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. Mush 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 mush 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?





Iodine turns bluish-black when it reacts with **starch** (long chains of sugar molecules found in crackers, bread, etc). Your saliva contains an **enzyme** called **amylase** which breaks down starch molecules.

Which cup has more starch molecules (darker blue-black color)? Chewed up crackers crackers in water

The breakdown of starch by amylase enzymes is an example of what kind ofdigestion?: chemical digestion physical digestion



Part 2: Modeling the Digestive System

In this activity, you will model all the different steps of your digestive system As you go, label the parts on the diagram at the end!

1. Use the bowl to represent your **mouth**. Break up half a banana and a piece of bread into small pieces into the bowl.

What does this step represent? (circle one) swallowing chewing defecation absorbing nutrients

Is this: mechanical or chemical digestion?

2. Add 4 spoonfuls of water into your bowl. Mash up the food and water thoroughly into a paste with a spoon.

3. Use a funnel to transfer the food mush into the narrow tubeshaped bag. What does the long narrow tube bag represent? Stomach esophagus mouth





intestine

Muscles in your esophagus push food downward through the tube. The series of wavelike 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? esophagus Stomach mouth

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 chemical or

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.



intestine

(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



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mouth	stoma	ach	small intestine	
e	esophagus		large intestine	