

✦ Atmospheric Science Explorers



Starfish – Australia



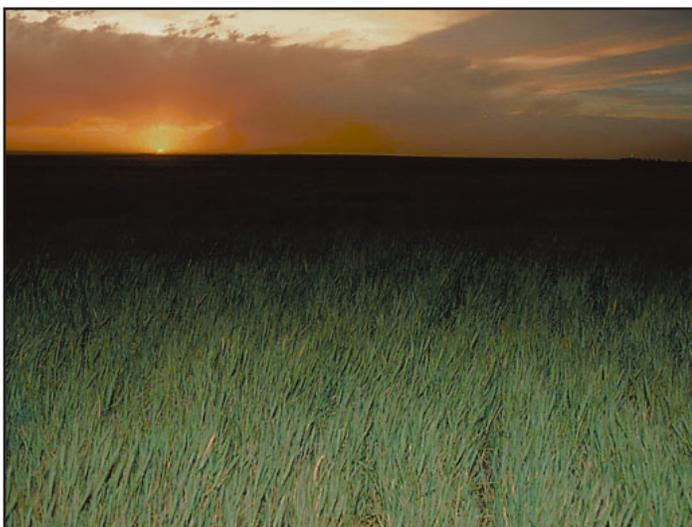
Spring Tulip – Colorado



Mountain Fog – Colorado



Ocean Sunset – Tasmania



Wheat Field – Eastern Colorado



Rainforest – Tasmania

Heating and Cooling of Actual Land Forms

The purpose of this lab is to observe the heating and cooling rates of samples of soil, grass, saltwater, fresh water, and sand.

Gather the following materials:

- 5 large test tubes
- 5 single-hole rubber stoppers
- samples of soil (listed above)
- 5 thermometers
- 100-watt bulb with light stand
- graph paper and colored pencils
- watch or clock w/ second hand
- ruler

Here's how to do it:

1. Use glycerin or soapy water on the rubber stopper prior to placing it on the thermometer.
2. In each test tube, place one thermometer and one sample of the previously listed materials.
3. Place all five test tubes in clamps and secure the tubes/clamps under the lamp.
4. Record the beginning temperature of each material.
5. Turn on the lamp.
6. Record the heating temperatures at each minute.
7. At minute 10, record the temperatures, then turn off the lamp.
8. Record the cooling temperatures every minute until minute 20.
9. Graph recorded results on a graph paper using appropriate scale, using a different colored pencil for each material.

Discussion:

- Which material heated up the fastest?
- Which heated the slowest?
- Which material cooled off the fastest?
- Which cooled the slowest?
- Were there any differences in the heating and cooling of the saltwater and the fresh water temperatures?

Question:

At the beach on a sunny day, the sand is much hotter than the water. Why is this?

Answer:

The sun's energy warms land faster than water. This occurs because water, especially large bodies of water like oceans or lakes, are able to absorb more energy than land without warming. At night, however, air over land cools more rapidly than the air over water.

Source: *Weather in the Lab* by Thomas Richard Baker

How Do Antarctic Animals Stay Warm in Bone-Chilling Water?

The purpose of this demonstration is to discover how animals survive in the coldest of conditions by experimenting with ways that allow us to endure cold temperatures.

Gather the following materials:

- 4 large, resealable, clear plastic bags
- duct tape
- 1 lb. vegetable shortening (Crisco)
- stop watch
- a bucket of cold water with ice cubes
- weights (stones or weights used on a balance)

Here's how to do it:

1. Cover one hand with a plastic bag.
2. Put a generous amount of solid shortening into another bag and put the plastic-covered hand into the bag with the shortening. Knead the shortening to make sure the hand is completely surrounded by shortening.
3. Wrap duct tape around the part of the bag covering your wrist to seal the bag.
4. Cover the other hand with two plastic bags without shortening.
5. Place both hands simultaneously into a bucket of cold water.
6. Time how long each hand remains underwater.
7. Remove the bags from your hands and seal the bags so water won't get in. Attach weights to the outer bag of each "glove."
8. Put the bags into the bucket of water. How much weight can each bag hold before it sinks to the bottom of the bucket?

Discussion

- Discuss how the solid shortening is like the blubber of Antarctic animals.
- Discuss what other advantages blubber gives marine animals besides warmth. (buoyancy)



Source: Gulf of Maine Aquarium at <http://gma.org>

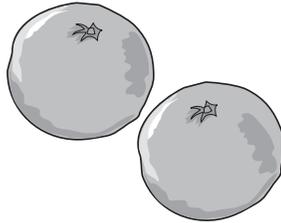
Our Earth's Living "Skin"

The purpose of this experiment is to represent the amount of useable soil on Earth. The orange represents the earth, and the orange peel represents the surface of the Earth. Most people think the surface of the Earth is mostly dirt/soil. This experiment will put things in proper proportion!

Gather the following materials: 2 oranges

Here's how to do it:

1. Put one of the oranges aside.
2. Remove three-quarters of the peel from the other orange. This represents the amount of water on Earth.
3. From the remaining peel, remove half of it. This represents areas where there is little or no usable soil (bogs, deserts, cities, mountains).
4. Carefully peel away three-quarters of the remaining orange peel. This represents areas that are too hot, too cold, or too wet for farming.
5. Look at how much peel is left on your orange. This is how much usable soil we have on Earth. It is only one thirty-second (1/32) of the Earth's surface.
6. Compare the unpeeled orange with this one.



Discussion:

- How does the amount of soil you believed to be on Earth compare to the actual quantity of usable soil on our planet?
- Why is soil important and why is it important to know of its quantity and usability?



Source: *EarthNet Project*, Canada
at <http://agc.bio.ns.ca/schools/EarthNet/english/>

Making Compost

The purpose of this activity is to learn how to make compost and why it is beneficial to the environment to do so.

Gather the following materials:

- dry brown yard waste such as dry leaves and dry pine needles (sawdust can also be used.)
- grass clippings, weeds, vegetation (green materials)
- soil and water

Here's how to do it:

1. Select an appropriate place for your compost-making area. Far corners of yards work well. If desired, a bin can be made out of chicken wire.
2. Place the dry materials on the bottom of your compost pile. Follow with the green materials.
3. Spray each layer with water so that each is very moist.
4. Mix in a little soil to get microorganisms in the mix.
5. Leave the compost alone for a few weeks. The microorganisms will gradually break down all the layers until they become dark brown, rich earthy humus that plants love. Use the compost as mulch, or mix it with planting soil.

Discussion:

Composting is an oxygen-dependent aerobic process that breaks down garden wastes naturally. It does not harm our environment as does the waste in landfills or waste that is incinerated. The number one source of human-caused methane emissions to the atmosphere is buried waste. What other activities can you participate in that counter increased buried waste?



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