



Student Exploration: Digestive System

Vocabulary: absorption, chemical digestion, chyme, digestion, digestive system, elimination, enzyme, fiber, mechanical digestion, nutrient, peristalsis, villus

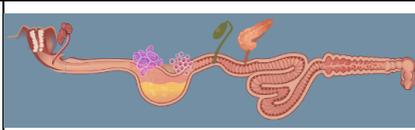
Gizmo Warm-up

The **digestive system** consists of 4 stages of digestion:

- First, food needs to get into the body, a process called **ingestion**.
- Next, the digestive system breaks food down into useful nutrients, a process called **digestion**.
- Then, the nutrients move into the bloodstream, a process called **absorption**.
- Finally, the leftover waste is removed from the body, a process called **elimination**.

With the *Digestive System* Gizmo, you can arrange the organs of the digestive system any way you like, **even in an incorrect order so be careful**. To begin, look at the organs on the **LARGE ORGANS** tab. Place your cursor over each organ to learn more about it.

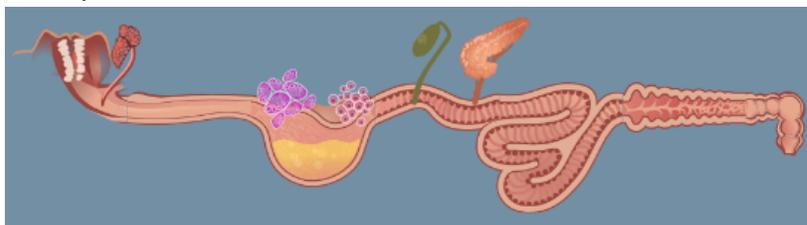
1. Which organs allow nutrients to be **absorbed**? _____
2. Which organ **stores** and **compacts** waste before it is eliminated? _____
3. Which *two* organs help to **break food down** mechanically? _____

Activity A: Mechanical and chemical digestion	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Click Reset and Clear screen. 	
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Introduction: Before nutrients are absorbed, they must be broken down to their simplest components. Teeth and muscular contractions in the stomach break food down into smaller particles, a process called **mechanical digestion**. In the meantime, powerful chemicals break down food in a process called **chemical digestion**.

Question: How are nutrients broken down in your digestive system?

1. Set up the Gizmo: Build a systems as shown in the diagram.
2. Label the organs in this set up:



3. From the FOOD tab, drag the **cheeseburger** to the mouth.

A. Click **Play**.

- a. Describe how the food moves through the esophagus _____
This is called _____. *This term will be added during class discussion.*
- b. Describe what the food looks like as it exits the mouth _____



c. Describe what happens while the food is in the stomach

d. Describe what happens as the food enters the small intestine

e. Describe the feces (poop) created _____

Activity B: Absorption	Get the Gizmo ready: Click Reset and Clear screen .
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Introduction: Digesting nutrients into simple molecules is important, but it doesn't matter unless the nutrients get into the bloodstream to feed body cells. This process is called **absorption**.

Question: How are nutrients absorbed?

1. Observe: Look through the descriptions of the large and small organs.

A. Which of the large organs allow **nutrients** and **water** to pass through their walls?

B. Which of the small organs transport absorbed nutrients to the bloodstream?

2. Set up the Gizmo: Drag the **Pecan pie** to the mouth.

a. Test each of the scenarios below by moving the capillaries and/or lymphatic vessels to different locations.

b. For **each** setup, record the nutrients that are *absorbed* by the system in the **Analysis** table.

Scenario	Sugars	Amino acids (protein)	Fatty acids (fats)	Water
Capillaries attached to the small intestine segments only				
Capillaries attached to the large intestine only				
Lymphatic vessels attached to the small intestine segments only (no capillaries)				
Lymphatic vessels attached to the large intestine only (no capillaries)				

3. Draw conclusions: Based on your experiments, where should the capillaries and lymphatic vessels be placed to maximize the absorption of nutrients from food?

Capillaries: _____

Lymphatic vessels: _____

4. Explore: Use the Gizmo to determine how absorption of water affects the texture of the stool (poop) that is produced by the digestive system. What do you conclude?

