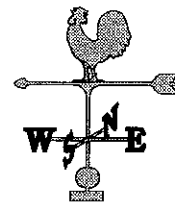


Name \_\_\_\_\_

Date \_\_\_\_\_

## WHAT MAKES WEATHER?

◆ **Focus:** What makes weather? The answer may surprise you, because what makes weather on earth isn't on earth at all—it's 93 million miles away! To see how this is so, read the article. Then answer the questions.



### The Sun and the Weather

You know that a sunny day is nice and that the sunshine will warm you up. But did you know that the sun also causes snow and rain? In fact, the *sun causes all weather on the planet.*

How can this be? The sun is a huge energy source. It's gigantic—more than a million times larger than the earth—and extremely hot. At the sun's surface, the temperature is about 10,000 degrees Fahrenheit. Energy in the form of light and heat is constantly given off by the sun into space.

Only about one two-billionth of the sun's energy reaches the earth. And much of the energy that does reach our planet is reflected back into space by clouds. But, because the sun generates so much energy, the tiny fraction that reaches us is powerful enough to have enormous effects. The energy that reaches the earth is absorbed by the atmosphere—the layer of air surrounding the earth—and by the ground and water. The atmosphere traps this energy next to the earth. All of this energy provides "fuel" for the "weather engine" that causes weather on the earth.

The sun does not heat the earth evenly. This is because the earth is a sphere and because land and water absorb and release heat at different rates. At different places on earth and at different times of the year, different amounts of the sun's energy fall, heating the earth and the atmosphere unevenly.

This uneven heating of the earth causes changes in the atmosphere. Huge, three-dimensional areas of the atmosphere called *air masses* form. These areas have different temperatures and air pressures. Air masses of opposite temperatures (hot or cold) and opposite air pressures (high or low) move toward each other. These movements of the air combine with other factors (like the rotation of the earth and the amount of water in the air) to make—you guessed it—our weather.

The point at which air masses collide is called a *front*. The fronts make weather. The sun's energy strikes the earth continuously, so the "weather engine" is always running. And it all starts with the energy of the sun, 93 million miles from earth.

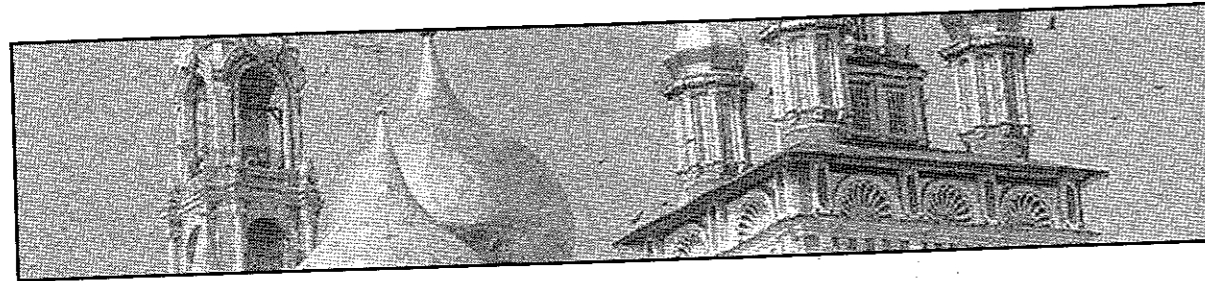




Name \_\_\_\_\_  
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## THE WORLD'S HIGHEST AIR PRESSURE

*A World Weather Record*



3. What was the highest barometric pressure ever recorded?

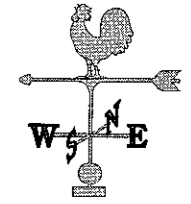
4. The sea-level average barometric pressure around the world is 29.92 inches. How does the highest recorded barometric pressure compare to this average? Express your answer as a percentage.



Name \_\_\_\_\_  
Date \_\_\_\_\_

## WHAT IS AIR PRESSURE?

◆ Focus: Read the article about air pressure. Then answer the questions that follow.



### Air Pressure

You're under a lot of pressure right now, whether you know it or not.

The pressure is air pressure. You know that air is the mixture of gases that surround the earth. Oftentimes this is called the *atmosphere*. Air pressure is the force that the air exerts in all directions.

To understand air pressure, think about a book. If you lift up a book or any other solid object, you can easily feel its weight. You can also easily feel the weight of a liquid, such as water. Air, which is a gas, has weight, too. But since it's much lighter than solids or liquids, you usually don't notice it.

How much does air weigh? A cubic foot of air weighs about one ounce.

The air pressure pushing down on you at this very moment from all of the air above

you is about one ton. Why aren't you squished by it? Because air exerts pressure in all directions—down, up, and sideways. There is air pressure on you from all sides, supporting you and compensating for the pressure from above.

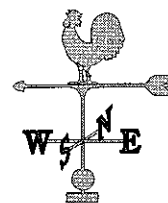
Scientists used to think that air pressure was caused by the great weight of the atmosphere pushing down. But we now know that air pressure is caused by the motion of air molecules. Air molecules move in all directions at incredible speed, colliding with each other and anything else they touch. The impact of these billions of molecules causes the air to generate pressure. That's why air pressure is exerted in all directions. That's also why the gravity of the earth doesn't pull all of the air in the atmosphere down to the earth's surface.

1. What is another term for the air?
2. How does the movement of air molecules create air pressure?
3. Write a one-sentence definition of air pressure.



Name \_\_\_\_\_

Date \_\_\_\_\_



## AIR PRESSURE AND WEATHER

◆ Focus: Read the article. Then answer the questions.

### Differences in Air Pressure Help Cause the Weather

Differences in air pressure in different places in the atmosphere are a major reason why we have weather. Why? Because of two important facts about air pressure.

**Fact: Air pressure “wants to be even.”**

To see what this means, imagine you have two airtight boxes. They’re exactly the same size. But one has more air in it. This is because more air has been squeezed into the same space, under higher pressure. If you suddenly connect the two boxes with a tube, air will rush from the high-pressure box to the low-pressure box until the air pressure evens out in both boxes. (This is the same principle that gives you a flat tire on your bike. The air in your tire is at a higher pressure than the surrounding atmosphere. When something punctures the tire, the air from the high-pressure tire rushes out to the lower-pressure atmosphere, equalizing air pressure, but giving you a flat.)

**Fact: Air pressure varies throughout the atmosphere.**

At any given moment, there are thousands of areas of higher pressure and areas of lower

pressure in the atmosphere. But if air pressure “wants to be even,” then why doesn’t the air pressure even out throughout the atmosphere and stay even?

This would happen if it weren’t for the sun. The sun heats the earth unevenly. Where the atmosphere receives more of the sun’s energy, the air warms up. Warmer air has lower pressure than cooler air. The atmosphere is constantly trying to “even out” these different pressures. But just as soon as it’s even, energy from the sun creates more high- and low-pressure areas, and the process continues. The result is that air is constantly moving from higher-pressure areas to lower-pressure areas.

As the air moves, it makes wind. It picks up and deposits moisture. It moves up and down. It creates and destroys clouds. In other words, it makes weather.

Of course, many other forces come into play to create weather. But, differences in air pressure, caused by differences in air temperature as a result of uneven heating from the sun, are fundamental to weather on earth.

1. What is meant by air pressure “wants to be even”?
2. How does the sun create uneven air pressure?
3. How does this uneven air pressure help create weather?

