



Science Unit: *Human Anatomy – How Do We Move?*

Lesson 5: *The Digestive System*

School year: 2007/2008

Developed for: Henderson Annex Elementary School, Vancouver School District

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Grade level: Presented to grades 3-5; suitable for 3-7 with age-appropriate modifications but optimally matches Grade 5 curriculum.

Duration of lesson: 1 hour and 15 minutes

Objectives

1. Learn about the digestive system.
2. Create a model of the digestive system.

Background Information

This is the fifth in a six-part series of “Human Anatomy” activities that all focus around the question: “How Do We Move?” The first session focused on the skeletal system, the second session focused on the muscular system, the third session focused on the respiratory system (providing oxygen needed for, and getting rid of carbon dioxide created by, physical activity). The last session will focus on the nervous system (the system that coordinates the activity).

Vocabulary

Word:

digestion	process by which our body breaks down food to get the nutrients we need
digestive tract	all the organs that make up the digestive system; also known as the “gastrointestinal system” or “gastrointestinal tract”)
saliva	liquid secreted in the mouth that helps us to digest
stomach	muscular organ that mashes up our food and helps to digest it
gastric juice	fluids that are released into the stomach to help digestion
small intestine	long, tube-like organ where digestion of food, and absorption of nutrients from our food into our blood, takes place
large intestine	long, tube-like organ that takes food that was not digested from our small intestine out to the rectum
rectum	the end of the large intestine; connects the large intestine to the anus
anus	opening at the end of the digestive tract through which feces leaves the body



Materials

- garbage bags
- bananas
- pantyhose stockings (cut the legs off and cut the feet off of each leg)
- water
- masking tape
- graham crackers
- scissors
- poster of the digestive tract
- Dixie cups with a whole cut out of the bottom
- plastic baggies

In the Classroom

Introductory Discussion

1. Ask the students what they already know about the digestive system.
2. Short description of other items to discuss or review.
 - Our muscles need energy in order to work. We get our “fuel” or “energy” (as well as nutrients like protein, fat, carbohydrates, vitamins and minerals) from the food we eat. In order for that fuel to get to our muscles we need to break down (or “digest”) our food and then we need to get the fuel and nutrients into our bloodstream. It is transported around the body through the bloodstream the same way that oxygen and carbon dioxide are (as we discussed in the previous lessons).
 - The digestive system is made up of a number of organs, each of which has a special role in digesting food:
 - mouth: used to chew up the food, which is an important first step in digestion. Also, the saliva in your mouth mixes with the food (a) to soften the food, and (b) saliva contains a special protein (called an enzyme) that breaks down carbohydrates in your food
 - esophagus: a tube through which the chewed up food passes on the way from the mouth to the stomach
 - stomach: a muscular organ that mashes up our food and helps to digest it. When food enters the stomach, special muscles at the top and bottom tighten up to seal your stomach like a Ziploc baggie and then the muscular stomach squishes up the food. If the muscle at the top does not seal up, food would come back up (this is what happens when you “throw up” or “vomit”). The stomach also releases a special fluid called “gastric juice” that helps to digest the food.
 - small intestine: after the food is squished up in the stomach, the muscle that was preventing food from passing through to the small intestine loosens up, along the food to pass along into the small intestine. The small intestine is a long, tube-like organ. More enzymes are released here and they help to continue to break down food so that the energy and nutrients can be absorbed into our blood (energy/nutrients pass through the wall of the small intestine and enter the bloodstream).
 - large intestine: long, tube-like organ that takes food that was not digested from our small intestine out to the rectum; a few nutrients are absorbed in large intestine instead of the small intestine
 - rectum: the end of the large intestine, the rectum connects the large intestine to the anus



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- anus: the opening at the end of the digestive tract through which feces (or “poo”), which is any part of the food that was not absorbed throughout the digestive tract, leaves the body
3. Briefly describe science activity.
 - In today’s experiment, students will make a model of the digestive system to examine the features of the digestive system..
 4. Briefly describe the processes of science that the students will focus on (prediction/hypothesis, observations, recording results, conclusions.)
 - Students will be making a model to examine the features of the digestive system.
 - Students will be recording their observations
 5. This activity is very messy!
 - It is best to make sure that the teachers are prepared for the messiness and, if possible, to do this activity outside.
 - Show the students step-by-step how the activity works before you start. Then, take them through the activity themselves, again one step at a time. This helps to ensure that the students don’t get too overexcited and helps keep them on track.
 - Remind the students that even though you are saying that the food by the end of the activity is like “poo,” it isn’t really “poo” (as some students get grossed out when they start to think of it this way). As the activity is messy, remind them it is OK if they get the mixture on their hands (it’s really just the same as if you were baking banana bread!). That being said, remind the students not to eat the mixture, as it is good scientific practice to never eat your experiments!

Science Activity

Activity Title: Building A Model of the Digestive System!

Purpose of Activity: To a model to examine features of the digestive system.

Methods and Instructions:

Set-up prior to experiment:

1. Tape garbage bags to the floor using masking tape to provide an area for the students to work on (alternatively, conduct this activity outside).
2. Divide the class into groups of 3-4 students.

Activity:

3. Each group is given a few graham crackers and a half a banana. Have the students squish these up in their hands (this represents “chewing” in the mouth). Add a little water to help them (the water represents “saliva”)
4. Place the squished up food into the baggie. Add a bit more water (to represent enzymes, a.k.a. “gastric juice”) and seal the baggie. Using their hands, students squish up the food until it is mixed up really well. This represents the churning action that happens in the stomach. Note that students should try not to have very much air in the baggie. Ask the students what would happen if there was too much air in the baggie (i.e., this would be what happens when you belch).



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5. Have them cut a hole in the bottom of the bag (this represents the “pyloric sphincter,” the muscular opening at the point where the stomach meets the small intestine).
6. Have one student hold open the top of the pantyhose stocking leg and the other student pour the mixture from the baggie (stomach) into the stocking leg (small intestine). Have the student holding the stocking leg use open hand to open the stocking and the other hand to hold the rest of the stocking closed (so that the mixture only fills up the top ~1/3 of the stocking).
7. Hold the bottom end of the stocking leg into a Dixie cup (which represents the large intestine).
8. Have them squeeze the mixture through the stocking leg into the Dixie cup. And of the water & mixture that comes out through the stocking represents the nutrients and energy that are being absorbed through the wall of the small intestine and going into the bloodstream, where it can be carried off to the places in the body that need nutrients and energy. Any of the mixture that ends up in the Dixie cup represents the part of our food that is not absorbed.
9. The cup represents the large intestine & rectum. You can talk about how water is actually absorbed at this point in the digestive tract. The hole in the cut represents the anus. Have the student squeeze the remaining mixture through the hole in the bottom of the cup, which represents “feces” being excreted through the anus.
10. Clean up!

Closure Discussion

1. Why did we use a plastic baggie to represent the stomach? (It seals up, just like our stomach does when it mixes up our food)
2. Why did we use the leg of pantyhose stocking to represent the small intestine (Because it is shaped like a tube, just like our small intestine, and because it has holes in it for some of the water & food to seep out, which represents the absorption of nutrients from the food, through the wall of the small intestine and into our bloodstream)
3. How does the digestive system help us to move? (It provides the energy our muscles need to be able to move)

References

Digestive System Activity <http://www.mun.ca/LTS/files/Digestive_system_alternate_activity.doc>
Memorial University Let's Talk Science Partnership Program. Accessed 4 March 2008.

Image Credits

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http://en.wikipedia.org/wiki/Image:Digestive_system_diagram_en.svg

The Digestive System

