

List the large air masses that affect the weather in the United States. (Maritime polar, Continental polar, Maritime tropical, and Continental tropical.)

Further suggestions:

Explain how the factors of heat energy, moisture, air pressure and winds affect the earth's weather.

Explain how convection currents are affected by heat.

Using the information in the video about the layers of the atmosphere, plot on a graph the temperatures found in the four main layers of the atmosphere.

Explain why it is important for an airplane to have a pressurized cabin.

The following demonstration will help show that air has mass. Fill a balloon with air and place it on a scale. Balance the scale, then pop the balloon. A change in the balance will occur, showing that there has been a change in the mass in the balloon.

Design a bulletin board showing various activities that can be done because of wind. For example, wind surfing, sailing, etc. Have students bring in the pictures.

To demonstrate the effects of hot and cold air masses, fill a beaker full of cold water with a few drops of food coloring. Place a test tube of warm water in the middle and observe what happens.

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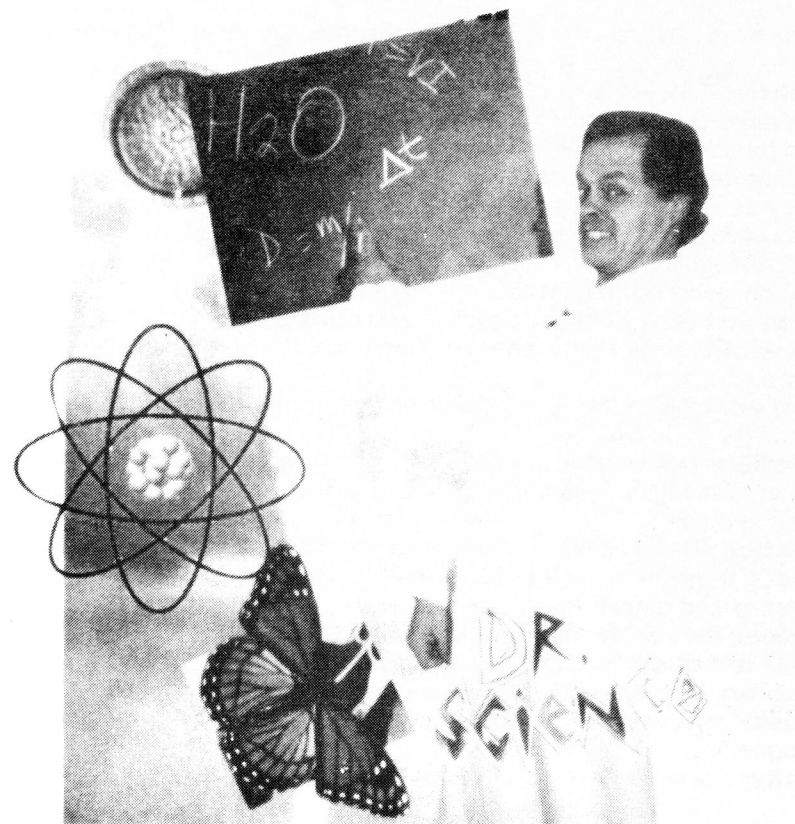
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Teacher's Guide

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Weather Systems



Weather Systems contains many demonstrations to help students understand the concepts of what is weather. Atmospheric factors that determine weather are discussed as well as weather patterns. Dr. Science makes learning about weather exciting by showing dramatic footage of weather and its effects. Factors that interact to cause weather are presented along with methods of heat transfer, local and wind patterns, and descriptions of clouds. The program compares the four major types of air masses and how they affect the world in which we live. Weather has been with us from the beginning of Earth's history to present day. This program presents this difficult subject in an exciting and thorough presentation.

Vocabulary:

Ozone: A molecule of three atoms of oxygen.

Troposphere: The lowest layer of the atmosphere, where water vapor is found.

Stratosphere: A layer of the earth's atmosphere where jet streams and the ozone layer are found.

Mesosphere: Coldest layer of the earth's atmosphere.

Ionosphere: Lower part of the thermosphere that contains electrically charged particles.

Thermosphere: The highest layer of the earth's atmosphere where the air is very thin and the temperature is high.

Air pressure: Pressure exerted on the earth by gravity pulling the air toward the earth's surface.

Wind: Convection current in air.

Local winds: Blow from any direction and cover a short distance.

Global winds: Blow from a specific direction and usually travel long distances.

Radiant energy: Visible and invisible energy from the sun that moves in waves.

Conduction: The process in which heat is transferred through a substance, or from one substance to another, by direct contact of one molecule with another.

Convection: The process in which molecules of liquids or gases move in currents, transferring heat as they move, caused by differences in temperature and density.

Radiation: The transfer of heat energy through space.

Infrared radiation: Invisible heat energy from the sun.

Barometer: An instrument for measuring air pressure.

Air mass: Large body of air that has the same temperature and humidity throughout.

Humidity: The amount of water vapor, or moisture in the air.

Dew point: The temperature at which moisture in the air condenses into droplets.

Relative humidity: The percentage of moisture the air holds relative to the amount it can hold at a particular temperature.

Condensation: The changing of gas into a liquid.

Fog: Clouds that form close to the ground.

Cumulus cloud: A puffy white cotton ball-like cloud with a flat bottom.

Cold front: The boundary formed when a cold air mass slides under a warm air mass and pushes the warm air along.

Warm front: The boundary formed when a warm air mass slides over a cool air mass and pushes the cold air along.

Stationary front: A type of front that forms when a mass of warm air meets a mass of cold air and no movement occurs.

Occluded front: A type of front that occurs when a cold front overtakes a warm front, pushes it upward, and meets cool air.

Preview and review questions:

What atmospheric factors interact to cause weather? (Heat energy, air pressure, winds and moisture).

Why do we have to breathe harder at higher altitudes? (Few air particles).

What is the contributing factor to air density? (Gravity).

What are the layers of the atmosphere from the closest to the earth to farthest away? (Troposphere, Stratosphere, Mesosphere, and Thermosphere).

How does ozone help the earth? (Ozone protects the earth from harmful ultraviolet rays).

Why does more dense air sink? (More dense air has particles closer together making them heavier).

How are clouds formed? (When warm moist air flows upward condensing into clouds.)

How are winds formed? (When moving air is heated, the density decreases so warm air rises, allowing the cooler heavier air to replace the rising warm air.)