Name _____ **Date** _____

The Air We Breathe

Purpose: To construct a model and understand the composition (make-up) of Earth's atmosphere.

Materials:
- rice (nitrogen gas particles)
- black beans (oxygen gas particles)
- popcorn kernals (trace gases particles)
- small graduated cylinder

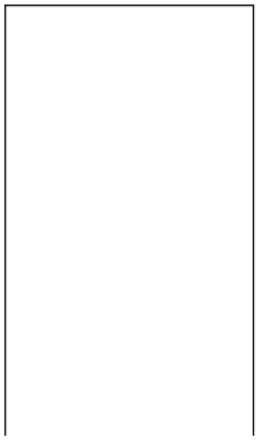
Directions: The goal of this activity is to fill your graduated cylinder with 200 air particles. The 'air' in your graduated cylinder should have the same composition as the air in our atmosphere. The air we breathe typically is 78% nitrogen, 21% oxygen, and the remaining 1% is a mixture of trace gases (a variety of gases that appear in very small amounts).

Procedure:

1. Use your math skills to calculate the number of nitrogen particles to add to the graduated cylinder. Using the chart below to help you, calculate 78% of 200.
2. From your beakers of gas particles, count out that many nitrogen particles and add them to the smallest/empty beaker.
3. Calculate 21% of 200. Enter this number into your chart.
4. Count out that many oxygen particles and add them to the smallest beaker.
5. Calculate 1% of 200. Enter this number into your chart.
6. Count out that many trace gas particles and add them to the smallest beaker.
7. Place the extra particles in your beakers and set them aside.
8. Carefully cover the smallest beaker with your hand and shake the gas particles to mix them thoroughly. Any spillage will constitute a gas leak and your group will have to be quarantined, i.e. separated!
9. Have your teacher check your model and initial _____.
10. Place the beaker on the table and observe the mixture of gas particles.
11. Answer the questions below based on your mixture.

Observations:

Draw a colored illustration of your beaker. Provide a key.



$\frac{5}{100} = .05$ $\frac{78}{100}$

Data:

Gas	Percent	Calculation (% ÷ 100) x 200 =	Particles Needed
Example: Helium	*5%*	*(5 ÷ 100) X 200 =*	*10*
Nitrogen	78%	(78÷100)x200	156
Oxygen	21%	(21÷100)x200	42
Trace Gases	1%	(1÷100)x200	2
Total	100%	xxxxxxxxxxxxxx	200

Conclusions:

1. Look at your jar. What type of gas makes up most of the air?

2. In your opinion, which gas in our atmosphere do you think is most important to sustaining life? Why?

3. If you had to fill your beaker with 500 air particles, calculate how many nitrogen particles you would need. Show your work!

4. Challenge (+2 points): When scientists study gases, they often measure concentration of particles PPM (parts per million). Calculate the number of oxygen, nitrogen, and trace gas particles in a column of air with 1,000,000 gas particles. Show your work!