

Name:

HUMAN BODY SYSTEMS: energy use, transport, waste removal

Digestive System: p. 60-65 AND 68-71

Identify the 3 major functions of the digestive system:

I. 3 major functions:

A.

B.

C.

How is **digestion** different than **absorption**?

Get one saltine cracker and divide it into 4 pieces. Take one piece and place it on your tongue. **DO NOT CHEW**. Notice how the piece will dissolve anyway... saliva chemically breaks the starch to sugars... does it taste sweet? Amylase is the enzyme in saliva that chemically breaks large molecules of starch into small molecules of glucose.

Now take another piece of cracker and place it in your mouth. Chew and swallow **WITHOUT USING YOUR TONGUE**. Not an easy task is it! Our tongue (a skeletal muscle) is critical in the swallowing process but also has a role (along with your sense of smell) in the taste of foods. You will also notice how the tongue will 'involuntarily' move about your mouth cleaning the teeth and physically getting all the food particles... thank you tongue!

Take the next piece and **ONLY USE YOUR TONGUE**... no teeth! Be very aware of the action of the tongue physically grinding your food.

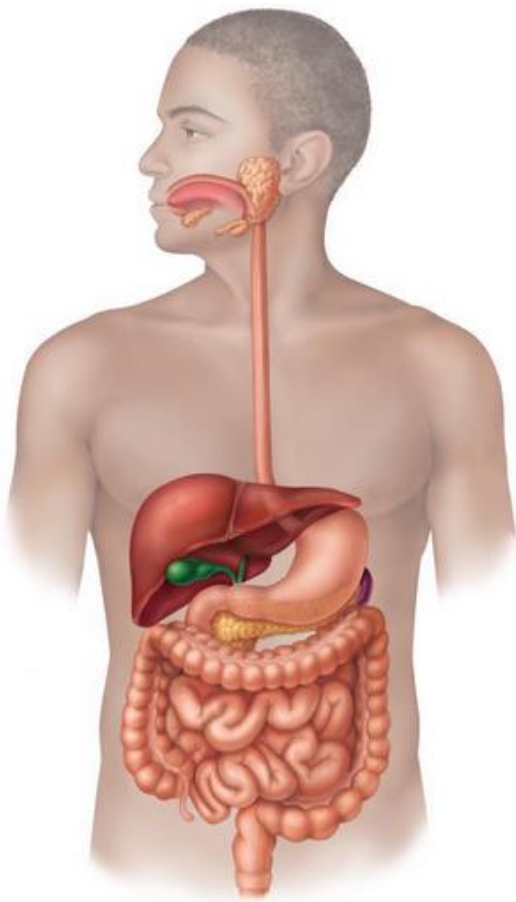
Finally, turn yourself upside down and eat the last piece (fully chew as normal). Remain upside down while you chew and swallow. Gravity does **NOT** move food down... **peristalsis** physically does. (you can eat the last piece of cracker in a normal chewing then swallowing fashion if you'd like)...

ILLUSTRATE and define peristalsis:

Villi are the small "fingers" in the small intestine that pull nutrients into the bloodstream via **diffusion** after all food is digested. Which would you rather use to grab as many jelly beans as you could: a single finger or all 10 fingers? How about have one straw to suck up a milkshake or use 10 straws? Use a small sponge to soak up a mess or a large towel? **More surface area with villi means more food is absorbed!**

What cell organelle (or cell process) has the **same function** as the digestive system? **EXPLAIN YOUR CHOICE!**

Label the diagram with each of the organs of the digestive system. Next, explain the **importance of each organ** (or the parenthetical term) for the process of digestion.



- mouth
- teeth
- tongue
- salivary gland
- esophagus
- stomach
- liver
- gall bladder
- pancreas
- small intestine
- villi
- large intestine
- rectum

There are two types of digestion that occur in the digestive system: **mechanical** and **chemical**. Place an "M" if it contributes to mechanical digestion (physically breaking smaller, churning, mixing, as well as muscle action) or a "C" if this is chemical digestion (chemically breaking down into smaller molecules and elements).

- _____ teeth cutting, grinding, and mashing food
- _____ stomach churning and mixing the food
- _____ gastric juices breaking down proteins and curdling milk
- _____ saliva changing starch to sugar
- _____ pancreatic enzymes breaking proteins into amino acids
- _____ bile making fat molecules smaller so other enzymes can break them down

How is *mucus* important for digestion?

Graph the following data for the time spent in the digestive system from French fry to feces, from pizza to poop, from cookie to caca, or from donut to doo doo. You choose type of graph (since we are comparing time spent in each organ you would choose between bar and circle) and be sure to consider the time intervals and make any calculations to convert to a common time.

Mouth	5-30 seconds
esophagus	10 seconds
stomach	4-5 hours
small intestine	3-12 hours
large intestine	6 hours to 2 days

Color always makes a graph better! (Remember all the steps in making a GREAT graph!) Attach your GREAT graph to this packet.

Circulatory (cardiovascular) System: p. 78-105

Identify the 3 major **structures** (parts) of the circulatory system:

I. 3 major structures:

A.

B.

C.

Identify the 3 major **functions** (jobs) of the circulatory system:

II. 3 major functions:

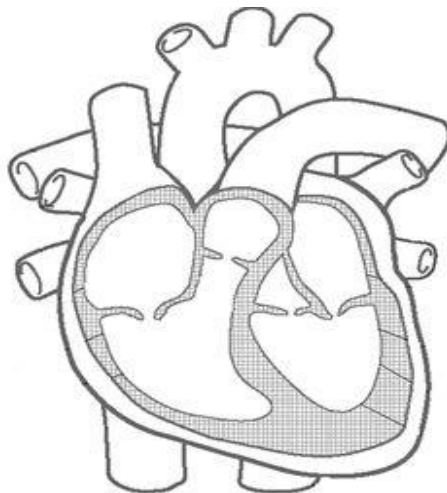
A.

B.

C.

Blood pumps from the right side of the heart to the lungs (to pick up oxygen and drop off carbon dioxide) then to the left side of the heart and to the rest of the body (to deliver oxygen to the cells and pick up any wastes from the cells) and then back to the right side of the heart once again. **Thus the 'circle' of the circulatory system!**

Label the heart diagram: **right atrium, left atrium, right ventricle, left ventricle**. Color the atria and ventricles with the correct oxygen rich (RED) blood and oxygen poor (BLUE) blood. (*page 80 is super helpful for this task!*)



Use the textbook pages 85-89 to help you fill in the following information about the blood vessels.

BLOOD VESSEL	FUNCTION	STRUCTURE OF WALL
Arteries	Carries blood away from heart	
Capillaries		
Veins		Thick walls with muscle layer in middle; has valves to keep blood moving back to heart

Blood pressure (the force blood exerts on the walls of the blood vessels) is measured by using a tool called a **sphygmomanometer** (sfig moh muh NAHM uh tur). Weird word, but also cool to say. Interesting that we can measure the force of our ventricles contracting (top number) and ventricles relaxing (bottom number). A healthy blood pressure is 120/80 or lower! Higher blood pressure means more damage to blood vessels over time. Yikes!

What cell organelle (or cell process) has the **same function** as the circulatory system? **EXPLAIN YOUR CHOICE!**

What is the **importance** of each blood component? (*The visual on page 93 is very helpful for this task*)

PLASMA

RED BLOOD CELLS

WHITE BLOOD CELLS

PLATELETS

Use the stethoscope to listen to your own heart. The heart is slightly left of center of your sternum (breastbone). The lub dub you hear are the valves between the heart chambers closing. **DO NOT TAP HARD ON STETHESCOPE.**

Now hold one hand up and the other hand down for **ONE FULL MINUTE**. Compare your hands side by side. The hand held up in the air will be paler (blood was pulled out from gravity) and likely feels tired due to lack of oxygen. The lower hand is likely very red and maybe your veins are popping out a bit. Veins have valves which help keep blood flowing back to the heart so it doesn't pool in your feet and keeps cycling back. Soon your blood will bring fresh oxygen so you don't feel as tired anymore.

Read pages 96-97 and answer the following:

1. What is the lymphatic system?

2. How do lymph nodes help fight disease?

Review pages 98-102 and answer the following:

List **2 circulatory system problems** explaining (a) what causes the problem **AND** (b) how to treat it.

1.

a.

b.

2.

a.

b.

Finally, select two **Tools of Technology** from the timeline on pages 99-100; add to your *GOSATOT* in the notebook!

Respiratory System: p. 112-126

The respiratory system has two jobs:

1.

2.

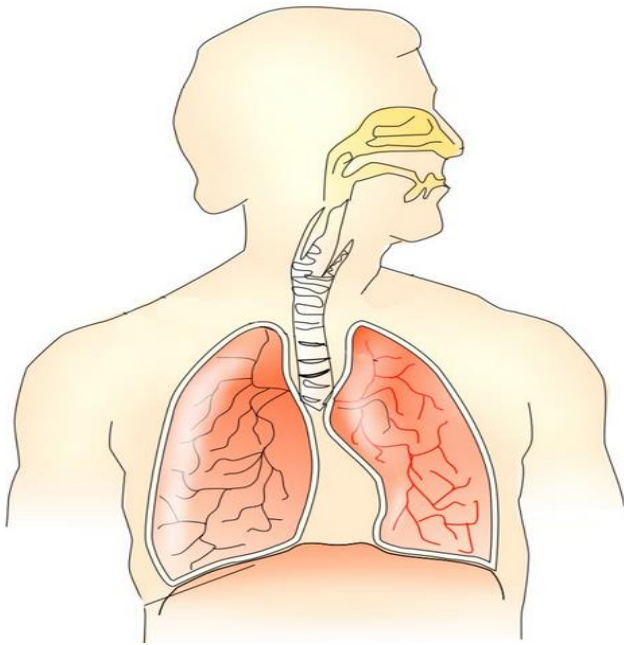
Examine the graph on page 113. How does the amount of oxygen gas change from an inhale to an exhale? What about the amount of carbon dioxide gas? What is happening here???

What cell process relies on the digestive, circulatory, and respiratory systems to be working together? **Explain WHY these systems are working together!!!**

Write the complete balanced chemical equation for cellular respiration below. **Include the chemical formulas with the common names of the molecules:** (we discussed energy processes a while ago... check your notebook!)

What is the name of the cell organelle where cellular respiration takes place?

Label each of the organs of the respiratory system. Next explain the **importance of each organ** for the process of respiration.



Nose

Pharynx

Larynx

Trachea

Bronchus (bronchi)

Lung

Diaphragm

How is **mucus** important for respiration?

All breaths are not the same. Pay attention for a few breaths to your regular in and out breath. Now breathe as deeply as possible. Now exhale as deeply as possible. Notice you need to take a slightly larger breath before you breathe more shallow again. NOW get up and do 15 good full energy energy energy jumping jacks. Sit down and notice your breath rate and depth has increased. **Why does breathing AND heart rate increase with activity?**

Place your hand on your voicebox and hum. Sound needs air and vibrations. No air, no sound. **THIS IS WHY YOU SHOULD NOT TALK WHILE YOU EAT!** Your airway is open for air to make sound but then the food can go down this open airway. The 'wrong tube' is the trachea (also called the *windpipe*). The 'right tube' for food is the esophagus! Your *epiglottis*, a flap of tissue, protects you from food going down the trachea.

IF your diaphragm has a muscle spasm you hear the 'hiccup' of your epiglottis shutting when the air moves. Hold the sides of your ribcage and breathe a deep inhale. Feel how the ribs expand. This expansion causes a concentration gradient for air to move in (high pressure to low pressure). The opposite occurs when we exhale.

Look at the diagram on page 117. The alveoli in the lungs are just like the villi of the small intestine. Increased surface area means more oxygen. Our lungs are not two pink balloons; rather they are millions of balloons! More balloons means more oxygen. More oxygen means more energy.

What is the name of the cell process where oxygen moves from an area of high concentration to an area of low concentration?

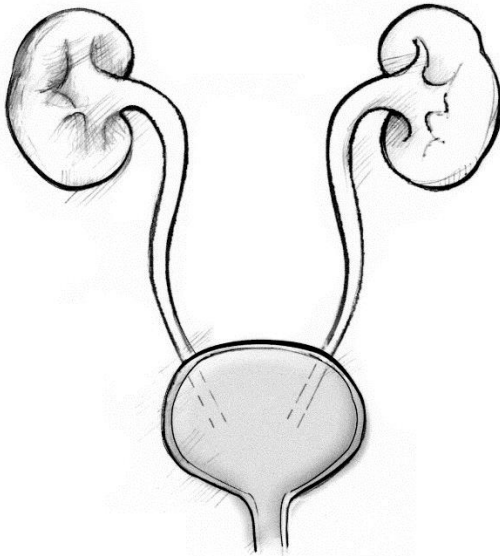
Asthma is one respiratory problem in which a person's airways become inflamed, narrow and swell, and produce extra mucus, which makes it difficult to breathe. Grab a straw and remove the paper. Hold your nostrils closed and breathe only through the straw for one whole song. How did it feel to breathe through only the straw? Why do you think asthma attacks are scary?

List 2 additional respiratory system problems explaining (a) what causes the problem **AND** (b) how to treat it.

1.
 - a.
 - b.
2.
 - a.
 - b.

Excretory System: p. 127-131

The function of the excretory system is to collect and remove cellular wastes. If we did not have a system to remove the wastes generated by our cells we would get very sick. Label the **kidneys**, **ureters**, **urinary bladder**, and **urethra** that all work together as organs of excretion in the diagram below:



The filters inside the kidneys are called nephrons.

What materials enter a nephron?

What materials are returned to the blood?

What materials leave the body in urine?

The bladder stores urine until you choose to eliminate the waste. Sometimes it feels like your bladder is so full it could explode but that is not likely to happen. You needed to learn how to control the sphincter muscles of your urethra when you were potty trained as a child. You learned voluntary control for these smooth muscles!

What comparative cell organelle (or cell process) has the **same function** as the excretory system?
EXPLAIN YOUR CHOICE!

Your lungs and skin are also considered excretory organs. The lungs rid excess CO_2 from cellular respiration and sweat evaporates excess salts and urea (ew... yuck) from our skin. The liver is also considered part of the excretory system as it further breaks down and recycles materials used by the body (such as bile and nutrients in the bloodstream). So many organs and systems work together to make sure excess waste leaves our bodies!

How does the process of excretion contribute to **homeostasis**? Respond with a supported **CEAL** paragraph written on looseleaf and attach to this packet. Include any other tissues, organs, or systems in your discussion.