Follow the Bite

How digestive structures change a meal

HAP.13.2 "Use models to describe structural adaptations present in each organ of the tract and correlate the structures to specific processing of food at each stage (e.g., types of teeth; muscular, elastic wall and mucous lining of the stomach…"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each digestive structure named in the passage. Circle the phrase that tells what it does, then draw a line connecting each structure to its function.

A Sandwich on the Move

1. Imagine biting into a toasted chicken sandwich. Incisors slice through the bread, while pointed canines grip and tear the chicken. Broad premolars and molars crush and grind the bite into smaller pieces. The tongue moves food against the teeth and mixes it with saliva, whose amylase begins breaking starch into smaller sugars. This moist lump, called a bolus, moves through the pharynx into the esophagus. Waves of muscle contraction, called peristalsis, push it toward the stomach. The lower esophageal sphincter relaxes to admit the bolus, then tightens to limit stomach contents flowing backward.

2. The stomach is not just a storage bag. Its muscular wall contracts to churn the sandwich into a thick mixture called chyme. Folds in the stomach wall allow it to expand as a meal enters. Glands release acid and the enzyme pepsin, which helps break down proteins in the chicken. A mucus-rich lining helps protect the wall from its own acid and enzymes. The pyloric sphincter, a ring of muscle at the stomach's exit, releases small amounts of chyme into the small intestine. This controlled flow gives the next organ time to process the mixture.

3. In the small intestine, digestive enzymes and bile help finish breaking down nutrients; bile helps disperse fats into tiny droplets. The intestine's inner surface has fingerlike villi, and their cells carry even smaller microvilli. Together these projections increase surface area for absorbing nutrients into the blood and lymph. Material that remains moves into the large intestine, whose lining absorbs water and salts. Its muscular wall moves the residue along as feces form. At the end, rectal walls stretch to hold feces briefly, while anal sphincters control when feces leave the body. Each structure changes what happens to a meal next.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the shapes of incisors and molars help them do different jobs on the sandwich?

2. The stomach churns food and releases acid. Which stomach structure performs the churning, and which helps protect the stomach during this process?

3. Compare the jobs of the lower esophageal sphincter and the pyloric sphincter as food passes through the stomach.

4. How do villi and microvilli in the small intestine serve a different purpose from the lining of the large intestine?

3 YOUR TURN

Your own words

In five sentences, build a route model for a bite of cooked lentils and carrots through the mouth, stomach, small intestine, and large intestine. Name one sphincter, link a structure at each stop to its job, and predict what would change if the villi were flattened.

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PART 1 · READ AND MARK

Underline each digestive structure named in the passage. Circle the phrase that tells what it does, then draw a line connecting each structure to its function. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the shapes of incisors and molars help them do different jobs on the sandwich?	**Incisors slice the bread, while the broad surfaces of molars crush and grind the bite.**
2	The stomach churns food and releases acid. Which stomach structure performs the churning, and which helps protect the stomach during this process?	**The muscular wall churns the food, and the mucus-rich lining helps protect the stomach from acid and enzymes.**
3	Compare the jobs of the lower esophageal sphincter and the pyloric sphincter as food passes through the stomach.	**The lower esophageal sphincter admits the bolus to the stomach and limits backward flow. The pyloric sphincter releases small amounts of chyme into the small intestine.**
4	How do villi and microvilli in the small intestine serve a different purpose from the lining of the large intestine?	**Villi and microvilli increase surface area for nutrient absorption. The large intestine's lining absorbs water and salts.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In the mouth, molars grind the lentils and carrots while saliva begins breaking down starch. The lower esophageal sphincter opens to let the swallowed bite enter the stomach. The stomach's muscular wall churns the food, and its mucus-rich lining helps protect it from acid. In the small intestine, villi absorb nutrients, but flattened villi would reduce the surface area available for absorption. The large intestine's lining absorbs water from the remaining material as feces form.

Accept other accurate structure-function links supported by the passage. For the route model, look for all four stops, a correctly described sphincter, and a prediction that flattened villi would reduce nutrient absorption.