Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

![C:\Users\linda.barnes\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\OPLFCESI\MC900150849[1].wmf]()…4, 3, 2, 1 - - Lift Off!!

We live in an ocean of gases called the atmosphere. This activity will help you learn about the various layers of that “ocean” of air. These layers are important to our understanding of how heat energy, air pressure, winds, and moisture cause our weather!

The directions for this assignment are described below in a bulleted list. **Make sure you read the directions very carefully.**

* You will create a poster using illustrations and captions to describe each layer of the atmosphere.
* Read the paragraphs below as you work. They will describe everything that must be included.
* Each word or phrase that is in **bold print and underlined** must be **written** on your poster.
* Each word or phrase that is in **BOLD AND ALL CAPITALS** must be **CREATIVELY DRAWN** on your poster.
* Arrows indicating temperature must be colored red.
* Arrows showing air pressure must be colored blue.
* Because the Earth is round, your drawing will contain a series of gentle arcs that define the surface of the Earth and each of its atmospheric layers.
* Use the following scale for calculating distances: 1 inch = 15 miles
* Always measure *from the Earth’s surface* to the top of each atmospheric layer.

**TEMPERATURE AND AIR PRESSURE**

With the edges of the arcs of the Earth surface curving down, line a ruler up with the long, right edge. Draw a line on the left side of the ruler. Divide this column into two so you have two long thin columns. Label one column: Air Pressure, Blue and the other: Temperature, Red. Draw arrows showing the direction the air pressure and temperature changes with increasing altitude in each layer. An up arrow means increasing with altitude, a down arrow means decreasing with altitude.

**AT THE BOTTOM**

Imagine you are traveling through the layers of the atmosphere on a rocket bound for outer space. To prepare for your journey, label the *arc* at the VERY bottom of your paper **Earth’s Surface.**

**GOING UP!**

While standing on the Earth’s surface, you are in an atmosphere that is divided into layers according to major changes in the temperature. Luckily, gravity holds these layers close to the Earth and makes life possible. The weight of these layers pushes down on the Earth’s surface. This push is called air pressure. Draw an **ARROW POINTING DOWN** at the Earth’s surface and label it **AIR PRESSURE.**

**WHERE THE WEATHER IS**

As your rocket lifts off, you are surrounded by the first layer of the atmosphere called the **Troposphere.** This is the layer in which **YOU** live. At about **5.5 miles** above sea level, **MOUNT EVEREST** is the tallest and most prominent mountain in the world based on measurement to sea level. Almost all the Earth’s **WEATHER** occurs here. The troposphere extends to about **10 miles** *above the Earth’s surface*. Since this is where water vapor often condenses, you will see **CLOUDS** out the window of your rocket. In the troposphere, the temperature decreases as the altitude increases. In other words, the higher you go in the troposphere, the colder it gets and air pressure decreases.

**BRRR, IT’S COLD HERE!**

Continuing upward, you enter the **Stratosphere.** This layer extends to about **30 miles** *above the Earth’s surface.* The temperature increases in the stratosphere due to the ozone layer capturing ultraviolet radiation. In other words, the higher you go in the stratosphere, the warmer it gets and the air pressure decreases. You immediately notice that there is very **STRONG WINDS BLOWING EASTWARD** in this layer called the **Jet Stream.** As you continue upward through the stratosphere, you find the very thin **Ozone Layer** (a special kind of oxygen – O3) present between **20-25 miles** *above Earth’s surface*. **LIGHTLY SHADE THIS AREA.** The ozone layer shields us from the sun’s ultraviolet rays which can cause cancer and sunburns.

**FREEZING FIRE!**

After leaving the stratosphere, you enter the third layer above the Earth’s surface called the **Mesosphere.** This layer extends to approximately **50 miles** *above the Earth’s surface*. Here **FEATHERY, THIN CLUDS OF ICE CRYSTALS** can often be seen in the evening. In this layer, the temperature further decreases to about -148°F. The temperature decreases in the mesosphere since there is no ozone and the amount of air pressure is decreasing. One job of the mesosphere is to help protect the Earth from **METEROIDS.** In fact, you see one streak by just as you glance out the window of your rocket. Thankfully it will burn up before it has a chance to strike the Earth as a meteorite.

**THE HEAT IS ON**

Getting closer to space, you enter the **Thermosphere.** This layer’s name means “Heat-Sphere” because it may reach temperatures as high as 2,732°F. The thermosphere gradually fades into outer space at an altitude of about **190 miles** *above the Earth’s surface*. In the thermosphere at about 95 miles above the Earth’s surface there are so few air particles that the air pressure is almost nonexistent. In your rocket you are enjoying listening to AM radio because the radio waves are “bounced “around the curve of the Earth.

**IT GLOWS HERE!**

**(NOT A LAYER OF ATMOSPHERE, BUT STILL IMPORTANT)**

Your ship finally leaves Earth’s atmosphere and you enter interplanetary space. But since Earth is like a really big magnet, you assume the earth must have a magnetic field. And it does! This field is called the **Magnetosphere.**  At the very top of your paper, indicate the magnetosphere is present. The magnetosphere is important because it shields the Earth from harmful radiation emitted by the sun. Here you spot the **NORTHERN LIGHTS** (also known as the Aurora Borealis), which are actually the strongest parts of the magnetosphere that glow as a result of being bombarded by solar radiation.

You are now bound for deep space. In distance, you see the **INTERNATIONAL SPACE STATION**, which is orbiting the Earth at **200 miles-215 miles.** Lucky you are in your **ROCKET** cabin which contains 78% nitrogen, 21% oxygen, and 1% carbon dioxide, water vapor and argon – the same atmosphere as in the troposphere so you can breathe. Have a great trip!

**Scoring Rubric for 4, 3, 2, 1 … Lift Off!**

1. **Temperature and Air Pressure \_\_\_\_\_/8**

Temperature and air pressure arrows.

1. **At the Bottom and Going Up \_\_\_\_\_/2**

**Earth’s Surface, Air Pressure, ARROW**

1. **Where the Weather is \_\_\_\_\_/2**

**Troposphere, YOU, MOUNT EVEREST, WEATHER, 10 miles, CLOUDS,**

1. **Brr, It’s Cold Here \_\_\_\_\_/2**

**Stratosphere, 30 miles, STRONG WINDS BLOWING EAST** labelled the **Jet Stream, Ozone Layer** (lightly shaded)

1. **Freezing Fire \_\_\_\_\_/2**

**Mesosphere, FEATHERY THIN CLOUDS OF ICE CRYSTALS, METEOROIDS**

1. **The Heat is On \_\_\_\_\_/2**

**Thermosphere, 190 miles**

1. **It Glows Here \_\_\_\_\_/2**

**Magnetosphere, NORTHERN LIGHTS, ISS, 200-215 miles, ROCKET**

1. **Color to highlight main features \_\_\_\_\_/5**
2. **Neatness \_\_\_\_\_/5**

**TOTAL \_\_\_\_\_/30**