Temperature Continued: Factors of Heating

Heat from the sun is responsible for keeping our planet warm. Earth, however, is round and is continuously moving, rotating and revolving around the sun. So all of our heat comes from the same source, the sun, but it cannot reach all parts of the planet equally.

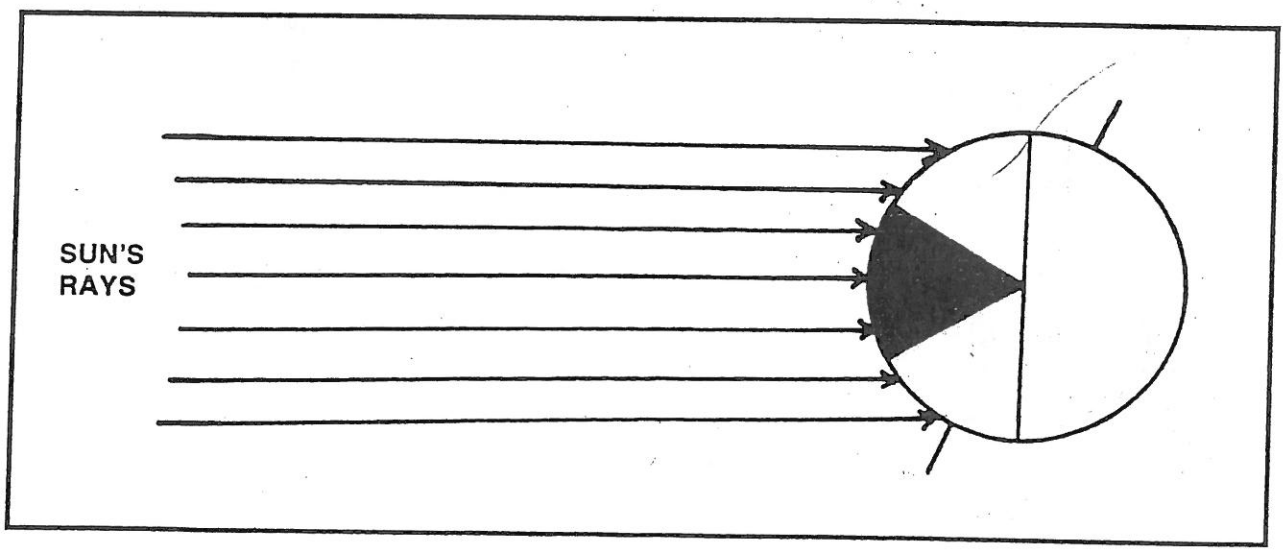
Sunlight that is able to strike the Earth's surface directly is more efficient than sunlight that strikes the Earth at an angle. It is brighter and warmer. Near the equator, sunlight hits the Earth very directly, at an angle close to 0 degrees. Areas around the equator are very warm and bright. Near the North and South Poles, sunlight strikes at an angle close to 90 degrees. These areas are quite cold.

Another factor that must be considered is the kind of surface the sunlight is striking. Imagine walking barefoot across a blacktopped area on a hot, sunny day. Ouch! Now imagine jumping barefoot through rain puddles on a cool, overcast day. Brrr! Soil, rocks, and dark surfaces absorb energy from the sun very quickly. Snow, ice, and water absorb the energy more slowly.

Clouds play an important role in heating the Earth. During the daytime, clouds may reflect sunlight, blocking the sun's heat from reaching the Earth's surface. At night, clouds have a different effect. They serve as a blanket, trapping warm air beneath them and keeping it close to Earth.

Now that we know that the sun cannot warm up the planet evenly, we must be aware of some of the characteristics of warm air and cool air.

When particles of matter gain heat, they have less attraction. They move farther away from each other. The matter becomes less dense. When particles of matter lose heat, they have greater attraction and move closer together. The matter becomes more dense. Remember, air is matter. When air is heated, it becomes less dense. When air is cooled, it becomes more dense. Air that is less dense rises, so warm air rises. Air that is more dense sinks, so cool air sinks. This becomes very important as we learn about air movement.



This illustration demonstrates the angle at which the sun's rays strike the Earth. Notice that the black area receives the most direct rays. This area of the Earth is brighter and warmer all year round.

Name _____ Pd: Date _____

For the student:

1. Why does the shape of our planet affect how it can be heated?

2. Why is the air around the equator warmer than the air around the North or South Poles?

3. Why is it better to wear light-colored clothing on hot, sunny days?

4. How do clouds prevent the Earth from becoming warmer during the daytime?

5. Why does warm air rise?

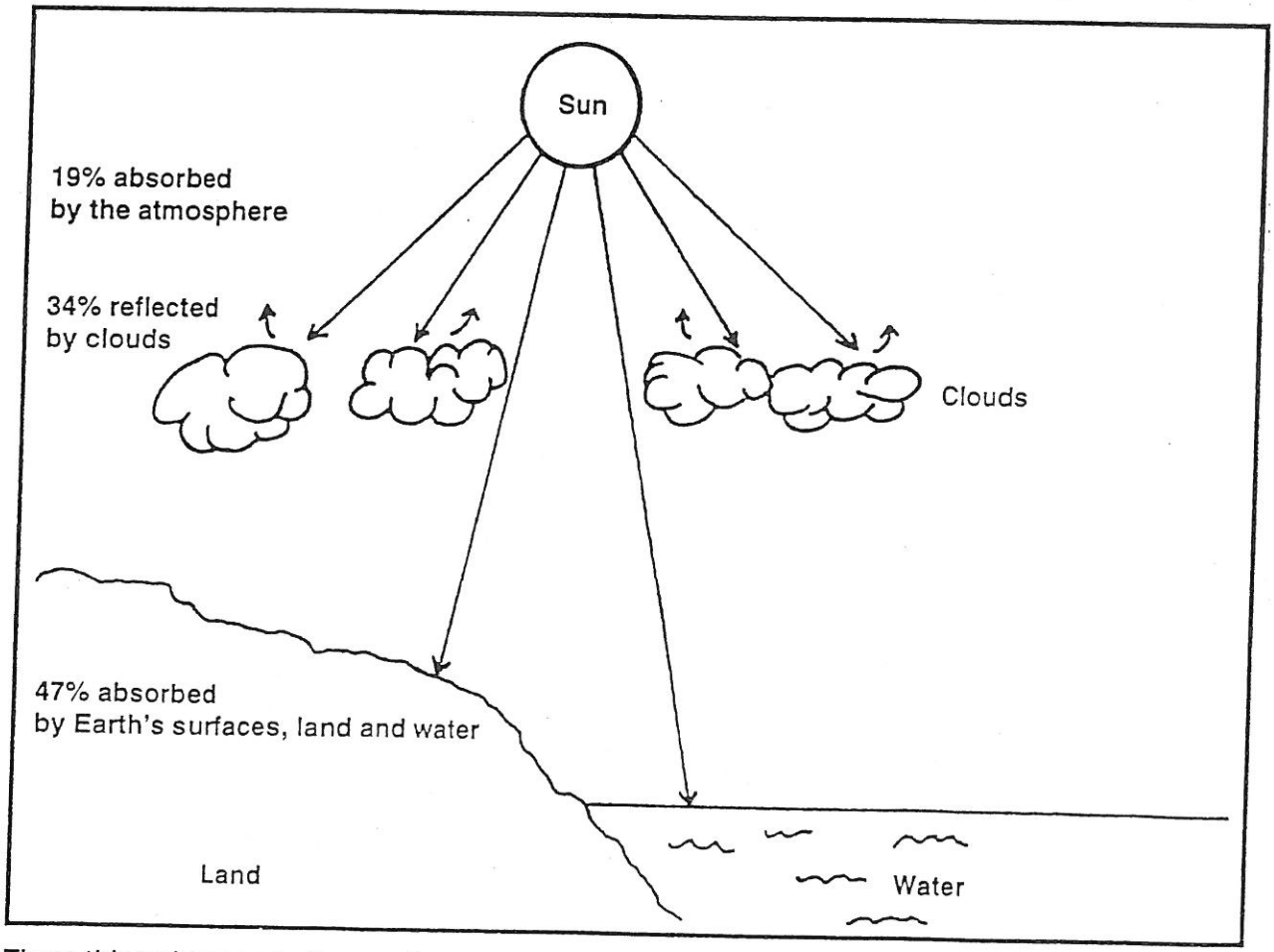
Factors of Weather: Temperature

Weather is the condition of the air around the Earth. Air pressure is one factor that determines the weather. Another property of air that can change is temperature, the warmth or coldness of the air.

Our sun is the source of heat for our planet. Of the tremendous amount of energy radiated from the sun, only a small percentage of the heat actually enters the Earth's atmosphere. The rest of the heat is lost in space.

Scientists believe that three things may happen to the sunlight that enters Earth's atmosphere. Thirty-four percent of it is reflected away from the Earth's surface by clouds. Nineteen percent is absorbed by the atmosphere. This sunlight warms the air. The remaining 47 percent is absorbed by Earth's surfaces, land and water, and warms them. The Earth's surfaces, in turn, are responsible for warming the portion of the atmosphere closest to them.

The Earth's atmosphere acts like a greenhouse. A greenhouse is designed to let in as much light as possible. The light warms the plants, encouraging their growth. A greenhouse is also designed to prevent heat from escaping. The Earth's atmosphere lets sunlight through to heat the planet and encourage the survival and growth of its organisms. The atmosphere also prevents most of the heat from escaping and getting lost in space.



Three things happen to the small percentage of sunlight that enters Earth's atmosphere.

Name Pd: Date

For the student:

1. What is the source of heat for Earth?

2. What happens to MOST of the heat radiated from the sun?

3. What happens to MOST of the sunlight that enters Earth's atmosphere?

4. What does heat radiated from Earth's surfaces do?

5. How does a greenhouse promote, or encourage, the growth of plants?