

The Digestive System

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About the Digestive System

The digestive system is responsible for the processing and uptake of nutrition. Every cell in an organism needs energy and an array of nutrients to remain alive. Humans ingest a variety of foods; these can be classified by their nutrition content as carbohydrates (sugars), lipids (fats), and proteins.

Digestion begins in the **mouth** with the help of the teeth, tongue and salivary glands. As we chew our food, it is broken down into smaller pieces using our teeth. The salivary glands release saliva, and with the help of the tongue the saliva is mixed in with the chewed food. Saliva helps move the food to the back of the mouth and it also contains chemicals to break down some sugars. Once the food is swallowed, it moves down the esophagus.

The **esophagus** is the tube in the throat that brings food from the mouth to the stomach. It is about 10 inches long and is muscular. These muscles help transport food to the stomach.

The **stomach** is a pear-shaped sack that produces and stores hydrochloric acid. This acid can break down large molecules of food into smaller molecules. It has strong muscles at both ends to keep the acid in the stomach. When the food is broken down into smaller molecules, it moves into the small intestine.

The **small intestine** is a coiled tube-like organ measuring 7 meters (22 feet) long. The main job of the small intestine is to absorb nutrients from the food and bring the nutrients to the blood where they can be circulated throughout the body. The wastes that are left then pass to the large intestine.

The **large intestine**, or **colon**, holds waste products until elimination can occur. Its main function is to absorb

water from the indigestible parts of food so the body can use the water. After all of the water has been removed from the waste, it is stored in the **rectum** until it can be eliminated from the body. When waste is eliminated from the body it passes through the **anus**, which is the opening to the external environment and the end of the digestive system.

The time it takes to digest food depends on its composition- a fatty meal takes longer to digest than one rich in sugars or proteins. On average, digestion takes about 55 hours in men and 72 hours in women. Food spends around 2-3 hours in the stomach, six hours in the small intestine, and 50-60 hours in the large intestine.

There are a few other organs that help with digestion including the liver, the gallbladder, and the pancreas. The **liver** does many things for the body but its main function in digestion is to produce **bile**.

Once it is produced, it is sent to the **gallbladder**, a balloon like structure that stores the bile until the body needs it. The bile's purpose is to help the small intestine break down fats.

Another organ that produces digestive juices is the pancreas. The **pancreas** is a lumpy white organ that produces pancreatic juices, which help break down carbohydrates, proteins, and fats in the small intestine.

One additional structure that is associated with the digestive system is the appendix, although it does not aid in the digestive process. The **appendix** is a pouch located where the small and large intestines meet, on the right side of the body. Occasionally it can become inflamed and it is necessary for it to be removed, a condition called **appendicitis**.

MOST*

VOCABULARY

Anus
Appendix
Appendicitis
Bile
Colon
Esophagus
Gallbladder
Large intestine
Liver
Mouth
Pancreas
Rectum
Stomach
Small intestine

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Activity: Mapping the Digestive System

MATERIALS NEEDED

12" x 24" piece of cardstock
Glue
Tape
Pen or Pencil
3 small cotton balls
1 small green balloon
1 brown coffee filter,
cone-shaped, #4
1 plastic bag, non-Ziploc
1 C-shaped piece of pink paper
1 piece of pink yarn—6"
1 piece of brown yarn—96"
1 piece of green yarn—26"

Students should be able to:

Identify 10 of the parts of the digestive system

Explain the function of each of the parts of the digestive system

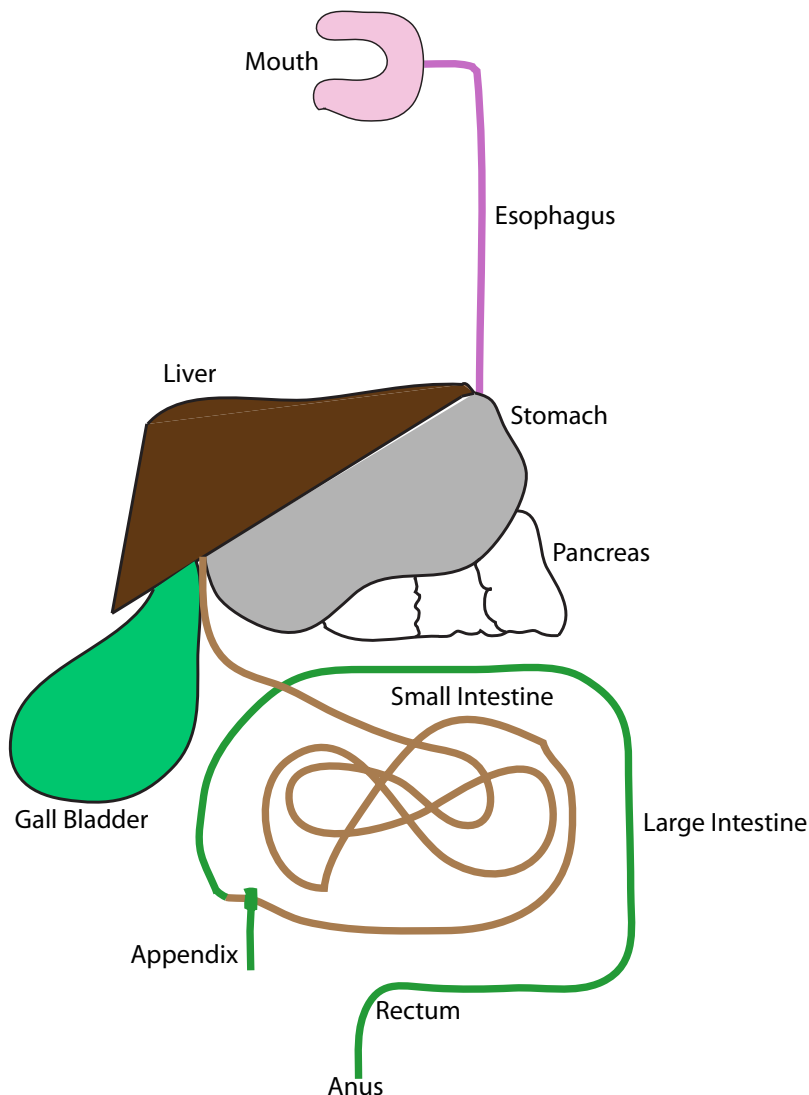
What to do:

1. The "C" represents the mouth. Place the "C" on the top of the board with the opening facing the left side.
2. The pink piece of yarn represents the esophagus. Place the yarn in the middle of the closed part of the "C" and have it head back towards the right side of the board then bend the yarn so it runs down towards the bottom of the board.
3. The plastic sandwich bag represents the stomach. Fold the plastic bag so it is a rounded sack that is approximately 6" long and 2 1/2" wide. Place the stomach on the board at an angle with the narrow ends of the bag pointing towards the top right side and the bottom left side of the board. Tuck the end of the pink yarn under the top right side of the stomach.
4. The cotton balls represent the pancreas. Take the cotton balls and stretch them out so they look a little elongated and lumpy. Lay the cotton balls end to end (they should be approximately 5 1/2" long by 1 1/2" wide) just below the stomach. Lift up the stomach slightly and tuck the edge of the pancreas under the stomach.
5. The coffee filter represents the liver and the green balloon represents the gallbladder. Take the coffee filter and cut the curved edge off so it is 3 inches at the widest spot. Hold it so the narrow, sealed end of the filter is towards the top of the board and the wide, opened part of the filter is towards the bottom of the board. Take the open end of the green balloon and tape it to the back of the coffee filter on the lower left side. The other end of the balloon should be pointing towards the lower left side of the board. Place the coffee filter and balloon on the board just above the plastic bag and to the left of the pink yarn. Have the edge of the coffee filter rest on top of the bag.
6. The brown yarn represents the small intestine and the green yarn represents the large intestine. Tie one end of the brown yarn to one end of the green yarn by making a small knot, making sure to leave a 2" tail of green yarn when you make the knot. This 2" piece of green yarn represents the appendix. If there is a tail of brown yard, trim that off at the knot.
7. Take the free end of the brown yarn and place it under the lower left end of the plastic bag. Lay the brown yarn down in a straight line that is 4" long from the edge of the bag towards the bottom of the board. Coil the rest of the brown yarn in an area about 6" wide and 4" high making sure the knot ends up on the lower left side of this area.

Activity: Mapping the Digestive System

What to do (cont.):

- With the knot in the lower left corner, make a border around the brown yarn by laying the green yarn up towards the balloon, then turn right and have it go towards the right edge of the board. When you reach the edge of the brown yarn, turn the green yarn and have it go down towards the bottom of the board, turning left when you reach the edge of the brown yarn. Finally, when you are below the brown yarn and in the center of the board have the green yarn turn and head towards the bottom of the board. The straight portion of the brown yarn represents the rectum and the very end of the green yarn represents the anus.
- Go back to the knot in the green and brown yarn and pull the tail of green yarn down and have it lay towards the bottom of the board. This represents the appendix.
- Have your teacher check to make sure everything is in the correct place. Then carefully glue each part of the digestive system down on the board. Once the glue has dried label the following parts:



Activity: Mapping the Digestive System

Name: _____

Date: _____

Digestive System Questions:

1. Digestion of food begins in which part of the body? _____

2. Which parts of the body produce juices that help digest food?

- a) stomach
- b) salivary glands
- c) pancreas
- d) liver
- e) all of these

3. Another name for the large intestine is: _____.

4. The main job of the small intestine is to: _____
_____.

5. A meal made up of mostly _____ takes the longest to digest.

- a) sugar
- b) protein
- c) fat
- d) vegetables

6) What else did you learn from this activity?

REVIEW:

Trace a piece of food through the digestive system sharing what function each organ plays in the digestive system.

MATERIALS NEEDED

- Chart of Digestive System
- Chunks of potatoes
- Grated potato
- 2 jars with lids
- Water

Students should be able to:

- Explain how teeth assist in digestion
- Explain the role of the stomach in digestion

The Power of Teeth

The teeth begin the digestion process by breaking down pieces of food into smaller parts. Next time you are eating notice the cutting, tearing, and grinding of food that occurs. The food travels from the mouth down the esophagus to the stomach. About ten seconds after you swallow your food, it reaches your stomach.

Your food reaches your stomach through a tube called your esophagus. Little glands in your stomach make special juices that are waiting for your food. Once your food enters your stomach, your muscles move the walls of your stomach. Your stomach mashes your food the way a baker kneads dough for bread! Your food gets mashed and stirred with the special juices. The juices and the mashing help to break your food into smaller pieces. This process is called digestion.

Your stomach has a door that closes to keep food inside. It keeps food inside to work on for a few hours. Your stomach can stretch out to hold almost two quarts of food! When it has digested your food as much as it can, the door opens and your food travels into your small intestine. When your stomach is empty, it shrinks like a balloon without air. Your stomach is a stretchy storage tank!

What to do:

1. You and your partner will receive two jars.
2. Put some potato chunks in one jar. Put some grated potato in the other jar. Add water to each jar. Fasten each lid.
3. Take turns shaking both jars for 10 minutes.
4. Look at the mixture. Discuss what happened to the potato in each container.

Questions:

Where does the body begin to break down food?

Why is chewing important?

What does your stomach do in digestion?

Teacher Notes for Mapping the Digestive System Activity:

This activity takes approximately 45 minutes to complete.

Teacher Notes for Chew It! Activity:

The Chew It! Activity is modeled after the Digestive System Internet Workshop . Melissa McMullan, a New Literacies Research Team member, created this Internet Workshop. It is designed to introduce you to the issue of food safety as you study the digestive system. They invite you to share your discoveries in class as well as on their discussion board: http://www.henry.k12.ga.us/cur/mybody/digest_lessons.htm

New York State Standards

Middle School

Living Environment Standard 1: Key Idea 3

Standard 4: Key Idea 1: 1.2a, 1.2b, 1.2c, 1.2e