**Questions to prepare for the exhibition**

**Organ system model**

Discuss your organ system

What organ system are you modelling?

Digestive System

What are the functions of your organ system?

The digestive system breaks down simple foods to provide nutrients for the body to reabsorb. This process also removes waste and allows the cells to gain nutrients.

Discuss your model

What function(s) does your model demonstrate? How does it demonstrate each function?

Our model demonstrates the mouth with a blender and water. The stomach is shown through hydrochloric acid and mixing to show the chemical and mechanical digestion. Then we used baking soda for sodium bicarbonate to neutralize the stomach acid. The enzymes demonstrate the breakdown of specific types of nutrients before we used dialysis tubing to show the reabsorption that occurs in the small and large intestine.

What functions of your organ system are not demonstrated by your model? If you had unlimited time and resources, how would you demonstrate these functions?

Our model did not show how the cells directly absorbed the nutrients from the small intestine and the numerous layers of capillaries and cells the food needs to pass through. We also did not show the waste being removed from the body or the pulvoic pump of the esophagus that brings food down to the stomach.

What scientific principles did you need to understand in order to build your model?

We needed to understand diffusion in order to get the dialysis tubing to function properly. This process is when particles move across a semipermeable membrane from high concentration to low concentration. Another principle that we needed to understand was how chemicals can be used to break down substances and then how other chemicals can neutralize the solution. This was used in the demonstration of the stomach when we tested the pH levels.

Show your model in action

Yes. It worked.

Discuss the design process

How did you come up with ideas?

At the beginning of the project, we had an entire class period to brainstorm ideas. At first, we listed all the major functions and purposes of the digestive system then wrote down every idea that we could possibly use to show each part.

How did your group decide on the ideas/plan that resulted in your model?

We discussed the items we could bring in from our own house and which materials would be the easiest to work with. If we did not have materials, then we changed our model to use a different object. We also spent time testing ways to neutralize acid so it would be safe in our model.

What ideas were considered and then dismissed? Why were they dismissed?

We thought about using a french press to model the stomach and show the muscle contractions, but then reconsidered because we were worried the hydrochloric acid might destroy the container and it would not be safe to drink from the coffee machine. We also debated how to show diffusion and went back and forth between using just iodine and an actual food product.

What problems did you face in the design process and how did you solve them?

We had trouble finding a way to show that our experiment actually worked. It was challenging to find exact results that are measurable and visible. Another issue we had with our project was being able to set up the entire model within a short amount of time because it required many different exact measurements and set up for four different substances.

How many times did you have to redesign/test/improve?

We generally had our final plan right from the start, deciding to mimic the digestive system. We did numerous tests on food to decide how to present our model in a more clear way. We also found through practicing our presentation that it was longer and a little more awkward than we wanted. So we improved our model by not showing the digestion process and pouring in the enzymes and acid. Instead we showed more of a before and after to make the process of digestion quicker.

Discuss collaboration

Who did what in your group?

We mostly collaborated together. We decided on what we needed to work on and took small parts of it together. For example we would want to test a food with enzymes and acid so someone would prepare the food, someone would get the solutions ready, etc. We did plan on having a structure to our model and we planned on having Matt create that while we worked on the rest of our model.

How did each member of the group contribute? How did you decide who would do what?

We never really decided who would do what, most of the time our group just collaborated together on each portion of the model and developed it together. There were some parts where we split up but we decided that based on efficiency, especially for building the actual stages we used to present the model

Did you leverage strengths and talents of people in your group or was it random or volunteer basis?

We generally didn’t plan our tasks based on this, instead we decided on what we needed done and someone would go and do it. So, I suppose it was mainly volunteer or random. The exception to this is that Matt enjoys building and engineering, so we had him build the base for our model.

Discuss Process Management

How was the work managed in your group? Was there a leader? Did you choose a leader? How?

We didn’t generally split up the work, but if the need arose, we decided to split based on efficiency. There was no specific designation for each task, just a large collaboration to finish the project quickly.

How did you communicate with each other about ideas and logistics of building the model?

The group basically spat out ideas as we went and built upon and improved those ideas throughout the design and construction processes. If we ever ran into problems while building, the group would just share any random ideas to solve the problem which worked pretty effectively.

How did you resolve disagreements?

Most of our disagreements came when we were brainstorming for our model. There were usually disagreements about the plausibility of an idea. Generally the idea that caused controversy about doing it wasn’t a great plan for our model. So arguments resolved when an idea was proven to not be good for our final plan.

Relate to the real world

How could what you learned during this project, your model, the concepts used in your model or the design and building process relate to/contribute to/help a real life situation?

These things can contribute and relate to a real life situation by showing people how to model in a lab situation with enzymes and acids the breakdown of different nutrients.