1. All heterotrophic organisms have some process for breaking down their food into smaller molecules that can be utilized by the organism. Cells can engulf smaller cells or molecules to be digested as food. Mushrooms secrete enzymes that chemically digest their nutrient source into smaller molecules that can then be absorbed through diffusion back into the fungus.

2. Mechanical digestion involves the physical breakdown of food into smaller pieces. Chemical digestion involves molecules, like enzymes, that break down nutrients into smaller molecules. In the animal kingdom, different digestive systems are designed to break down different nutrients and are adapted to the organism’s type of nutrition. Open the Model Gallery in your Backpack and add one herbivore, one carnivore, and one omnivore to the scene. Use Notes to label the type of nutrition for each animal. Take a photo of your scene.
3. Let’s follow the pathway of food through the human digestive tract from entrance to exit. Begin in the mouth. What happens inside your mouth when you eat a bite of food? How are your front teeth used compared to the function of your molars in the back of your mouth during mechanical digestion? What is the function of the salivary glands and how do they help with chemical digestion? You are encouraged to dissect the parts of the mouth and write your answers to these questions on Notes. Then take a photo of the model and your answers.

4. The mass of food that has been chewed and mixed with saliva is now called a bolus. This bolus is swallowed and passes from your mouth down a long, muscular tube called the esophagus to your stomach. Use the Ruler in your Backpack to estimate how long the esophagus is. Provide an answer in both metric and standard units.

5. Remove the stomach so that you can use the Cutting Plane or the Camera in your Tools to examine the inside of the stomach. Why do you think the inside of the stomach is bumpy and full of ridges of muscle? Use this information as data to support whether the stomach plays a larger role in mechanical or chemical digestion.
6. The bolus can hang out in the stomach for 2-4 hours. What factors impact how long the bolus is in the stomach?

7. At this point in the journey, your food has only just started to be broken down. The small intestine is responsible for the majority of chemical digestion and is the main location for nutrient absorption. What characteristics of the small intestine are adapted to accomplishing chemical digestion of nutrients and absorption of nutrients into the bloodstream?

8. Your liver is the largest solid organ in your body and plays major roles in digestion. The liver works to detoxify the blood, breaking down ammonia and other toxic byproducts of the digestion process. The liver also removes toxic chemicals that have entered the bloodstream through cigarette smoke, medicines, and the environment.

9. The liver also produces bile, which is used to digest lipids and fat soluble vitamins like A, D, E, and K so they can be absorbed. Bile also neutralizes excess stomach acid and kills some bacteria that are present in food. In between meals, bile produced by the liver is stored in the gallbladder until it is needed. The gallbladder is a greenish colored, oval shaped structure located under the liver. Dissect the gallbladder and add a Note to label the gallbladder with at least two functions. Then take a photo.
10. After your small intestine has absorbed the majority of the nutrients from the food you ingested, what is left inside the small intestine? What is the function of the large intestine?

11. Our bodies rely on symbiotic relationships with bacteria that work to chemically digest the proteins, lipids, and carbohydrates that we eat. Our intestinal bacteria also produce compounds that we cannot manufacture, like some vitamins. What type of symbiotic relationship do we have with our gut bacteria?

12. The large intestine is also known as the colon. At the bottom of the ascending colon, along the right side of the body, is the appendix. Scientists are still debating the function of the appendix. One theory states that the appendix provides a place for healthy gut bacteria to live so that they are available to repopulate the digestive tract after an illness. Other theories call the appendix a vestigial organ, an organ that has lost all or most of it’s function. What data would need to be gathered in order to support one theory or another?

13. There are some foods that are indigestible to humans, like cellulose. If we cannot digest cellulose, which is the main component of the cell walls in plants, why does your doctor always say to eat at least five servings of fruits and vegetables everyday?
14. Your food travels the last five feet (60 inches or 150 centimeters) through the ascending, transverse, and descending colon. As indigestible plant material passes through the colon, this roughage pulls other matter along, cleaning out the colon. Water also diffuses out through the colon and back into the body. This process is vital to your body so that you do not get dehydrated. How do you think the three portions of the colon got their names? Use evidence from your observations to support your answer.

15. The journey is now coming to an end as food is passed from the descending colon into the rectum and through the anal sphincter. Did you know that about 60% of your feces is bacteria that your body is excreting? Now that you have learned more about the digestive system, what new, curious questions do you have?