White blood cells called B cells produce proteins that can be used for the treatment of certain illnesses. However, these B cells do not live for very long on their own. To keep the B cells growing for a long time in laboratories, scientists fuse the B cells with cancer cells (fused B-cancer cells) that do grow for a very long time. The particular cancer cells used for the fusion are treated with chemicals that make them unable to produce the nitrogenous bases adenine and guanine, but the B cells with which they are fused do produce these nitrogenous bases. The scientists grow the large fused B-cancer cells in a growth medium that contains necessary nutrients for the cells and includes a source of carbon.

Organic Molecules Practice Free Response Question Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(a)  **Describe** the role of carbon in biological systems.

**Hydrocarbon chains form the backbone of the organic molecules needed for life. – Carbohydrates- provide quick energy and structural support in plants**

**Lipids- provide long term energy storage and steroids such as sex hormones needed for chemical messages**

**Proteins- form structural support, hormones, chemical messengers, cell receptors in the cell membrane for communication between cells, etc etc**

**2) Carbon cycles from the atmosphere, water and earth to sustain life. Climate change is linked to a disruption of the carbon cycle. For example build up of Co2 precipitates into the ocean leading to ocean acidification and loss of coral reef habitats so ecosystems are negatively impacted**

(b) The membranes of both B cells and the cancer cells are largely composed of phospholipids.  **Explain** how, when the membranes are fused, the polar parts of the phospholipids from one cell will interact with the phospholipids from the other cell and how the nonpolar parts of the phospholipids from one cell will interact with the phospholipids from the other cell.

**Polar parts- hydrophilic will want to be on outside of membrane**

**Nonpolar- will want to hide away from the fluid inside or outside of the cell**

**As a result the two cell membranes may fuse?**

(c)  **Make a claim** about the most immediate effect on the fused B-cancer cells if the fused cells are transferred to a growth medium that lacks a source of nitrogen.

**Without nitrogen cannot make proteins!**

(d)  **Provide reasoning** with evidence based on the composition of biological macromolecules **to support your claim.**

**Amino acids are the building blocks of life and without Nitrogen (amino acids have an amine group- NH2, an carboxyl group and a side chain attached to the hydrocarbon backbone) the building blocks of proteins will be missing without Nitrogen (no amine group).**