Name: ____ **Date:** _______________ **Class:** _____________

Balloons Worksheet

Using your trash bag hot air balloon:

1) In the space provided below, plot five measurements of balloon mass [grams] versus the temperature [C] of the air inside the balloon. Place temperature on the x-axis and mass on the y-axis. Using a ruler, draw a line that shows the trend of your data. Note: your first point should be the empty trash bag at room temperature.

2) What happens to the total mass of the balloon as the temperature increases?

3) Estimate the point where your line would cross the x-axis. This is the temperature at which your balloon would become less dense than air.

Using your helium balloon:

1) Weigh an empty balloon. Record its mass, $M_{balloon}$, in [g]

2) Attach masses to the helium balloon until it no longer floats. What is the maximum amount of mass the balloon can lift, M_{lift}? [g]

3) Estimate the volume of your balloon, using the assumption that it is a sphere. The volume of a sphere can be calculated using the equation: $V_{balloon} = 4/3\pi\ r^3$
Record your Volume in [L] (hint: 1 [L] = 1000 [cm^3]

4) Estimate the density of helium in [g/L]. The density of air is 1 [g/L]. Use this equation:
$\rho_{helium} = (V_{balloon}\ \rho_{air} - M_{balloon} - M_{lift}) / V_{balloon}$

5) Assuming a house weighs 45,000 kg, how many balloons would it take to lift the house? (Just like in the Disney movie, <u>Up</u>!)