I. Body Organization

Questions 1: Fill in the blanks with the following words: connective, nervous, homeostasis, organs, epithelial, tissues, organ systems, cells
Question 2: Find the Oddballs and Decode the Message

Each group of terms below contains an unrelated oddball. Circle the term that doesn’t belong, and explain why it doesn’t. Then take out the third letter of each oddball. Rearrange these letters to find the secret code word.

a. skin hair nails teeth

b. smooth flexor cardiac skeletal

c. tendon joint ligament cartilage

d. blood formation movement storage digestion

The Code Within the Code: ___ ___ ___ ___

Question 3: The answers to the following riddles all have a second “body conscious” meaning.

a. You might hear one at a baseball game or a wedding. ___

b. A seafood sound-alike _______________________

c. To tease someone _______________________

d. You hit these right on the head. ___________

e. Prisoners live in them. _____________________
**Question 4:**

The figure below was supposed to be labeled with several of the body’s organ systems. Unfortunately, the person hired to do the labeling has never heard of an organ system—he just took a wild guess at the placement of the letters. Please help straighten out the mess. Write the correct terms in the blanks.

![Diagram of human body with labels](image)

a. __________________________
b. __________________________
c. __________________________
d. __________________________
e. __________________________
f. __________________________

**Question 5: Build a Better Robot**

Imagine you have been asked to build a robot that uses many of the same “organ” systems as the human body. You have the following parts available to you. Which system could each part be used for?

a. metal pipes __________________________

b. computer __________________________

c. various hinges __________________________
d. rip-proof material __________________________

e. bungee cords __________________________

f. electrical wire __________________________

II. The cardiovascular system:

**Question1: The Rat Workout**

Scientists in the cardiovascular research lab at a local university have built two boxes they call the “Rat Workout Boxes.” By releasing rewards from small chutes along the sides of the boxes, they encourage the rodents to race from station to station. The rewards are only given if the rats follow the proper sequence from station to station (1–9 for the circulatory workout, 1–7 for the pulmonary workout).

The scientists are so familiar with the cardiovascular systems that they have nicknamed each station with one of your vocabulary words. The box called “The Circulatory Workout” begins with the right atrium, then follows the course of a blood cell from there. The box called “The Pulmonary Workout” begins with the nose and follows the course of a molecule of oxygen from there.

Your job is to number the stations, then draw lines between them following the sequence.
**Question 2:** Bobby Bebembop’s Blood Bank

Bobby Bebembop has developed a machine, called the Bloodomatic 3000, that will make 29 L of synthetic blood using 26 L of water and just 3 L of real blood. He is convinced that his new device will put an end to the town’s blood shortage. A local hospital has an urgent order for 29 L of synthetic blood that is compatible with blood from type O recipients. He needs 3 L to make a new batch, but there are not 3 L of type O blood. The next blood delivery is not until tomorrow evening, but he still wants to make the urgent batch tonight. He decides to try mixing together at least two varieties of blood, but he has to be sure that the mixture is compatible with type O blood. Bobby found 2 L of type A blood, 2 L of type B, 2 L of type AB, and 1 L of type O. Can he make a batch of synthetic blood compatible with type O blood with what he has now? Explain your answer.

______________________________________________

________________________________________________________________________

________________________________________________________________________
Question 3: The diagram below shows an external view of the mammalian heart. Show the positions of the following structures on the diagram.

Right atrium, left atrium, right ventricle, left ventricle, aorta, inferior vena cava,
Question 4: The diagram below shows a section through the heart seen from the same direction as the external view in question 1.

a) Label the following structures:

- right atrium
- left atrium
- right ventricle
- left ventricles
- inferior vena cava
- superior vena cava
- aorta
- pulmonary artery
- pulmonary vein
- tricuspid valve
- mitral valve

b) On the diagram of the heart shown above indicate the direction of blood flow through the heart. Use red to show the pathway of oxygen-rich blood and blue the pathway of oxygen-poor blood.
Question 5: Choose terms from the list to complete the sentences below.

atria; right hand side; vena cava; ventricles; valves; pulmonary artery; veins; arteries; left hand side; aorta, coronary artery;

a) The top two chambers of the heart are called__________
b) These structures stop blood flowing backwards into the atria. _________
c) This side of the heart receives oxygenated blood. _________
d) This is the largest artery in the body. _________
e) These are blood vessels that carry blood towards the heart. _________
f) This blood vessel supplies the heart muscle with oxygenated blood? _________

Question 4: Fill in the name of the blood vessel in the table below.

<table>
<thead>
<tr>
<th>Name of blood vessel</th>
<th>Blood?</th>
<th>Walls?</th>
<th>Towards or away from heart</th>
</tr>
</thead>
<tbody>
<tr>
<td>.....................</td>
<td>Oxygenated</td>
<td>Thin</td>
<td>Towards</td>
</tr>
<tr>
<td>.....................</td>
<td>Oxygenated</td>
<td>Thick</td>
<td>Away from</td>
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<tr>
<td>.....................</td>
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<td>Thick</td>
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<tr>
<td>.....................</td>
<td>Deoxygenated</td>
<td>Thin</td>
<td>Towards</td>
</tr>
</tbody>
</table>
**Question 6:** Arrange these events in the correct order starting with F.

A. The left ventricle contracts and blood flows along the aorta to the body

B. The blood flows through the tricuspid valve into the right ventricle.

C. Oxygenated blood flows along the pulmonary veins into the left atrium

D. The blood passes through the mitral valve into the left ventricle

E. The left atrium contracts

F. Deoxygenated blood flows from the inferior and superior vena cavae into the right atrium.

G. The deoxygenated blood picks up oxygen

H. The right atrium contracts

I. The right ventricle contracts and blood flows along the pulmonary artery to the lungs

**III. Digestive System:**

**Question 1:**
In order to study the digestive tract of a 14-year-old human, Professor Martinez shrunk a crew and their vessel to bite size and disguised them as a grape. The ship, however, lost video contact with the professor as soon as it was swallowed. The crew members don't know where they are, but they can use E-mail to describe what they see. Using these E-mail clues, help Professor Martinez track the ship’s progress.
Message from crew captain:
The trip started a bit rough. The crew was a little shaken. We traveled through a long passageway and ended up in a very sloshy room. Right now we are stuck between some sort of door and another long hall.

a. Where are they?

After the doorway opened more, a big wave of fluid hit us from behind and thrust us forward.

b. What was the fluid?

We are traveling through another hall, longer than the first, but this hall is different. The wall is covered with a hair like substance. We keep getting squeezed forward. It feels like a boa constrictor keeps squeezing us and then letting us go.

c. Where is the crew now?
d. On a separate sheet of paper, write three more messages
the professor might receive from his brave crew, and
explain where the crew was when they sent them.

**Question 2:** Solve these anagrams about the digestive and
urinary systems. Answers may consist of any number of words.

Rearrange the letters from the following words to reveal a fact
about saliva.

**TINY SALMON SEIZE CANVAS**

Rearrange the letters from the following words to reveal a fact
about the gallbladder.

**DODGE BASEBALL TREE THRILLS**

**Question 3:** For each group of terms, circle the one that doesn’t
belong and explain why it doesn’t.

- a. tongue, salivary glands, stomach, kidneys
- b. pancreas, molars, incisors, canines
- c. peristalsis, constipation, colon cancer, gastric ulcer
- d. urethra, nephron, gastric ulcer, ureter

**Question 4:** Answer the following questions

1. What are the wavelike contractions of smooth muscle that move food
down the esophagus called? __________________________

2. What structure produces bile? __________________________

3. What is the purpose of bile? __________________________
4. List the order food passes through your body.
________________________________

5. List three accessory digestive organs.
________________________________
________________________________
________________________________

6. What is the modification of the small intestinal wall that serves to increase surface area. ________________________

7. In what segment(s) of the alimentary canal (mouth, stomach, small intestine, large intestine) does chemical digestion occur for each macromolecule type?
   a. proteins  _________________  c. carbohydrates _________________
   b. lipids _________________  d. nucleic acids _________________

Question 5: Match the given words to the statements below:

<table>
<thead>
<tr>
<th>a. liver</th>
<th>b. colon</th>
<th>c. gallbladder</th>
<th>d. esophagus</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. mouth</td>
<td>f. pancreas</td>
<td>g. tongue</td>
<td>h. peristalsis</td>
</tr>
<tr>
<td>i. stomach</td>
<td>j. large intestine</td>
<td>k. villi</td>
<td>l. teeth</td>
</tr>
</tbody>
</table>

_____1. stores a substance called bile, which physically breaks down fat droplets

_____2. Digestion begins when salivary gland secretions enter this

_____3. Minute projection extending from the walls of the small intestine and involved in absorbing products of digestion

_____4. used to cut, tear, and grind food; adult has 32
5. When you swallow food, muscular movements carry the food along this structure to the stomach.

6. This organ absorbs excess water from undigested food prior to its release from the body as a solid waste.

7. Muscular movement involving the walls of the digestive tract that serve to mix materials and move them along the tract.

8. It pushes food to the back of the mouth prior to swallowing.

9. This organ produces bile and detoxifies a variety of substances.

9. Produces digestive juices that are released into the small intestine.

10. Another name for the large intestine.

11. Functions include mixing food and serving as a reservoir prior to the food being passed on to the small intestine.

**Question 6:** Label the following and list the function for the structures (you are not doing #5 & 12):
<table>
<thead>
<tr>
<th>Structure Number</th>
<th>Structure Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td></td>
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<tr>
<td>2</td>
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<td>14</td>
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</tr>
</tbody>
</table>
IV. The Urinary System

Question 1: Fill in the blanks

1. The functions of the urinary system include elimination of ________ such as ________________ wastes, _______, and drugs.

2. Kidneys also regulate ________________, including water and ________________ balance, and blood acid-base balance, along with ________ pressure, ________ production, and activation of ____________.

Question 2: Trace the path of urea from the glomerulus to the exterior of the body.

Glomerulus → Glomerular capsule → ....

Question 3: State the functions of each of the following components of the urinary system

a) Ureter .................................................................

b) Urinary bladder

.................................................................

c) Urethra

... .................................................................

Question 4: Describe the effect of the following substances in the body.

ADH (antidiuretic hormone)________________________

Coffee ________________________________
V. Respiratory System

**Question 1:** Using your respiratory homework from the weekend, match the structure to the number in the diagram. Make sure all numbers are correctly labeled. Fill in the table with the structure name and function. Turn in your homework with the worksheet.
<table>
<thead>
<tr>
<th>Structure Number</th>
<th>Structure Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Question 2: Answer the following questions**

1) What keeps food from going down our windpipe?

2) What role do red blood cells play in respiration?

3) How are plants our partners in breathing?

4) What are your vocal cords and how do they help you make sound?

5) What is the purpose of the C-shaped rings of tough, rubbery cartilage that are in your trachea?

6) What is the purpose of the mucus in your nose?

7) What muscle allows you to breathe in and out?

8) Name all of the structures of the UPPER respiratory tract.

9) How is the respiratory system linked to the cardiovascular system?
Question 3: Solve the clues below. Then use the clues to complete the puzzle on the next page.

_____________ 1. system that transports materials to and from the body’s cells
_____________ 2. a connective tissue made up of cells, cell parts, and plasma
_____________ 3. the fluid part of blood
_____________ 4. largest lymph organ
_____________ 5. upper portion of the throat
_____________ 6. system that collects extra cellular fluid and returns it to your blood
_____________ 7. lymph organ just above the heart that produces lymphocytes
_____________ 8. fluid and particles absorbed into lymph capillaries
_____________ 9. type of blood circulation between the heart and the lungs
_____________ 10. the smallest blood vessels in the body
_____________ 11. your voice box
_____________ 12. expressed in millimeters of mercury (mm Hg)
_____________ 13. cell fragments that clump together to form a plug that helps reduce blood loss
_____________ 14. organs that are found along the lymphatic vessels that filter particles from lymph
_____________ 15. process that is made up of breathing and cellular respiration
_____________ 16. type of blood circulation between the heart and the rest of the body
_____________ 17. dome-shaped muscle involved in breathing
_____________ 18. upper heart chambers
_____________ 19. blood vessels that direct blood away from the heart
_____________ 20. made up of groups of lymphatic tissue located Inside your throat, at the back of your nasal cavity, and at the back of your tongue
__________ 21. system consisting of the lungs, the throat, and the passageways that lead to the lungs
__________ 22. lower heart chambers
__________ 23. blood vessels that direct blood toward the heart
__________ 24. tiny sacs on the bronchiole branches of the lungs
__________ 25. your windpipe
__________ 26. the two tubes that connect the lungs with the trachea

**Question 4:** Use the clues to help you find the words. Words may appear horizontally, vertically, diagonally, or backward.
VI. Revision

**Question 1:** After you finish reading the chapter, try this crossword puzzle, using the clues provided.

**ACROSS**

3. the type of bone tissue that is rigid and dense (two words)
8. the place where two or more bones meet
10. small organs in the skin that produce a salty liquid that cools the skin (two words)
11. the type of bone tissue that gives a bone strength and support (two words)
17. a collection of organs that is made up of your hair, skin, and nails (two words)
21. strong bands of elastic tissue that connect the bones in a joint
22. small organs in the dermis that produce hair (two words)
23. the type of tissue made of cells that contract and relax to produce movement (two words)
24. a group of similar cells that work together to perform a function
25. a chemical in the body that determines skin and hair color
26. the type of tissue that sends electrical signals through the body

**DOWN**

1. two or more tissues working together
2. soft, flexible tissue that is found in the tip of your nose
3. the type of tissue that joins, supports, protects, insulates, and cushions organs (two words)
4. the thin, outermost layer of skin
5. a muscle that straightens a part of the body
6. maintenance of a stable internal environment in the body
7. strands of tough connective tissue that join skeletal muscles to bones
9. the type of muscle that is found in the digestive tract and blood vessels (two words)
12. the type of tissue that covers and protects underlying tissue (two words)
13. a muscle that bends a body part
14. a type of muscle that is found only in the heart
15. the thick, underlying layer of skin that contains many small structures
16. a collection of organs whose primary function is movement (two words)
18. muscles that produce movement (two words)
19. a collection of organs that is made up of bones, cartilage, and connective tissue (two words)
20. the special material in bones that makes blood cells
**Question 2:** A spaceship full of alien ambassadors has just landed in your backyard. They are very interested in earthling science, especially the study of biological systems. Help them translate their scrambled list of terms. DOOG CLUK!

1. long, straight tube connecting your throat and stomach
2. microscopic filters located in the kidneys
3. large, reddish-brown organ that makes bile, breaks down nutrients, and stores toxins
4. saclike organ that breaks down food into liquid
5. oval organ that sends fluid into the small intestine to chemically digest and neutralize chyme
6. bean-shaped organs that filter blood
7. small, saclike organ that stores bile
8. tube where most chemical digestion occurs
9. tube where liquid waste is changed into solid waste
10. group of organs that work together to digest food
11. group of organs that remove waste from the blood

GAPHOUSES  
HORNPENS  
VIRLE  
SCAMTHO  
SNARPACE  
YIDNEKS  
BALDGLARDLE  
LALMS SEENITINT  
GELAR NESTIENT  
GESTIDIVE SMETYS  
YANRIRU TYSMES
Question 3: See how many words you can find from the list below.

BONES
CALCIUM
CLAVICLE
FEMUR

PATELLA
RADIUS
RIBS
SKELETON

SPINE
STERNUM
STIRRUP
TIBIA
Question 4: See how many words you can find from the list below.

ALVEOLI  DIAPHRAGM  OXYGEN
BREATHE  EXERCISE  RESPIRATORY
BRONCHI  LUNGS  TRACHEA
**Question 5:** See how many words you can find from the list below.

```
S D T V O L T J O T R R B H B
K S G D Y F P R S Y U U N L G
F K L R F K R Q G Q Z B A C Y
R I Y N E P H R N S D E F R
L D X Y E T E C M B D O W V V
V N U F N O E O M E S P X D W
P E A S Q W O R R N C X I I E
T Y Y A V R U W U E X U W C T
Q S E M H G R R A G L F Y X S
T I D T Y Y J M I F Y D E W A
L C A N U G E W E N W C X S W
R B A R H T E R U U A W D R F
L B J A Q P W W W F Z R I K B
F U R I N E O H A N W N Y Z B
J A Y F D E K T B B G R H Q E
```

<table>
<thead>
<tr>
<th>BATHROOM</th>
<th>NEPHRONS</th>
<th>URETHRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLADDER</td>
<td>PEE</td>
<td>URINARY</td>
</tr>
<tr>
<td>FLUID</td>
<td>TUBE</td>
<td>URINE</td>
</tr>
<tr>
<td>KIDNEYS</td>
<td>URETER</td>
<td>WASTE</td>
</tr>
</tbody>
</table>
VII. LABS

Lab 1: Muscles at Work

Have you ever exercised outside on a cold fall day wearing only a thin warm-up suit or shorts? How did you stay warm? The answer is that your muscle cells contracted, and when contraction takes place, some energy is used to do work, and the rest is converted to thermal energy. This process helps your body maintain a constant temperature in cold conditions. In this activity, you will learn how the release of energy can cause a change in your body temperature.

Ask a Question
1. Write a question that you can test about how activity affects body temperature.

Form a Hypothesis
2. Form a group of four students. In your group, discuss several exercises that can produce a change in body temperature. Write a hypothesis that could answer the question you asked.

Test the Hypothesis
3. Develop an experimental procedure that includes the steps necessary to test your hypothesis. Be sure to get your teacher’s approval before you begin.

4. Assign tasks to individuals in the group, such as note taking, data recording, and timing. What observations and data will you be recording? Design your data tables accordingly.

5. Perform your experiment as planned by your group. Be sure to record all observations in your data tables.

Analyze the Results
1. How did you determine if muscle contractions cause the release of thermal energy? Was your hypothesis supported by your data? Explain your results in a written report. Describe how you could improve your experimental method.

**Applying Your Data**

Why do humans shiver in the cold? Do all animals shiver? Find out why shivering is one of the first signs that your body is becoming too cold.

**Lab 2: Build a Lung**

When you breathe, you actually pull air into your lungs because your diaphragm muscle causes your chest to expand. You can see this is true by placing your hands on your ribs and inhaling slowly. Did you feel your chest expand?

In this activity, you will build a model of a lung by using some common materials. You will see how the diaphragm muscle works to inflate your lungs. Refer to the diagrams at right as you construct your model.

**Procedure**

1. Attach the balloon to the end of the straw with a rubber band. Make a hole through the clay, and insert the other end of the straw through the hole. Be sure at least 8 cm of the straw extends beyond the clay. Squeeze the ball of clay gently to seal the clay around the straw.
2. Insert the balloon end of the straw into the neck of the bottle. Use the ball of clay to seal the straw and balloon into the bottle.

3. Turn the bottle gently on its side. Place the trash bag over the cut end of the bottle. Expand a rubber band around the bottom of the bottle to secure the bag. You may wish to reinforce the seal with tape. Before the plastic is completely sealed, gather the excess material of the bag into your hand, and press toward the inside of the bottle slightly. (You may need to tie a knot
about halfway up from the bottom of the bag to take up excess material.)
Use tape to finish sealing the bag to the bottle with the bag in this position.
The excess air will be pushed out of the bottle.

![Step 3](image)

**Analyze the Results**

1. What can you do with your model to make the “lung” inflate?

2. What do the balloon, the plastic wrap, and the straw represent in your model?

3. Using your model, demonstrate to the class how air enters the lung and how air exits the lung.

**Applying Your Data**

Do some research to find out what an “iron lung” is and why it was used in the past. Research and write a report about what is used today to help people who have difficulty breathing.
Links

Watch these movies to learn about the systems that run the complicated machine called your body!

**Movie: Heart & Circulatory System**:  
http://kidshealth.org/kid/htbw/CSmovie.html

**Movie: Digestive System**:  
http://kidshealth.org/kid/htbw/DSmovie.html

**Movie: Endocrine System** :  
http://kidshealth.org/kid/htbw/ESmovie.html

**Movie: Immune System**:  
http://kidshealth.org/kid/htbw/ISmovie.html

**Movie: Muscular System**:  
http://kidshealth.org/kid/htbw/MSmovie.html

**Movie: Brain & Nervous System**:  
http://kidshealth.org/kid/htbw/NSmovie.html

**Movie: Lungs & Respiratory System** :  
http://kidshealth.org/kid/htbw/RSmovie.html

**Movie: Bones & Skeletal System**:  
http://kidshealth.org/kid/htbw/SSmovie.html

**Movie: Urinary System**:  