1. Spend 2-3 seconds reading the headings in this text. What do you think this text is about?

2. Circle the words that are important to learn in this text.

3. Underline the most important thing to know in each paragraph.

4. For each word that you circled, write one sentence that explains what this word means. Make your explanation simple, as if you were explaining the word to a younger brother or sister.

5. What do you think the person who wrote this text wants you to understand?
How Sunlight Affects the Earth

Materials:
You have been given
- a model Sun (the lamp)
- a model Earth (the Styrofoam ball)

Task:
1) Draw the earth on the styrofoam ball.
2) Put the rubberband around the middle of the ball to show the equator.
3) Use the toothpick to place the ball on the cup.
   First, put the model Earth on the cup straight up and down.
4) Shine the light from the lamp on the model Earth.
5) Think about the questions:
   a. How does the Sun’s light hit the Earth?
   b. Does the Earth get the same amount of sunlight in every place?
6) Now put the model Earth at tilt.
7) Shine the light from the lamp on the model Earth.
8) Think about the questions:
   a. How does the Sun’s light hit the Earth?
   b. Does the Earth get the same amount of sunlight in every place?
   c. What are the effects (results) of the amounts of sunlight that different parts of the Earth get?
Preliminary?
Where does the Earth get its energy?

Does all of the light from the Sun reach Earth?

What happens to light that doesn’t reach the Earth?

Task 5?

What happens if you turn the ball? How often does the Earth make a full rotation?

What happens if you move the Sun further away? How would this affect the temperature of Earth?

Does Earth get the same amount of sunlight in every place?

If not, what part of Earth receives the brightest sunlight?

Based on your observations (what you saw), what part of Earth would be hottest? What part of Earth would be coldest? How does the temperature of South Africa compare with other parts of Earth?

Pierce pencil through North poles to represent axis?

Should we include tilt of Earth on its card?
REVIEW: Earth's Energy Balance

TASK CARD:

Using the model, work in groups and answer the following questions orally

1) Where does earth get its energy?
2) Does all of the light from the Sun reach the Earth?
3) What happens to light that doesn't reach the earth?
4) Does the Earth get equal amounts of sunlight everywhere?
5) What part of the Earth gets the most sunlight?

INDEPENDENT SHOW AND PROVE:

Answer the following on your own:

1) How does the size of the planet affect the amount of sunlight the earth receives?

2) How does the distance of the planet from the sun affect the amount of sunlight the earth receives?

3) What is the name of the atmosphere, the ocean, and the land working together to determine the weather?
Earth’s Atmosphere

The Earth is surrounded by a blanket of air, which we call the atmosphere. It reaches over 560 kilometers (348 miles) from the surface of the Earth, so we are only able to see what occurs fairly close to the ground. Early attempts at studying the nature of the atmosphere used clues from the weather, the beautiful multi-colored sunsets and sunrises, and the twinkling of stars. With the use of sensitive instruments from space, we are able to get a better view of the functioning of our atmosphere.

Life on Earth is supported by the atmosphere, solar energy, and our planet’s magnetic fields. The atmosphere absorbs the energy from the Sun, recycles water and other chemicals, and works with the electrical and magnetic forces to provide a moderate climate. The atmosphere also protects us from high-energy radiation and the frigid vacuum of space.

The envelope of gas surrounding the Earth changes from the ground up. Four distinct layers have been identified using thermal characteristics (temperature changes), chemical composition, movement, and density.

Troposphere

The troposphere starts at the Earth’s surface and extends 8 to 14.5 kilometers high (5 to 9 miles). This part of the atmosphere is the most dense. As you climb higher in this layer, the temperature drops from about 17 to -52 degrees Celsius. Almost all weather is in this region. The tropopause separates the troposphere from the next layer. The tropopause and the troposphere are known as the lower atmosphere.

Stratosphere

The stratosphere starts just above the troposphere and extends to 50 kilometers (31 miles) high. Compared to the troposphere, this part of the atmosphere is dry and less dense. The temperature in this region increases gradually to -3 degrees Celsius, due to the absorption of ultraviolet radiation. The ozone layer, which absorbs and scatters the solar ultraviolet radiation, is in this layer. Ninety-nine percent of "air" is located in the troposphere and stratosphere. The stratosphere separates the stratosphere from the next layer.

Mesosphere

The mesosphere starts just above the stratosphere and extends to 85 kilometers (53 miles) high. In this region, the temperatures again fall as low as -93 degrees Celsius as you increase in altitude. The chemicals are in an excited state, as they absorb energy from the Sun. The mesopause separates the mesosphere from the thermosphere.

The regions of the stratosphere and the mesosphere, along with the stratosphere and mesosphere, are called the middle atmosphere by scientists. This area has been closely studied on the ATL.AS Spacelab mission series.

Thermosphere

The thermosphere starts just above the mesosphere and extends to 600 kilometers (372 miles) high. The temperatures go up as you increase in altitude due to the Sun’s energy. Temperatures in this region can go as high as 1,727 degrees Celsius. Chemical reactions occur much faster here than on the surface of the Earth. This layer is known as the upper atmosphere.

The upper and lower layers of the thermosphere will be studied more closely during the Tethered Satellite Mission (TSS-1R).

Composition of the Atmosphere

The atmosphere is primarily composed of Nitrogen (N2, 78%), Oxygen (O2, 21%), and Argon (Ar, 1%). A myriad of other very influential components are also present which include the water (H2O, 0 - 7%), "greenhouse" gases or Ozone (O3, 0 - 0.01%), and Carbon Dioxide (CO2, 0.01-0.1%).

Beyond the Atmosphere

The exosphere starts at the top of the thermosphere and continues until it merges with interplanetary gases, or space. In this region of the atmosphere, Hydrogen and Helium are the prime components and are only present at extremely low densities.

Source: http://www.nasa.gov/audience/forstudents/9-12/features/912_liftoff_atm.html
Action Notes # 2 – Energy Budget and Greenhouse Gases

In my own words, the energy budget is:

In my own words, ‘radiation’ means:

Energy absorbed by the earth is:

If an object absorbs energy from the sun, the temperature of the object does what:

As the temperature increases, the wavelength gets:

As the temperature decreases, the wavelength gets:

The sun radiates short waves. Re-radiated heat like that from the earth, comes in what kind of wave lengths:

The atmosphere contains heat trapping gases that ABSORB short wave radiation (from the sun) known as:

Some examples of these gases are:

What effect do these gases have on the earth’s temperature:

When the sun radiates light energy this is known as:

Input=

Output=