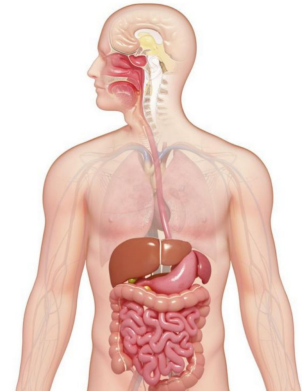


The Digestive System

- All living creatures need energy from their environment. Animals get this energy by eating food.
- The **digestive system** helps an animal break down food and extract the high-energy molecules and nutrients from it.
- A combination of **mechanical digestion** (chewing, churning) and **chemical digestion** (breaking down molecules with enzymes) is used to get energy and nutrients from food.
- The **excretory system** is connected to the digestive system. It helps the animal get rid of the parts of food they cannot break down and absorb.



Part 1: Digestion in the Mouth

1. Label one of the clear cups 'water' and one 'saliva'.
2. First, set up your **control** (a simpler system to compare to your experiment). Place a few small crackers (as many as there are kids) in a cup. Add 1 tablespoon water. Mash and mix up the crackers and water.

Now let's see if the **saliva** (spit) in your mouth acts just like water:



3. Every kid should put 1 small cracker in their mouth and keep it there for 1 minute. You can mash and chew the cracker, but don't swallow any. After 1 minutes, spit out the mush of saliva and cracker into a second cup. Eww -- it's gross but worth it for science!

Discuss: Compare the 2 cups. Does the cracker mush look the same or different?

Which crackers are more thoroughly ground up?

ones that were chewed or ones that sat in water

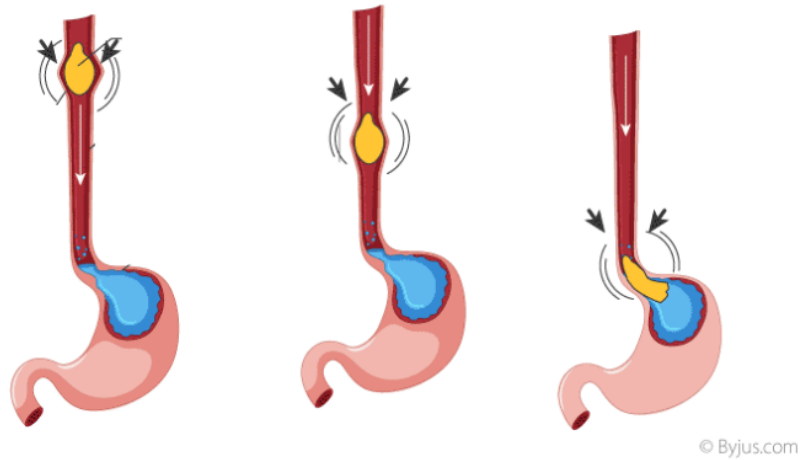
Grinding up food with your teeth is an example of what kind of digestion?

mechanical or chemical digestion

4. Add 2 drops of iodine to each cup and swirl around to mix.

Discuss: Do you see a difference between the 2 cups?

Muscles in your esophagus push food downward through the tube. The series of wave-like contractions is called **peristalsis**.



4. Cut off the bottom of the tube. Push the food through the tube into a quart-size ziploc bag.

What does the ziploc bag represent?

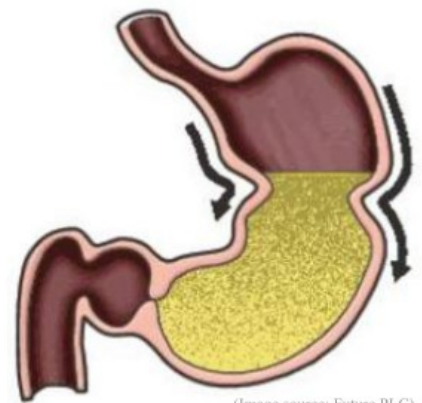
Stomach esophagus mouth intestine

5. Add 4 spoonfuls of Coca-cola into your bag with the food. Coca-cola is very **acidic**. It represents **stomach acid**.

Acids help break down food molecules. What kind of digestion is this?

mechanical or chemical

6. Use your hands to squeeze the bag to thoroughly mash up its contents. This represents contractions of the muscles in the walls of your stomach.



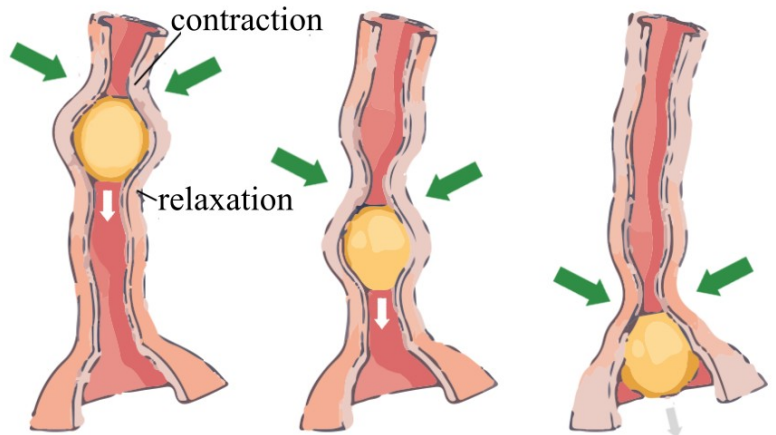
(Image source: Future PLC) How It Works Magazine, 2020

When food particles are broken down by churning of your stomach walls, what kind of digestion is this?

mechanical or chemical

7. Cut off a corner of the bag and transfer the contents into the stocking. The stocking represents the **small intestine**.

The small intestine squeezes food through more peristaltic contractions. The walls of the intestine are permeable. As the food moves along, nutrients and energy-containing molecules seep out through the walls into your bloodstream. Blood carries them to the rest of the body.



8. Squeeze the food down along the stocking. Try making peristaltic contractions, as in the picture. Make sure to do this over a tray.

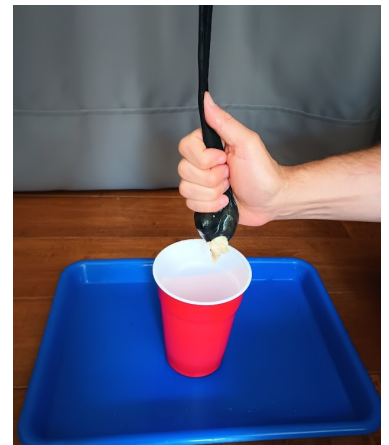
Discuss: What do you see in the tray? What does this represent?

Your small intestine is very long: 5 meters! It is wound up tightly to fit inside your abdomen.

10. Cut off the bottom of the stocking and squeeze the material into a cup with a hole on the bottom.

The cup represents the **large intestine**. The large intestine helps absorb excess water and digestive juices.

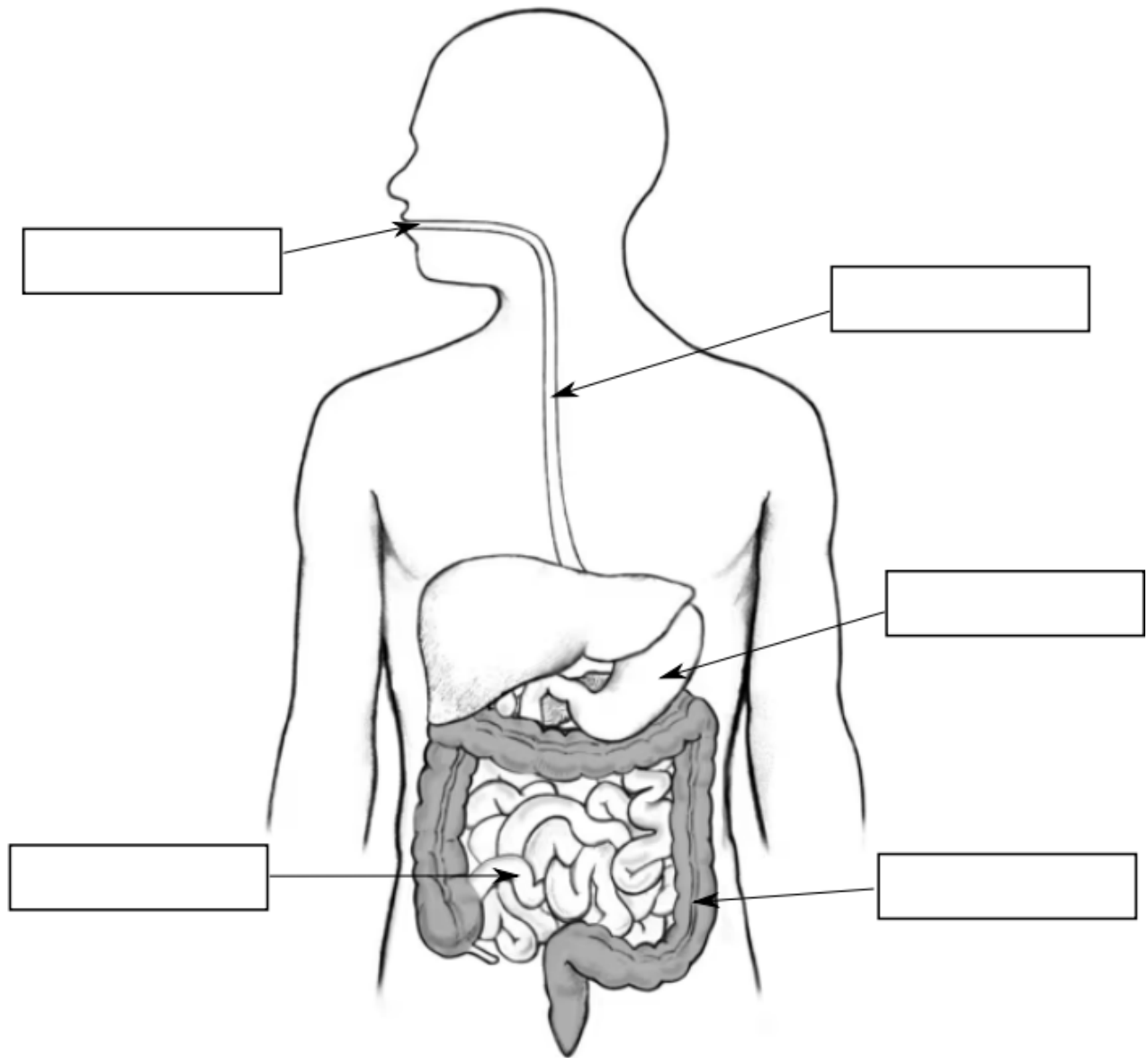
11. Use a paper towel to absorb some extra fluid, while pushing the material through the hole in the bottom.



What does this process represent?

swallowing chewing defecation absorbing nutrients

Digestive System Diagram



word bank:

mouth

stomach

small intestine

esophagus

large intestine