

Final Digestion and Absorption



How Do the Small Intestine, Liver, and Pancreas Function?

What Does the Large Intestine Do?

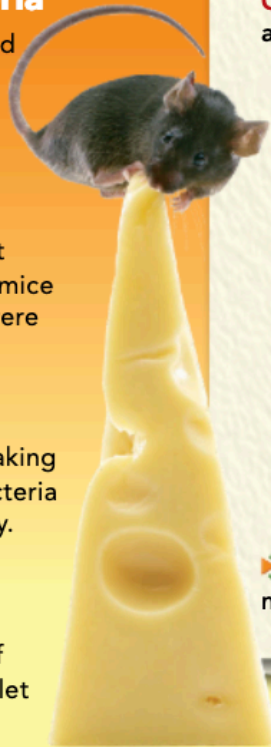
my planet DiARY

Partnering with Bacteria

Misconception Bacteria are bad for you.

That isn't always true. In one experiment, scientists showed that some bacteria are actually good for your body! The scientists created "bacteria-free" mice. They found that these mice got sick more easily than mice with bacteria in them. The bacteria were actually good for the mice.

When you eat foods such as certain yogurts or cereals, you are not only satisfying your hunger. You're also making sure your body has enough good bacteria to keep your digestive system healthy. Good bacteria help protect you from harmful germs by either killing them or making your body an unfriendly environment for them to live in. So, if you want to keep your body healthy, let those good bacteria get to work!



MISCONCEPTION

Communicate Discuss the questions with a partner. Write your answers below.

1. Why do you think the "bacteria-free" mice got sick more easily?

2. What else can you do to stay healthy?

PLANET DIARY Go to Planet Diary to learn more about digestion and absorption.

Bacteria from an intestine



Do the Inquiry Warm-Up
Which Surface Is Larger?

Vocabulary

- small intestine
- liver
- bile
- gallbladder
- pancreas
- villi
- large intestine
- rectum
- anus

Skills

- 🎯 **Reading: Identify the Main Idea**
- 🔺 **Inquiry: Develop Hypotheses**



How Do the Small Intestine, Liver, and Pancreas Function?

Think about how ticket takers help people enter an event in an orderly way. In some ways, the stomach is the “ticket taker” of the digestive system. After food becomes a thick liquid, the stomach releases a little of that liquid at a time into the small intestine, the next part of the digestive system.

The Small Intestine At about 6 meters—longer than some full-sized cars—the small intestine makes up two thirds of the length of the digestive system. Its small diameter, from 2 to 3 centimeters wide, gives the small intestine its name.

A great deal happens in the small intestine. The **small intestine** is the part of the digestive system where most chemical digestion takes place. When food reaches the small intestine, starches and proteins have been partially broken down, but fats have not been digested. **Most chemical digestion and the absorption of nutrients take place in the small intestine. Substances produced by the liver, pancreas, and lining of the small intestine help to complete chemical digestion.** The liver and the pancreas send their substances into the small intestine through small tubes.



🎯 **Identify the Main Idea**
Complete the graphic organizer by identifying the main idea and supporting details about the small intestine.

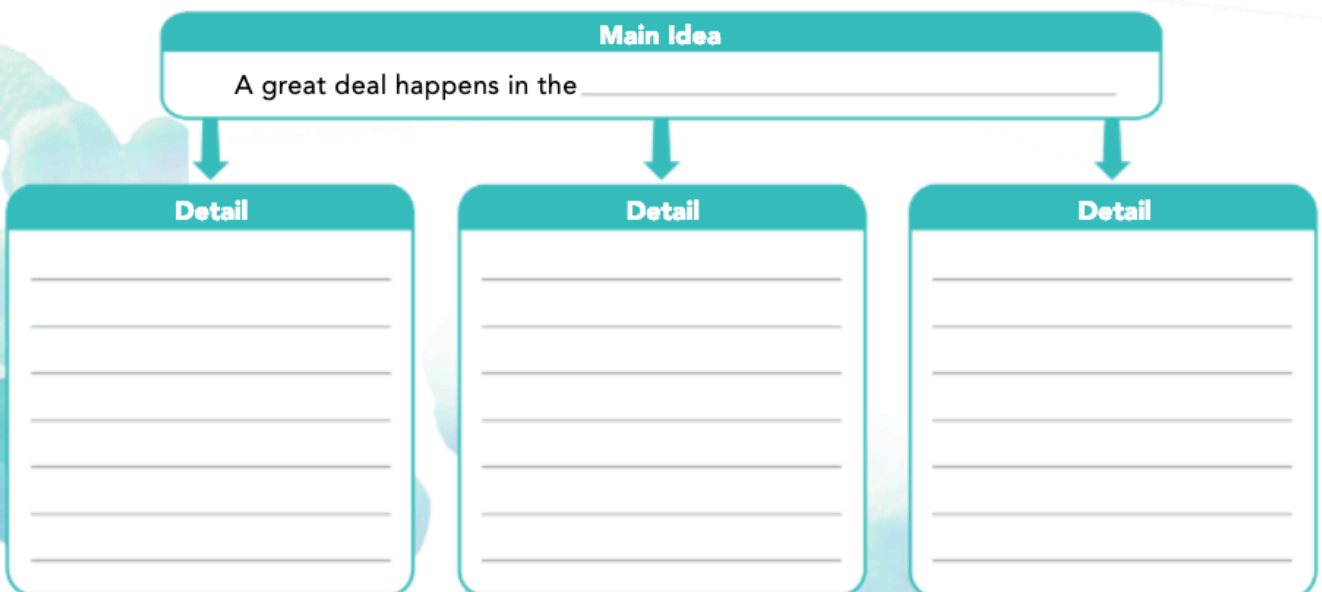




FIGURE 1

Organs of Digestion

The liver, pancreas, and gallbladder produce and store substances that aid digestion.

Use the diagram to complete the activities below.

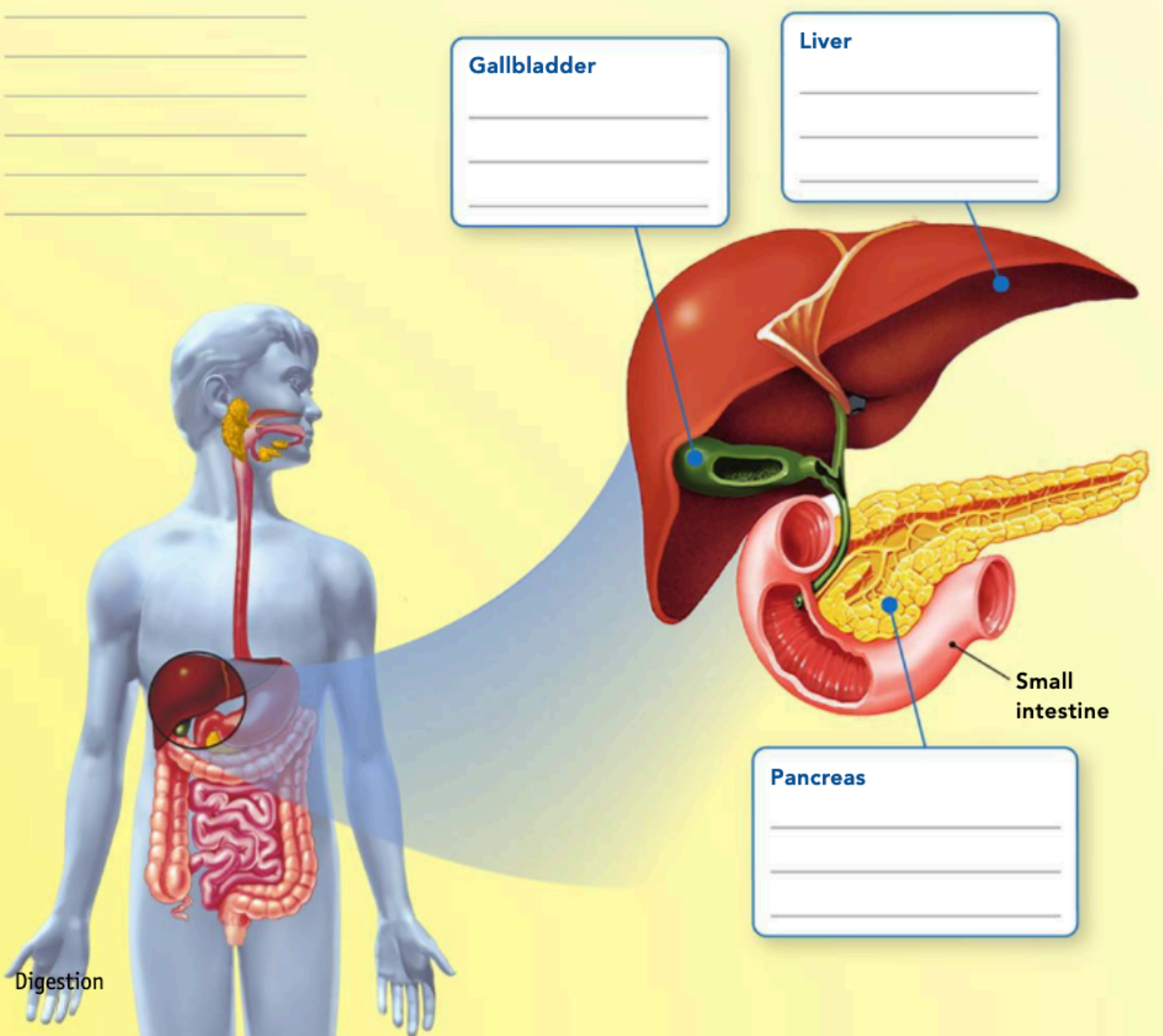
- 1. Explain** Describe each organ and its function.
- 2. Develop Hypotheses** How might a blockage in the tube between the gallbladder and the small intestine affect digestion?

The Liver and Gallbladder

Find the liver in **Figure 1**. The **liver** does many jobs in the body. One of its jobs is to make bile for the digestive system. **Bile** is a substance that breaks up fat particles. Once it is made, bile is stored in an organ called the **gallbladder**. It is released when food enters the small intestine. Bile does not aid in the chemical digestion of foods. It physically breaks up large fat particles into smaller fat droplets. The droplets are broken down by enzymes produced in the pancreas.

The Pancreas

Like the liver, the pancreas does many jobs in the body. The **pancreas** is a triangular organ located between the stomach and the first part of the small intestine. The pancreas produces digestive enzymes that help break down carbohydrates, proteins, and fats. But, these digestive enzymes cannot break down all food substances. For example, the enzymes are not able to break down the fiber in food.



Gallbladder

Liver

Pancreas

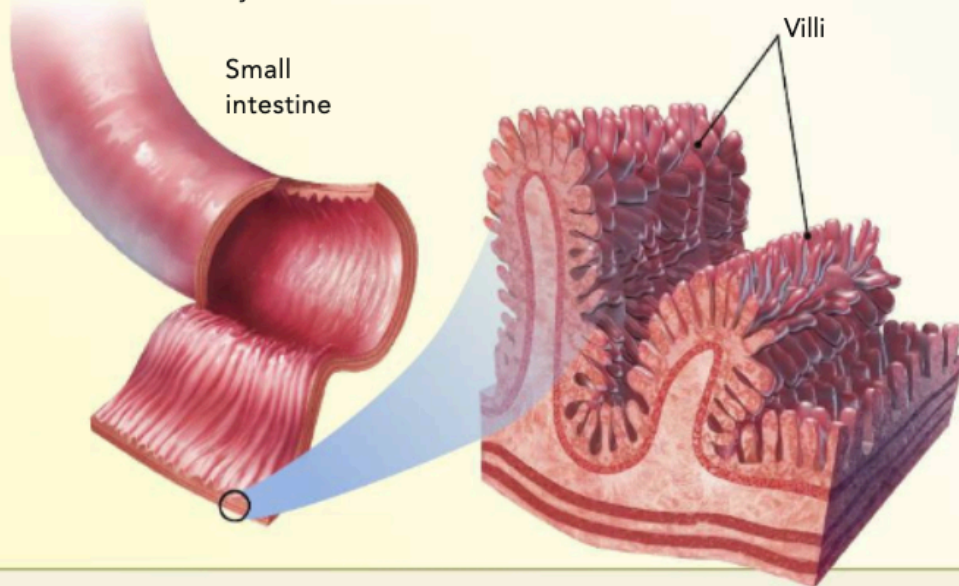


Absorption in the Small Intestine After chemical digestion takes place, the small nutrient molecules are ready for the body to absorb. The structure of the small intestine helps absorption occur. The inner surface of the small intestine is folded into millions of tiny finger-shaped structures called **villi** (VIL eye) (singular *villus*). Villi, shown in **Figure 2**, greatly increase the surface area of the small intestine. More surface area means that more nutrients can be absorbed. Nutrient molecules pass from cells on the surface of a villus into blood vessels and are then delivered to body cells.

FIGURE 2

Villi

Tiny villi line the folds of the small intestine.



do the math!

If the small intestine had smooth walls, its surface area would be 0.57 m². With villi, its surface area is about 250 m², about the size of a tennis court.

1 Calculate Divide to find how many times greater the surface area is with villi than it is without villi. Round your answer to the nearest whole number.

2 CHALLENGE Some people have a wheat allergy that results in villi being destroyed. What problems might they have?



Assess Your Understanding

1a. Explain How are the liver and pancreas involved in digestion?

b. Relate Cause and Effect How do villi help the small intestine carry out its function?

got it?

I get it! Now I know that the small intestine, liver, and pancreas _____

I need extra help with _____

Go to **my science** **COACH** online for help with this subject.



FOOD for you

How does food become materials your body can use?

FIGURE 3

REAL-WORLD INQUIRY There are many different parts to your body's digestive system.

Use what you've learned about digestion to complete the tasks.

- 1. Describe** Identify the different kinds of nutrients listed in the table and what each nutrient is needed for.
- 2. Explain** In the boxes on the next page, write how each structure helps food become materials your body can use.

Three Groups of Nutrients		
	Kinds	Needed for...
Carbohydrates		
Fats		
Proteins		



What Does the Large Intestine Do?

By the time material reaches the end of the small intestine, most nutrients have been absorbed. The water and undigested food that is left moves from the small intestine into the large intestine. As you can see in **Figure 3**, the **large intestine** is the last section of the digestive system. **As the material moves through the large intestine, water is absorbed into the bloodstream. The remaining material is readied for elimination from the body.**

The large intestine is about 1.5 meters long. It contains bacteria that feed on the material passing through. These bacteria normally do not cause disease. In fact, they are helpful because they make certain vitamins, including vitamin K.

The large intestine ends in a short tube called the rectum. The **rectum** is where waste material is compressed into solid form. This waste material is eliminated from the body through the **anus**, a muscular opening at the end of the rectum.

1 Mouth



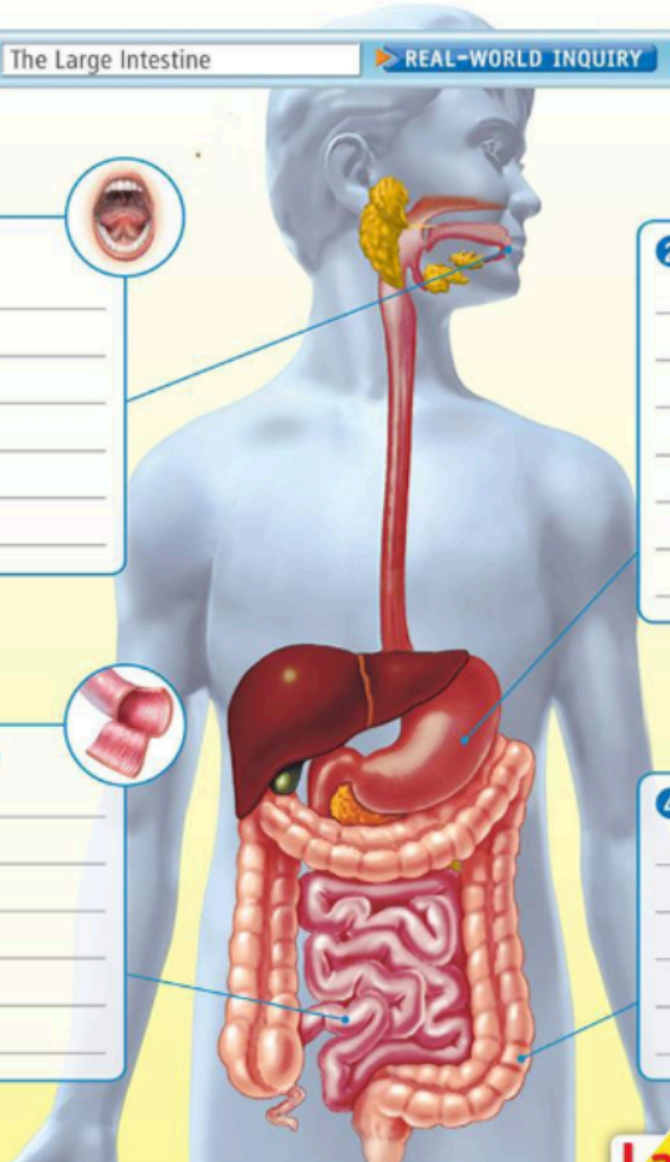
2 Stomach



3 Small Intestine



4 Large Intestine



Do the Quick Lab *The Role of the Large Intestine.*

Assess Your Understanding

2a. **Review** What role do bacteria play in the large intestine?

b. **ANSWER THE BIG QUESTION** How does food become materials your body can use?

got it?

I get it! Now I know that the large intestine's role is _____

I need extra help with _____

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