The Digestive System

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What are the parts of the digestive system?
- How does each part of the digestive system work?

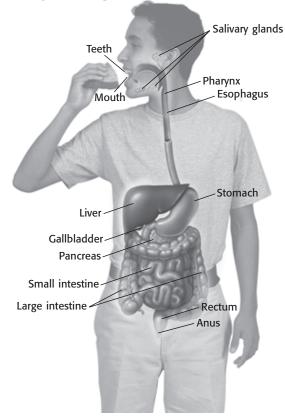
National Science Education Standards LS 1a, 1d, 1e, 1f, 3b

What Are the Parts of the Digestive System?

The **digestive system** is a group of organs that break down, or digest, food so your body can get nutrients. The main organs of the digestive system make one long tube through the body. This tube is called the *digestive tract*. The digestive tract includes the mouth, pharynx, esophagus, stomach, small intestine, and large intestine.

The digestive system has several organs that are not part of the digestive tract. The liver, gallbladder, pancreas, and salivary glands add materials to the digestive tract to help break down food. However, food does not go into these organs.

The Digestive System





Organize As you read, make combination notes about each digestive organ. Write the function of the organ in the left column of the notes. Draw or describe the structure in the right column.



1. Identify What is the name of the tube that food passes through?

TAKE A LOOK

2. Color Use a colored pencil to shade all of the digestive organs that food passes through.

Name	Class	Date

SECTION 1 The Digestive System continued

STANDARDS CHECK

LS 1e The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, and protection from disease. These systems interact with one another.

circulatory system work with the digestive system?	
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Critical	Thinking
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4. Infer Why do you think you should chew your food well before you swallow it?

Math Focus

5. Compute Ratios Young children get a first set of 20 teeth called baby teeth. These teeth usually fall out and are replaced by 32 permanent teeth. What is the ratio of baby teeth to permanent teeth?

 the esoph

How Is Food Broken Down?

The sandwich you eat for lunch has to be broken into tiny pieces to be absorbed into your blood. First, food is crushed and mashed into smaller pieces. This is called mechanical digestion. However, the food is still too large to enter your blood. Next, the small pieces of food are broken into their chemical parts, or molecules. This is called *chemical digestion*. The molecules can now be taken in and used by the body's cells.

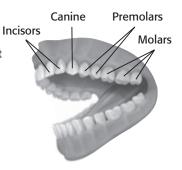
Most food is made up of three types of nutrients: carbohydrates, proteins, and fats. The digestive system uses proteins called *enzymes* to break your food into molecules. Enzymes act as chemical scissors to cut food into smaller particles that the body can use.

What Happens to Food in the Mouth and Stomach?

MOUTH

Digestion begins in the mouth where food is chewed. You use your teeth to mash and grind food. Chewing creates small, slippery pieces of food that are easy to swallow. As you chew, the food mixes with a liquid called saliva. Saliva is made in salivary glands in the mouth. Saliva has enzymes that start breaking down starches into simple sugars.

Most adults have 32 permanent teeth. Each type of permanent tooth has a different role in breaking up food.



ESOPHAGUS

Once the food has been chewed to a soft mush, it can be swallowed. The tongue pushes the food into the *pharynx*. The *pharynx* is the part of the throat that makes food go to the esophagus and air go to the lungs. The **esophagus** is a long, straight tube that leads from the pharynx to the stomach. Muscle contractions, called *peristalsis*, squeeze food in hagus down to the stomach.

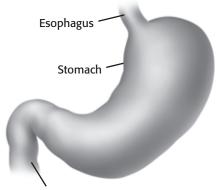
STOMACH

The stomach is a muscular, saclike organ. The stomach uses its muscles to continue mechanical digestion. It squeezes and mashes food into smaller and smaller pieces.

The stomach also has glands that make enzymes and acid. These chemicals help break down food into nutrients. Stomach acid also kills most bacteria in the food. After a few hours of chemical and mechanical digestion, the food is a soupy mixture called *chyme*. \square

The stomach squeezes and mixes food for hours before it releases the mixture into the small intestine.





Part of small intestine

What Happens to Food in the Small and **Large Intestines?**

Most chemical digestion takes place after food leaves the stomach. Chyme slowly leaves the stomach and enters the small intestine. The pancreas, liver, and gallbladder add enzymes and other fluids to the small intestine to help finish digestion. The large intestine absorbs water and gets rid of waste.

PANCREAS

The **pancreas** is an organ located between the stomach and small intestine. Food does not enter the pancreas. Instead, the pancreas makes a fluid that flows into the small intestine. The chart below shows the chemicals that make up this pancreatic fluid, and the function of each.

Chemical in pancreatic fluid	Function
sodium bicarbonate	to protect the small intestine from acid in the chyme
enzymes	to chemically digest chyme
hormones	to control blood sugar levels

READING CHECK
KLADING CHECK

6. Identify What kinds of digestion occur in the stomach?

TAKE A LOOK

7. Identify What is the role of
enzymes in pancreatic fluid?

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LIVER

The **liver** is a large, reddish brown organ found on the right side of the body under the ribs. The liver helps with digestion in the following ways.

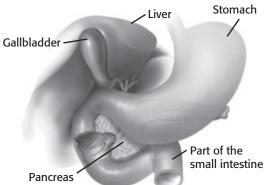
- It makes bile.
- It stores extra nutrients.
- It breaks down toxins, such as alcohol.

GALLBLADDER

Bile is made in the liver, and stored in a small, saclike organ called the **gallbladder**. The gallbladder squeezes bile into the small intestine when there is food to digest. Bile breaks fat into very small droplets so that enzymes can digest it.

The liver, gall bladder, and pancreas are linked to the small intestine. However, food does not pass through these organs.





TAKE A LOOK

9. Identify Which organs in this diagram does food pass through?

READING CHECK 8. Identify What is the

function of bile?

SMALL INTESTINE

The **small intestine** is a long, thin, muscular tube where nutrients are absorbed. If you stretched out your small intestine, it would be much longer than you are tall—about 6 m! If you flattened out the surfaces of the small intestine, it would be larger than a tennis court.

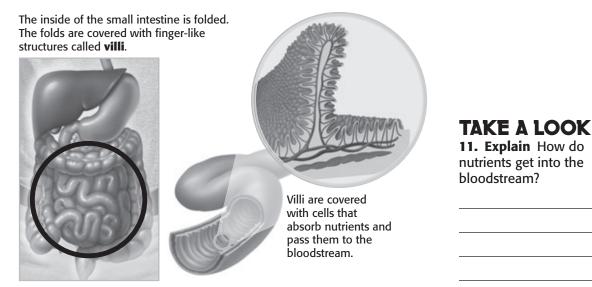
The inside wall of the small intestine is covered with many small folds. The folds are covered with cells called villi. Villi absorb nutrients. The large number of folds and villi increase the surface area of the small intestine. A large surface area helps the body get as many nutrients from food as possible. \square



10. Explain Why is a large surface area in the small intestine important?



SECTION 1 The Digestive System continued



Most nutrient molecules are taken into the blood from the small intestine. However, the body can't use everything you eat. The soupy mixture of water and food that cannot be absorbed moves into the large intestine.

LARGE INTESTINE

The **large intestine** is the last part of the digestive tract. It stores, compacts, and rids the body of waste. The large intestine is wider than the small intestine, but shorter. It takes most of the water out of the mixture from the small intestine. By removing water, the large intestine changes the liquid into mostly solid waste called feces, or stool.

The *rectum* is the last part of the large intestine. The rectum stores feces until your body can get rid of them. Feces leave the body through an opening called the *anus*. It takes about 24 hours for food to make the trip from your mouth to the end of the large intestine.

You can help keep your digestive system healthy by eating whole grains, fruits, and vegetables. These foods contain a carbohydrate called *cellulose*, or *fiber*. Humans cannot digest fiber. However, fiber keeps the stool soft and keeps materials moving well through the large intestine.

€Say It

Name With a partner, name as many foods as you can that are sources of fiber.

Name _____ Date ____

Section 1 Review

NSES LS 1a, 1d, 1e, 1f, 3b

SECTION VOCABULARY

digestive system the organs that break down food so that it can be used by the body

esophagus a long, straight tube that connects the pharynx to the stomach

gallbladder a sac-shaped organ that stores bile produced by the liver

large intestine the wider and shorter portion of the intestine that removes water from mostly digested food and that turns the waste into semisolid feces, or stool

liver the largest organ in the body; it makes bile, stores and filters blood, and stores excess sugars as glycogen **pancreas** the organ that lies behind the stomach and that makes digestive enzymes and hormones that regulate sugar levels

small intestine the organ between the stomach and the large intestine where most of the breakdown of food happens and most of the nutrients from food are absorbed

stomach the saclike, digestive organ between the esophagus and the small intestine and that breaks down food by the action of muscles, enzymes, and acids

1.	List What organs in the digestive system are not part of the digestive tract?
2.	Describe What is the function of saliva?
3.	Compare How is chemical digestion different from mechanical digestion?
4.	List Name three places in the digestive tract where chemical digestion takes place.
5.	Explain How does the structure of the small intestine help it absorb nutrients?
6.	Apply Concepts How would digestion change if the liver didn't make bile?