Name: _____ Date: _____ Group: _____

Structure, Function, and Information Processing

STEMLabs is a biotechnology company doing research on the mechanisms that help living things survive. You are a new employee of STEMLabs and, as part of your training, must demonstrate your knowledge. Your first task is to (through scientific investigation) provide evidence that living things are made up of cells, either one cell or many different numbers and types of cells.

Part I: Conduct an Investigation and Evaluate Its Effectiveness
Conduct the investigation (see Student Reference Sheet) and evaluate its effectiveness in achieving the purpose described above.

After conducting the investigation, answer the following questions:

1. What types of data are collected in this investigation?

2. What tools and methods were necessary for this investigation? Why were they necessary?

3. What evidence supports that all living things are made up of cells?

4. What evidence can be used to distinguish living things from nonliving things?

5. What evidence can be used to distinguish single-celled organisms from multicellular organisms?

Provide an evaluation for whether or not the evidence collected will meet the goals of the investigation. Your evaluation should include references to cellular composition as a distinguishing feature of living things.

Part II: Develop a Model
Your next task is to develop a model to describe the function of an individual cell as a whole and the ways that the smaller parts of the cell contribute to the function.

In the model, be sure to:

- Identify the relevant parts of the cells from the human skin and the onion skin, including nucleus, chloroplasts, mitochondria, cell membrane, and cell wall
- Describe the structure of the cell membrane or cell wall as it relates to the function of the organelles and the whole cell
- Explain how cell structures (separately or together) contribute to
  - Maintaining a cell's internal processes, for which it needs energy
  - Maintaining the structure of the cell and controlling what enters and leaves the cell
  - Functioning together as parts of a system that determines cellular function
- Compare the structure of plant cells and animal cells based on structure and function

In your new job at STEMLabs, you will be researching slime molds. These are single-celled organisms most of the time, but sometimes they get together in a group and act like a multicellular organism. The organism that they form together is a simple example of a system made up of interacting subsystems. The individual cells have functions of their own, and the groups of cells have a combined function.

Your supervisor wants you to explain your understanding of how systems can be made up of interacting parts through an argument about the human body. How is the human body also a system of interacting subsystems composed of groups of cells?

Part III: Support an Argument
Develop an argument, supported by evidence, for how the human body is a system of interacting subsystems composed of groups of cells. Use information from any of the modules and/or the model you developed in Part II to support the following claim.

Claim:
The body is a system of interacting subsystems composed of groups of cells.

Evidence:

Reasoning:

One of the characteristics of all living things is the ability to respond to the environment. As a researcher at STEMLabs, you will be studying the response of slime molds to various environmental stimuli. In order to learn more about stimulus and response, you decide to do a review of sensory receptors in the human body.

Part IV: Gather and Synthesize Information

Review the information provided on the Student Reference Sheet, and then prepare a brief summary of how sensory receptors respond to stimuli. Make sure to address the following points:

- The causal relationships between information received by sensory receptors and behavior
- Provide evidence to illustrate that some sensory information will cause an immediate behavior and some will be stored as a memory.