

Physiology Class 3:

Digestive and Excretory Physiology

Activities

These activities are designed to be done at home. There is no grade given for these and they do not have to be turned in. The answer key has been emailed to your grown up.

The Journey of a Nutrient

Pick one of the following and write a story about its digestive journey through the body:

Carbohydrate, Protein and Fat

Answers

Journey of a Carbohydrate

A carbohydrate begins its journey in the **mouth**, where chewing breaks it apart and **salivary amylase** starts turning starch into smaller sugars. It moves down the **esophagus** into the **stomach**, where digestion pauses because the acidic environment inactivates amylase. When it enters the **small intestine**, **pancreatic amylase** breaks it down into simple sugars like glucose. These sugars are then absorbed through the walls of the **jejunum** and enter the **bloodstream**, where they travel to cells for energy.

Journey of a Protein

A protein first reaches the **stomach**, where strong acid unfolds its structure and **pepsin** begins breaking it into smaller chains. The partially digested protein enters the **small intestine**, where **pancreatic proteases** (like trypsin and chymotrypsin) cut it into even smaller pieces. Enzymes from the intestinal lining finish the final breakdown into **amino acids**. These amino acids are absorbed mainly in the **jejunum** and move into the **bloodstream**, ready to help build and repair tissues throughout the body.

Journey of a Fat

A fat droplet travels unchanged through the **mouth** and **stomach** because fats are not digested much there. When it reaches the **small intestine**, **bile** from the liver and gallbladder breaks it into tiny droplets, making it easier for **pancreatic lipase** to act. Lipase then splits the fat into **fatty acids and glycerol**. These are absorbed mostly in the **jejunum and ileum**, where they are packaged into special carriers and sent into the **lymph system** before eventually entering the bloodstream. From there, cells use fats for energy, membranes, and hormone production.

Super Athlete!

Pretend you are a super athlete and you forgot to drink enough water before a big event. Describe the things that you might experience and what is happening in your body.

Answer: A strong response should include the following ideas:

1. Physical Experiences of Dehydration

Students might describe:

- Feeling tired or weak
- Muscle cramps
- Dry mouth or extreme thirst
- Headache or dizziness
- Faster heart rate
- Reduced ability to perform at their best
- Feeling overheated or unable to cool down

2. What Is Happening Inside the Body

Students should show an understanding of these key points:

A. Low Water Levels

- Blood becomes more concentrated (higher osmolarity).
- There is less fluid available for sweat, making it harder to cool down.

B. Kidney Response

- Kidneys release **more ADH**, causing them to **reabsorb more water**.
- Urine becomes **dark and concentrated**.

C. Circulatory Effects

- Lower fluid levels mean **less blood volume**, which makes the heart work harder.
- Muscles may not get oxygen and nutrients as efficiently.

D. Muscle Effects

- Electrolyte imbalance can lead to **muscle cramps** or weakness.

E. Performance Impact

- Dehydration reduces endurance, speed, strength, and coordination.
- The athlete may overheat more easily since sweating decreases.

3. Summary Statement

Students should clearly connect dehydration to reduced performance and physical discomfort because the body cannot cool itself, maintain blood pressure, or deliver nutrients effectively when water levels are low.

Pre-Assessment Quiz:

Digestive and Excretory Physiology

1. Which process describes the physical breakdown of food?
 - A. Chemical digestion
 - B. Mechanical digestion**
 - C. Absorption
 - D. Filtration
2. Which enzyme begins carbohydrate digestion in the mouth?
 - A. Pepsin
 - B. Amylase**
 - C. Lipase
 - D. Trypsin
3. What is the main site of nutrient absorption?
 - A. Stomach
 - B. Ileum
 - C. Colon
 - D. Jejunum**
4. Which organ produces bile?
 - A. Pancreas
 - B. Gallbladder
 - C. Stomach
 - D. Liver**
5. What is the nephron's primary job?
 - A. Make hormones
 - B. Fight infection
 - C. Filter blood**
 - D. Store urine

6. Where does glomerular filtration occur?

- A. Loop of Henle
- B. Distal tubule
- C. Collecting duct

D. Glomerulus

7. Which hormone makes the kidneys save more water?

- A. Insulin
- B. Testosterone
- C. Estrogen

D. ADH

8. What happens to urine during dehydration?

- A. It becomes pale
- B. It increases a lot
- C. It stops forming

D. It becomes concentrated

9. Which waste product is removed by the kidneys?

- A. Hemoglobin
- B. Glucose

C. Urea

D. Bile

10. Which structure stores solid waste before elimination?

- A. Ileum
- B. Stomach

C. Rectum

D. Jejunum