Digestive and Excretory Systems

Focus on the New York State Learning Standards

- **1.2a** Each system is composed of organs and tissues which perform specific functions and interact with each other.
- **1.2b** Tissues, organs, and organ systems help to provide all cells with nutrients, oxygen, and waste removal.
- **1.2c** The digestive system consists of organs that are responsible for the mechanical and chemical breakdown of food. The breakdown process results in molecules that can be absorbed and transported to cells.
- **1.2e** The excretory system functions in the disposal of dissolved waste molecules, the elimination of liquid and gaseous wastes, and the removal of excess heat energy.

The digestive system breaks down food into usable forms, and the excretory system functions to rid the body of liquid and gaseous wastes.

The **digestive system** is a system made of organs that function in breaking food down into usable forms.

Enzymes are chemicals that speed up chemical reactions.

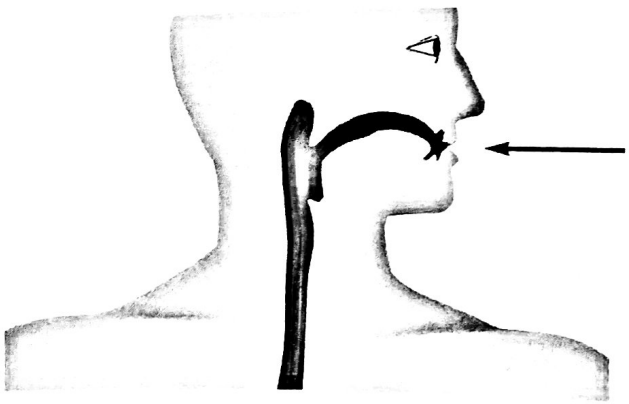
The **excretory system** is a system made of organs that function in eliminating liquid and gaseous wastes from the body.

Guided Instruction

DIRECTIONS Read the following information.

Food contains energy and nutrients the body needs. The **digestive system** is made up of the tissues and organs that mechanically and chemically digest food. The result is small molecules that can be absorbed into the bloodstream and transported to cells. The organs of the digestive system shown on the next page include the mouth, pharynx (throat), esophagus, stomach, liver, pancreas, small intestine, and large intestine.

Mechanical digestion includes chewing food into smaller pieces. Smaller pieces of food are easier to digest chemically. The stomach is a muscular organ that also functions in mechanical digestion. **Enzymes** in saliva and in the other parts of the digestive system speed the chemical breakdown of food.



Mouth (mechanical digestion begins with chewing, and saliva begins chemical digestion)

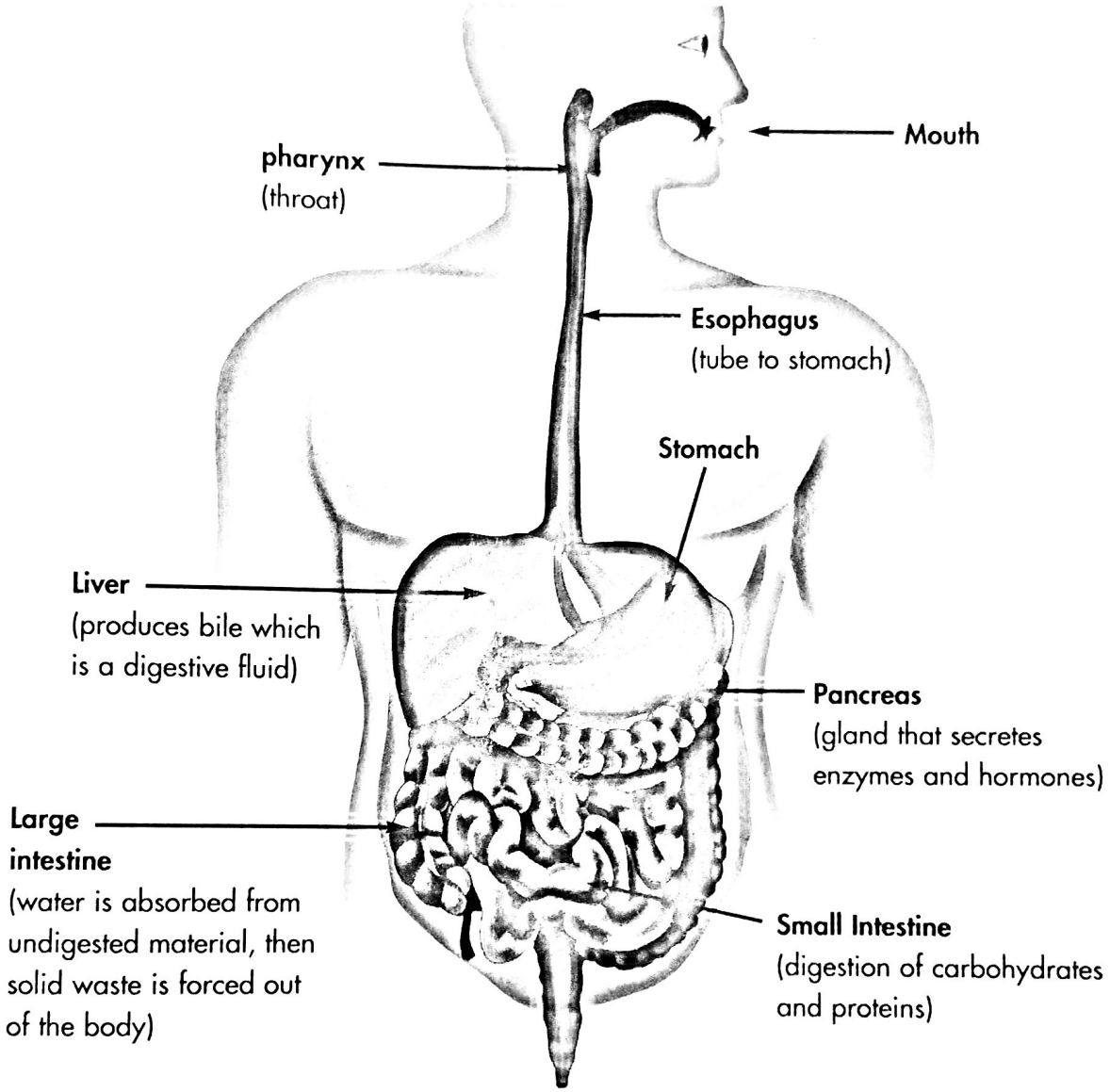
Guided Questions

What are some organs in the **digestive system?**

What is the function of **digestive enzymes?**

Where does digestion begin?

THE DIGESTIVE SYSTEM



Most chemical digestion occurs in the small intestine. There, secretions from the liver and pancreas finish breaking food down into molecules the body can absorb. The large intestine absorbs remaining water.

The **excretory system** includes the lungs, skin, and the kidneys. The lungs remove carbon dioxide from the body. The skin has an important function of releasing water and salt from the body as well as releasing excess heat. Sweating actually cools the body. The kidneys are the main organs of excretion.
They filter blood, removing excess water and dissolved wastes. The cleaned blood returns to circulation.
The wastes and water are eliminated as urine.

Guided Questions

What are the organs of the **excretory system?**

DIRECTIONS For each question, write your answer in the spaces provided.

1. What is mechanical digestion and where are the two places in the digestive system that it takes place?

2. How is mechanical digestion different from chemical digestion?

3. What is the purpose of chemical digestion? What is responsible for the rate of chemical digestion?

4. List the three organs of excretion and give a function for each.

5. Why would people become very sick if their kidneys stopped functioning properly?

6. How is a disease that makes it hard for the small intestine to function likely to affect the body? Explain your answer.

Apply the New York State Learning Standards to the State Test

Directions (7–11): For each question, write your answer in the spaces provided. Base your answers to questions 7 through 11 on the paragraph and diagram below.

DIGESTIVE JUICES AND ENZYMES		
Digestive Juice	**Enzyme**	**Effect of Juices and Enzymes on Nutrients**
saliva	ptyalin	breaks down starch into complex sugars
gastric (stomach)	pepsin	breaks down protein into simpler proteins
pancreatic (pancreas)	trypsin, lipase, and amylase	breaks down proteins, starch, and fats into simpler proteins, glycerol, and fatty acids
intestinal (intestines)	sucrase, maltase, and other enzymes	breaks down fats, simpler proteins, and complex sugars into fatty acids, glycerol, amino acids, and simple sugars

7 What type of digestion are enzymes involved in? How do they work?

8 Are individual amino acids likely to be found in the mouth? Explain.

9 Enzymes are not found in the esophagus or the large intestine. Based on the absence of enzymes, what can be concluded about these organs? Explain.

10 What is one reason most of the nutrients in food are absorbed in the small intestine?

_____

_____

11 What is probably the role of the esophagus in the digestive system?

_____

Directions (12–18): Each question is followed by four choices. Decide which choice is the *best* answer. Circle the number of the answer you have chosen.

12 Which organ is a part of the excretory system?

(1) lung
(2) stomach
(3) esophagus
(4) pancreas

13 Mechanical digestion breaks food into

(1) new molecules
(2) smaller pieces
(3) chemicals
(4) enzymes

14 What is the role of the kidneys?

(1) digest and absorb nutrients
(2) clean and filter blood
(3) transport nutrients to cells
(4) control body functions

15 Which of the following digestive organs is the site of most nutrient absorption?

(1) small intestine
(2) large intestine
(3) esophagus
(4) stomach

16 The role of the digestive system is to break food down into molecules that can be

(1) fit into the body
(2) eliminated as waste
(3) carried to cells
(4) passed on to offspring

17 What is the role of the excretory system?

(1) protection from disease
(2) production of offspring
(3) generation of movement
(4) elimination of wastes

18 Both mechanical and chemical digestion occur in the

(1) small intestine
(2) esophagus
(3) liver
(4) stomach

Focus on the New York State Learning Standards

Skeletal and Muscular Systems

1.2a Each system is composed of organs and tissues which perform specific functions and interact with each other.
1.2b Tissues, organs, and organ systems help to provide all cells with nutrients, oxygen, and waste removal.
1.2g Locomotion, necessary to escape danger, obtain food and shelter, and reproduce, is accomplished by the interaction of the skeletal and muscular systems, and coordinated by the nervous system.

The muscular system and the skeletal system work together to help an organism move.

The **skeletal system** is a system made up of bones, cartilage, ligaments, and tendons.
The **muscular system** is a system made up of three different types of muscles that allow for movement.

Cartilage is softer and more flexible than bone but also gives support.

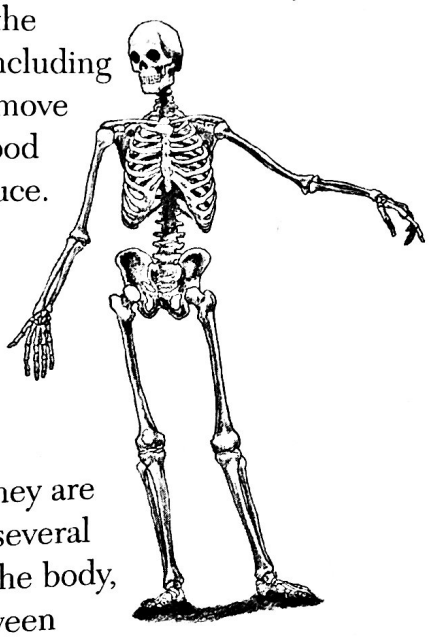
Ligaments connect bones together.

Tendons connect muscles to bones.

Guided Instruction

DIRECTIONS Read the following information.

How do you like to spend your free time? Do you play a sport or a musical instrument? These activities require you to move different parts of your body. The ability to move is vital for the survival of most animals, including humans. Animals need to move to escape danger, obtain food and shelter, and to reproduce. The skeletal and muscular systems-controlled by the nervous system-are chiefly responsible for movement.



Bones are the organs of the **skeletal system**. They are hard and strong and have several functions. Bones support the body, giving it shape. Joints between bones allow for controlled movements. Bones store minerals such as calcium and phosphorus and protect softer parts of the body.

There are other tissues in the skeletal system. **Ligaments** connect some bones. **Tendons** connect muscles to bones. A soft, flexible tissue, called **cartilage**, is found where some bones come together. Cartilage also supports some body parts, such as the nose and ears.

Guided Questions

What are the organs of the **skeletal system?**

What do **ligaments** do?

What are **tendons** attached to?

Where is **cartilage** found?

The **muscular system** produces the force to move body parts. There are three different types of muscles in the body: skeletal, smooth, and cardiac. Every type of muscle, however, works by contracting, or getting shorter.

Skeletal muscles are used to move body parts such as arms and legs. A person can control the contractions of skeletal muscles. Smooth muscles are found in internal organs, such as the stomach and intestines. Cardiac muscle is found only in the heart. A person cannot control contractions of smooth and cardiac muscles.

Guided Questions

What is the function of the **muscular system?**

What are the three types of muscles found in the body?

Directions For each question, write your answer in the spaces provided.

1. What are the parts of the skeletal system?

2. List some functions of the skeletal system.

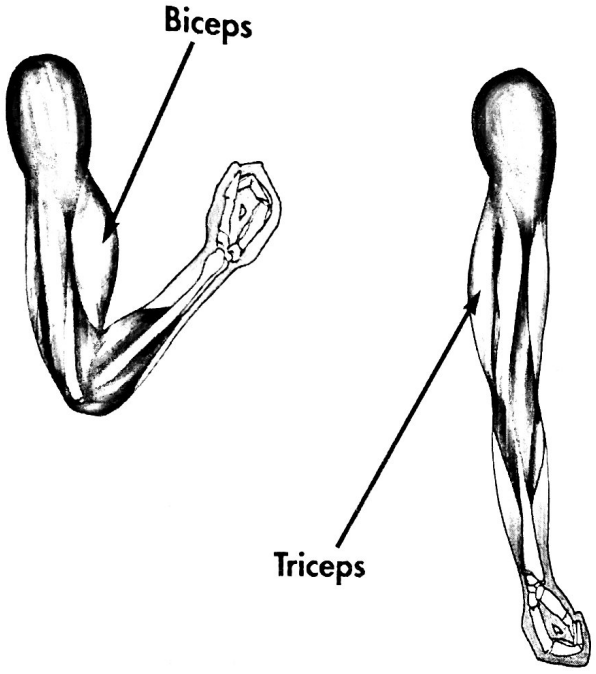
3. How do skeletal muscles cause bones to move?

4. List the three types of muscles and where in the body each type can be found.

5. What is the difference between bone and cartilage?

Apply the New York State Learning Standards to the State Test

Directions (6–9): For each question, write your answer in the spaces provided. Base your answers to questions 6 through 9 on the paragraph and diagram below.



Skeletal muscles pull on bones to produce movement. Many of the skeletal muscles work in opposing pairs. One muscle contracts while the other relaxes. Typically, a muscle that works to straighten part of the body is paired with a muscle that works to bend that part of the body.

6 Which muscle is the triceps paired with?

_____

7 Which muscle works to straighten your arm at the elbow?

_____

8 Which muscle is likely contract when a person picks up a box off the floor?

_____

9 What type of tissue connects a muscle to a bone?

_____

Directions (10–17): Each question is followed by four choices. Decide which choice is the *best* answer. Circle the number of the answer you have chosen.

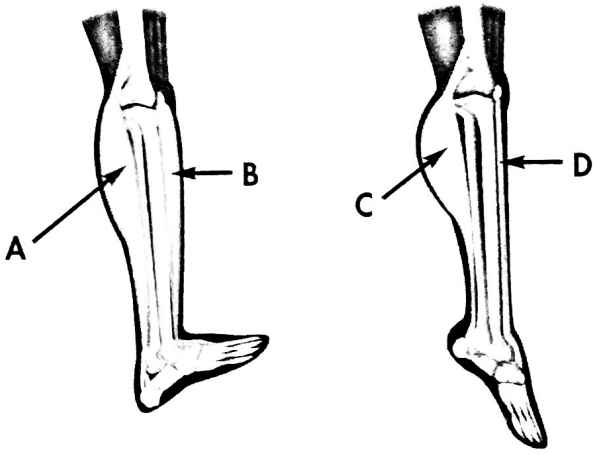
10 Which body system generates force to create body movements such as walking and swimming?

(1) skeletal
(2) muscular
(3) nervous
(4) circulatory

11 Which substance is stored in bones and released for use as the body needs it?

(1) calcium
(2) oxygen
(3) sugar
(4) water

12 Which muscles shown below are contracting?



(1) A and B
(2) B and C
(3) C and D
(4) D and A

13 Which tissue connects two bones together?

(1) skin
(2) joint
(3) tendon
(4) ligament

14 In which location is smooth muscle found?

(1) heart
(2) brain
(3) stomach
(4) arm

15 When a muscle contracts, it becomes

(1) lighter
(2) heavier
(3) shorter
(4) longer

16 Which is a role of the skeleton?

(1) generating force
(2) protecting organs
(3) sending instructions
(4) collecting information

17 Which type of muscle can a person control?

(1) cardiac
(2) skeletal
(3) cartilage
(4) smooth

Focus on the New York State Learning Standards

Nervous and Endocrine Systems

1.2a Each system is composed of organs and tissues which perform specific functions and interact with each other.
1.2b Tissues, organs, and organ systems help to provide all cells with nutrients, oxygen, and waste removal.
1.2g Locomotion is coordinated by the nervous system.
1.2h The nervous and endocrine systems interact to control and coordinate the body's responses to changes in the environment, and to regulate growth, development, and reproduction. Hormones are chemicals produced by the endocrine system; hormones regulate many body functions.
5.1f Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required for survival. Regulation includes a variety of nervous and hormonal feedback systems.

The nervous system and the endocrine system control and coordinate all the body activities, as well as maintain homeostasis.

The **endocrine system** is a system made of glands that secrete hormones to help control and coordinate activities in the body.

The **nervous system** is a system made of organs that control and coordinate body activities.

A group of cells that produce a chemical that is used elsewhere in the body is called a **gland**.

Hormones are chemicals that transmit signals from one part of the body to another.

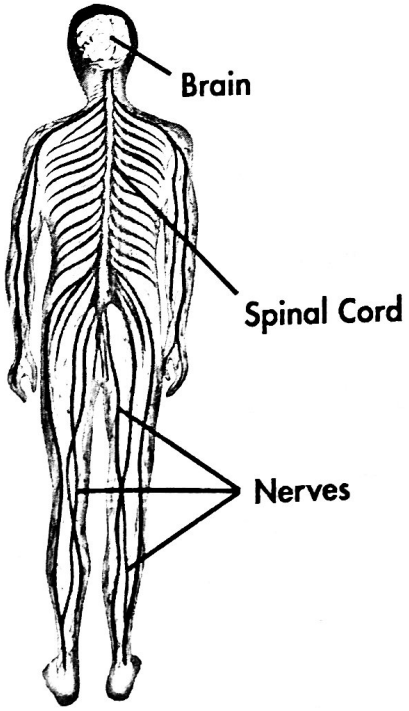
Homeostasis is the process in which a stable, internal environment is maintained in an organism.

Guided Instruction

DIRECTIONS Read the following information.

Can you remember a time when you were scared? Maybe your heart started pounding and your palms became sweaty. This reaction was a result of the interactions of your **endocrine system** and **nervous system**. These systems work together to control and coordinate different body activities in response to changes in your environment.

The nervous system is composed of the brain, spinal cord, nerves, and sense organs.



Guided Questions

What are the parts of the **endocrine system?**

What are some parts of the **nervous system?**

The nervous system receives and processes information from both inside and outside the body and then controls the body's response. For example, suppose you touch a hot object. The nervous system detects heat and causes you to pull your hand away. The nervous system quickly sends signals to specific parts of the body. Because it can react so quickly, the nervous system is able to control shorter term processes such as moving, breathing, and heart rate.

The endocrine system includes the adrenal, thyroid, parathyroid, pituitary, and thymus glands. The pancreas, testes, and ovaries are also glands of the endocrine system. These **glands** secrete chemical messengers called hormones directly into the bloodstream to affect many organs at once. A response to a hormone is slower than a response to a nerve signal. **Hormones** regulate many slower body functions such as metabolism, growth, development, and reproduction.

Humans cannot survive large changes in body conditions such as temperature, heartbeat, and the amount of chemicals in the bloodstream. Nervous and endocrine feedback mechanisms detect changes and alter the rate of different body functions to maintain stability. This process is called **homeostasis.** Homeostasis results in a stable internal environment.

Guided Questions

List five glands of the **endocrine system.**

What does a **gland** do?

What do **hormones** do?

What is **homeostasis?**

Directions For each question write your answer in the spaces provided.

1. What do the nervous and endocrine systems accomplish by working together?

_____

_____

2. List three endocrine glands and describe the function of glands.

_____

_____

_____

3. How are the nervous system and the endocrine system similar?

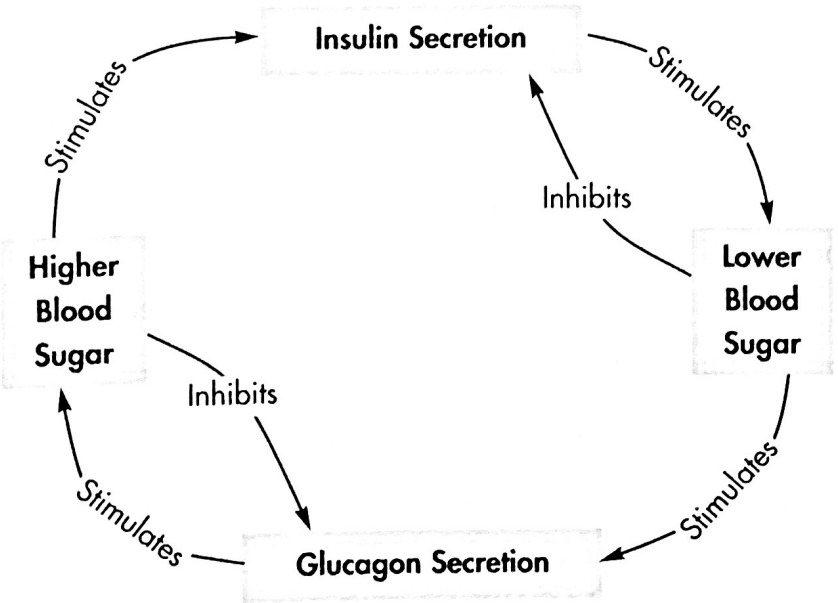
4. Why is the nervous system better suited to control a person's movement than the endocrine system?

Apply the New York State Learning Standards to the State Test

Directions (5–8): For each question, write your answer in the spaces provided. Base your answers to questions 5 through 8 on the paragraph and sequence chain below.

HOW THE PANCREAS REGULATES BLOOD SUGAR LEVELS

When blood sugar is high, cells in pancreas produce insulin, which stimulates cells to absorb sugar from the blood.



When blood sugar is low, cells in pancreas produce glucagon, which raises amount of glucose in the blood.

Diabetes is a disease that makes it difficult for a person to regulate the level of glucose in the bloodstream. The sequence chain above shows how a healthy person is able to regulate the level of glucose in the bloodstream.

5 Which two hormones interact to control the blood glucose levels?

6 What triggers the pancreas to secrete insulin? What triggers the pancreas to secrete glucagon?

7 If a person misses a meal, which hormone is more likely to be secreted? Explain.

8 Describe how the regulation of blood glucose levels by insulin and glucagon illustrates homeostasis.

Directions (9–16): Each question is followed by four choices. Decide which choice is the *best* answer. Circle the number of the answer you have chosen.

9 Chemical messengers secreted by glands are called

(1) neurons
(2) enzymes
(3) antibodies
(4) hormones

10 Which body condition is kept stable by homeostasis?

(1) weight
(2) height
(3) skin color
(4) temperature

11 Which organ is a part of the endocrine system?

(1) stomach
(2) heart
(3) pancreas
(4) brain

12 Which statement best describes endocrine glands?

(1) function mainly to cure injuries
(2) found in various areas of the body
(3) controls the function of neurons and synapses
(4) secretes enzymes

13 Which of the following helps to maintain homeostasis in a human?

(1) sweating
(2) running
(3) sleeping
(4) crying

14 Which word best describes the role of the endocrine system?

(1) transport
(2) regulation
(3) protection
(4) digestion

15 Which body system senses and controls responses to changes in the environment?

(1) circulatory
(2) nervous
(3) skeletal
(4) respiratory

16 Which hormone helps to maintain proper blood sugar levels?

(1) adrenalin
(2) estrogen
(3) glucagon
(4) pepsin