Water can be used for transportation.

Teacher check: Initials _____

Score _____ Date _____

80/100

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