



Atmosphere &amp; Weather

Name \_\_\_\_\_

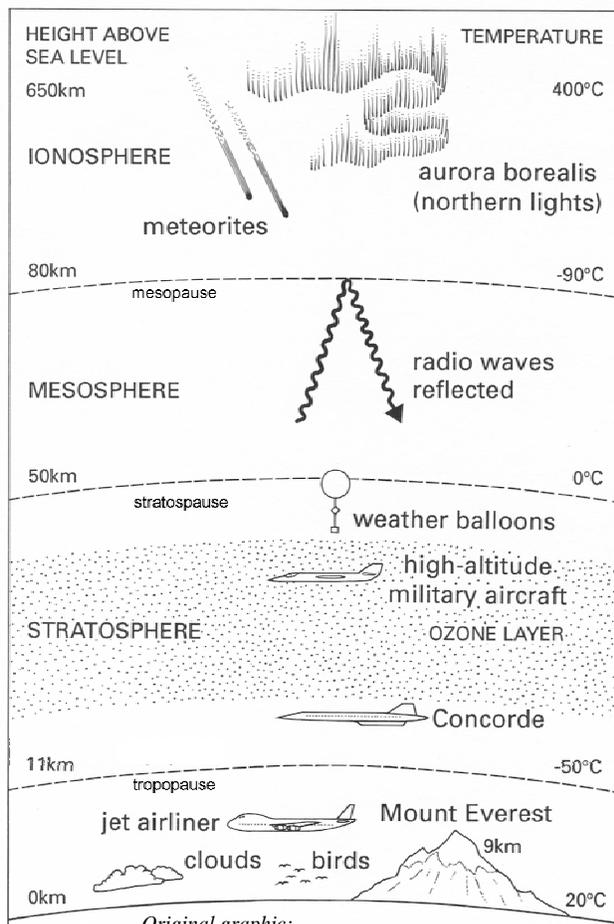
## Graphing the Atmosphere

**Purpose:** To visualize how the atmosphere can be divided into layers based on temperature changes at different heights by making a graph.

**Background Information:** The atmosphere can be divided into four layers based on temperature differences. The layer closest to the Earth is called the **troposphere**. Above this layer is the **stratosphere**, followed by the **mesosphere**, then the **thermosphere**. The upper boundaries between these layers are known as the **tropopause**, the **stratopause**, and the **menopause**, in that order. The final layer is called the **exosphere**.

Temperature differences in the four layers are caused by the way solar energy (energy from the Sun) is absorbed as it moves downward through the atmosphere. The Earth's surface absorbs most of the Sun's energy. Some of this energy is bounced back out by the Earth as heat, which warms the troposphere.

The atmosphere



*At the mesopause, the temperature begins to increase with altitude, and this trend continues in the thermosphere. Solar energy hits the Earth's atmosphere and heats it.*

*The mesosphere does not absorb solar heat, so the temperature decreases with altitude.*

*The temperature begins to increase with altitude in the stratosphere. This warming is caused by a form of oxygen called ozone (O<sub>3</sub>) absorbing ultraviolet radiation from the sun.*

*The average temperature in the troposphere rapidly decreases with altitude – it colder the higher you go.*

Original graphic:  
<http://schoolsscience.rice.edu>

Adapted from [http://www.geosociety.org/educate/LessonPlans/Layers\\_of\\_Atmosphere.pdf](http://www.geosociety.org/educate/LessonPlans/Layers_of_Atmosphere.pdf)

M. Poarch – 2006  
science-class.net

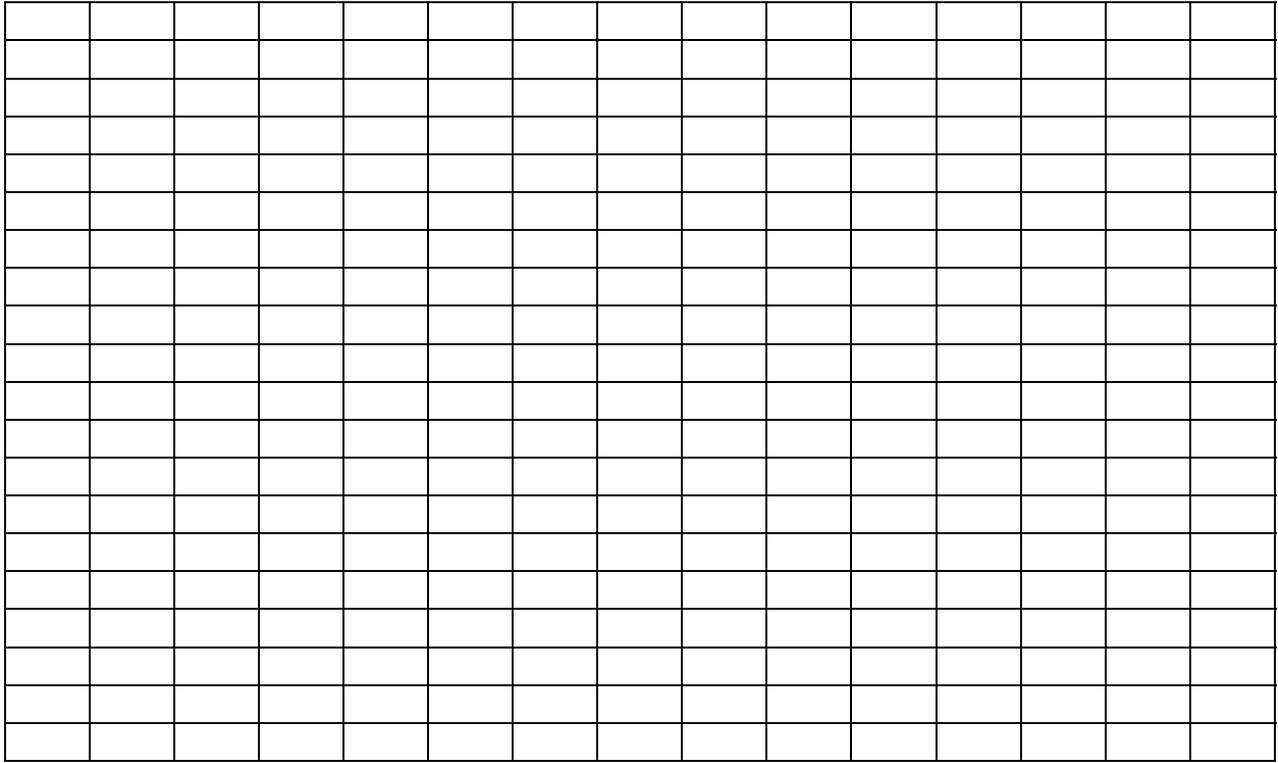
**Procedure:**

1. Given this data:

Average Temperature Readings at Various Altitudes

Altitude (km)	Temperature (C°)	Altitude (km)	Temperature (C°)
0	15	52	-2
5	-18	55	-7
10	-49	60	-17
12	-56	65	-33
20	-56	70	-54
25	-51	75	-65
30	-46	80	-79
35	-37	84	-86
40	-22	92	-86
45	-8	95	-81
48	-2	100	-72

2. Graph this data using a line graph. Why? \_\_\_\_\_  
Be careful to plot the negative temperature numbers correctly.
3. Remember **TAILS & DRY MIX**. (Check your handbook for help if you need to)
4. Label the different layers of the atmosphere and the separating boundaries between each layer. (troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause, thermosphere)
5. Label the general location of the ozone layer.



**Questions & Conclusions:**

1. What is the basis for dividing the atmosphere into four layers?

2. Does the temperature increase or decrease with altitude in the:

troposphere? \_\_\_\_\_ stratosphere? \_\_\_\_\_  
mesosphere? \_\_\_\_\_ thermosphere? \_\_\_\_\_

3. What is the approximate height and temperature of the:

tropopause: \_\_\_\_\_  
stratopause: \_\_\_\_\_  
mesopause: \_\_\_\_\_

4. What causes the temperature to increase with altitude through the stratosphere?

5. What causes the temperature to decrease with altitude through the mesosphere?

6. What causes the temperature to decrease with altitude in the troposphere?