

# Activity #1: The Earth's First Atmosphere

### Did You Know?

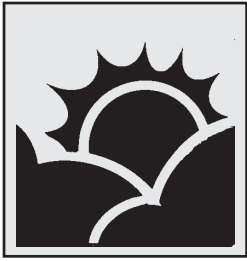
*The atmosphere is like a giant blanket of air around the earth. The atmosphere is divided into layers. Weather happens in the troposphere, the layer directly above the ground.*

The atmosphere is one of four main ingredients which cause weather. To understand weather it is important to understand the earth's atmosphere. By studying fossilized evidence, scientists have determined that the earth's first atmosphere was very different from its atmosphere today. It consisted of hydrogen, helium, methane, and ammonia, similar to the present-day atmosphere of Jupiter. The earth's earliest atmosphere probably did not contain much oxygen. Oxygen collected in the atmosphere gradually as the earth aged over millions of years.

1. Although hydrogen, helium, methane, and ammonia are no longer the primary gases found in our atmosphere, they exist today in many different forms. Look through your daily newspaper for pictures or examples of these gases. Find also newspaper advertisements of products manufactured from or with these gases.
2. One of the most common uses for helium today is to fill balloons. Look through the classified advertisement section of today's newspaper to find places in your community to purchase helium. Can you think of other uses for helium?

HYDROGEN	HELIUM	METHANE	AMMONIA
<b>CLASSIFIED LISTINGS:</b>			

**Extension Activity:** Using old newspapers for building material, construct an imaginary body-suit that would enable you to survive in the earth's first atmosphere. Be creative! Then, write a paragraph to explain how your body-suit works, what it is made of, and how it will protect you.



## Activity #2: The Second Atmosphere

### Did You Know?

*Space probes indicate that the earth's second atmosphere was virtually the same as the one found on Venus today: 97 percent carbon dioxide.*

Much of the earth's second atmosphere was created by the many volcanoes that scarred the young planet spewing forth carbon dioxide. Today, major volcanic explosions occur somewhere in the world every two to three years. During most eruptions, volcanic gas pours out in large quantities. (Volcanic gas is made up chiefly of steam, carbon dioxide, and nitrogen.) When this happens, it temporarily affects the condition of the earth's atmosphere. Volcanic gas carries a large amount of volcanic dust. This combination of gas and dust looks like black smoke and can travel through the air for hundreds of miles. Besides making the air very difficult to breathe, the ash and debris can damage crops and destroy homes.

1. Look through today's newspaper for news or information pertaining to a present-day volcano or volcanic eruption. Determine how the earth's atmosphere may be temporarily affected by such an eruption.
2. Search through today's newspaper for pictures or advertisements of items you might need if you lived within 250 miles of a volcanic eruption. (For example: tarps for cars, air filters for air conditioning and heating units, etc.) How would you use these items? Who would benefit from use of these items ?

NEWSPAPER ITEM	HOW USED?	WHO BENEFITS?

**Extension Activity:** Check your newspaper each day for articles pertaining to other types of explosions. (For example: an explosion resulting from an auto accident involving a large propane truck.) Collect information for an extended period of time. Create a newspaper clipping file. Chart your findings. What gases were released into the atmosphere as a result of each explosion? Which explosion affected the largest number of people? How? Which type of explosion caused the most damage? What were the costs?



## Activity #3: Oxygen in the Atmosphere

### Did You Know?

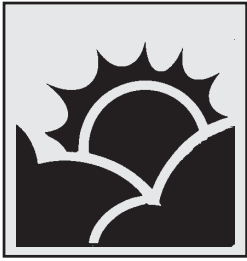
*Nitrogen makes up 78 percent of the earth's atmosphere today, and oxygen makes up 21 percent. The remaining 1 percent consists mainly of argon and small amounts of other gases.*

As the earth aged over millions of years, oxygen gradually collected. Oxygen was originally combined with other chemicals in rocks (many of which were under water). The melting of these rocks freed the oxygen and allowed it to escape to the surface. As the amount of oxygen increased, conditions on earth became favorable for plants and animals to develop. At the same time, carbon dioxide gradually dissolved into the oceans. This produced the building blocks of life: carbon-based molecules. Vast seas of algae and other plants began to grow in the oceans. The plants took in carbon dioxide and released oxygen. Scientists believe it took approximately 3 billion years to produce enough oxygen to support life on the earth.

1. Plants and animals today are dependent on each other for life. Plants make oxygen as they grow. Animals breathe (or take in) oxygen and exhale carbon dioxide. Plants require carbon dioxide and then give off oxygen. Scientists call this a "cycle" because it goes around and around, with each depending on the other. Search through your collection of newspapers for pictures of plants and animals. Begin a plant and animal clipping file.
2. Using your newspaper clippings and poster board, create an oxygen/carbon-dioxide cycle illustration. Be sure to show how each part of the cycle is dependent on the other. Begin by sketching your poster layout below.



**Extension Activity:** Can you explain why items left outdoors tend to rust? How does oxygen in the atmosphere play a part in the rusting process? Create your own simple experiment to demonstrate this process. Then, scan today's newspaper advertisements for rust-prevention products. Explain how these products work.



## Activity #4: Glacials & Interglacials

### Did You Know?

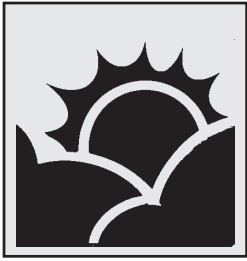
*About 450 million years ago the Sahara Desert was covered in ice. But from about 4000-2000 BC it was covered in grass and trees. Cave paintings which date from that time period give us that information.*

The earth’s climate has changed very slowly over the centuries. It is made up of warm periods (interglacials) and cold periods (glacials) or Ice Ages. We live in an interglacial which began about 10,000 years ago. The last glacial was 19,000 years ago when a third of the earth lay under an ice sheet some 800 feet (244 m) thick. A severe change in climate may have been the reason for dinosaurs becoming extinct about 65 million years ago. At this time, some people believe, a meteor struck the earth causing a dust cloud to block out the sun’s heat and the earth became very cold. Some scientists believe dinosaurs were cold-blooded animals, and so froze to death. (Other scientists say the colder weather killed the plants first. As they died off, the plant-eating dinosaurs starved to death. And without the plant-eaters for food, the meat-eating dinosaurs were the next to die.)

1. As the earth went through glacial and interglacial periods, temperatures reached all time lows and all time highs. Within our own interglacial period, we experience lows and highs each day, month, and year. Using a thermometer, record the temperature outside of your classroom every day for at least six weeks. Begin by using the chart below.
2. Then, find the weather page or weather information in your newspaper each day. Compare your classroom findings with the high and low temperatures of your city as listed in your daily newspaper. What conclusions can you draw about your own data? In the six-week time period, what was your highest high and lowest low?

DATE RECORDED	CLASSROOM TEMPERATURE	NEWSPAPER INFORMATION	
		HIGH	LOW

**Extension Activity:** Glacial means “having an icelike form.” Look in the grocery section of today’s newspaper for ten items having icelike forms. Then, determine which of those items are frozen liquids and which are frozen solids.



## Activity #5: Weather of the Past

### Did You Know?

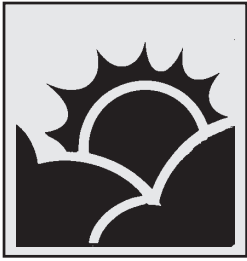
*Tree ring dating is one of the most reliable ways to learn about weather of the past. Every year a tree grows a new ring. If the ring is wide, the weather was moist and warm, if narrow then it was dry and cold.*

The weather and climate of the earth has changed many times during the 4,600 million years since the earth began. The glacial periods or ice ages of the past may have been caused by a change in the earth's orbit around the sun, or a change in the tilt of the earth on its axis. Even the smallest orbital change can alter the amount of heat we receive from the sun. From the 1600s to the 1800s, the weather was much colder than it is today. The Thames River in England froze over regularly for several months at a time. In the winter of 1683 the ice on top of the river measured 10 inches (26 cm) thick. In London, fairs were held on the ice. The last Frost Fair on the Thames was held in 1814, when the ice was thick enough to take the weight of an elephant.

1. What would you wear to a Frost Fair? Look through your newspaper advertisements for clothing items that could be worn during really cold weather. List those items on the chart below. Next, find examples in the newspaper of clothing items for really hot weather.
2. Find non-clothing items in the newspaper that represent hot or cold weather (for example: an air conditioner, heater, sun tan oil, a snow blower).

COLD WEATHER CLOTHING ITEMS	WARM WEATHER CLOTHING ITEMS	OTHER ITEMS (COLD WEATHER)	OTHER ITEMS (WARM WEATHER)

**Extension Activity:** Besides dressing for cold and hot weather, we do things that are seasonally related. List some of the seasonal festivals and holidays that you and your family celebrate. Then look through your daily newspaper for information about seasonal fairs and festivals in your community. Make a list of the fairs you would most like to attend. Explain why. How would you dress?



## Activity #6: The Sun

### Did You Know?

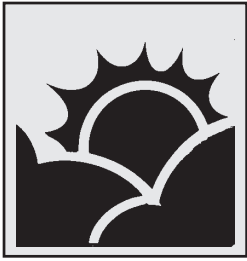
*Sunspots are dark patches on the sun's surface. A single spot may be 8 times the earth's diameter. They become very active every 11 years. Meteorologists think that sunspot activity may alter weather patterns by affecting the earth's magnetic fields.*

All the earth's heat and light comes from the sun. More heat and light reaches the earth from the sun in one minute than the whole world can produce in a year. Sunlight travels at about 186,000 miles or 300,000 km per second. It takes about eight and a half minutes to reach the earth. The sun keeps the temperature of most of the earth's surface at -60°F to 120°F (-51°C to 49°C). If the amount of sunlight reaching the earth was cut by a tenth, the oceans would turn to ice and life on earth would die. The sun is the key to the world's weather. Its rays filter through the atmosphere and warm the earth's surface which, in turn, heats the air above. The equator is hot because the sun shines directly overhead. The polar areas are cold because the rays hit the earth at wider angles.

1. Solar energy is energy produced by the sun. It is used for heating buildings and water, and converting light into electricity. It is an alternate energy source. Can you think of any other alternate energy sources available to you today?
2. Look through your newspaper for articles about solar energy or other alternate energy sources. List any examples you find under the proper category. (Be sure to check also the classified advertisements and the new home listings that emphasize energy efficiency.)

SOLAR ENERGY	HYDRO-ELECTRICITY	NUCLEAR ENERGY	WIND POWER	TIDAL POWER	GEOTHERMAL POWER	INCINERATED GARBAGE

**Extension Activity:** Conduct a simple experiment to find out why the equator is warmer than the north or south pole. Shine a flashlight straight down on a sheet of newspaper. Then tilt the flashlight so that its rays strike the paper at a slant. When you point the flashlight straight down, it makes a small circle of light on the newspaper. When you tilt it so that its rays strike the newspaper at a slant, it makes a larger, dimmer, oval shape. A slanted ray of sunlight spreads out more thinly over the earth's surface than a ray that shines straight down. While both rays carry the same amount of heat from the sun, the heat carried by the slanted ray is spread out and less intense.



## Activity #7: Almanacs & Weather

### Did You Know?

*Weather advice from an 1808 almanac: "Spiders make larger webs as rain approaches, and insects bite more severely when rain is near." There were no instruments or weather bureau services in the early 1800s.*

An almanac is a book or pamphlet, usually published once a year, that contains different kinds of information. An almanac often includes a calendar, outstanding dates and events, movements of heavenly bodies, and facts about governments, history, geography, and weather. It may also give figures on population, industry, and farm production. Almanacs originally provided a calendar of the months, with eclipses, the movements of the planets, and the rising and setting times of the sun, moon, and stars. People believed that this information would be useful to farmers and to navigators. In the 1800s, many newspapers began issuing almanacs. These included food recipes, first-aid advice, humorous tidbits, and weather predictions. Some almanac authors used astronomy to predict the weather, while others felt that weather repeated itself in patterns. Gradually, publishers stopped the practice of predicting the weather, except in the *Old Farmer's Almanac*, the *Farmer's Almanac*, and the current *Ford Almanac* which predicts weather from records of past years.

- Headlines, for news stories or advertisements, are sometimes written as weather predictions. The ad headline, "Beat the Arctic Blast, Buy Your Antifreeze Now," for example, infers that snow or cold weather may be coming soon. Find similar examples in today's newspaper and list these below.
- Create your own weather-related headlines for products you see advertised in today's newspaper. Try to make accurate inferences based on the normal seasonal weather.

ARTICLE OR ADVERTISEMENT HEADLINE	WEATHER INFERENCE

**Extension Activity:** Using one of the farmer's almanacs published nowadays, find the weather forecast or prediction for any particular week. Then look in your local newspaper each day that same week for the exact weather that your area experienced. How do the two compare? How accurate was the almanac's long-range weather forecast?



# Activity #8: Weather History

### Did You Know?

The first weather satellite (Tiros I) was launched by the United States on April 1, 1960. It circled the earth every two hours at heights of 420-900 miles (700-1500 km) sending back pictures of cloud and snow cover.

<b>1643:</b> Evangelista Torricelli (Italy) invented the first barometer for measuring air pressure.	<b>1805:</b> Admiral Sir Francis Beaufort (Britain) devised the Beaufort Scale for measuring wind speed at sea.
<b>1654:</b> Grand Duke Ferdinand of Tuscany invented the first sealed thermometer for measuring temperature.	<b>1843:</b> Lucien Vidie (France) made the first aneroid (non-liquid) barometer for measuring air pressure.
<b>1714:</b> Gabriel Daniel Fahrenheit (Germany) devised the first Fahrenheit Scale (°F) for measuring temperature.	<b>1846:</b> John Robinson (Britain) invented the cup anemometer for measuring wind speed and direction.
<b>1742:</b> Anders Celsius (Sweden) devised the Celsius or Centigrade scale (°C) for measuring temperature.	<b>1930:</b> Pierre Molchanov (USSR) launched a radiosonde for measuring weather in the upper atmosphere.
<b>1752:</b> Benjamin Franklin (USA) invented the lightning conductor for use on high buildings.	<b>1945:</b> John von Neumann (USA) built an electronic computer known as <i>Maniac</i> . It was the first to be used for weather forecasting.
<b>1783:</b> Horace-Benedict de Saussure (Switzerland) made the first hair hygrometer for measuring humidity.	<b>1960:</b> The first weather satellite, <i>Tiros I</i> , was launched by the USA.

1. If it were possible, what would you invent relating to weather or weather measurement? What would you name your instrument or invention? What would it do? What would it look like? Sketch your invention below.
2. Scan today's newspaper for examples of interesting advertisements. Create your own display advertisement to promote and sell your new invention. Mount your finished product on poster board.

**Extension Activity:** Turn to the weather page in today's newspaper. Find a reference that relates to each of the inventor's mentioned in this lesson. (Temperatures, for example, listed in Fahrenheit (°F) would relate to 1714 and Gabriel Daniel Fahrenheit.)



## Activity #9: Newspaper Weather Information

### Did You Know?

*The U.S. National Weather Service makes about 2 million forecasts a year. It also sends out storm and flood warnings and nearly 750,000 forecasts for aircraft.*

Most newspapers in the United States get their weather information from one or all of the following sources: the U.S. Geological Survey, the National Weather Service, and various state and local services. Newspaper weather information is found on the "weather page," which can be located by using the index on the front page of the newspaper. References to weather, however, can be detected in almost every section of the newspaper.

1. Find weather-related information in today's newspaper by participating in the scavenger hunt below.
2. Make this a competitive exercise by teaming up with several classmates against other student teams. Be the first team to find all 30 items!

### WEATHER SCAVENGER HUNT IN THE NEWSPAPER

- |  |  |
|--|--|
| <input type="checkbox"/> Headline having a weather word                    | <input type="checkbox"/> Local precipitation information                       |
| <input type="checkbox"/> Photo showing "severe" weather                    | <input type="checkbox"/> Sports story about an event influenced by the weather |
| <input type="checkbox"/> High temperature in your city                     | <input type="checkbox"/> Movie ad having a weather connection                  |
| <input type="checkbox"/> Reference to weather in a comic strip             | <input type="checkbox"/> High and low temperature of any international city    |
| <input type="checkbox"/> Classified ad for a climate-related vacation home | <input type="checkbox"/> Advertisement for a seasonal product                  |
| <input type="checkbox"/> Sunrise and moonrise times                        | <input type="checkbox"/> Navigation instruments for sale                       |
| <input type="checkbox"/> Picture of a seasonal sport                       | <input type="checkbox"/> U.S. city with the lowest temperature                 |
| <input type="checkbox"/> Information having to do with astronomy           | <input type="checkbox"/> The word "cloud"                                      |
| <input type="checkbox"/> High tide and low tide in feet or meters          | <input type="checkbox"/> Tragedy relating to weather                           |
| <input type="checkbox"/> Weather-related job listing                       | <input type="checkbox"/> A weather symbol                                      |
| <input type="checkbox"/> Convertible-style automobile for sale             | <input type="checkbox"/> Price of an agricultural product on the open market   |
| <input type="checkbox"/> Air pollution index for your community            | <input type="checkbox"/> Your state weather forecast                           |
| <input type="checkbox"/> Local weather-related news story                  | <input type="checkbox"/> A compound weather word                               |
| <input type="checkbox"/> National weather-related news story               | <input type="checkbox"/> Weather map   |
| <input type="checkbox"/> U.S. city with the highest temperature            |  |
| <input type="checkbox"/> Advertisement for seasonal sports equipment       |  |

**Extension Activity:** Write to newspaper companies in various cities around the country. Request a copy of their newspaper. When the newspapers arrive, compare weather information. What are the similarities and differences? Which newspaper had the most comprehensive weather coverage?