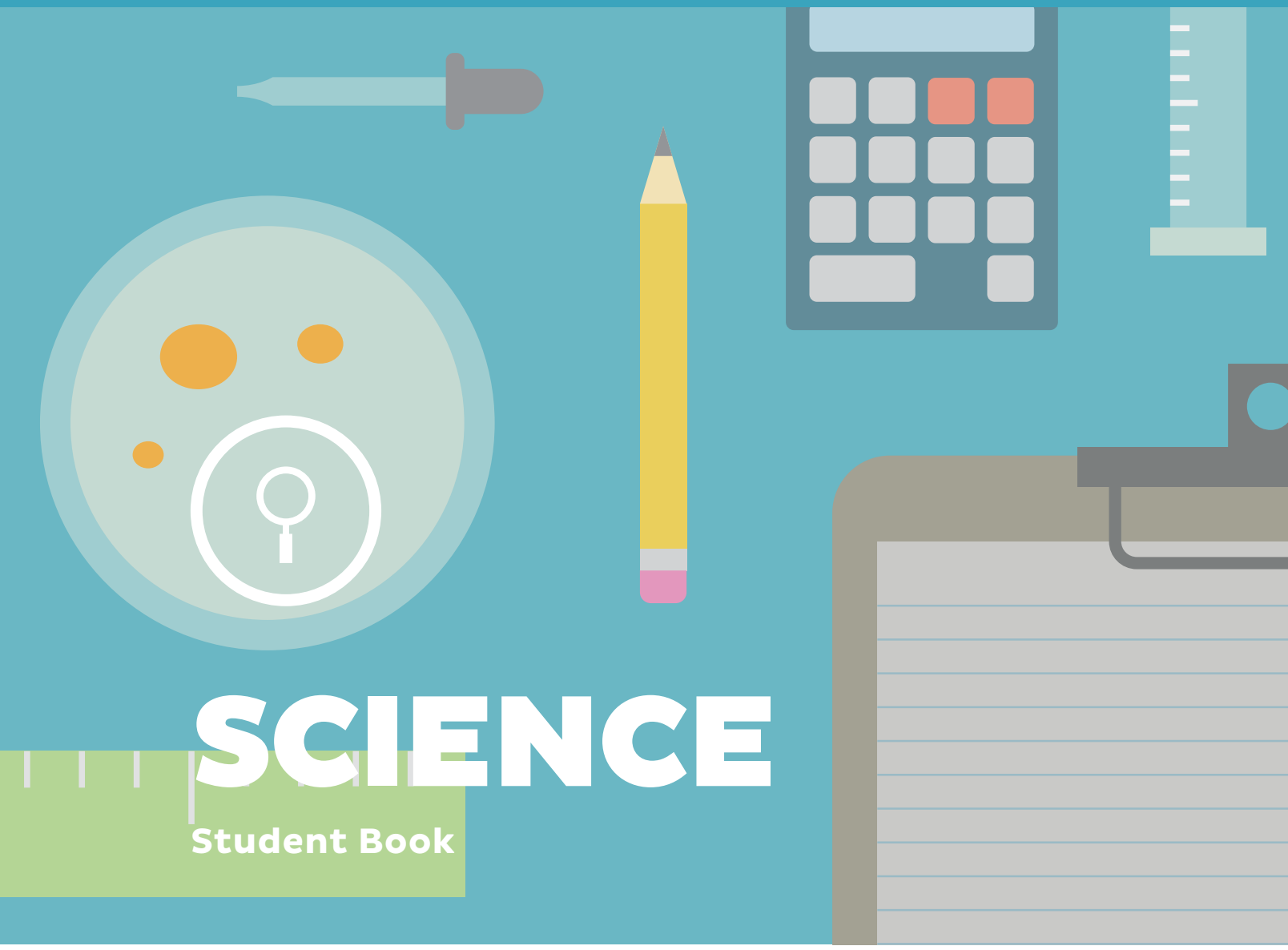
LIFEPAC®



SCIENCE

Student Book

4th Grade | Unit 7

Alpha Omega
PUBLICATIONS

SCIENCE 407
WEATHER

Introduction |3

1. Causes of Weather 4
   - Atmosphere |6
   - Temperature |10
   - Air Pressure and Movement |13
   - Moisture |17
   - Self Test 1 |20

2. Forces of Weather 23
   - Rainstorms, Thunder, and Lightning |25
   - Hurricanes |26
   - Tornadoes |28
   - Hail and Snowstorms |29
   - Sand and Dust Storms |33
   - Geographic Changes |35
   - Self Test 2 |36

3. Prediction of Weather 39
   - Oberserving Weather |40
   - Using Weather Instruments |41
   - Self Test 3 |46

LIFEPAC Test |**Pull-out**

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WEATHER

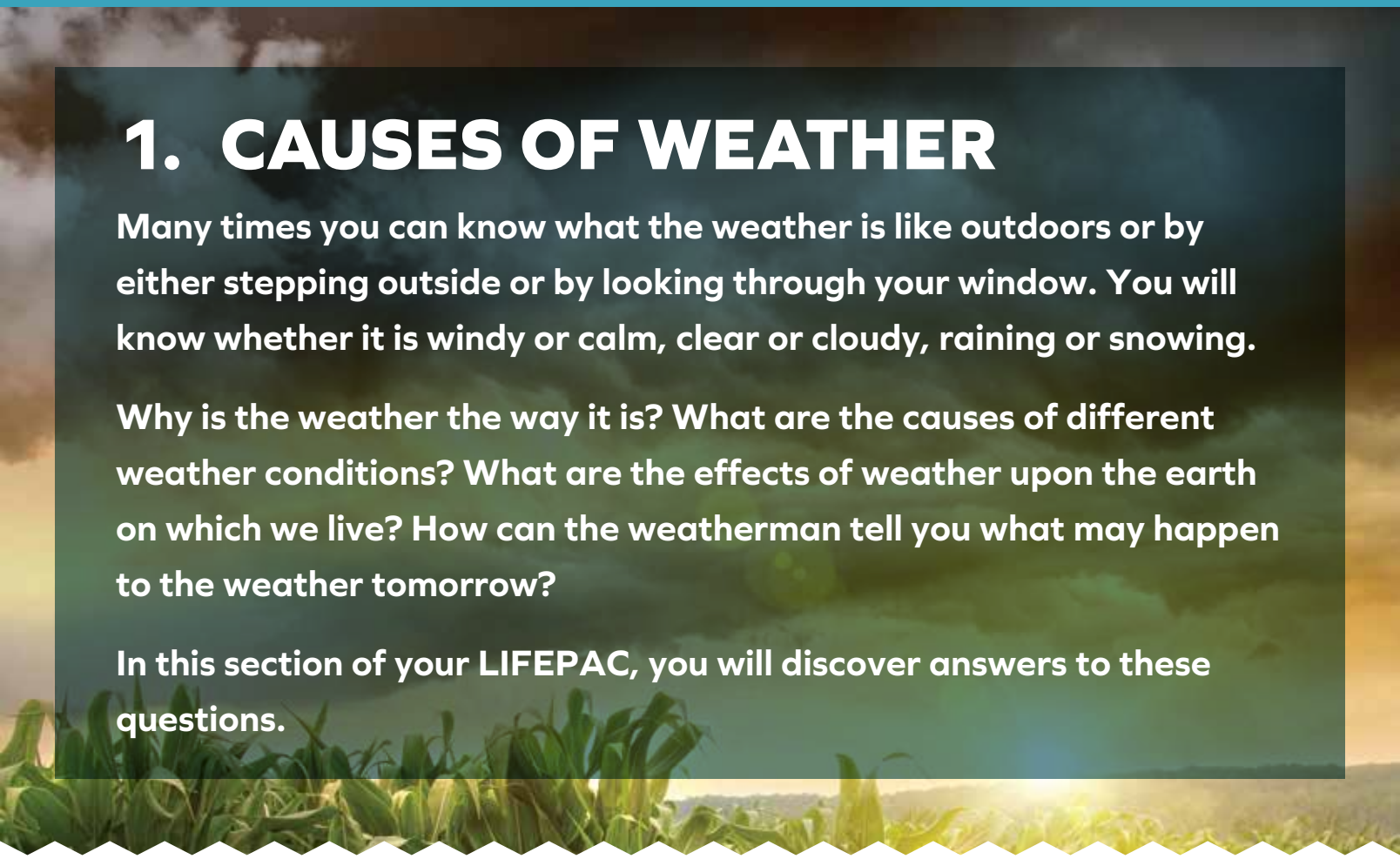
On the second day of Creation, God separated the earth and sky. God made the atmosphere. All life on earth depends upon this ocean of air. Without air, people, animals, and plants would all die within a very short time.

Changes in the air around the earth, such as changes in the temperature or in the pressure, cause different kinds of weather. In this LIFEPAC® you will learn about the causes and forces of the weather. You will also find out something about weather prediction, both by observation and by the use of special instruments.

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 finished this LIFEPAC, you should be able to:

1. Tell three reasons why weather conditions are different.
2. Tell about the forces of weather.
3. Relate the importance of weather in God's plan.
4. Describe the different types of storms, their dangers and their benefits.
5. Explain the relationship between weather and geography.
6. Identify instruments used in predicting weather.



1. CAUSES OF WEATHER

Many times you can know what the weather is like outdoors or by either stepping outside or by looking through your window. You will know whether it is windy or calm, clear or cloudy, raining or snowing.

Why is the weather the way it is? What are the causes of different weather conditions? What are the effects of weather upon the earth on which we live? How can the weatherman tell you what may happen to the weather tomorrow?

In this section of your LIFEPAC, you will discover answers to these questions.

Objectives

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

1. Tell three reasons why weather conditions are different.
3. Relate the importance of weather in God's plan.

Vocabulary

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

altitude (al' tu tüd): Height above the earth's surface.
atmosphere (at' mu sfir): Air that surrounds the earth.
Celsius (sel' sē us): A thermometer scale of 100 degrees (C).
cycle (sī kul): A period of time or action that repeats itself.
evaporate (i vap' u rāt): To change from a liquid to a vapor.

exosphere (ek′ su sfir): The part of the atmosphere that begins to blend into space
expand (ek spand′): To spread out.
extend (ek stend′): To stretch out.
Farenheit (far′ un hīt): A temperature scale for a thermometer (F).
ionosphere (ī on′ u sfir): A layer of air above the earth.
layer (lā′ ur): One thickness or fold.
ozone (ō′ zōn): A gas present in the air.
pressure (presh′ ur): Weight or force upon something.
pressurized suit (presh′ u rīzd süt): An airtight suit that can be blown up to keep normal pressure.
radiation (rā de ā′ shun): Giving out rays of light, heat, or electricity.
stratosphere (strat′ u sfir): The upper part of the atmosphere.
transparent (tran spãr unt): Easily seen through.
troposphere (trō′ pu sfir): The layer of the atmosphere nearest the earth.
ultraviolet (ul tru vī′ u lit): Unseen rays from the sun.
vapor (vā′ pur): Moisture in the air.

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 take**n**, /i/ in penc**i**l, /o/ in lem**o**n, and /u/ in circ**u**s.

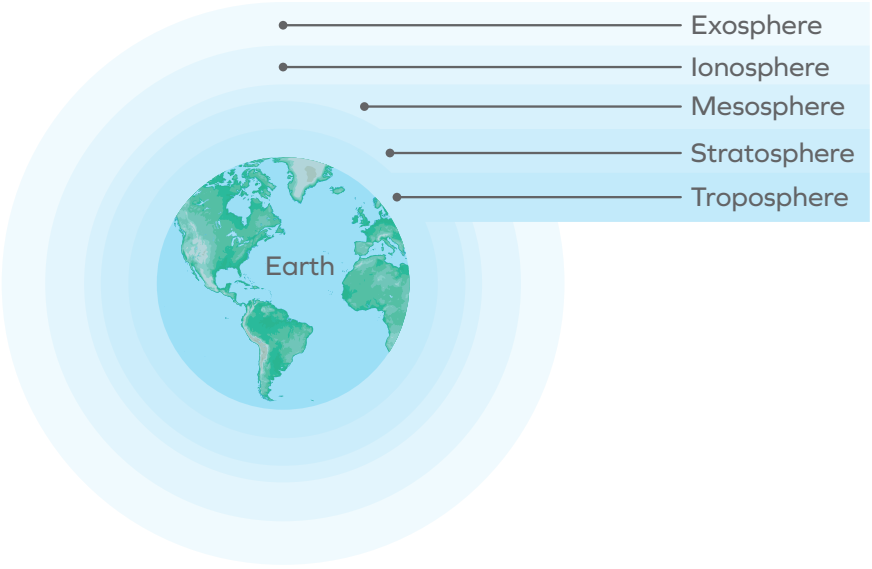
Atmosphere

Do you know that when you came to school this morning, you were walking through an ocean of air? You live at the bottom of a huge ocean of air called the **atmosphere**.

You cannot see the air. Scientists do not know exactly how far into space the air **extends**. Scientists do know that the airplanes that take off and land every day at busy airports depend upon air. Clouds float on air. Birds fly through it. All living things, including man, animals, and plants, have to have air in order to live.

You feel air moving when you go outdoors. You see the result of air when you look at the swaying treetops or at rustling corn. You feel the air blowing across your face. Sometimes you see the damage it can cause to buildings and trees that happen to be in its path when it blows with force.

Although scientists do not know the exact limits of our atmosphere, they know that air is about one thousand miles (1,600 kilometers) in all directions around our earth. By using weather balloons, planes, and rockets, weathermen have studied the atmosphere. They have found out many exciting facts about it, and they are learning more every year.



| Layers of the atmosphere

Scientists have named the levels of the atmosphere. Air nearest the earth is called the **troposphere**. The word *troposphere* comes from a Greek word that means to *turn* and *mix*. In this **layer** the mixing and turning of the air takes place. The troposphere contains almost all the air and most of the water **vapor** in the atmosphere. The great wind belts, the clouds, and the weather are all part of the troposphere.

The lower part of the troposphere, which is the earth's weather zone, extends only about ten miles (about 16 kilometers) in all directions from the earth. The air not only moves across the land, but it moves up and down, causing wind belts.

As we travel outward from our earth, the next layer of atmosphere is the **stratosphere**. The stratosphere reaches a height of about thirty miles (about 48 kilometers) above the earth. Very few clouds are found in the stratosphere. The air is very thin. In this layer jet planes fly at fast speeds.

In the upper part of the stratosphere is a layer of gas called **ozone**. This gas acts as protection against the **ultraviolet** rays of the sun. Ultraviolet rays can be dangerous to people. The rays give you a bad sunburn if you are in the hot sun too long.

Beyond the stratosphere are the **mesosphere**, **ionosphere**, and the **exosphere**. Beyond these layers the atmosphere blends into space where no air exists.

Complete these statements.

1.1 The air that surrounds the earth is called _____ .

1.2 The layer of air that lies closest to the earth is called the _____ .

1.3 The layer of gas in the upper part of the atmosphere is called _____ .

1.4 The ozone layer of gas protects us from the ultraviolet rays of the _____ .

Answer these questions.

1.5 What are four of the five zones of atmosphere around our earth?

a. _____ b. _____

c. _____ d. _____

1.6 In what two general directions does air travel over land and water?

a. _____ b. _____

1.7 As the air that surrounds our earth reaches higher and higher levels, what happens to it? _____

1.8 Can you think of three man-made objects that depend on air to operate?

a. _____ b. _____ c. _____

1.9 On which day of Creation did God make the air? _____

_____

DOES AIR TAKE SPACE?

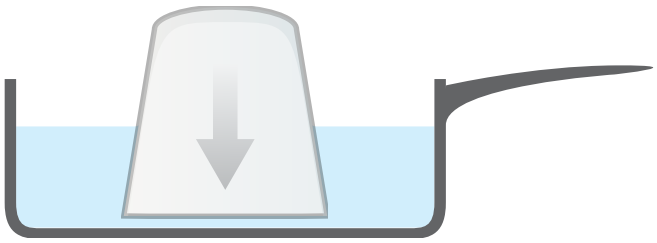
View 407
Air: Grade 4 Science experiments video

These supplies are needed:

a water glass
a pan full of water

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

- ☐ **1.** Turn the glass upside down in the water.
- ☐ **2.** Push the mouth of the glass straight down into the water as far as possible.
- ☐ **3.** On the drawing show the level of the water inside the glass compared with the level of the water in the pan.



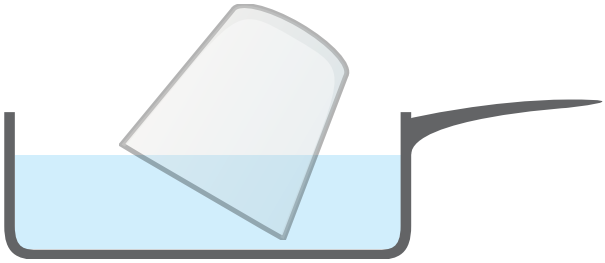
Answer this questions.

1.10 Why were the two levels of water different? _____

_____

Repeat the experiment. Check the boxes as you do each step.

- ☐ **1.** Turn the glass upside down in the water.
- ☐ **2.** Push the mouth of the glass straight down into the water as far as possible.
- ☐ **3.** Tip the glass so that one edge of the mouth is above the water.



Answer these questions.

1.11 What happened to the level of the water in the pan? _____

_____

1.12 When the glass contained air, could the water fill it? _____

1.13 Why could not the water fill it? _____

1.14 What does this experiment show us about air and space? _____

_____

Teacher check:

Initials _____ Date _____

Temperature

The first part of a weather report is usually the temperature. Why does the air have different temperatures? Why are some places on the earth hot and others cold? What heats the air?

To answer these questions, you need to know something about the sun and how it heats the earth.

Heat travels from sun to earth by **radiation**. When heat goes through **transparent** material, such as glass, the material is heated very little.

EXPERIMENT!

These supplies are needed:

sheet of black paper
window
sunlight shining through the window

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

- ☐ **1.** Place the sheet of black paper near a closed window where the sun is shining brightly.
- ☐ **2.** Let the sun shine on the sheet of paper for a few minutes.
- ☐ **3.** After a few minutes, touch the paper.
- ☐ **4.** Touch the window glass.
- ☐ **5.** Notice whether the glass feels warm.

Answer these questions.

1.15 Did the sheet of black paper feel warm? _____

1.16 Did the window glass feel warm? _____

1.17 What is the difference between the window glass and the paper? _____

_____

The rays of the sun that went through the window glass heated the paper. The glass was not heated because the glass is transparent. That is, the light shines through it. Light *does not* shine through the paper. The paper is not transparent.

The rays of the sun come through the transparent air. They have to pass through both space and the earth's atmosphere. They lose very little heat as they pass through the atmosphere. How then, does air get warmed by the sun?

The answer lies in the fact that the heat rays strike the surface of the earth. The earth absorbs them and holds them. In this way the earth becomes heated and, in turn, heats the air close to it.

The closer we are to the ground, the more heat we will feel. When we want to find a cooler spot, we sometimes go to the mountains. The mountain areas are often cooler when weather conditions are normal, because the temperature drops about three and one-half degrees **Fahrenheit** (2° Celsius, 2°C) for every 1,000 feet (305 meters) of **altitude**.

Complete the following sentences.

1.18 Heat travels from the sun to earth by _____ .

1.19 Rays of sunlight come through the_____ to the earth.

1.20 Anything that lets light through it so that objects can be seen easily is said to be _____ .

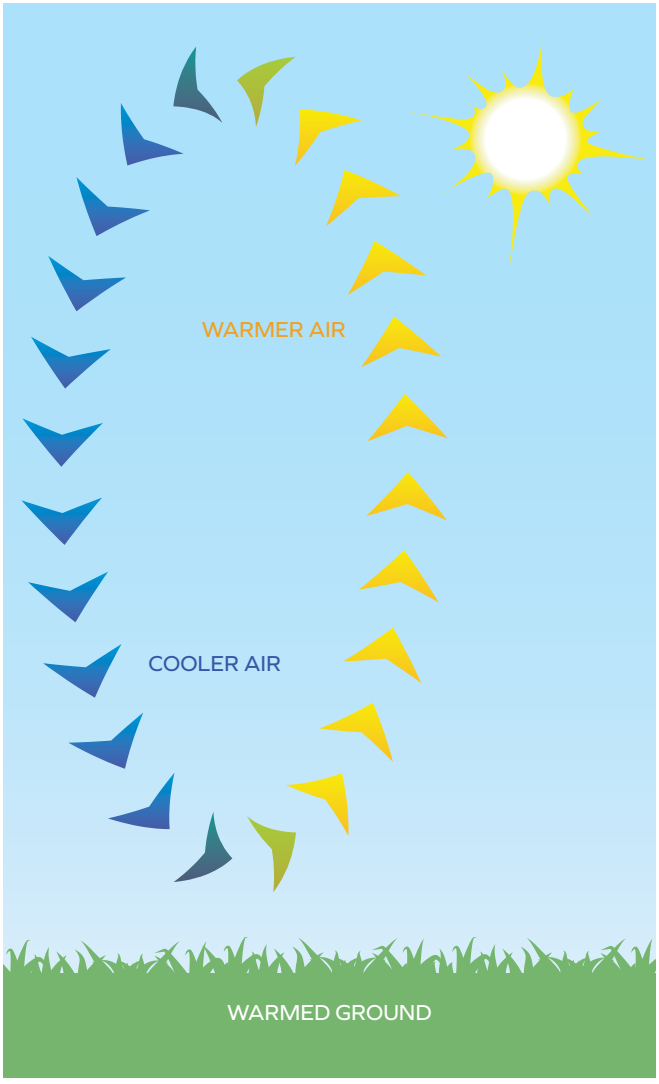
1.21 Glass is _____ .

1.22 The air that is _____ to the ground is usually warmest.

1.23 When we go to the mountains, the temperature is often several degrees _____ there.

1.24 The temperature, in normal weather conditions, drops _____ degrees Fahrenheit for every 1,000 feet of altitude.

1.25 This temperature (in question 1.24) is the same as _____ degrees Celsius.



| Air goes up when warmed by the earth

Put these statements in the correct order.

The ground absorbs heat from the sun.
Heat rays from the sun pass through the earth's atmosphere.
The ground heats the air above it.
Heat rays from the sun pass through space.
Heat rays strike the ground and warm it.

1.26 _____

1.27 _____

1.28 _____

1.29 _____

1.30 _____

Air Pressure and Movement

After lunch, Rick and Mary were waiting for Uncle George. He had promised to see them and to talk with them in the den as soon as he had finished a phone call. They wanted to learn more about the weather.

They were getting a little discouraged. After looking and looking through many of Uncle George's magazines they could not find even one article or picture about weather.

His books seemed to be all about plants and flowers. They found none about weather.

Then Uncle George came in. "Rick and I have a lot of questions about weather. We cannot find the answers anywhere. When I get back to school, I have to write a paper about weather and what causes it," Mary said.

"What would you like to know?" asked Uncle George.

Rick had the first question.

SELF TEST 1

Match these items (each answer, 3 points).

1.01	_____	space	a. Creator
1.02	_____	stratosphere	b. gives heat to the earth
1.03	_____	air	c. light shines through
1.04	_____	God	d. sun's rays
1.05	_____	C	e. abbreviation for Celsius
1.06	_____	ultraviolet	f. height of 30 miles
1.07	_____	sun	g. no air
1.08	_____	transparent	h. weather
			i. atmosphere

Choose the correct word to complete each sentence (each answer, 3 points).

atmosphere	fog	rises	troposphere
cycle		pressure	second expands
radiation	third		

1.09 When air is warmed by the rays of the sun striking the earth, it _____ and becomes cooler.

1.010 Heat travels from the sun to earth by _____ .

1.011 The water _____ is God's way of giving water to man, animals, and plants.

1.012 A cloud on or close to the ground is called _____ .

1.013 The layer of atmosphere that lies closest to the earth is called the _____ .

1.014 When something gets larger, it _____ .

1.015 Air has _____ .

1.016 God made air on the _____ day of Creation.

1.017 The air that surrounds the earth is the earth's _____ .

Write the correct letter and answer on the blank (each answer, 3 points).

1.018 We live in an ocean of _____ .
a. water b. fog c. air

1.019 Large portions of our earth are kept green by means of the _____ cycle.
a. decay b. cloud c. water

1.020 When water is heated, it changes into _____ .
a. a liquid b. steam c. lightning

1.021 Clouds that are heavy and dark usually have much water _____ in them.
a. vapor b. steam c. pressure

1.022 A fog is a cloud close to the _____ .
a. ionosphere b. desert c. ground

1.023 Heat travels from the sun to earth, is taken in by the ground, and _____ again.
a. rises b. falls c. disappears

1.024 The layer of ozone in the earth's atmosphere protects people against _____ rays from the sun.
a. beneficial b. ultraviolet c. harmless

1.025 The layer of air nearest the earth is called the _____ .
a. troposphere b. ionosphere c. ozone

1.026 Height above sea level is called _____ .
a. latitude b. altitude c. ozone

Answer *true* or *false* (each answer, 2 points).

1.027 _____ As air reaches higher levels, it gets thinner.

1.028 _____ God created air on the sixth day.

1.029 _____ No atmosphere exists on the moon.

1.030 _____ When warm air goes up and cold air is pushed down, a movement of the air, called wind, occurs.

1.031 _____ The exosphere is the layer of air where jet planes fly at high speeds.

1.032 _____ When water evaporates, it changes from a gas to a liquid.

1.033 _____ God is very exact in what He does.

1.034 _____ You can see the air.

1.035 _____ The layer of gas in the upper part of the atmosphere is called ozone.

Answer this question (each answer, 1 point).

1.036 What are four causes of changes in the weather?

a. _____

b. _____

c. _____

d. _____

Teacher check: Initials _____

Score _____ Date _____

80/100

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