

Image from <http://www.therapycouch.com/Images/MT.AP.Anatomical%20Position.jpg>

Tissues, Organs, & Systems

Cross-Curricular Focus: Life Science

Multi-cellular organisms have many cells that work together in specific ways, each group performing certain functions. When each group does its part, the organism gets everything that it needs.

A **tissue** is a large group of cells that all have the same purpose or function. Each kind of cell has unique characteristics such as shape, size, flexibility, color and texture. Nerve cells combine with other nerve cells to make nerve tissue. Muscle cells combine with other muscle cells to make muscle tissue. Bone cells combine with other bone cells to make bone tissue and so on.

An **organ** is a group of tissues that work together to do a certain job for the body. Some of the human body's organs include the stomach, lungs, heart, kidneys, brain and liver. Some of a plant's organs include roots, stems, fruit and leaves.

When several different organs join to meet the organism's needs, they are working together in an organ **system**. There are several different organ systems constantly working in most multi-cellular organisms. You are probably familiar with some of the human body systems. The respiratory system includes the lungs and all the body parts that allow us to breathe in oxygen and exhale carbon dioxide. The circulatory system includes the heart and all the body parts that help move blood around the body. The blood, in turn, carries nutrients and oxygen to all the cells of the body. The respiratory and circulatory systems work very closely together. The digestive system helps the body get nutrients from food that is eaten, and store energy for future use. The excretory system helps remove waste products that would otherwise harm the body.

Each of the body's systems is necessary for the overall health of the body. As the body's building blocks, cells join to make tissues. Tissues join to make organs. Organs join to make systems. It's all arranged to ensure the organism's survival.

Name: Key

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

Actual wording of answers may vary.

1) Which statement supports the fact that bone cells are smaller than bone tissue?

Bone cells combine with other bone cells to make bone tissue.

2) What is an organ? Give an example of an organ.

An organ is a group of tissues that work together to do a job for the body. Example: brain

3) List two organ systems.

example of correct answer: respiratory and digestive

4) Which organ system do you think is the most interesting? Why? student's choice

5) Why is it necessary for the respiratory and circulatory systems to work together?

The respiratory system takes in oxygen which the circulatory system distributes to the body.

KEY - System Chart

Complete the following chart that describes the body systems:

System	Functions	Organs
Integumentary	Mechanical, chemical and biological barrier - Protects internal environment from invasion - Protects against fluid and protein loss	Skin, sweat and oil glands, nails, and hair
Skeletal	Gives shape to the body, protects delicate parts of the body, muscle attachment, blood formation, stores minerals	Striated/Skeletal, Cardiac and Smooth bones, tendon, cartilage
Digestive	Physical /chemical breakdown of foodstuffs so they can be absorbed into the bloodstream and used by the cells/tissues, and eliminate non-digestible substances produced during metabolism	Mouth, salivary glands, pharynx, esophagus, stomach, intestine, liver, gallbladder, pancreas
Cardiovascular	Acquires oxygen, rids the body of carbon dioxide	Heart, arteries, veins, capillaries, lymph nodes, lymph vessels, spleen
Urinary	Filters the blood, eliminates wastes, regulates the fluid and chemical composition of the blood, helps maintain the acid-base balance, helps maintain mineral homeostasis, thus producing urine.	Kidneys, ureters, urinary bladder, urethra
Endocrine	Controls and coordinates bodily functions and the special senses	Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal, Gonads
Reproductive	Provides for reproduction	Male: testes, epididymis, vas deferens, ejaculatory duct, seminal vesicles, prostate gland, penis, urethra Female: ovaries, fallopian tubes, uterus, vagina, breasts
Muscular	Contract and relax to cause movement by pulling bones, stabilize body position, and generate heat	Skeletal, smooth and cardiac muscles
Nervous	Monitors internal and external environments with receptors, interprets stimuli, responds to stimuli by sending an electrical message to another nerve, a muscle, or a gland; thus, regulates bodily activities. Special senses are taste, smell, sight, hearing and equilibrium.	Nerves, brain, spinal cord, and special sense organs
Lymphatic	Carries some tissue fluid and wastes to blood, assists with fighting infection.	Lymph nodes, lymph vessels, spleen, tonsils, and thymus gland
Respiratory	Breathes in oxygen and eliminates carbon dioxide.	Nose, pharynx, larynx, trachea, bronchi, lungs

Organ Systems Overview

A. Use the key below to indicate the body systems that perform the following functions for the body:

- | | | | |
|-------------------|---------------------|-----------------|-------------|
| a. cardiovascular | d. integumentary | g. nervous | j. skeletal |
| b. digestive | e. lymphatic/immune | h. reproductive | k. urinary |
| c. endocrine | f. muscular | i. respiratory | |

- K. urinary 1. rids the body of nitrogen-containing wastes
- C. Endocrine 2. is affected by removal of the thyroid gland
- J. Skeletal 3. provides support and levers on which the muscular system acts
- A. cardiovascular 4. includes the heart
- H. Reproductive 5. causes the onset of the menstrual cycle (also c. endocrine)
- D. Integumentary 6. protects underlying organs from drying out and from mechanical damage
- E. Lymphatic/immune 7. protects the body; destroys bacteria and tumor cells
- B. Digestive 8. breaks down ingested food into its building blocks
- I. respiratory 9. removes carbon dioxide from the blood
- A. Cardiovascular 10. delivers oxygen and nutrients to the tissues
- F. Muscular 11. moves the limbs; facilitates facial expression
- K. urinary 12. conserves body water or eliminates excesses
- H. Reproductive and C. Endocrine 13. facilitate conception and childbearing
- C. Endocrine 14. controls the body by means of chemical molecules called hormones.
- D. Integumentary 15. is damaged when you cut your finger or get a severe sunburn

B. Use the above key, choose the *organ system* to which each of the following sets of organs or body structures belong:

- E. Lymphatic/immune 1. thymus, spleen, lymphatic vessels
- J. ~~skeletal~~ skeletal 2. bones, cartilages, tendons
- C. Endocrine 3. pancreas, pituitary, adrenals
- I. respiratory 4. trachea, bronchi, alveoli
- K. urinary 5. kidneys, bladder, ureters
- H. reproductive 6. testis, vas deferens, urethra
- B. digestive 7. esophagus, large intestine, rectum
- A. cardiovascular 8. arteries, veins, heart

C. The levels of organization of a living body are chemical, cell, tissue, organ, organ system, and organism.

D. Define organ: a body part or structure that is made up of 2 or more types of tissue and performs a specific body function

E. Using the terms provided, correctly identify all of the body organs provided with leader lines in the drawings shown below. The name the organ systems by entering the name of each on the answer blank below each drawing.

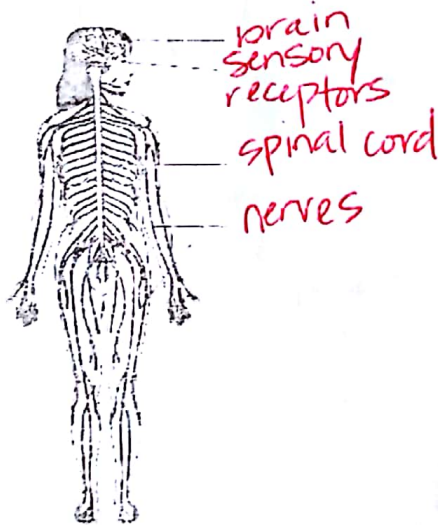
Blood vessels
Brain

Heart
Kidney

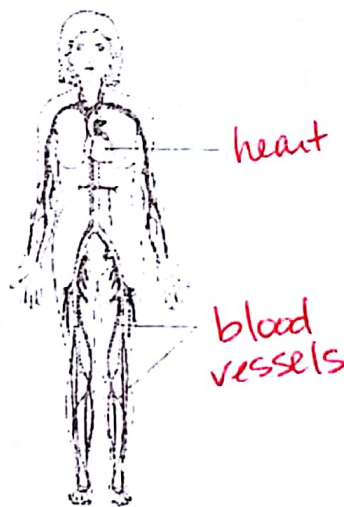
Nerves
Sensory receptor

Spinal cord
Ureter

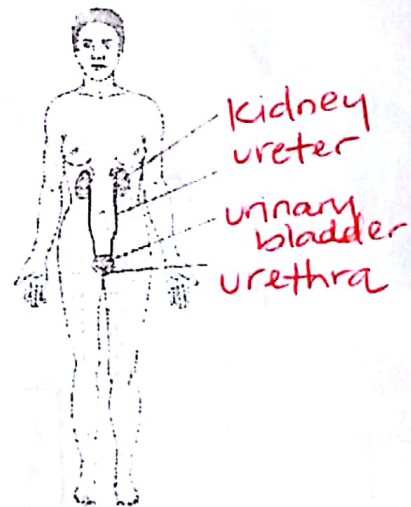
Urethra
Urinary bladder



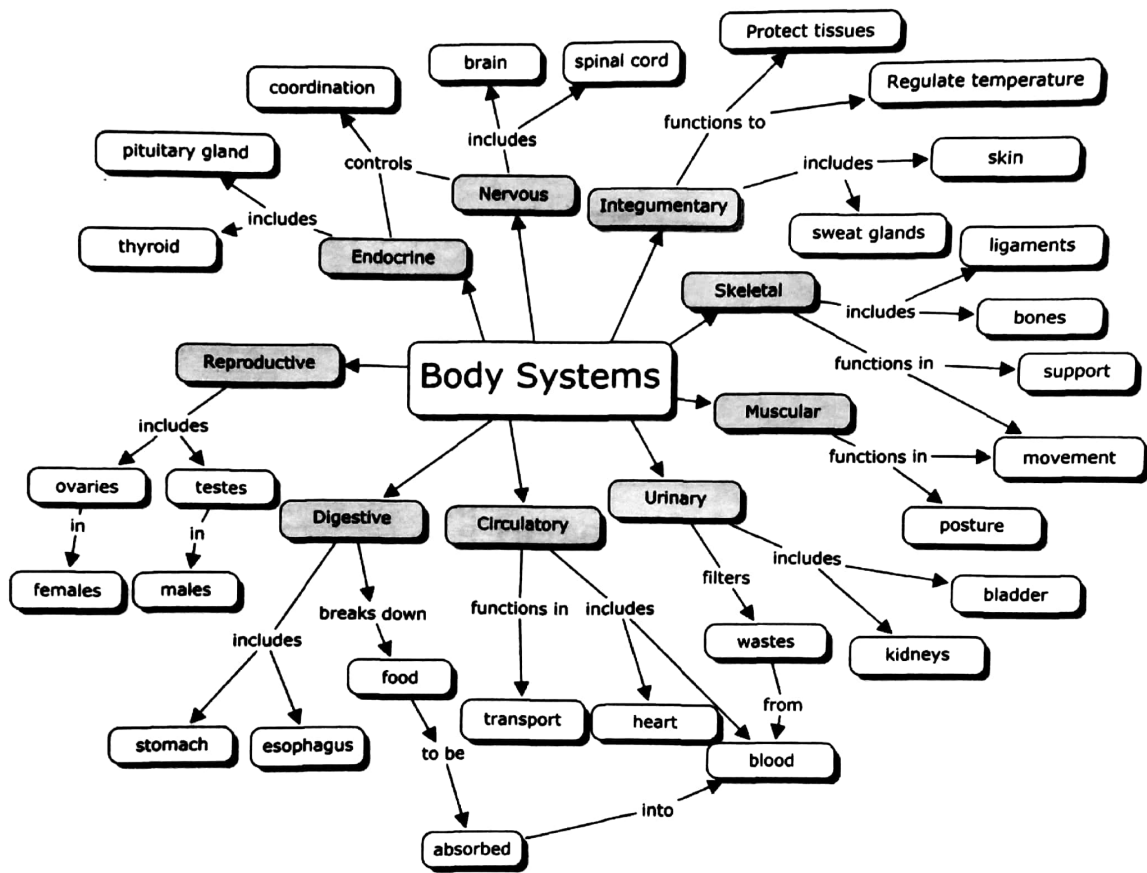
Nervous



Cardiovascular



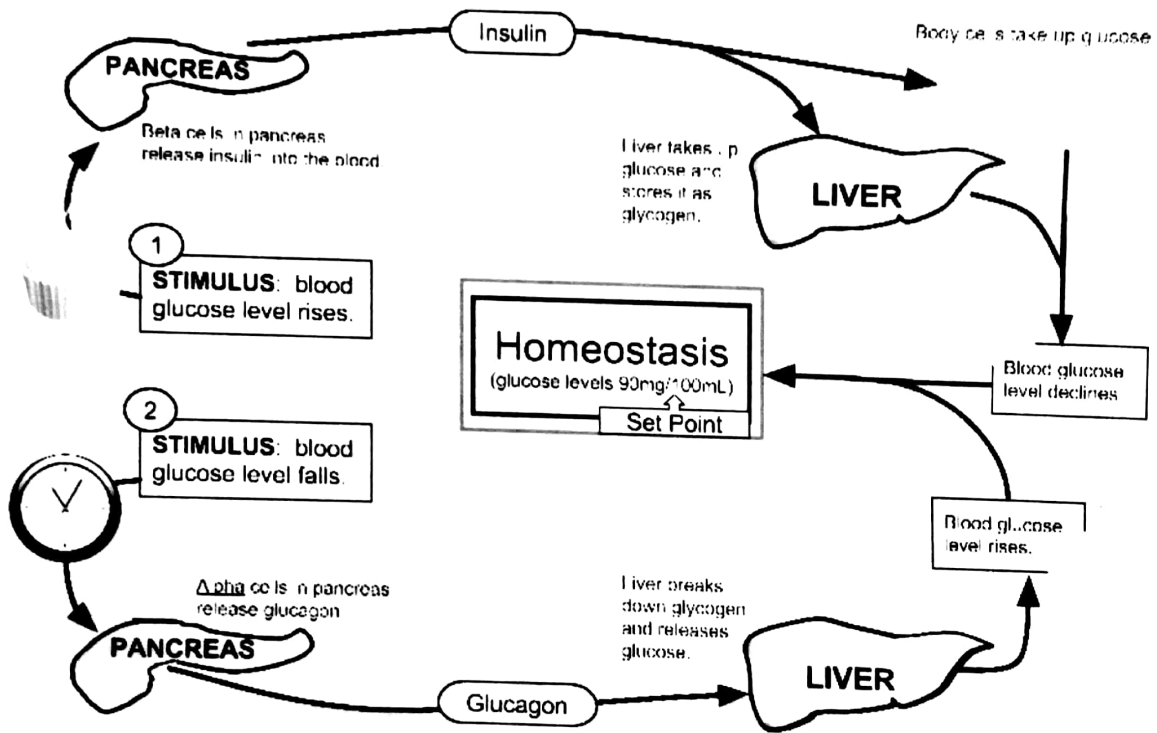
Urinary



Name: _____

Feedback Loops: Glucose and Glucagon

The control of blood sugar (glucose) by insulin is a good example of a negative feedback mechanism. When blood sugar rises, receptors in the body sense a change. In turn, the control center (pancreas) secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin. Examine the graphic below to understand how this feedback loop works.



1. The image shows two different types of stimuli (1 and 2), but doesn't explain what the stimuli is that causes blood sugar to raise or lower. Based on clues in the graphic, what are the two stimuli?

- ① cupcake, consumption of sugary snack
- ② time

2. What happens when your blood sugar rises?

pancreas releases insulin into blood



3. What is the effect of glucagon? What cells release glucagon?

↓ increases blood
breaks down sugar
glycogen in the liver

↳ alpha cells in pancreas

4. What is the effect of insulin? What cells release insulin?

↓ decreases blood
body cells take up sugar
glucose & liver stores
it as glycogen

↳ beta cells in pancreas

5. What is the normal level of glucose in the blood? Why is this called a "set point."

90 mg/100mL

↳ this is the point at which
your body tries to maintain

6. What would you expect to happen if your blood sugar was 120 mg / 100 mL ? Be specific.

Your body would release insulin b/c you have too much
sugar in your bloodstream.

7. A person with diabetes cannot regulate their blood sugar, mainly because the pancreas does not release enough insulin. To treat the disease, a person must monitor their blood sugar, if their blood sugar is high, they must take an injection of insulin. How do you think they would need to treat low blood sugar?

Eat a sugary snack

8. In a single sentence, explain the relationship between the pancreas and homeostasis.

Pancreas seeks to maintain homeostatic blood sugar levels.

9. Where does the glucose that is released into the blood ultimately end up (2 places)?

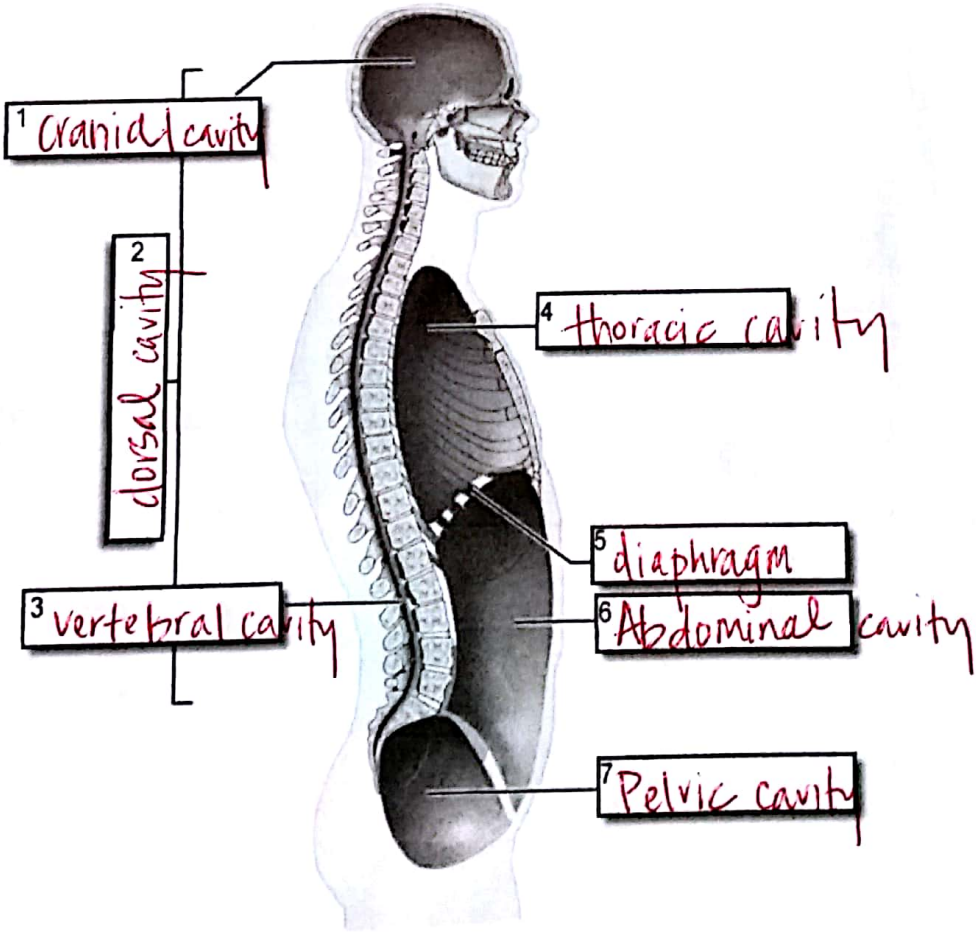
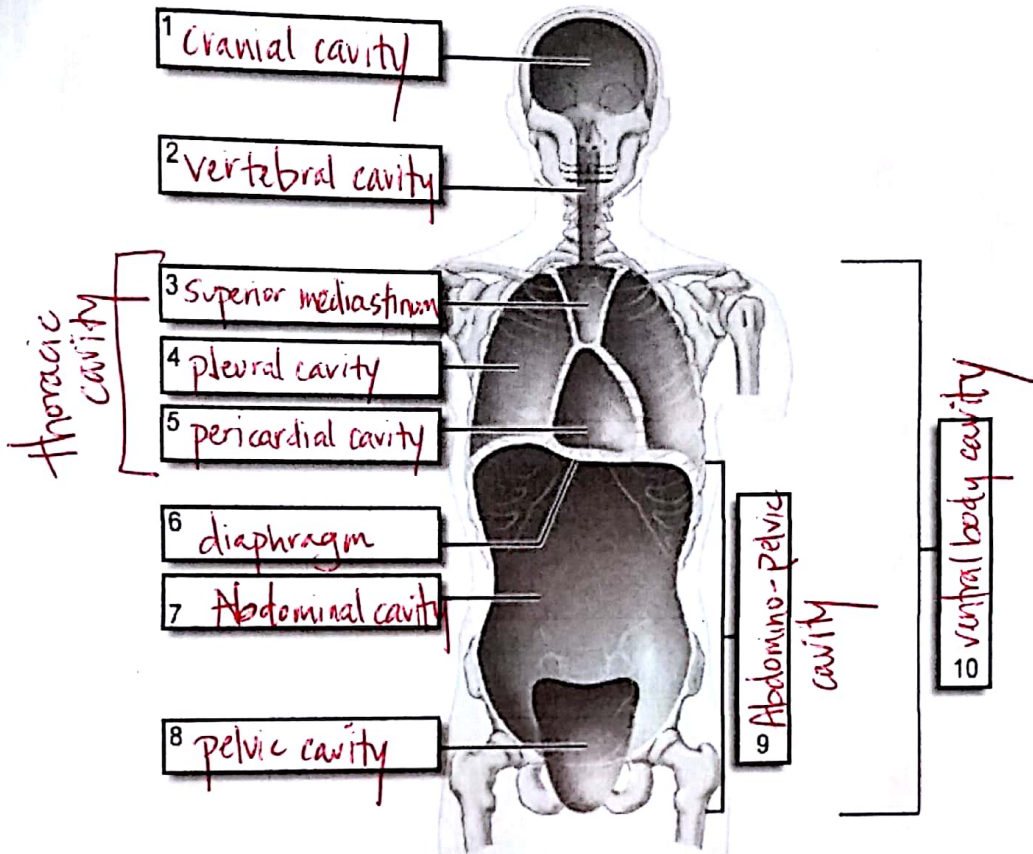
- ① body cells
- ② ~~urine~~ liver

10. Explain how the thermostat in your house uses a negative feedback system to maintain your home's temperature.

When the temperature gets too hot, the AC kicks on to cool the house down. When the temperature gets too cold, the heater kicks on to warm the house.

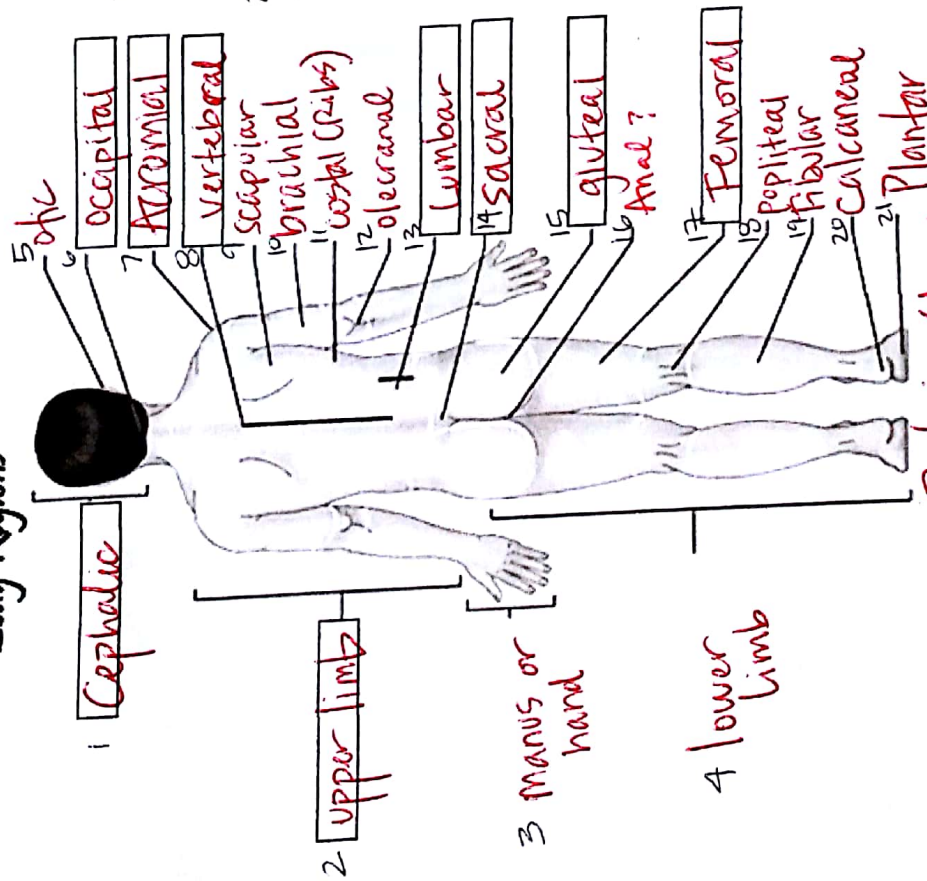
Body Cavities Labeling

Name: _____

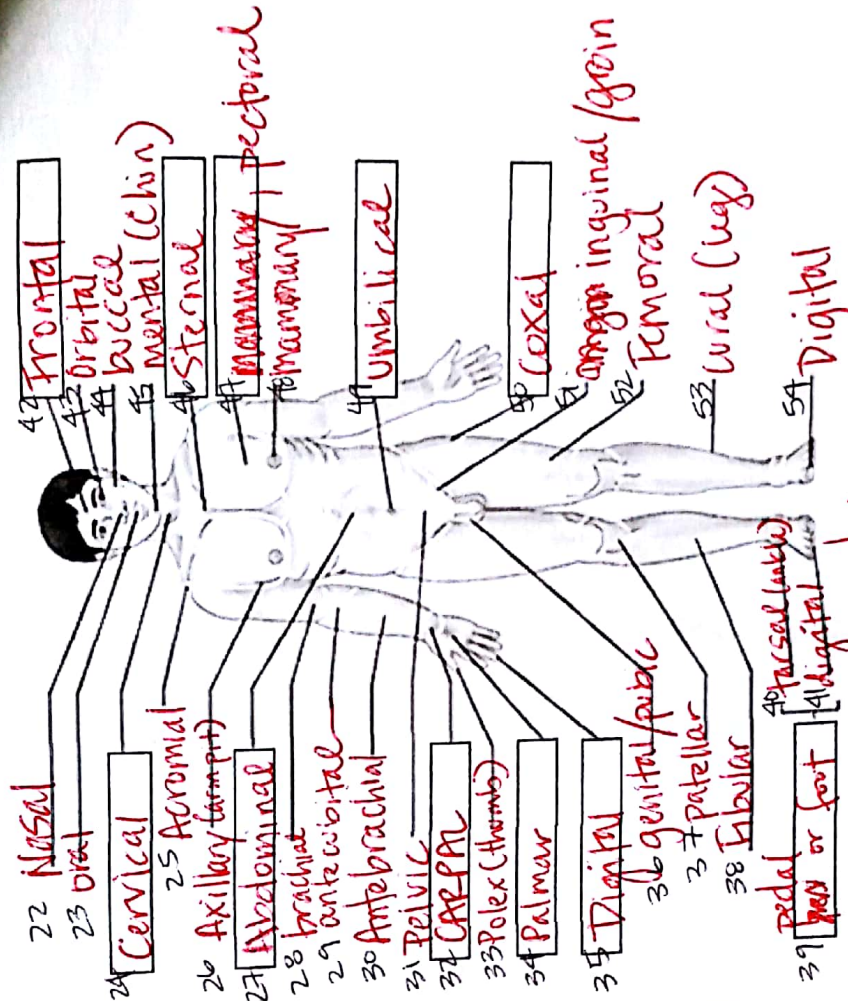


Anatomy & Physiology Body Regions

Name _____



Posterior/dorsal



Anterior/Ventral

Each box represents a body region as described in your text and in the body region chart. Label the images appropriately.