Inside a Bite

Trace two kinds of digestion through one meal

HS-AP10-3 "Compare and contrast mechanical and chemical digestion."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB As you read, underline physical changes to food and circle changes to nutrient molecules. Number two places where a physical change helps a chemical change happen.

What Happens to Toast, Egg, and Avocado?

1. Picture a bite of toast topped with mashed avocado and egg. Your teeth crush the bite into smaller pieces, while your tongue mixes it with saliva. This is mechanical digestion: food changes size or shape, but its molecules are not broken apart. At the same time, salivary amylase begins breaking some starch molecules in the toast into smaller sugars. That is chemical digestion because an enzyme changes the molecules themselves. Both processes begin in the mouth. Chewing also exposes more of the toast to saliva, so the enzyme can reach more starch.

2. After you swallow, muscular contractions move the bite through the esophagus to the stomach. In the stomach, muscles churn and mix food with digestive juices. Churning is mechanical: it redistributes the food without breaking nutrient molecules apart. Stomach acid creates conditions for the enzyme pepsin, which begins breaking proteins in the egg into smaller pieces called peptides. Pepsin's action is chemical digestion. Unlike chewing, stomach churning does not use teeth, yet both actions physically rearrange food. Neither churning nor chewing can do the molecular work of pepsin, even though mixing helps digestive juices contact the food.

3. In the small intestine, bile from the liver breaks large droplets of avocado fat into smaller droplets. This physical process, called emulsification, is mechanical digestion because the fat molecules remain unchanged. Bile is not an enzyme. Smaller droplets give pancreatic lipase more fat surface to contact. Lipase breaks fat molecules into fatty acids and monoglycerides, a chemical change. Pancreatic enzymes also continue breaking starch and proteins into smaller molecules. Across the meal, mechanical actions make food easier to mix with digestive fluids, while chemical actions split nutrient molecules. Together they prepare nutrients for absorption through the small intestine's lining.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do chewing and salivary amylase differ in what they change, and where do both act?

2. Compare stomach churning with pepsin's action on egg protein. Why can't churning do pepsin's job?

3. Bile and pancreatic lipase both act on avocado fat. How is each action classified, and what happens to the fat molecules?

4. How do mechanical actions in the mouth and small intestine similarly help chemical digestion, even though they act on different parts of the meal?

3 YOUR TURN

Your own words

Imagine eating rice with butter. In 4 to 5 sentences, compare one mechanical action with one chemical action that help digest this meal, then explain how the actions work together. Include where each happens and name the nutrient changed by the chemical action.

ANSWER KEY

Inside a Bite

HIGH SCHOOL · HS-AP10-3

PART 1 · READ AND MARK

As you read, underline physical changes to food and circle changes to nutrient molecules. Number two places where a physical change helps a chemical change happen. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do chewing and salivary amylase differ in what they change, and where do both act?	**Both act in the mouth. Chewing changes the size of food pieces, while salivary amylase breaks starch molecules into smaller sugars.**
2	Compare stomach churning with pepsin's action on egg protein. Why can't churning do pepsin's job?	**Churning physically mixes food. Pepsin chemically breaks egg proteins into peptides, which churning cannot do.**
3	Bile and pancreatic lipase both act on avocado fat. How is each action classified, and what happens to the fat molecules?	**Bile mechanically divides fat into smaller droplets without changing its molecules. Lipase chemically breaks fat molecules into fatty acids and monoglycerides.**
4	How do mechanical actions in the mouth and small intestine similarly help chemical digestion, even though they act on different parts of the meal?	**Chewing exposes more toast starch to salivary amylase. Bile makes smaller fat droplets, giving lipase more fat surface to contact.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

When I chew rice with butter, my teeth break the food into smaller pieces without changing its molecules. In my mouth, salivary amylase starts breaking the rice's starch into smaller sugars. Chewing mixes the rice with saliva, helping the enzyme contact the starch. Both actions help digest the meal, but only amylase chemically changes the starch.

Accept other passage-supported comparisons that distinguish physical changes from changes to nutrient molecules. For Part 3, accept an accurate mechanical and chemical pairing involving rice or butter if the response explains how the actions work together.