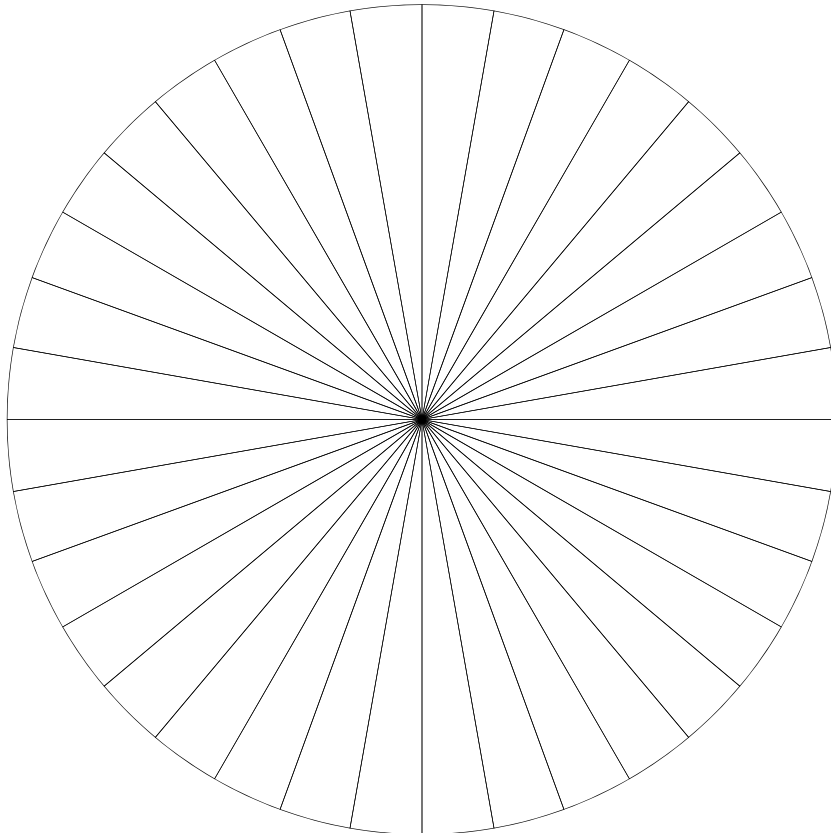


Graphing the Atmosphere

Part 1: Atmospheric Composition

The atmosphere is made up of many different gases, and the amount of each type of gas present depends on what layer of the atmosphere you're talking about. Near the Earth's surface, the atmosphere is made up of 78% nitrogen, 21% oxygen, and 1% other gases. (These other gases include mostly argon and water vapor, with some carbon dioxide, and trace amounts of others.)

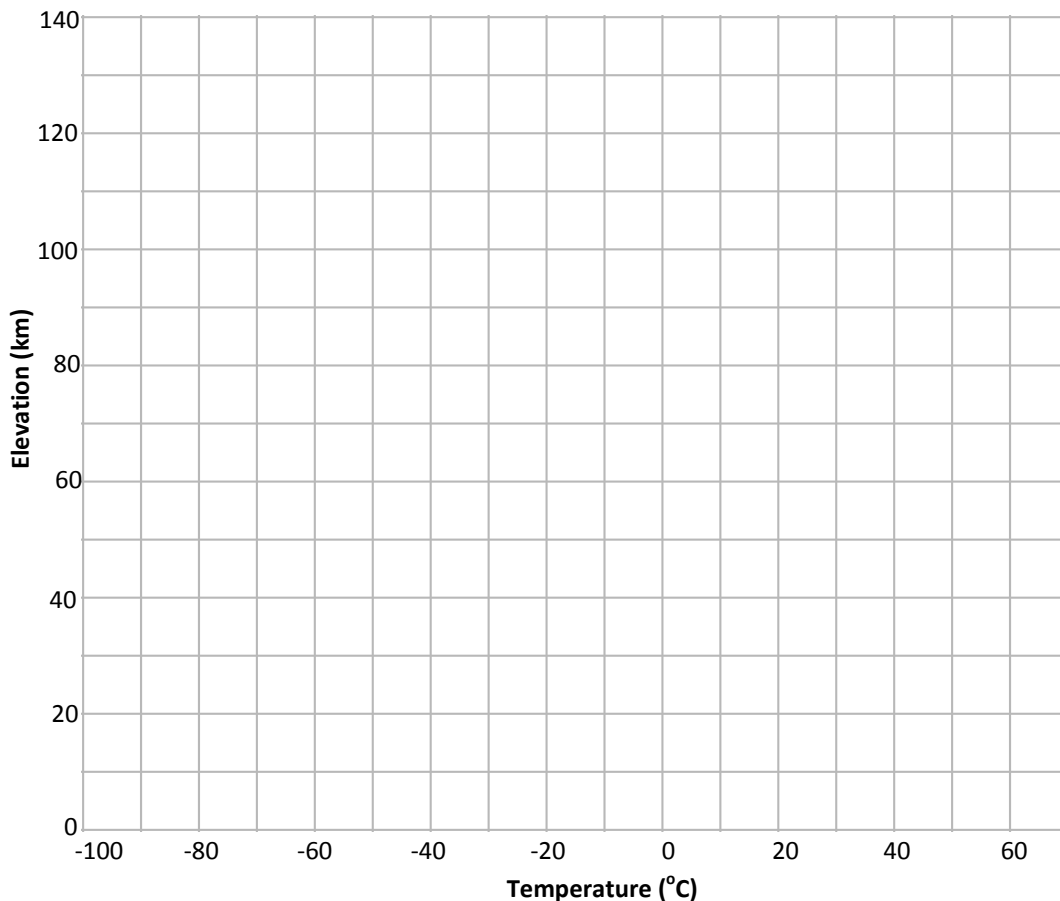
You will be using the above information to construct a pie graph below, but before you start drawing, you will need to calculate how many degrees are represented by each percentage. **Show your factor-label work for at least one of these calculations in the extra space on this page.** (For factor-label, just remember that 100 percent = 360 degrees.) Your graph should show percentage nitrogen, oxygen, and other gases. **Make sure that your graph includes a title, labels of gas name and % for each pie piece, and correctly-sized pie pieces, each colored a different color.** To help you, the template for your pie graph is given below, with 10° pieces already marked.



Part 2: Atmospheric Layers

The atmosphere can be categorized into 5 different layers, based on significant changes in temperature that occur at certain heights above the Earth's surface. If you were to move upward through the atmosphere, you would notice a certain trend in air temperature, but you would notice that this trend reverses several times as you continue upward. Each time the trend reverses, you have passed into a new layer of atmosphere. The layers of the atmosphere are, in order from lowest elevation to highest, the troposphere, stratosphere, mesosphere, thermosphere, and exosphere.

You will be using the data table below to complete the graph of elevation versus temperature. As you construct your graph, your focus is to recognize the trends in temperature that occur as elevation increases, and also to determine where each atmospheric layer is found. (The exosphere will not show up in your graph, since it is so high. Some scientists don't list the exosphere as a separate layer.) **Be sure that your graph includes a title, all data points graphed correctly, and a line connecting the points in order as they are listed.**



Temp (°C)	Elevation (km)
20	0
-45	10
-50	20
-42	30
-20	40
-15	50
-23	60
-50	70
-90	80
-85	90
-60	100
-40	110
0	120
40	130

When you have completed the graph, draw dashed lines horizontally across your graph, separating it into the different atmospheric layers. (The exact boundaries of the layers may not be easy to define, but you should be able to draw each dashed line in the correct range.) Then label each layer on the graph. Once your entire graph is finished, answer the following questions. Your answers may come in part from your graph, but you will also need

to use the information found online at <http://www.pbs.org/wgbh/nova/balloon/science/atmosphere.html>. You should read the entire webpage. (This site may also be linked to your teacher's website.)

1. According to your graph, in which layer of the atmosphere is the coldest air temperature found?
2. According to your graph, in which layer of the atmosphere is the warmest air temperature found?
3. According to your graph, the troposphere extends from Earth's surface up to what approximate elevation?
4. The layers of the atmosphere are determined based on air temperature, which has to do with the energy of the molecules in the air. Where does this energy originally come from?
5. According to your graph, what happens to temperature as elevation increases within the stratosphere?

What reason does the webpage give for this temperature trend in the stratosphere?

6. According to the webpage, what causes layers of electrically-charged atoms to build up in the thermosphere?
7. Use the webpage, your graph, and some critical-thinking to match each of the following to the one correct layer of the atmosphere. Write the letter of the atmospheric layer next to the description.

_____ Layer we live in and breathe

_____ Outermost layer

_____ Thinnest layer

_____ High concentration of UV-absorbing ozone

_____ Layer that contains the ionosphere layers

_____ Molecules here can escape into outer space

_____ Where almost all weather occurs

_____ Where magnetic storms called auroras occur

- A. Troposphere
- B. Stratosphere
- C. Mesosphere
- D. Thermosphere
- E. Exosphere