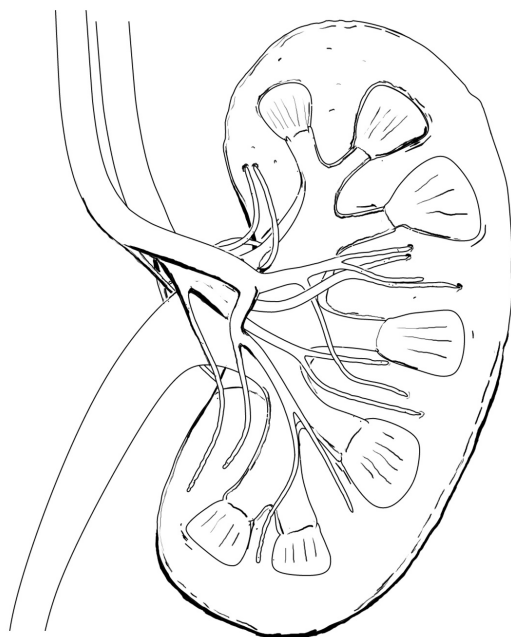


Exploring the Digestive and Excretory Systems



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Student Learning Objectives

Upon viewing the video and completing the enclosed activities, students will be able to do the following:

- Describe digestion as the process by which the body breaks down food into simpler forms it can use.
- List the major nutrients needed by the body: proteins, fats, carbohydrates, vitamins, and minerals.
- Describe the characteristics of each of the major nutrients and cite an example of a food in which it is abundant.
- For each of the major nutrients, cite one way the body utilizes it.
- Define the processes of mechanical and chemical digestion.
- Provide examples of both chemical and mechanical digestion at work in the digestive system.
- List the major structures in the digestive tract starting with the mouth and ending with the large intestine.
- Create a simple sketch of the major structures in the digestive tract.
- Explain the role the mouth, teeth, and tongue play in the process of digestion.
- Describe how the stomach digests food both mechanically and chemically. Also list a couple of compounds involved with digestion in the stomach.
- Explain that peristalsis consists of a series of wave-like muscular contractions that move food through the digestive tract.
- Understand that the small intestine plays a vital role in the chemical digestion of carbohydrates and proteins. Absorption of fats, vitamins, minerals, and amino acids also occurs here.
- Understand that other organs contribute to the digestive process including the liver, pancreas, and numerous glands.
- Briefly explain the role of the large intestine (colon) in the digestive process.
- Explain that excretion is the process by which wastes and excess substances are removed from the body.
- Understand that the liver, a very large organ, carries out over 500 different functions, and is active in both digestion and excretion.
- Describe how excretion occurs in the lungs and in the skin.
- List some of the important structures that make up the urinary system.
- Understand that kidneys perform the very important job of removing nitrogen-containing wastes from the blood, as well as controlling the concentration of other substances in the body.

Assessment

Preliminary Assessment (p. 14-15):

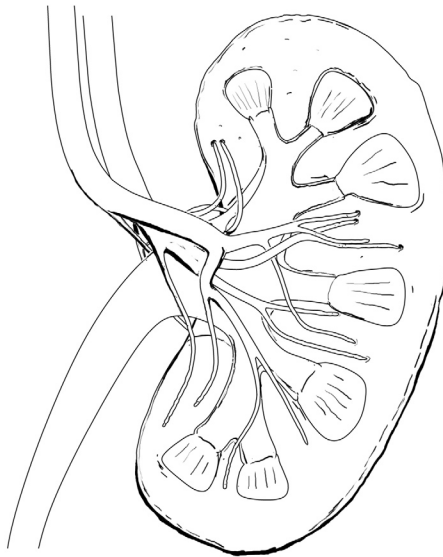
The Preliminary Assessment is an assessment tool designed to gain an understanding of students' preexisting knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Post Assessment (p. 16-17):

The Post Assessment can be utilized as an assessment tool following student completion of the program and student activities. The results of the Post Assessment can be compared against the results of the Preliminary Assessment to assess student progress.

Video Review (p. 18):

The Video Review can be used as an assessment tool or as a student activity. There are two sections. The first part contains questions displayed during the program. The second part consists of a ten-question video assessment to be answered at the end of the video.



Introducing the Program

Before showing the video program to your students ask them what they had for breakfast this morning. Write their answers on the board. Have them study the list of foods for a minute. Ask them what foods they think are healthier than others. Ask them to explain their reasoning. Explain to students that foods contain several different nutrients. The body needs a wide variety of nutrients. Tell them to pay close attention to the video to learn about the characteristics of various nutrients.

Write the term “Digestion” on the board. Ask students to define this process in the body. Discuss what is accomplished through this process of digestion and why these accomplishments are so important. Have students list some of the body structures included in the process of digestion. Tell students that the video will focus on the main organs responsible for digestion in the body. Following the video program review these structures and discuss their functions.

Program Viewing Suggestions

The student master “Video Review” (p. 19) is provided for distribution to students. You may choose to have your students complete this master while viewing the program or do so upon its conclusion.

The program is approximately 20 minutes in length and includes a ten-question video assessment. Answers are not provided to the Video Assessment in the video, but are included in this guide on page 13. You may choose to grade student assessments as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.

Video Script: Exploring Digestive and Excretory Systems

1. What are some of the essential things you do everyday to maintain your body?
2. Here's a hint - they're not things you do every few seconds like breathing or blinking.
3. But, if you thought about things like eating, drinking, and going to the bathroom, you're right.
4. These functions involve two major body systems – the digestive system and the excretory system.
5. What are the functions of these two systems?
6. What organs do they include?
7. What are some of the problems that may occur with the digestive and excretory systems?...
8. ... and, what things can you do to help maintain them?
9. During the next few minutes we are going to answer these questions and others...
10. ... as we explore our vital digestive and excretory systems.
- 11. Graphic Transition – The Role of Digestion**
12. As soon as you bite into a piece of food the process of digestion begins.
13. What exactly is digestion? Digestion is the process by which the body breaks down food into simpler forms that it can use.
14. As you know, food contains a number of different kinds of nutrients that the body needs for energy, and to regulate itself.
15. It's critical that the body obtains the correct quantities, quality, and combinations of nutrients.
16. Just as you wouldn't fill the gas tank of this car with soda,...
17. ... you shouldn't provide your body with bad food. It needs a healthy, well-balanced diet that includes the right nutrients.
18. Cells in the body obtain most of their energy from carbohydrates.
19. Carbohydrates are compounds made of carbon, hydrogen, and oxygen.
- 20. You Decide!** Which of these foods has the greatest concentration of carbohydrates?
21. The pasta has the greatest concentration of carbohydrates.
22. Fruits, vegetables, sweets, and breads are also rich in carbohydrates.
23. Sugars, starches, and fibers are types of carbohydrates.
24. You may have heard people say that potato chips, hot dogs, and fried foods are fatty foods.
25. These foods are high in fats and oils, and they are part of another group of nutrients, broadly referred to as lipids.
26. There are two main groups of lipids: saturated fats and unsaturated fats.
27. Not all lipids are bad. In fact, many are needed for energy storage, cell growth, and other activities.
28. While fats are essential, too much fat, particularly saturated fats such as those in dairy products and fatty, red meats,...
29. ...can be a major contributor to problems such as obesity, high blood pressure, cancer, strokes, and heart disease.
30. In addition to lipids and carbohydrates, proteins are another type of nutrient.
31. Proteins are important in constructing and repairing body parts, supplying energy, and fighting infections.

Video Script: Exploring Digestive and Excretory Systems

32. The human body contains hundreds of different proteins, which it constructs from amino acids.
33. There are 22 different types of amino acids. While the body is able to produce amino acids, eight must be obtained by eating foods such as eggs, meats, fish, poultry, milk, grains, and beans.
34. Most of the healthy foods we consume contain small amounts of another type of nutrient - vitamins.
35. Vitamins consist of complex molecules that do not contain energy.
36. They play a key role in a wide range of cellular activities.
37. You've probably heard of some of the many different kinds of vitamins such as vitamin C abundant in citrus fruits...
38. ... and vitamin D abundant in eggs, salmon, and sunlight.
39. You wouldn't want to eat these rocks, but believe it or not they too, contain important nutrients called minerals that are needed by the body. Minerals are inorganic compounds. These marble rocks contain a specific type of mineral called calcium.
40. Calcium is a major component in bones and teeth.
41. The body needs over a dozen different types of minerals.
42. Like iron which is essential for transporting oxygen in the blood.
- 43. You Observe!** What do you see as this person breathes out on a cold day?
44. You see a cloud of water vapor.
45. Every time you exhale, water vapor is emitted. It is a byproduct of cellular activities.
46. Water, another compound vital to our bodies, is critical for a wide variety of processes, including waste removal. It is also a major ingredient in blood and cytoplasm. Water needs to be replenished daily, and is obtained from liquids that we drink and foods that we eat.
- 47. Graphic Transition – Digestion in the Body**
48. The first step in the digestive process begins by chewing food – an example of mechanical digestion.
49. In mechanical digestion, food is physically broken down but not chemically changed.
50. While the teeth and tongue work to break food into smaller pieces, salivary glands secrete a substance called saliva that begins the process of chemical digestion.
51. Chemical digestion involves food being broken down into simpler molecules by chemicals and enzymes.
52. Saliva begins that process by breaking down starches into simple sugars.
53. When you swallow food, it moves through an area in the back of the throat called the pharynx,...
54. ...and into a long muscular tube called the esophagus.
55. Through a series of wave-like muscular contractions referred to as peristalsis, food travels through the digestive tract toward the stomach. A valve-like structure called the cardiac sphincter regulates the passage of food into the stomach.
56. When the valve relaxes, food enters the stomach.
57. Sometimes, when the cardiac sphincter relaxes, hydrochloric acid from the stomach travels up into the esophagus.

Video Script: Exploring Digestive and Excretory Systems

58. That acid can irritate the lining of the esophagus causing an uncomfortable condition called acid reflux, commonly referred to as indigestion or heartburn.
59. The stomach is a thick-walled sac made of smooth muscle. It can hold about two liters of food or liquid.
60. Place your hand between the bottom of your ribs and your belly button. This is the approximate location of your stomach.
61. Muscular contractions of the stomach wall churn and mix food.
- 62. You Decide!** What type of digestion is this called?
63. This is an example of mechanical digestion and results in the physical breakdown of food.
64. Food is chemically digested in the stomach as well when it mixes with hydrochloric acid, pepsin, and mucus secreted by glands located in the walls of the stomach.
65. While liquids pass through the stomach relatively quickly, solids are reduced more slowly to a thin, soupy liquid called chyme.
66. After two to six hours, chyme passes through a valve called the pyloric sphincter into the small intestine.
67. The small intestine is a hollow tube that's only about 2.5 centimeters in diameter, but it stretches about seven meters.
68. The chemical digestion of carbohydrates and proteins is completed in the small intestine.
69. Absorption of fats, vitamins, minerals, and amino acids into the bloodstream also occurs here.
70. Small finger-like projections called villi, that line the inner walls of the small intestine, are packed with capillaries and lymph vessels called lacteals. Capillaries absorb carbohydrates and proteins while lacteals absorb fats and fatty acids.
71. The added surface area of villi in the small intestine is equivalent to the area of this soccer field!
72. In the small intestine, chyme is mixed with bile from the liver, pancreatic juice from the pancreas, and intestinal juice from glands in the intestinal wall. These secretions contain enzymes and other substances necessary for digestion.
73. Undigested and unabsorbed materials then pass from the small intestine into the large intestine, also called the colon.
74. The large intestine is shorter than the small intestine – only about 1.5 meters long. But it has a much larger diameter of about five to six centimeters.
75. Here water and water-soluble vitamins are absorbed.
76. When most of the water has been removed, solid waste called feces remains. Feces is removed from the body through the anus.
- 77. Graphic Transition – What is Excretion?**
78. Chances are you don't particularly like thinking about how your body gets rid of waste.
79. Still, removing waste is just as an important process as providing the body with energy.
80. Excretion is the process by which wastes and excess substances are removed from the body.
81. Your household produces wastes as a result of daily activities. Similarly, the body produces waste as a result of normal metabolic processes.

Video Script: Exploring Digestive and Excretory Systems

82. In humans, wastes removed in the process of excretion include carbon dioxide, water, mineral salts, as well as certain nitrogen compounds – specifically ammonia, urea, and uric acid.
83. The liver, a very big organ, carries out over 500 different functions, and is active in both digestion and excretion.
84. In the process of excretion the liver removes wastes and potentially harmful substances from the blood, purifying it.
85. The liver also plays a key role in breaking down excess amino acids into ammonia, pyruvic acid, glycogen, or fat for storage.
86. Over-consumption of alcohol can lead to a disease of the liver called cirrhosis, inhibiting that organ's ability to detoxify the blood.
87. The lungs are also considered excretory organs because they rid the body of water vapor and carbon dioxide when you exhale.
88. Surprisingly, the skin is also an excretory organ. In fact, it is the largest organ in your body.
- 89. You Predict!** What will happen to the skin of this person if they exercise hard for a long time?
90. Their skin becomes sweaty.
91. Sweating is the process by which waste is eliminated through the skin.
92. If you've ever tasted sweat you know it's salty. Salt is one substance that is excreted by the skin.
93. Small amounts of urea, as well as a great deal of water, are also excreted by the skin. Skin also plays a big role in removing excess heat.
94. The skin has two main layers: the outer layer called the epidermis, and the inner layer called the dermis.
95. Various kinds of glands reside in the dermis layer, including sweat glands and sebaceous glands - glands that produce sweat and oils.
- 96. Graphic Transition – The Urinary System**
97. One of the most important ways that the body excretes wastes is via specialized structures in the urinary system.
98. The main organs of the human urinary system include two bean-shaped kidneys located at the bottom of the rib cage near the back.
99. Kidneys perform the very important job of removing nitrogen-containing wastes from the blood. They control the concentrations of substances in body fluids such as salts, water, minerals, and vitamins. And, kidneys also regulate blood volume and pH levels.
100. The kidneys remove wastes from the blood and process them into a yellow colored liquid called urine.
101. Urine is a sterile liquid containing salts, urea, and water.
102. The fundamental filtering units in the kidneys are nephrons.
103. Each kidney contains over one million nephrons!
104. This is an extreme close-up of a nephron.
105. Most of the fluid is returned or reabsorbed by the blood stream along with other substances needed by the body.

Video Script: Exploring Digestive and Excretory Systems

106. Urine passes out of the kidneys to the bladder through small tubes called ureters.
107. From time to time urine is emptied from the bladder through the urethra and exits the body.
- 108. Graphic Transition – In Review**
109. During the past few minutes we have explored the many functions and structures involved in human digestion and excretion.
110. We began by describing the role and function of nutrients needed by the body including carbohydrates, proteins, fats, vitamins, and minerals.
111. The path of food as it travels through the digestive system and the various digestive organs were highlighted.
112. We discussed the role of mechanical digestion, chemical digestion, and absorption throughout the digestive system.
113. Next, we investigated the purpose and importance of excretion.
114. Some of the key excretory organs including the lungs, liver and skin were discussed.
115. Last, the major functions and structures of the urinary system were explored.
116. Hopefully you now have a better understanding and appreciation for the valuable processes of digestion and excretion.

117. Graphic Transition – Video Assessment

Fill in the blank with the correct word.

1. Sugars, starches, and fibers are types of _____.
2. _____ are the building blocks of proteins.
3. In _____ digestion food is physically broken down.
4. Wave-like muscular contractions called _____ move food through the digestive tract.
5. In the stomach food is reduced to a soupy mixture called _____.
6. _____ add surface area to the inner walls of the small intestine
7. _____ is the process by which wastes are removed from the body.
8. The _____ is a large organ that carries out over 500 different functions.
9. _____ remove nitrogen-containing wastes from the blood.
10. The fundamental filtering units in the kidneys are called _____.

Answer Key to Student Assessments

Preliminary Assessment (p. 15-16)

1. b - nutrients
2. c - digestion
3. a - carbohydrates
4. d - amino acids
5. a - teeth chewing
6. b - peristalsis
7. b - hydrochloric acid and pepsin
8. d - chyme
9. a - absorption of nutrients
10. b - surface area
11. c - colon
12. a - excretion
13. d - liver
14. b - skin
15. a - urine
16. Digestion is the process by which the body breaks down food into simpler forms it can use.
17. The major nutrients include proteins, fats, carbohydrates, vitamins and minerals. Fruits, breads, and pasta are carbohydrate-rich.
18. Chemical digestion involves food being broken down into simpler molecules by chemicals and enzymes. Whereas mechanical digestion involves food being broken down physically but not chemically.
19. Excretion is the process by which wastes and excess substances are removed from the body.
20. Kidneys perform the very important job of removing nitrogen-containing wastes from the blood. They also control concentrations of salts, water, minerals, and vitamins.

Video Review (p. 19)

1. The pasta has the greatest concentration of carbohydrates.
2. The person is breathing out a cloud of water vapor, which is a by-product of cellular activities
3. This is an example of mechanical digestion and results in the physical breakdown of food.
4. The person's skin becomes sweaty from exercising hard. Sweating is the process by which waste is eliminated through skin.

Video Assessment (p. 19)

1. carbohydrates
2. amino acids
3. mechanical
4. peristalsis
5. chyme
6. villi
7. excretion
8. liver
9. kidneys
10. nephrons

Post Assessment (p. 17-18)

1. b- hydrochloric acid and pepsin
2. c - colon
3. a - urine
4. b - nutrients
5. d - chyme
6. a - excretion
7. c - digestion
8. a - teeth chewing
9. b - skin
10. a - carbohydrates
11. a - absorption of nutrients
12. b - peristalsis
13. b - surface area
14. d - amino acids
15. d - liver
16. Kidneys perform the very important job of removing nitrogen-containing wastes from the blood. They also control concentrations of salts, water, minerals, and vitamins.
17. Digestion is the process by which the body breaks down food into simpler forms it can use.
18. Excretion is the process by which wastes and excess substances are removed from the body.
19. Chemical digestion involves food being broken down into simpler molecules by chemicals and enzymes. Whereas mechanical digestion involves food being broken down physically but not chemically.
20. The major nutrients include proteins, fats, carbohydrates, vitamins and minerals. Fruits, breads, and pasta are carbohydrate-rich.

Exploring Digestive and Excretory Systems Vocabulary (p. 20)

1. b - mechanical digestion
2. d - nutrients
3. f - lipids
4. h - amino acids
5. j - chemical digestion
6. o - esophagus
7. l - peristalsis
8. n - chyme
9. m - absorption
10. k - villi
11. i - excretion
12. g - liver
13. e - skin
14. c - kidneys
15. a - nephrons

Answer Key to Student Activities

Physical and Chemical Digestion (p. 21)

	Description of Mechanical Digestion	Description of Chemical Digestion	Enzymes and Compounds	Nutrients digested
Mouth	Teeth and tongue chew food into smaller pieces	Salivary juices begin digesting food	salivary amylase	carbohydrates
Stomach	contractions and churning mix food	gastric juices secreted by stomach	hydrochloric acid kills harmful bacteria; pepsin breaks down large proteins; salivary amylase	Proteins carbohydrates
Small Intestine	Food is moved via peristalsis through small intestine	Pancreatic juice; bile; intestinal juice	numerous including: amylase, proteases; trypsin; maltase; lipase	Proteins; carbohydrates; fats; vitamins; minerals

Describing the Digestive Tract (p. 22-23)

1. liver
2. gall bladder
3. small intestine
4. large intestine
5. stomach
6. pancreas
7. rectum
8. anus

Digestion Structure	Description of Structure	Role in Digestion
Mouth	opening that includes tongue and numerous teeth	chews food into smaller pieces; begins chemical digestion and lubricates food
Esophagus	muscular tube that transports food from mouth to stomach	primary role is transportation of food
Stomach	Muscular sac with thick expandable walls	reduces food to a thin, soupy mixture called chyme; begins digesting proteins and helps digest carbohydrates
Small Intestine	a long, hollow tube that is about 2.5 cm in diameter and 7 meters long	chemical digestion of proteins, and carbohydrates is completed here; vitamins, fats, and minerals are absorbed
Large Intestine	The colon is a hollow tube that is about 6 cm wide and about 1.5 meters long	water and water soluble vitamins are absorbed here. Feces are formed and transported from colon.

1. It is a one-way system in that food moves from the mouth located in the anterior end, goes through the digestive tract, and exits the body at the posterior end.
2. The chemical digestion of carbohydrates and proteins is completed in the small intestine. Absorption of fats, vitamins, minerals, and amino acids into the bloodstream occurs here.
3. The liver is a large and very important organ that carries out over 500 different functions in the body. It plays an active role in digestion and excretion.

Nutrients in Your Diet (p. 24)

Breakfast

Food	Description of Nutrients
Glass of orange juice	carbohydrates, high in vitamin C
Poached egg	high in protein
Buttered toast	carbohydrates in bread and fat in butter
Daily multi-vitamin pill	many multivitamins contain the daily requirement of vitamins

Lunch

Food	Description of Nutrients
Glass of water	no nutrients but is essential on a daily basis
Tuna fish sandwich	tuna is high in protein and some healthy fats; carbohydrates in bread
Apple	high in vitamins and minerals; is carbohydrate-rich
Carrot	carbohydrates and high in vitamins and minerals

Dinner

Food	Description of Nutrients
Glass of milk	carbohydrates and some fats
Piece of chicken	high in proteins, contains some fats
Potato	carbohydrate and rich in vitamins
Green salad	high in numerous vitamins and minerals
Asparagus	high in numerous vitamins and minerals
Ice cream	contains carbohydrates, fats, minerals, and vitamins

Kidneys: The Body's Filters (p. 25)

- a. medulla
- b. cortex
- c. ureter
- d. renal vein
- e. renal artery

1. Excretion is the process by which the body collects and removes wastes from the body.
2. The two kidneys are the main organs in the urinary system. They are located at the bottom of the rib cage near the back.
3. The kidneys remove nitrogen-containing wastes from the blood. They also control concentrations of substances in body fluids such as salts, water, minerals, and vitamins.
4. Urine is a waste product produced by the kidneys. It contains water, salts, and urea.
5. Nephrons are the fundamental filtering units in the kidney.

Preliminary Assessment

Name: _____

Directions: Circle the best answer for each of the following:

- Carbohydrates, fats, proteins, minerals, and vitamins are examples of:
 - energy
 - nutrients
 - electrolytes
 - organs
- The process of the body breaking down food into simpler forms it can use is called:
 - metabolism
 - excretion
 - digestion
 - energy synthesis
- Sugars, starches, and fibers are collectively referred to as:
 - carbohydrates
 - proteins
 - fats
 - vitamins
- The human body contains hundreds of different proteins it constructs from:
 - water
 - vitamins
 - carbohydrates
 - amino acids
- Which of the following is an example of mechanical digestion breaking down food into smaller pieces?
 - teeth chewing
 - stomach acids
 - saliva
 - bile
- The series of wave-like contractions that move food through the digestive tract is called:
 - excretion
 - peristalsis
 - chemical digestion
 - metabolism
- Which of the following substances aid in chemical digestion of food in the stomach?
 - bile and pancreatic juice
 - hydrochloric acid and pepsin
 - hemoglobin and iron
 - plasma and leukocytes
- In the stomach, solids are reduced to a thin, soupy liquid called:
 - saliva
 - hydrochloric acid
 - pepsin
 - chyme
- One of the most important tasks of the small intestine is the:
 - absorption of nutrients
 - collection of water
 - excretion of urine
 - repair of blood cells
- Small finger-like projections called villi in the small intestine add a great deal of:
 - gastric juice
 - surface area
 - infection
 - acid
- Undigested and unabsorbed materials from the small intestine pass into the:
 - gall bladder
 - stomach
 - colon
 - liver
- The process by which wastes and excess substances are removed from the body is called:
 - excretion
 - absorption
 - digestion
 - metabolism
- Which organ plays a very important role in the process of excretion?
 - heart
 - stomach
 - brain
 - liver
- Sweating is the process by which waste is eliminated through the:
 - mouth
 - skin
 - lungs
 - blood
- The kidneys remove wastes from the blood and process them into a liquid called:
 - urine
 - lymph
 - plasma
 - saliva

Post Assessment

Name: _____

Directions: Circle the best answer for each of the following:

- Which of the following substances aid in chemical digestion of food in the stomach?
 - bile and pancreatic juice
 - hydrochloric acid and pepsin
 - hemoglobin and iron
 - plasma and leukocytes
- Undigested and unabsorbed materials from the small intestine pass into the:
 - gall bladder
 - stomach
 - colon
 - liver
- The kidneys remove wastes from the blood and process them into a liquid called:
 - urine
 - lymph
 - plasma
 - saliva
- Carbohydrates, fats, proteins, minerals, and vitamins are examples of:
 - energy
 - nutrients
 - electrolytes
 - organs
- In the stomach, solids are reduced to a thin, soupy liquid called:
 - saliva
 - hydrochloric acid
 - pepsin
 - chyme
- The process by which wastes and excess substances are removed from the body is called:
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 - teeth chewing
 - stomach acids
 - saliva
 - bile
- Sweating is the process by which waste is eliminated through the:
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- Sugars, starches, and fibers are collectively referred to as:
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 - repair of blood cells
- The series of wave-like contractions that move food through the digestive tract is called:
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 - chemical digestion
 - metabolism
- Small finger-like projections called villi in the small intestine add a great deal of:
 - gastric juice
 - surface area
 - infection
 - acid
- The human body contains hundreds of different proteins it constructs from:
 - water
 - vitamins
 - carbohydrates
 - amino acids
- Which organ plays a very important role in the process of excretion?
 - heart
 - stomach
 - brain
 - liver

Post Assessment

Name: _____

Directions: Answer the following using complete sentences

16. What are some of the primary jobs of the kidneys?

17. What is digestion?

18. What is excretion?

19. How is chemical digestion different from mechanical digestion?

20. List two examples of nutrients, and include the examples of food in which they are abundant.

Video Review

Name: _____

Directions: Answer these questions as you watch the video:

1. You Decide!

Which of these foods has the greatest concentration of carbohydrates?

2. You Observe!

What do you see as this person breathes out on a cold day?

3. You Decide!

What type of digestion is this called?

4. You Predict!

What will happen to the skin of this person if they exercise hard for a long time?

Video Assessment

Directions: After you watch the video, fill in the blank to complete the sentence.

1. Sugars, starches, and fibers are types of _____.
2. _____ are the building blocks of proteins.
3. In _____ digestion food is physically broken down.
4. Wave-like muscular contractions called _____ move food through the digestive tract.
5. In the stomach food is reduced to a soupy mixture called _____.
6. _____ add surface area to the inner walls of the small intestine.
7. _____ is the process by which wastes are removed from the body.
8. The _____ is a large organ that carries out over 500 different functions.
9. _____ remove nitrogen-containing wastes from the blood.
10. The fundamental filtering units in the kidneys are called _____.

Digestive and Excretory Systems Vocabulary

Name: _____

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

____ 1) alneacmhc sngteiodi _____

____ 2) eunnritts _____

____ 3) iispld _____

____ 4) ioanm isadc _____

____ 5) hmcleaic ietodsnig _____

____ 6) uapssheog _____

____ 7) tspiesrlia _____

____ 8) ycehm _____

____ 9) rnpboiaots _____

____ 10) ilvil _____

____ 11) ctnroexie _____

____ 12) vlrle _____

____ 13) knsi _____

____ 14) ynisdek _____

____ 15) hnnesrpo _____

a. Fundamental filtering units in the kidney.

b. The process of breaking food into smaller and smaller pieces by physical means.

c. Two bean-shaped organs located at the bottom of the rib cage; play a key role in removing nitrogen-containing wastes from blood.

d. The substances in food that provide the energy and raw materials the body needs to stay healthy.

e. The largest excretory organ in the body; excretes water, salts, and urea.

f. Complex nutrients of which there are two main groups: saturated fats and unsaturated fats.

g. A large organ responsible for hundreds of different digestive and excretory functions.

h. The building blocks of proteins needed by the body.

i. The process by which wastes and excess substances are removed from the body.

j. Involves food being broken down into simpler molecules by chemicals and enzymes.

k. Small finger-like projections on the inner lining of the small intestine; contains capillaries and lacteals.

l. Wave-like muscular contractions that move food through the digestive tract.

m. The process of nutrients being absorbed into the bloodstream.

n. A thin, soupy liquid that consists of partially digested food.

o. A long, muscular tube leading from the pharynx to the stomach.

Physical and Chemical Digestion

Name: _____



Background:

As soon as you bite into an apple the process of digestion begins. What is digestion? Digestion is the process by which the body breaks down food into simpler forms it can use. The activities involved in digestion can be categorized into two main groups: mechanical digestion and chemical digestion. Both forms of digestion work together in helping the body break down food into forms it can use.

In mechanical digestion food is physically broken down but not chemically changed. In the mouth for example, the tongue and teeth work to break down food into smaller and smaller pieces. As food is broken down into smaller pieces the total surface area of the food increases. An increase in surface area provides more contact space for substances involved in chemical digestion to take action.

In the process of chemical digestion food is broken down by chemicals and enzymes into simpler forms. There are many different digestive chemicals and enzymes, many of them quite nutrient specific. In the stomach, for example, a digestive enzyme called pepsin carries out the role of breaking down proteins.

In this activity you will describe the specific ways mechanical and chemical digestion occur in parts of the digestive system.

Directions:

Using your knowledge about digestion, along with other sources (encyclopedia, textbooks, and biology reference books) complete the chart below.

	Description of Mechanical Digestion	Description of Chemical Digestion	Enzymes and Compounds	Nutrients Digested
Mouth				
Stomach				
Small intestine				

Describing the Digestive Tract

Name: _____

Background:

When you swallow food, it moves through an area in the back of the throat called the pharynx, and into a long muscular tube called the esophagus. Through a series of wave-like muscular contractions referred to as peristalsis, food travels through the digestive tract toward the stomach. A valve-like structure called the cardiac sphincter regulates the passage of food into the stomach.

The stomach is a thick-walled sac made of smooth muscle. It can hold about two liters of food or liquid. Place your hand between the bottom of your ribs and your belly button. This is the approximate location of your stomach. Muscular contractions of the stomach wall churn and mix food. This is an example of mechanical digestion and results in the physical breakdown of food. Food is chemically digested in the stomach as well when it mixes with hydrochloric acid, pepsin, and mucus secreted by glands located in the walls of the stomach. While liquids pass through the stomach relatively quickly, solids are reduced more slowly to a thin, soupy liquid called chyme. After two to six hours, chyme passes through a valve called the pyloric sphincter into the small intestine.

The small intestine is a hollow tube that's only about 2.5 centimeters in diameter, but it stretches about seven meters. The chemical digestion of carbohydrates and proteins is completed in the small intestine. Absorption of fats, vitamins, minerals, and amino acids into the bloodstream also occurs here. Small finger-like projections called villi, that line the inner walls of the small intestine, are packed with capillaries and lymph vessels called lacteals. Capillaries absorb carbohydrates and proteins while lacteals absorb fats and fatty acids.

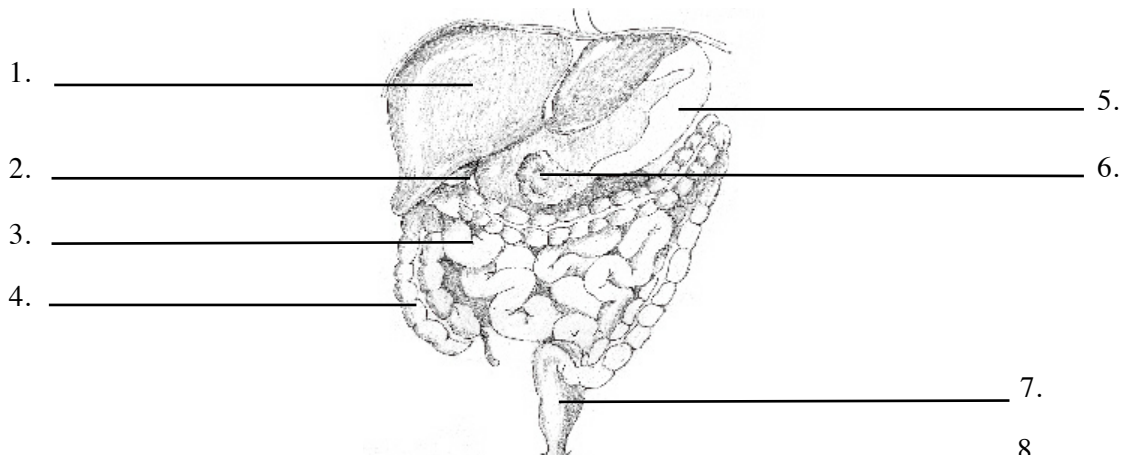
In the small intestine, chyme is mixed with bile from the liver, pancreatic juice from the pancreas, and intestinal juice from glands in the intestinal wall. These secretions contain enzymes and other substances necessary for digestion. When most of the water has been removed, solid waste called feces remains. Feces is removed from the body through the anus.

Chances are you don't particularly like thinking about how your body gets rid of waste. Still, removing waste is just as an important process as providing the body with energy. Excretion is the process by which wastes and excess substances are removed from the body. Your household produces wastes as a result of daily activities. Similarly, the body produces waste as a result of normal metabolic processes.

The liver, a very big organ, carries out over 500 different functions, and is active in both digestion and excretion. In the process of excretion the liver removes wastes and potentially harmful substances from the blood, purifying it. The liver also plays a key role in breaking down excess amino acids into ammonia, pyruvic acid, glycogen, or fat for storage.

Directions:

1. Read the background section describing the structures and functions of the human digestive system.
2. Label the major structures of the human digestive system on the diagram below.



Describing the Digestive Tract

Name: _____

3. In the table below describe the structure. Also explain the role the structure plays in the digestive process.

Digestion Structure	Description of Structure	Role in Digestion
Mouth		
Esophagus		
Stomach		
Small intestine		
Large intestine		

4. In this part of the activity you will create a sketch of the major digestive organs in your own body. Have a partner trace the outline of your upper torso on a large piece of paper. Sketch in the mouth, esophagus, stomach, small intestine, and large intestine in the appropriate place on the paper.

Questions:

1. Describe how the human digestive tract is a one-way system.
2. Explain the process of digestion in the small intestine.
3. What is the role of the liver?

Nutrients in Your Diet

Name: _____



Background:

As you know, food contains a number of different kinds of nutrients the body needs for energy, and regulation. It's critical that the body obtains the correct quantities, quality, and combinations of nutrients. Just as you wouldn't fill the gas tank of a car with soda, you shouldn't provide your body with bad food. The body needs a healthy, well-balanced diet that includes the right nutrients.

There are five main groups of nutrients needed by the body. These major nutrients are carbohydrates, fats, proteins, vitamins, and minerals. The food you eat on a regular basis contains a mixture of these nutrients. However, some foods have a greater concentration, or abundance, of certain nutrients than other foods. For example, pasta contains some vitamins, minerals and proteins, but it is especially rich in carbohydrates.

Directions: In this activity you will figure out the dominant types of nutrients in a breakfast, lunch, and dinner. Below are three charts that include foods in a breakfast, lunch, and dinner. Using your knowledge of nutrients, as well as other reference resources, describe the major nutrients in each meal.

Breakfast

Food	Description of Nutrients
Glass of orange juice	
Poached egg	
Buttered toast	
Daily multi-vitamin pill	

Lunch

Food	Description of Nutrients
Glass of water	
Tuna fish sandwich	
Apple	
Carrot	

Dinner

Food	Description of Nutrients
Glass of milk	
Piece of chicken	
Potato	
Green salad	
Asparagus	
Ice cream	

Kidneys: The Body's Filters

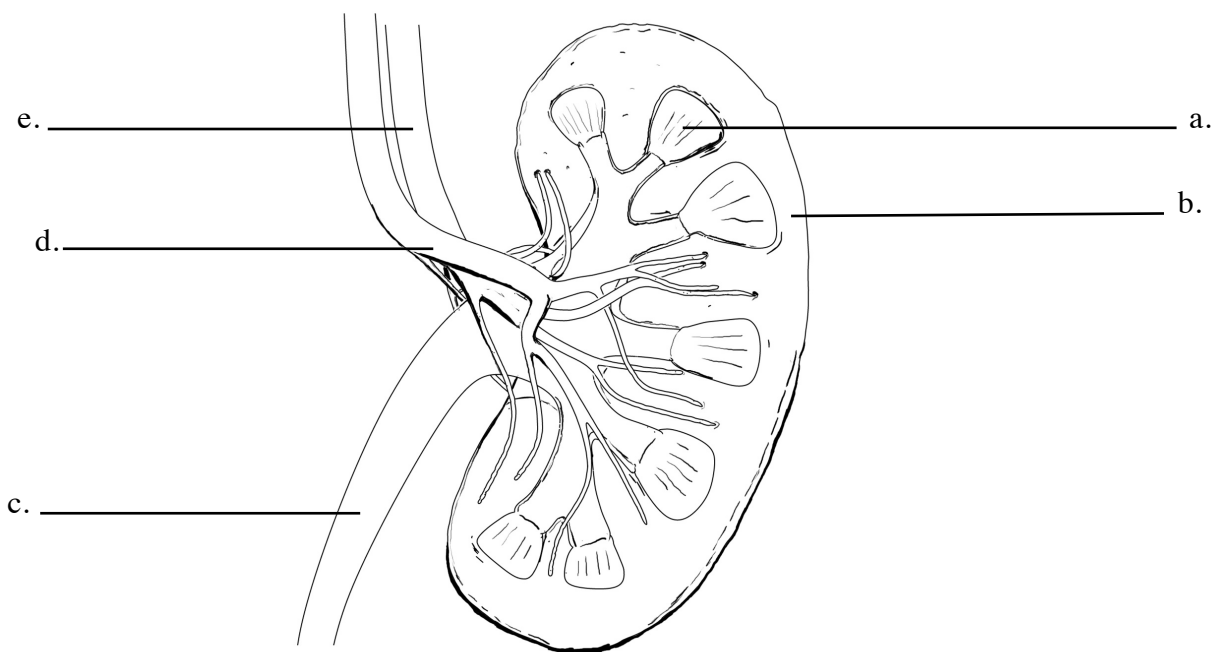
Name: _____

Background:

One of the most important ways that the body excretes wastes is via specialized structures in the urinary system. The main organs of the human urinary system include two bean-shaped kidneys located at the bottom of the rib cage near the back. Kidneys perform the very important job of removing nitrogen-containing wastes from the blood. They also control concentrations of substances in body fluids such as salts, water, minerals, and vitamins. And, kidneys also regulate blood volume and pH levels. The kidneys remove wastes from the blood and process them into a yellow colored liquid called urine. Urine is a sterile liquid containing salts, urea, and water. The fundamental filtering units in the kidneys are nephrons. Each kidney contains over one million nephrons! Most of the fluid is returned or reabsorbed by the blood stream along with other substances needed by the body. Urine passes out of the kidneys to the bladder through small tubes called ureters. From time to time urine is emptied from the bladder through the urethra and exits the body.

Directions:

Label the parts in the kidney cross-section below. Answer the questions.



Questions:

1. Define the process of excretion in the human body.
2. What are the main excretory organs in the urinary system? Describe their locations.
3. What are some of the functions of the kidneys?
4. What is urine?
5. What are nephrons?