**Problem Statements:**

1) Cells as a System: All living things are made of cells.  As a living organism we are in fact made of cells.  As we all know our body and therefore our cells need certain vital components in order to survive.  At times however, our body and thus our cells do not get these components as quickly as necessary.  The outer membrane of a cell is semi-permeable.  Scientists know that substances can diffuse (get into) into the cell but need to determine at what rates (how quickly) substances can diffuse through this semi-permeable membrane.  They have noticed that when animals increase their body temperature the effect of the substance they ingest seems to increase at a much higher rate.  Dialysis tubing another type of semi-permeable (this is really similar to the cell) membrane has many similar characteristics and properties of the semi-permeable cell membrane.  Scientists can use this tubing to conduct research regarding temperature and diffusion across the cell membrane.

Purpose:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Independent variable\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) Energy Transfer:  All energy on planet Earth comes from the sun.  Autotrophs then convert this energy to provide oxygen and food for other organisms.  In order to take life to other planets or replenish our planet we would have to maintain plants in some form of sealed environment like a biodome.   It has been proven that plants need sunlight, carbon dioxide and water to survive.  Scientists need to determine if plants can get the nutrients they need in a sealed environment.

Purpose:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Independent variable\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Energy Transfer:  All energy on planet Earth comes from the sun.  Autotrophs (plants) then convert this energy to provide oxygen and food for other organisms. Organisms must have a balanced supply of energy.  All heterotrophs (animals) ingest carbohydrates, lipids, and proteins to maintain this balance.  Scientist need to know which of these components (carbohydrates, lipids or proteins) is the most important in energy supply for heterotrophs.

Purpose:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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