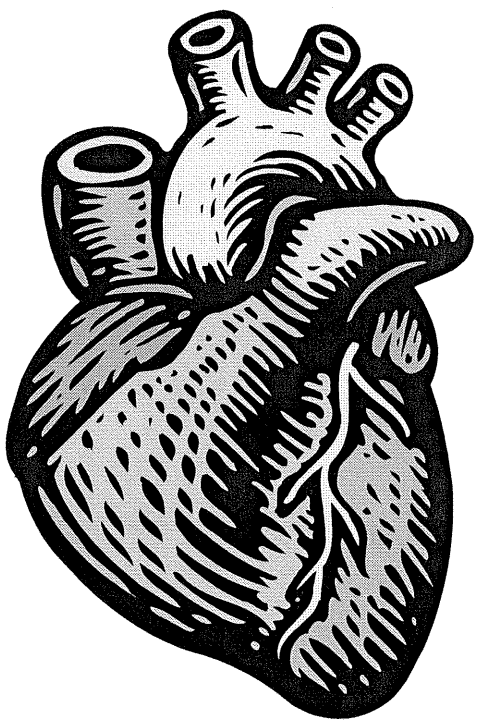
Body Systems Blackline Masters

Human Body Kit # 94

Revised April 2007
LOGO- revision June 2008

OCM BOCES Science Center

Circulatory System

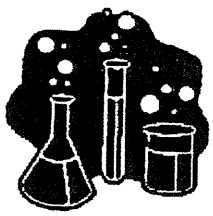


The Circulatory System

Vocabulary to Know

1. arteries
2. blood
3. capillaries
4. circulatory system
5. heart
6. involuntary
7. lymph
8. lymph nodes
9. pulse
10. red blood cells
11. valve
12. veins

Name_____ Date_____



The Circulatory System

Lab 1

Title: The affect of exercise on heart rate

Background:

The **heart** is a muscular organ that pumps blood through your body. **Arteries** carry blood away from the heart. Arteries have muscular walls that expand as blood is pushed through them.
This causes a **pulse** in the arteries as blood is pushed through them.

In this lab we will observe whether exercise affects heart rate.

Problem:

What is the affect of exercise on heart rate?

State your hypothesis for this experiment.

If a person exercises <u>more</u> then the heart rate will _____

because _____

Which variable will you be manipulating in this experiment?_____

_____

How will you measure it ?_____

Which variable will be the responding variable ? _____

How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

_____ _____

Procedure:
Safety First!!!

1. Find your pulse. There are two places where the pulse is easy to feel. Try both methods and see which one is easier for you.
   A. Using the index and middle finger of your left hand, follow your ear lobe, on the left side of your head, down to a point on your neck just below your jaw bone. Press gently and move your fingers slightly right or left until you feel a gentle pulsing on your fingers.
   B. Using the index and middle finger of one hand press gently on the underside of the wrist of your other hand. Move your fingers slightly right or left until you feel a gentle pulsing on your fingers.

2. When your teacher signals you, count the number of pulses for one minute. Record this on your data sheet.

3. Stand up and do quick jumping jacks for one minute. Immediately take your pulse for one minute. Record this on your data sheet.

4. Repeat step 3 exercising for two minutes and then again exercising for three minutes.

5. Rest for 3 minutes and do the first three Conclusion/Discussion questions. Then take your pulse again. Record this on your data sheet.

6. Construct a line graph of your data.

Results:

The effect of exercise on heart rate

	Pulse Rate (minute)
Resting Pulse	
Exercise One minute	
Exercise Two minutes	
Exercise Three minutes	
After rest	

Conclusion/Discussion:

1. What is the effect of exercise on heart rate? Give evidence for your answer.

_____

_____

2. Do the results agree with your hypothesis? _____If not, write a new hypothesis.

_____

_____

3. Why does your heart beat faster when you exercise ?

_____

4. What happened to your heart rate after you rested? Why do you think this occurred?

_____

Heart smarts: Celebrate Valentine's Day with science activities that pump up students' heart knowledge

Instructor, Jan-Feb, 2005 by Mackie Rhodes

Heart Trivia

Share the following trivia about the heart. Do they know any additional heart facts?

HANDY SIZE: The average heart is about the size of a fist and weighs 11 ounces (or 300 grams).

PUMP POWER: The heart pumps the blood on a complete path through the body more than 1,000 times a day.

FEEL THE BEAT: An adult heart beats about 72 times a minute while a kid's heart beats much faster--90 to 120 times a minute!

ROUND & ROUND: The heart recirculates all the blood in the body--almost five liters worth--every single minute.

Germ Gobblers

SCIENCE FACT: Along with water and other substances, blood also contains red and white blood cells. Red cells carry oxygen and carbon dioxide; white cells attack germs.

ACTIVITY: Students can make blood models to show how white blood cells work. For each model you will need tiny dots punched from red craft foam and from white magnet sheets (available at craft stores), a clear plastic soda bottle, and a small 3-D magnet. Assemble these materials, then guide students through the following steps:

1. Place 50 red blood "cells" into the bottle "blood vessel." Add one white cell for every 10 red cells.
2. Drop in a 3-D magnet "germ," replace the bottle's cap, and then tilt and shake the bottle gently.
3. Observe how the white blood cells "attack" the germ, as shown.
4. Repeat the experiment using different numbers of red and white blood cells. What happens?
5. In your journal, explain how white blood cells work and why they are important to the body.

Pump Action

SCIENCE FACT: The heart has four chambers that function as two pumps. These pumps push open valves to let blood flow from chamber to chamber.

ACTIVITY: Students can "pump" their own heart models. You'll need permanent markers, freezer bags, liquid starch, food coloring, masking tape, and rubber bands. Assemble materials, then guide students through these steps: 1. Label a bag as shown, then add two inches of starch and a few drops of food coloring. Press the air out of the bag, zip it, and reinforce the seal.

2. Make chambers by gathering and wrapping a rubber band tightly around the top of the bag under the seal. Next, push the "blood" into the "atrium" and loosely wrap a rubber band around the middle to create a "valve."

3. Gently pump the atrium, forcing blood through the valve into the ventricle.

4. In your journal, describe how blood moves through the heart to the body.

Get the Beat

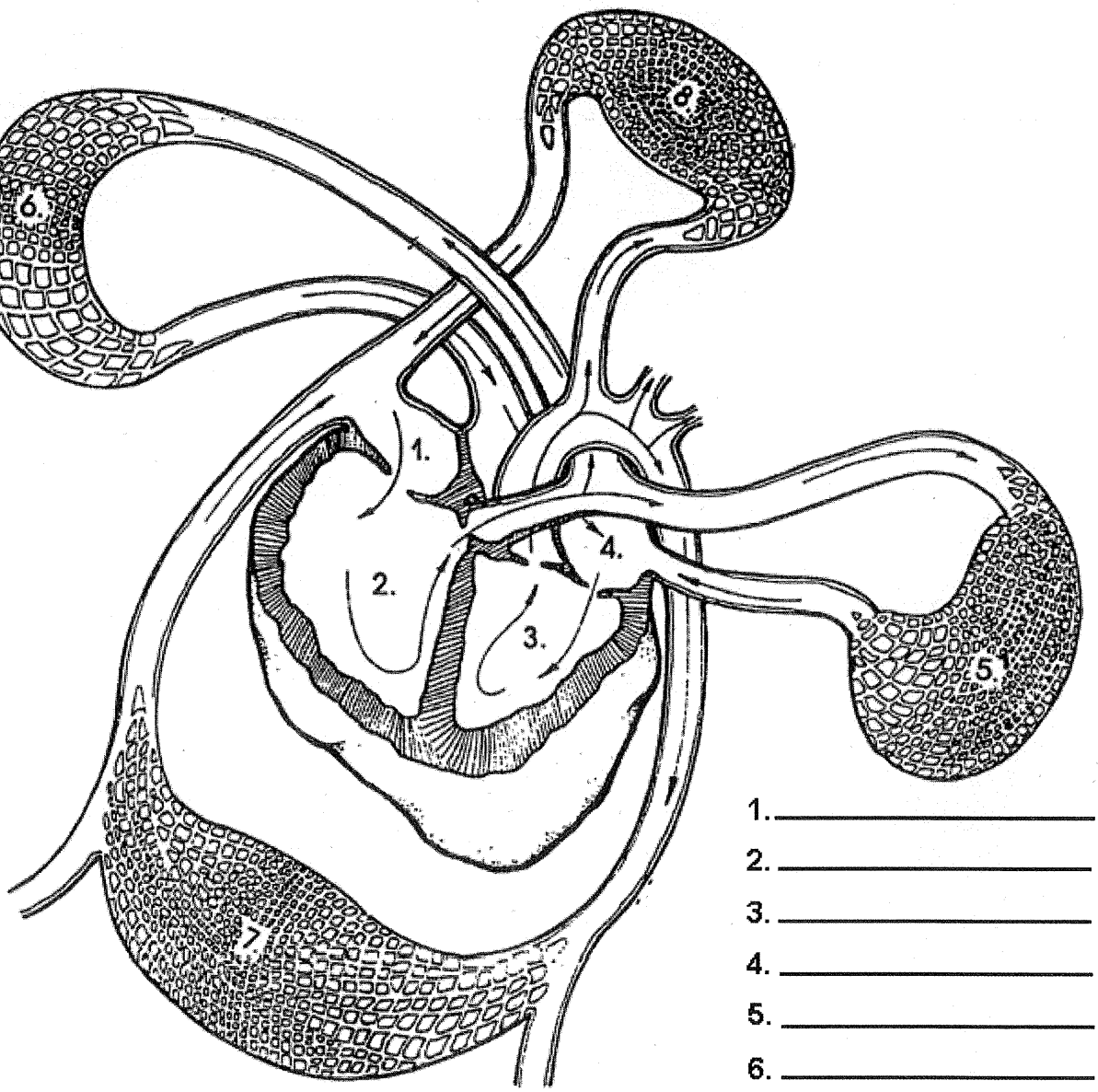
SCIENCE FACT: How often a heart pumps is measured by taking a pulse. Physical activity can change a person's heart rate.

ACTIVITY: Students can compare their own heart rates using these interactive charts. Label the sections as shown, numbering from 50 to 150. Then guide students through these steps: 1. Find a pulse (at your wrist, neck, or inner elbow) and count the beats for 15 seconds. Multiply by 4. 2. Write your name and heart rate on a cutout and tape it to the "At Rest" chart. 3. After 2 minutes of exercise (such as jumping jacks), find your rate again and display it on the other chart. 4. In your journal, compare your heart rates with the rates of the class.

Name _____ Date _____

Your Heart, the Blood Pump

Your heart has the job of pumping blood to the many parts of your body. (Parts 1 – 4)
Label the parts of the heart and the location of the flow of blood. (Parts 5 – 8)



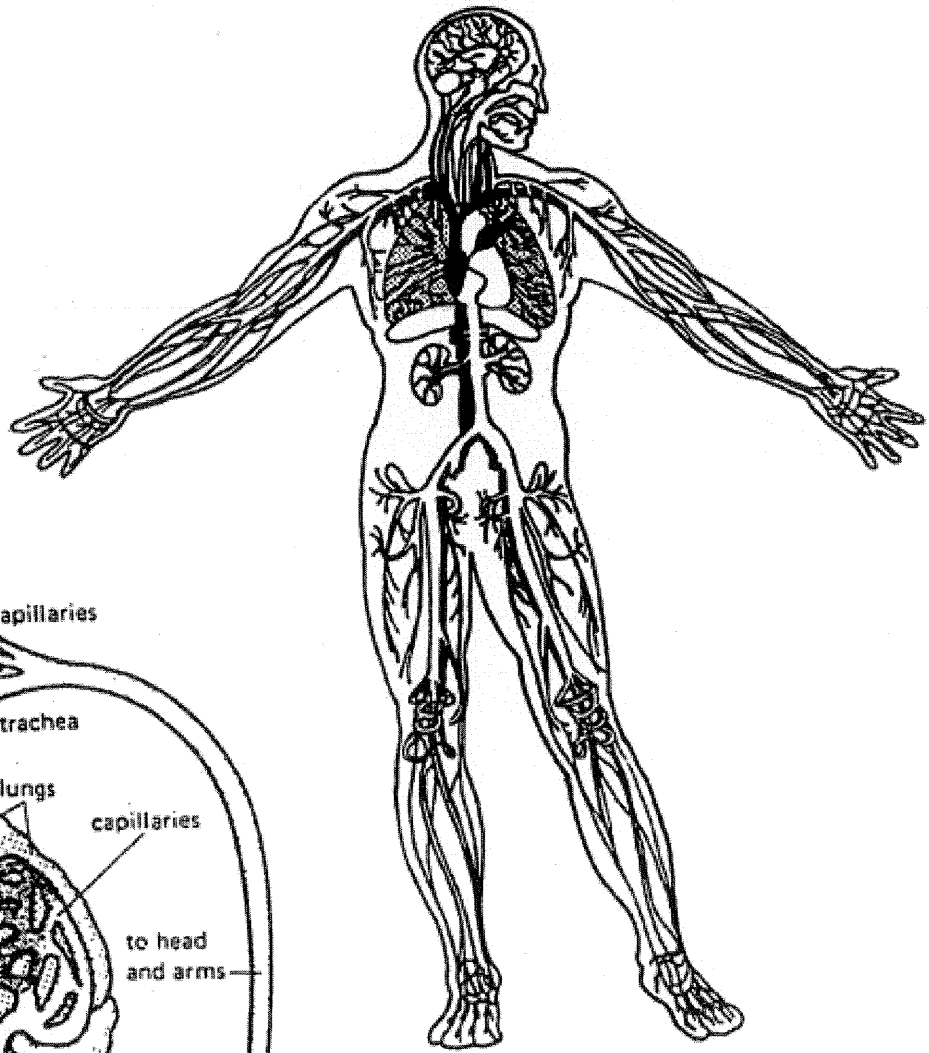
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

WORD BANK

left atrium	**right atrium**	**lower body**
left ventricle	**right ventricle**	**upper body**
left lung	**right lung**	

Name _____ **Date** _____

Circulatory System



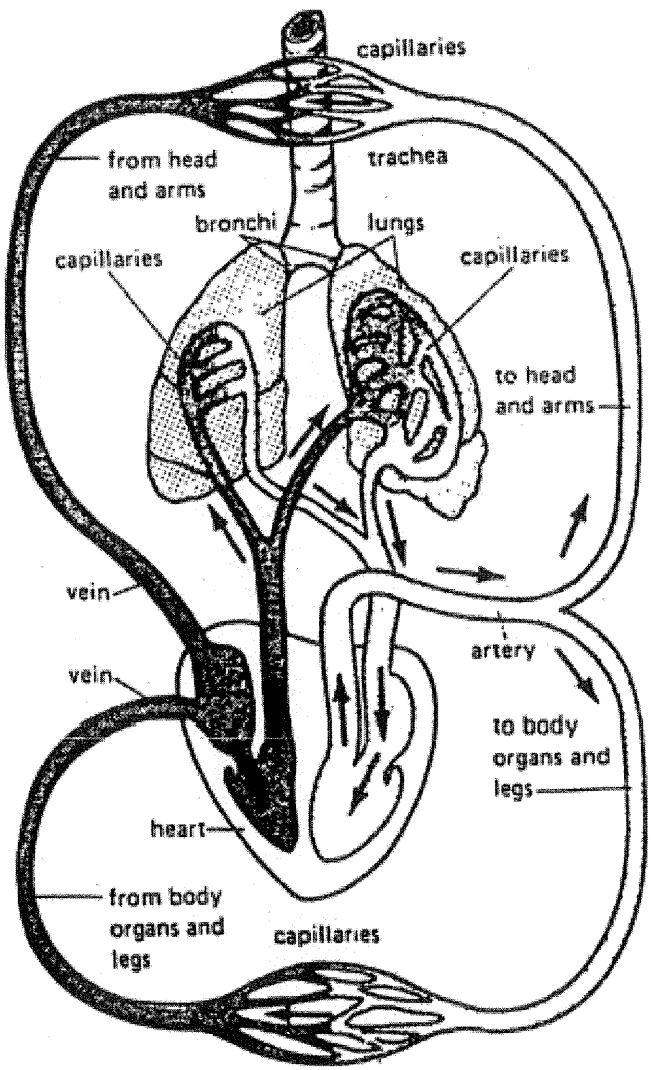


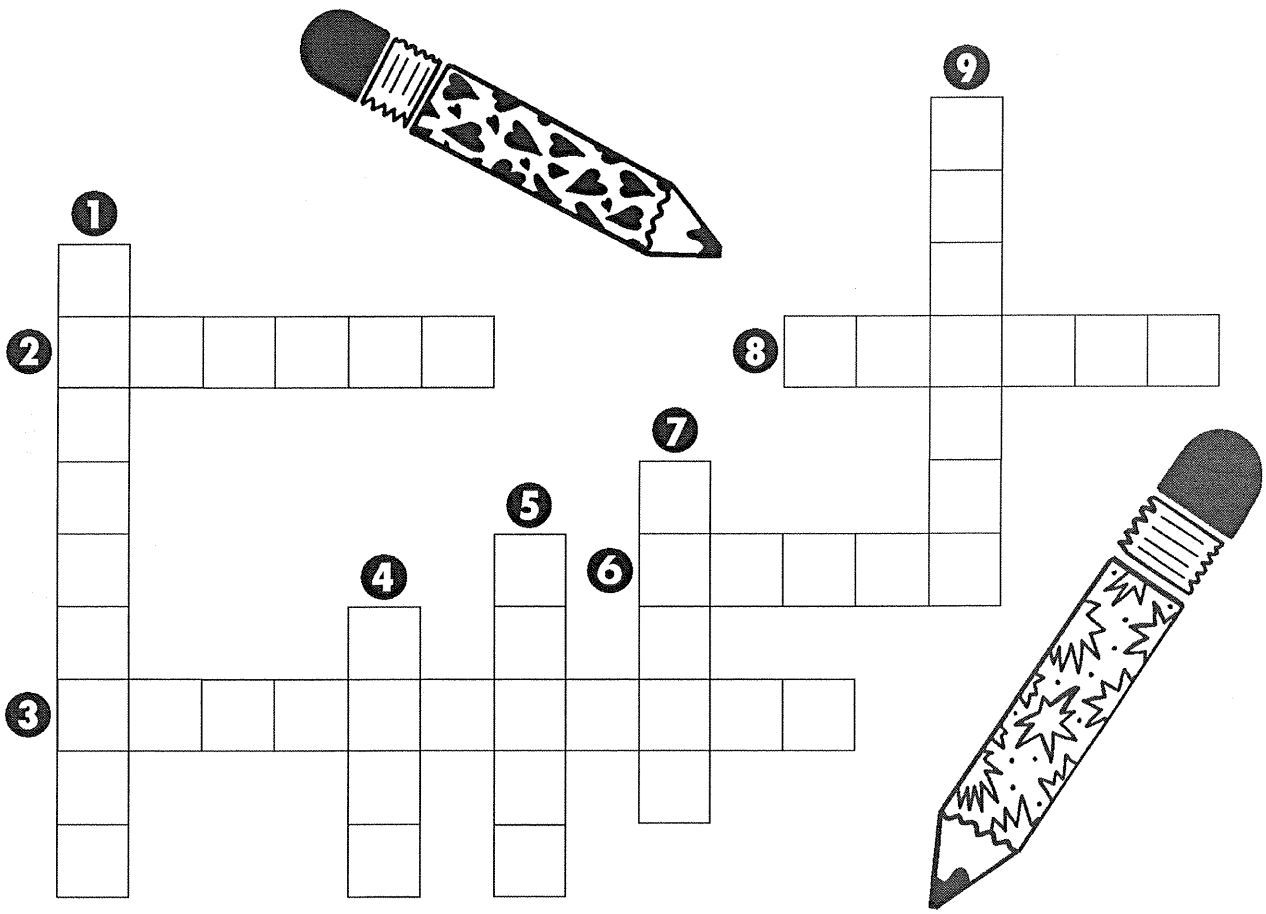
Figure 1

NAME _____

American Heart Association®
Fighting Heart Disease and Stroke

Heart Word Game

Sean and Yolanda were playing a game in which they spell words using letter squares. All the words they spelled were about the circulatory system. Fill in their game board by using the clues and words below.



1. what the heart does to send blood rushing out
2. a gas that our bodies need
3. the name for the system that includes our heart and blood vessels
4. what the heart works like
5. what you can listen to with a stethoscope
6. the part of the body that takes in oxygen
7. the liquid that carries oxygen throughout our bodies
8. what our heart is made of
9. the tubes that carry blood

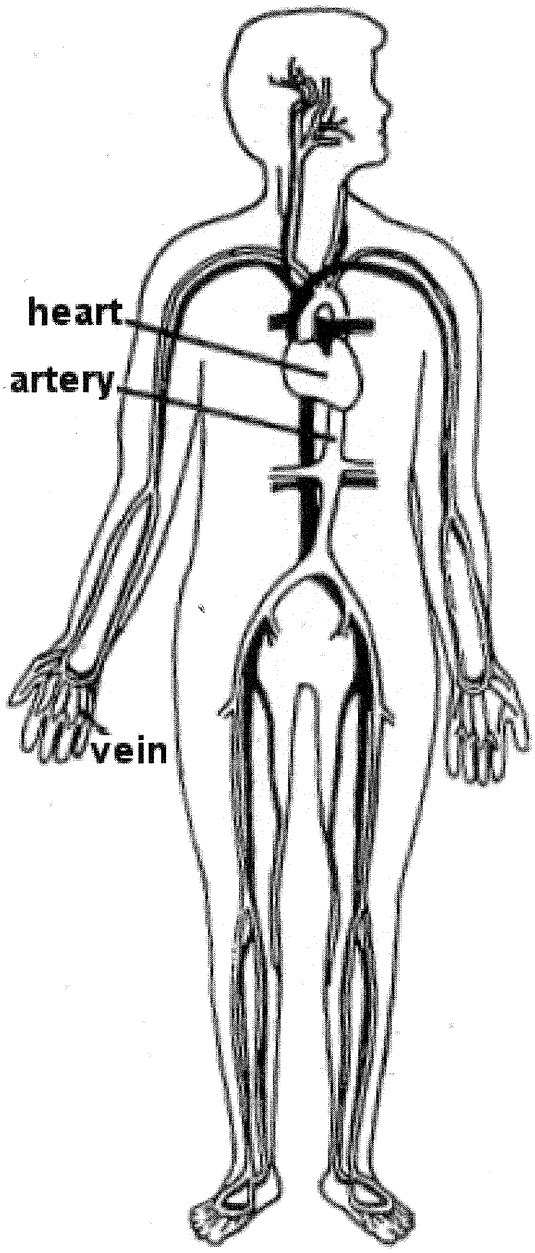
blood
circulatory
contracts
heart
vessels
muscle
oxygen
pump
lungs

Name _____ **Date** _____

Inter-body Highway System

Veins, arteries and capillaries are the blood vessels that form the fantastic highway system found in your body.

Write the word **vein**, **artery** or **capillary** In front of the statement that best describes that type of blood vessel.



1. _____ carries blood away from the heart.

2. _____ carries blood back to the heart.

3. _____ is the tiniest blood vessel.

4. _____ carries oxygen-rich blood.

5. _____ connects the arteries and veins.

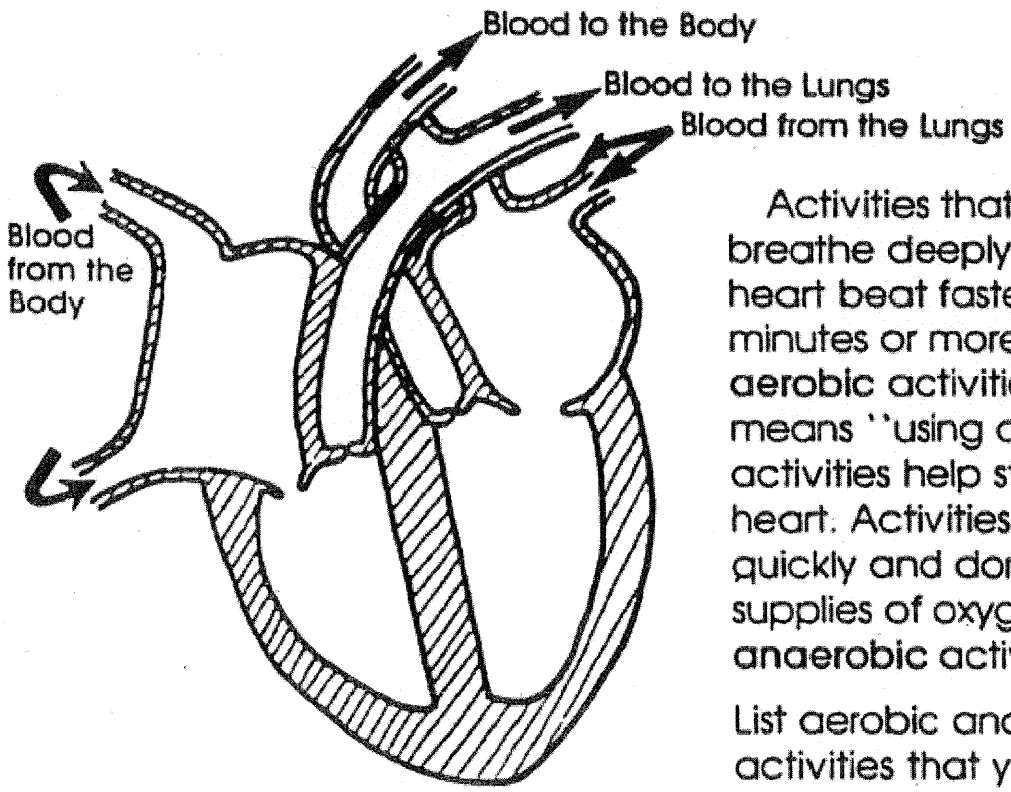
Your blood is the vehicle that travels this highway. It transports oxygen, carbon dioxide, food, and waste. Your blood has cells in it that fights infection and it clots to prevent excessive blood loss.

Name _____ Date _____

TEAM WORK

Your heart is really **two pumps** that work together like a team. The **right side** of your heart takes dirty, carbon dioxide-filled blood in through the right atrium to the right ventricle. It is then pumped through the pulmonary arteries to your lungs. The blood takes on oxygen and loses carbon dioxide in the lungs. It returns to the **left side** on the heart through the pulmonary veins. It enters the left atrium and flows to the left ventricle. The left side of the heart pumps this oxygen-filled blood through the main artery of the body, called the aorta, to all the parts of your body.

- On the diagram, use arrows to trace the path of the blood.
- Color the part of the heart that is filled with carbon dioxide-filled blood a dark color (black or dark blue).
- Color the areas filled with oxygen-rich blood a bright red.



Activities that make you breathe deeply and your heart beat faster for 5 minutes or more are called **aerobic** activities. Aerobic means "using oxygen." These activities help strengthen your heart. Activities that are done quickly and don't require new supplies of oxygen are called **anaerobic** activities.

List aerobic and anaerobic activities that you enjoy.

Aerobic

1. _____
2. _____
3. _____

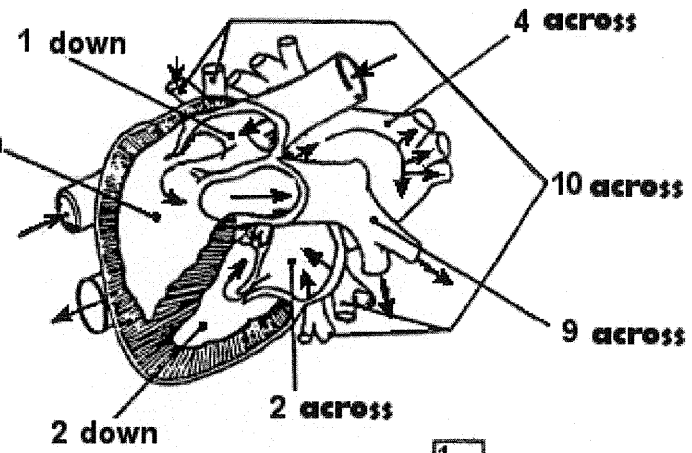
Anaerobic

1. _____
2. _____
3. _____

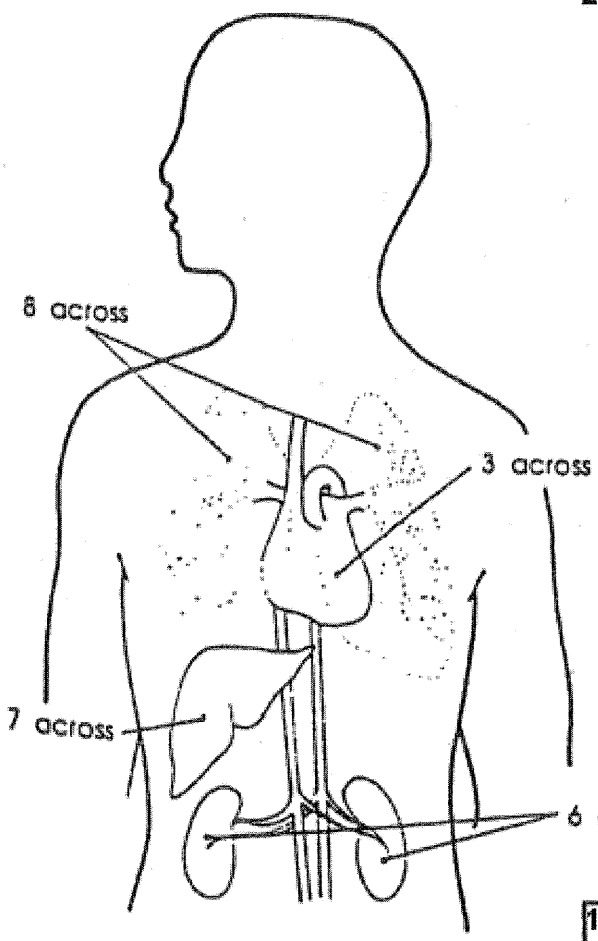
Name _____ Date _____

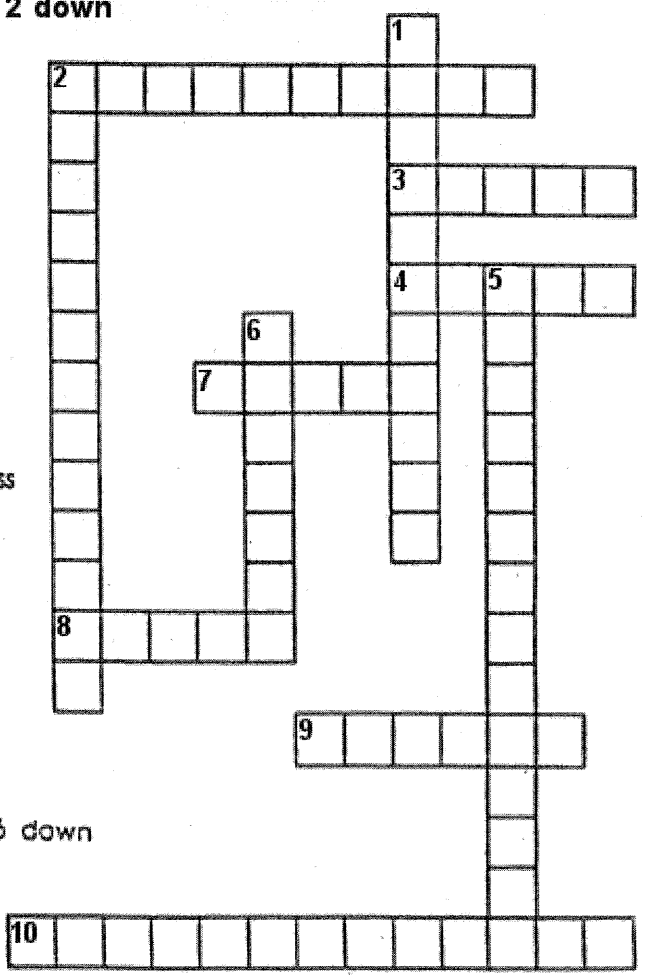
Lub – Dub, Lub – Dub

(Circulatory System Review)



Use the Word Bank
to complete the puzzle.





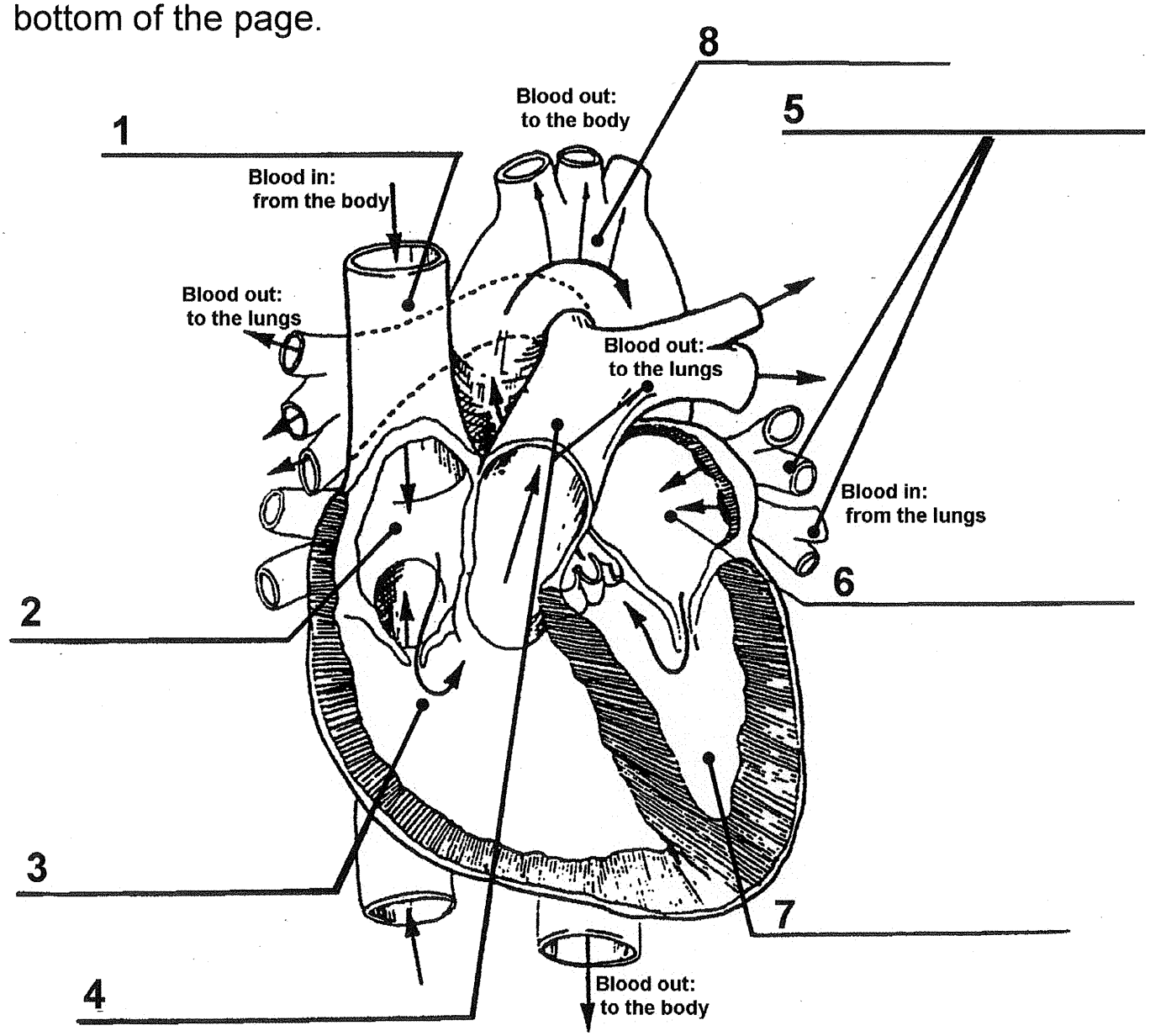
WORD BANK

lungs	**heart**	**liver**	**pulmonary vein**
kidneys	**aorta**	**right atrium**	**artery**
right ventricle	**left ventricle**	**left atrium**	

Name: _____ **Date**_____

Your Heart

Label the parts of your heart. There is a list of words to use at the bottom of the page.



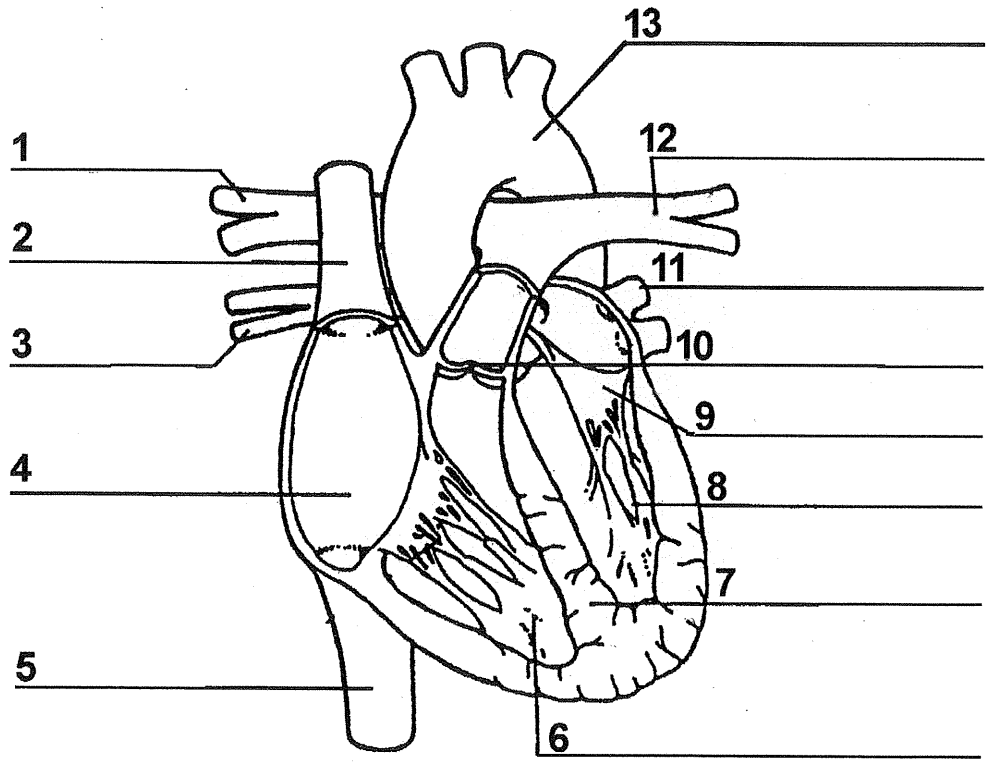
WORD BANK		
left atrium	right atrium	vena cava
left ventricle	right ventricle	aorta
pulmonary artery	pulmonary vein	

Name _____ **Date** _____

Structure of the Heart

Label the parts of the human heart on the diagram.

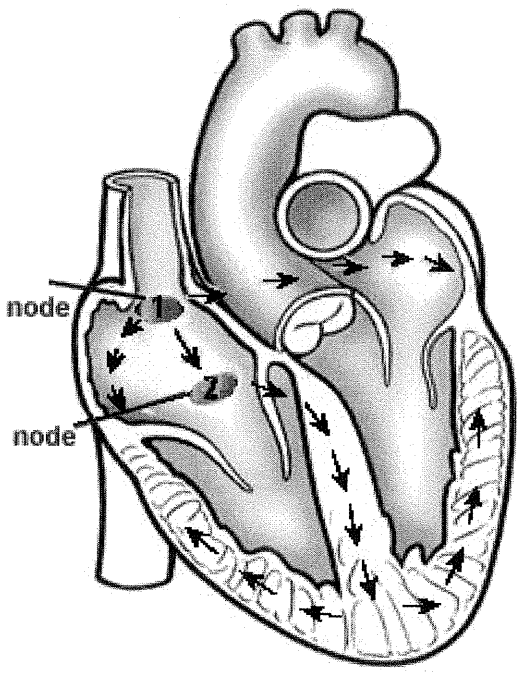
a. aorta
b. left pulmonary artery
c. left pulmonary vein
d. left atrium
e. left ventricle
f. septum
g. right ventricle
h. inferior vena cava
i. valve
j. right atrium
k. right pulmonary vein
l. right pulmonary artery
m. superior vena cava



Heartbeat

Fill in the blanks as you read. Then, in the diagram, label the nodes as SA or AV.

The heart beats regularly because it has its own pacemaker. The pacemaker is a small region of muscle called the sinoatrial, or **SA**, node. It is in the upper back wall of the right _____. This _____ node triggers an impulse that causes both atria to _____. Very quickly, the impulse reaches the atrioventricular, or **AV**, node at the bottom of the _____ atrium. Immediately, the _____ node triggers an impulse that causes both _____ to contract.

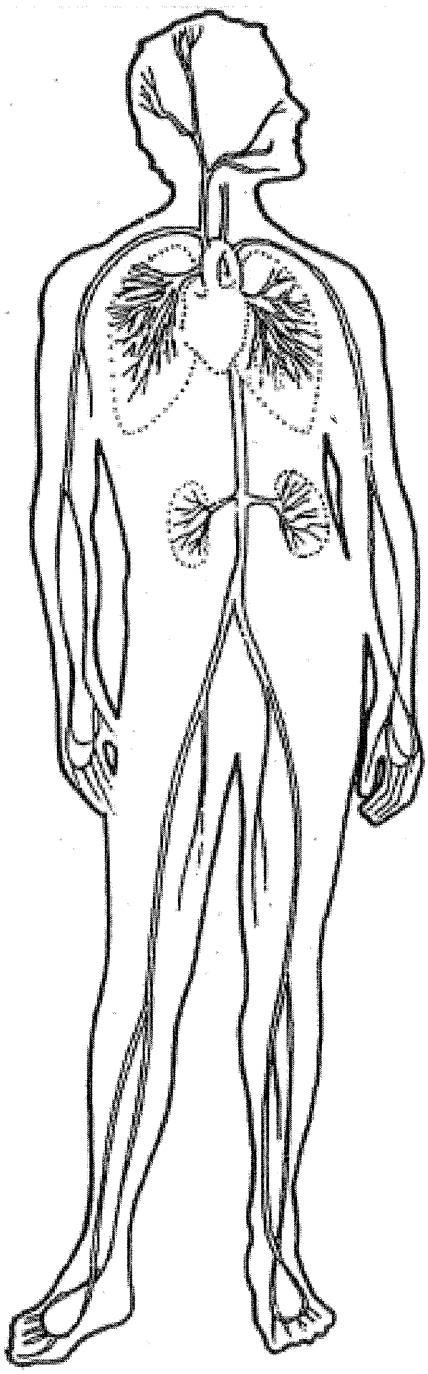


Name _____ Date _____

Veins and Arteries

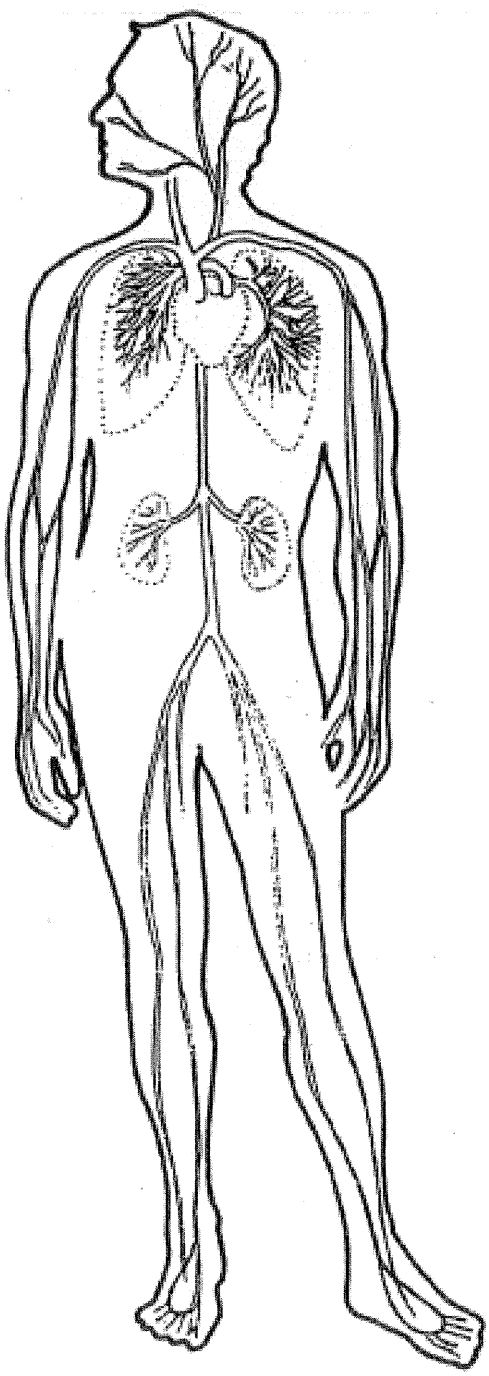
Arteries

Draw red arrows on the arteries showing the flow of blood away from the heart.



Veins

Draw blue arrows on the veins showing the flow of blood back to the heart.



Digestive System

The Digestive System

Vocabulary to Know

1. anus
2. chemical breakdown of food
3. digestive system
4. esophagus
5. gall bladder
6. large intestine
7. liver
8. mouth
9. mechanical breakdown of food
10. nutrients
11. pancreas
12. rectum
13. small intestine
14. stomach

Name_____ Date_____

A Model of the Digestive System

In this activity, we will construct a model that represents the length of the organs of the digestive tube.

Predict:
How long do you think the digestive tube is in your body?

_____

Procedure:

1. Check that you have all of the materials needed to start the experiment: metric ruler, streamers, scissors

2. Your teacher will give you an index card with the name of an organ of the digestive tube and its length. When you receive this card, measure and cut a length of streamer that matches that length.

3. When everyone is ready in your group, tape your model together on the board. Remember to tape a label on the left side of each organ section.

Results:

Construct a bar graph from the class data.

Conclusion:

1. Why do you think each of the organs is the length it is?

2. Besides length, what other ways are the digestive organs different?

Activity #1: How Long is the Digestive System?

Have students cut a piece of yarn according to the following measurements. Allow students to use different color yarn to represent different organs. After the yarn has been cut, tie the pieces together to see how long the digestive system is:

Esophagus: 25 cm
Stomach: 20 cm
Small Intestine: 700 cm
Large Intestine: 150 cm
Total: 895 cm

Activity #2: A Digestive System Simulation

1. FOOD TUBE: Lay out two parallel lines of tape on the floor, 3' apart and long enough for halt the class to stand shoulder to shoulder on one side of the parallel lines.

2. FOOD PARTICLE: The food particle consists of M&Ms placed in small zip-lock bags. These are placed (a few baggies per sac) in wadded newspapers in small paper lunch bags. Place the small sacks in larger sacks with added newspaper. Place all sacks and add newspaper until the large plastic bag is full.

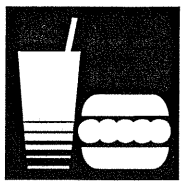
3. ACTION 1: PERISTALTIC MOVEMENT: Put the food particle to be eaten at one end of the food tube and a large trash can at the other. Have students line up on both sides, facing each other, squeeze the food particle the length of the food tube, WHILE doing the DIGESTION actions:

4. DIGESTION: Label and/or instruct each student. As the food comes to a student they should narrate what they are doing and why:

- Teeth: Tear food apart (break plastic bag)
- Saliva: Use spray bottles to moisten food particle
- Stomach: Tear small bags apart; Spray food with their pancreatic juices
- Small Intestine: absorbs food, find bags of candy and pass to blood (the teacher can play the role of the blood)
- Large Intestine: Reabsorbs water, sponge up water on the floor and puts the waste papers in the trashcan

Source: Providence Science Outreach Program

Name_____ Date_____



The Affect of Particle Size on the Rate of Digestion

In this lab, we will observe whether a sugar cube or loose sugar granules dissolve more quickly.

Hypothesize:
What is the affect of particle size on the rate at which sugar will dissolve?

- If sugar cubes and sugar granules are placed in water, then _____ will dissolve more quickly because

_____.

You are manipulating the particle size in this experiment. This is the variable. How will you measure it? _____

The rate of dissolving is the responding variable in this experiment. How will you measure it? _____

List some other variables that you may need to control in this experiment. List something you can do to control them. One example is completed for you.

Crushing	Do not crush the sugar while stirring
_____	_____
_____	_____
_____	_____

Procedure:

1. Safety first! Do not taste any of the lab materials. They may not be clean.

2. Check that you have all of the materials needed to start the experiment:

2 spoons	2 containers	sugar cube
sugar granules	liquid measuring device	

3. Fill both containers $\frac{1}{2}$ full of water.

4. At the signal, place the sugar cube in one container and the granulated sugar in the other. This must be done at the same time.

5. Gently stir both containers.

6. Record the time when the sugar dissolves on the data table. (Dissolved is when you no longer see the sugar.)

7. Repeat the experiment or combine the data with other groups' data.

Results:
Make a table to chart your results.

Conclusion:
1. Which type of sugar dissolved most quickly? Give evidence.

_____

2. Why did that form of sugar dissolve faster?

_____

3. Did the results agree with your hypothesis?_____ If not, write a new hypothesis: _____

_____

4. How does mechanical breakdown of food help digestion?

_____

_____

5. Why is it important to chew your food thoroughly?

_____

Lab Ideas for Digestive System

PART I: McMush - Demonstration of Fat Content

Materials:

1 quarter pound hamburger meal (with medium fries & 12 oz cola)
1 blender
1 hot plate
1 - 500 ml beaker
1 - 200 ml graduated cylinder
100 ml of water
2 oven mitts
1 wooden spoon
1 refrigerator to cool McMush mixture

Procedure Overview:

1. The complete meal will be blended.
2. A large sample of the meal will be heated.
3. From the heated sample, 100 ml will be taken to be cooled .
4. Results from the 100 ml sample are representational of the complete meal.

Procedure:

1. Preheat the hot plate.
2. Break up meal into small pieces and blend.
3. Pour part of the blended McMush into a 500 ml beaker.
4. Add 100 ml of water to the McMush and stir well.
5. Boil McMush mixture gently for 15 minutes.
6. Use oven mitts to protect your hands and pour the hot McMush mixture into a graduated cylinder. Then cool in the refrigerator for 5 minutes.
7. Remove McMush from the refrigerator and measure the amount of accumulated fat at the top of the graduated cylinder.
8. Record results.
9. Clean glassware with warm soapy water.

Expected Outcome:

The fat will form a layer at the top and solidify as it cools. You may calculate the percent of fat in the McMush meal by dividing the mls of fat by the total mls of your sample. For example, you might find 40 ml of fat out of a total of 100 ml of sample. This would indicate that the total meal contained 40% fat.

PART II: Starch Analysis #1 - Starches to Sugars

Starches start to be digested in your mouth. Saliva contains amylase, an enzyme that breaks down starch into small sugar molecules.

Materials:

1/4 slice of bread or other starchy food like a low salt saltine cracker per student

Procedure:

1. Chew on a 1/4 to 1/2 slice of bread for 1 to 2 minutes.
2. Make certain you don't swallow the bread.
3. Swallow or dispose of the bread mush after 2 minutes.
4. Record Observations.

Expected Outcome:

At first the bread will taste bland and plain. However, after a minute or two the taste of the bread should turn mildly sweet. This sweet taste is the result of the amylase converting the starch into sugars.

Experiments with Fats

This exercise illustrates how bile fluid in the intestines emulsifies oils and fats. It is necessary for the body to emulsify fats to separate them and expose them to more enzymes. In this exercise, the dishwashing liquid represents the bile fluid.

Materials:

2 clear plastic cups
warm water
dishwashing liquid
cooking oil
1 tablespoon
1 teaspoon

Procedure:

1. Fill two glasses with warm water.
2. Add a tablespoon of cooking oil to each glass.
3. Add a teaspoon of dishwashing liquid to one of the glasses.
4. Stir both glasses very well.
5. Record observations.

Expected Outcome:

The glass with the dishwashing liquid will have a milky look to it and it should have tiny oil droplets, whereas the other cup with have two very separate layers, one oil layer on the top and water below. The oil "droplet" will be very large in the glass without dishwashing liquid compared to the oil droplets in the glass with the dishwashing liquid.

PART V: Illustration of Digestion System

Materials:

individually wrapped hard candies (nothing that could melt)
a dozen small water guns
newspaper
a piece of chalk
a small trash barrel
small piece of paper that read as shown below (try to divide the parts equally with the exception of Anus. Only one student is needed to represent the Anus.)

Procedure:

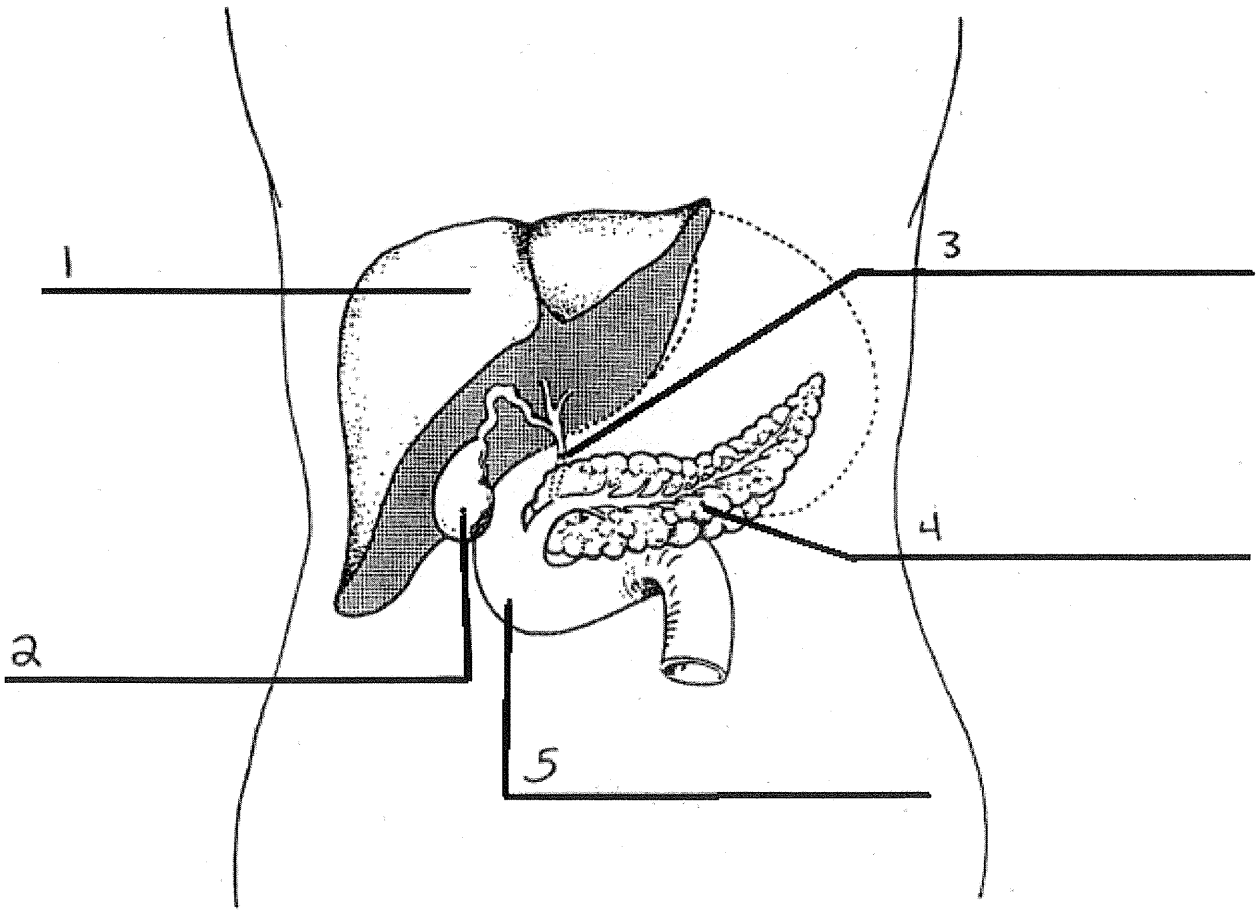
This is a good outdoor activity. Place some individually wrapped candies in the center of some newspaper. Cushion the candy well. Make two or three of these candy balls. These candy balls represent food. This food is passes through the digestive system, starting in the mouth and ending in the rectum (see below). On some school yard pavement, mark the following in a straight line, leaving about 2 feet between each.

Pavement reads:	**Student slip reads:**	**Props. for students**
Mouth	Saliva	Water guns; sudents spray the food (enzymes)
Esophagus		No student stands here; food just passes through
Stomach	Pancreatic Juice	Water guns; these enzymes moisten the food
Small Intestine	Small Intestine	Students use their hands to tear off the paper
Large Intestine	Blood	They distribute nutrients (candy) to entire body , and thus they pass around the candy to all the students participating in the activity
Rectum	Anus	One student represents the anus, disposing of the paper as it is passes to him/her; this student has the trash barrel.

Name _____ Date _____

Digestion Helpers

Label these organs that aid in the digestion of the food you eat.



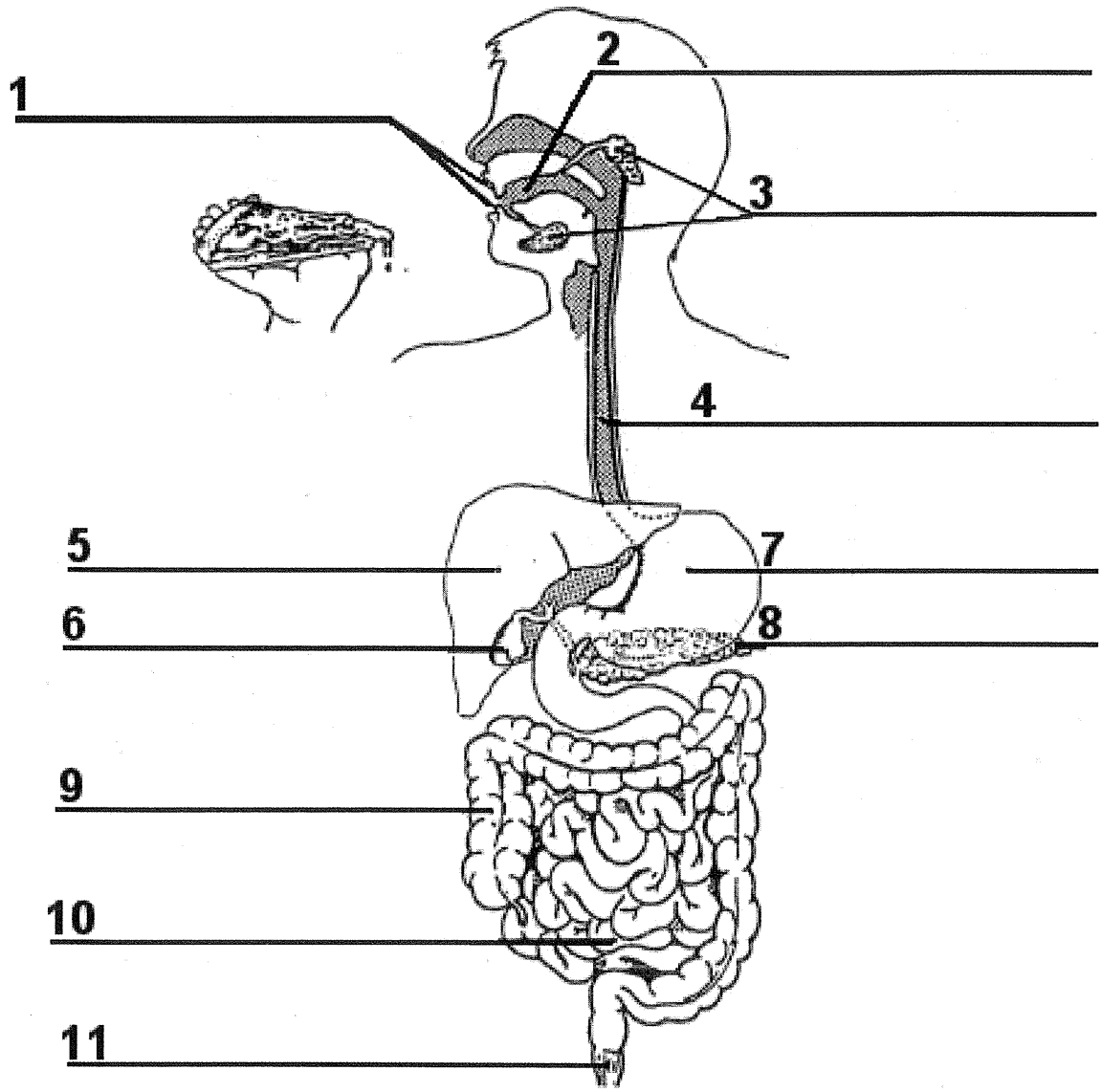
WORD BANK

liver	**pancreas**	**gallbladder**
bile duct	**duodenum**	

Name _____ Date _____

Your Digestive System

Label the parts of your digestive system.



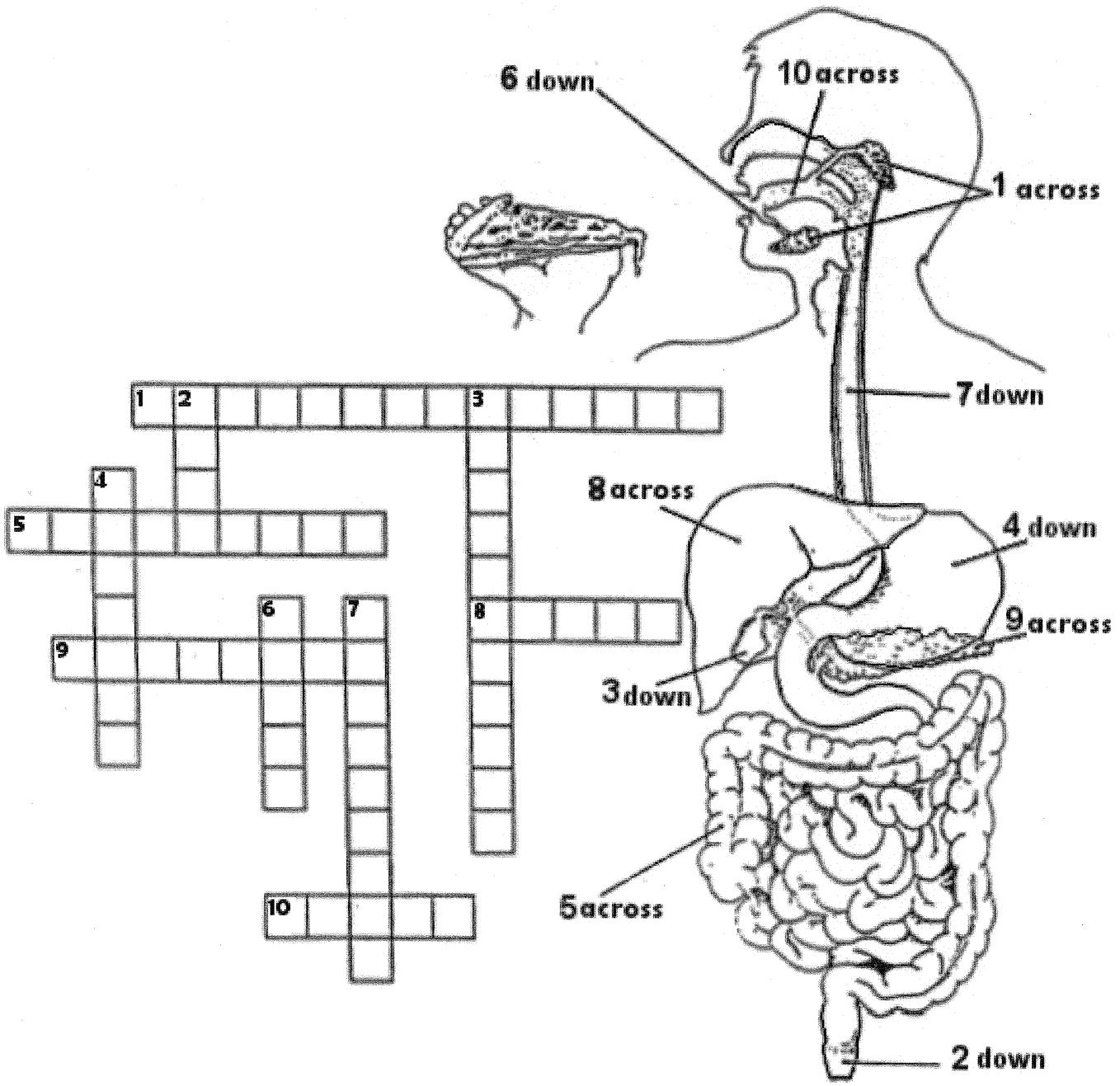
WORD BANK

pancreas	liver	gallbladder	salivary glands
stomach	mouth	large intestine	anus
esophagus	teeth	small intestine	

Name _____ Date _____

Gulp, Gulp (Digestive System Review)

Use the Word Bank to complete the puzzle.



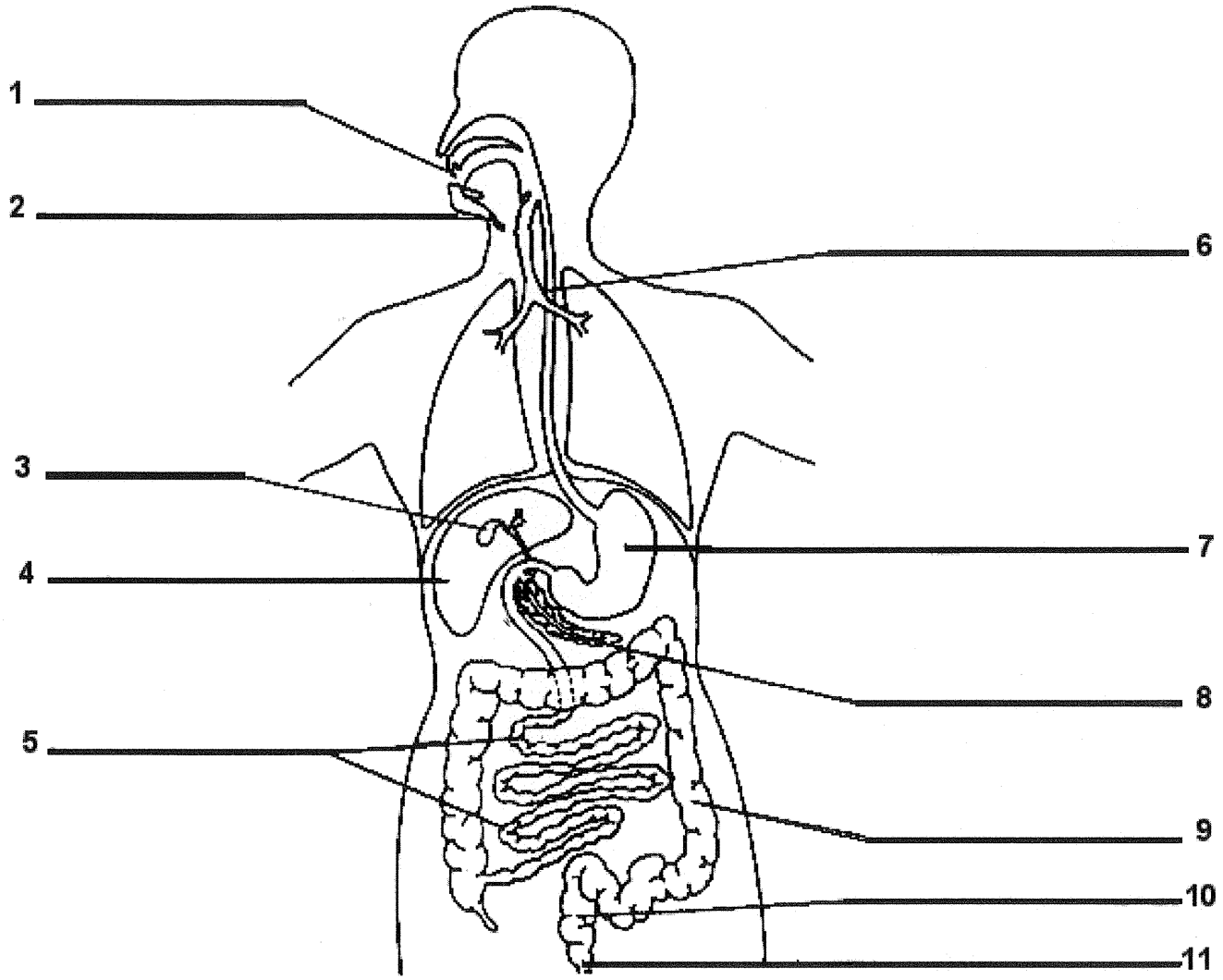
WORD BANK

mouth	gall bladder	liver	pancreas
intestine	teeth	salivary glands	esophagus
anus	stomach		

Name _____ Date _____

LABELING DIGESTION

Label the parts of the human digestion system in the diagram.



TRACING DIGESTION

Trace the path that food goes through as it is digested in the human body. Show this by listing the parts of the digestive system in the order that food passes through them. Start from the mouth.

1. mouth
2. _____
3. _____
4. _____
5. _____
6. liver
7. _____
8. _____
9. _____
10. _____
11. _____

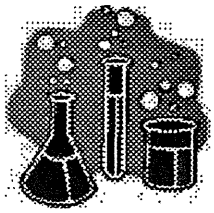
Excretory System

The Excretory System

Vocabulary to Know

1. Excretory system
2. Kidneys
3. Lungs
4. Skin
5. Urethra
6. Ureter
7. Urinary bladder
8. Urine

Name_____ Date_____



The Excretory System

Lab 1

Title: The affect of exercise on the heat released by the lungs

Background:

The **Excretory system** consist of organs that are responsible for the disposal of dissolved waste particles, the elimination of liquid and gaseous wastes, and the removal of excess heat. The lungs help to regulate the body's temperature by removing excess heat.

Problem:

Does exercise affect the amount of heat given off by the lungs?

State your hypothesis for this experiment.

If a person does jumping jacks for two minutes then the temperature of the air they exhale will be _____because_____

_____

Which variable will you be manipulating in this experiment?_____

How will you measure it ?_____

Which variable will be the responding variable ? _____

How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

_____ _____

Procedure:

Safety First!!!
Do not use straws used by other people.
Spread out when doing your jumping jacks. Check to be sure you will not be hitting any other people or objects.

1. Check that you have all of the materials needed to start the experiment.
Two straws Bottle with 50 ml water and cover Thermometer

2. When your teacher signals you, measure the temperature of the water.
Record the temperature on the data table.

3. Make sure your straw is immersed in the water. Then exhale slowly into the bottle. Continue this for two minutes.

4. Measure the temperature of the water.
Record the temperature on the data table.

5. When your teacher signals have one partner do two minutes of jumping jacks.

6. Have the partner that exercised exhale slowly into the bottle for two minutes.

7. Measure the temperature of the water Record the temperature on the data table.

8. Empty the water from the bottle and get 50 ml of fresh water.

9. Have the second partner repeat steps 4 through 8.

10. Calculate the class averages and record on the data sheet.

11. Answer the Discussion/Conclusion questions.

Results:

The effect of exercise on heat released by the lungs

Student Name	Temperature Before Exercise (Celsius)	Temperature After Exercise (Celsius)	Change in Temperature (Celsius)	Change in heat (calories) ml X Change in temperature
1.				
2.				
Class				

Conclusion/Discussion:

1. How did exercise affect the heat given off by the lungs? Give evidence for your answer.

_____

_____

2. Did the results agree with your hypothesis? _____If not, write a new hypothesis.

_____

3. Why would there be more heat to release after exercise?

_____

4. What other ways does the body have to give off excess heat?

_____

5. What are some other factors that might how much heat a body needs to release?

_____

A Model of the Excretory System

Objective:
This lesson will identify the structures and order the process of the excretory system through a model or a diagram.

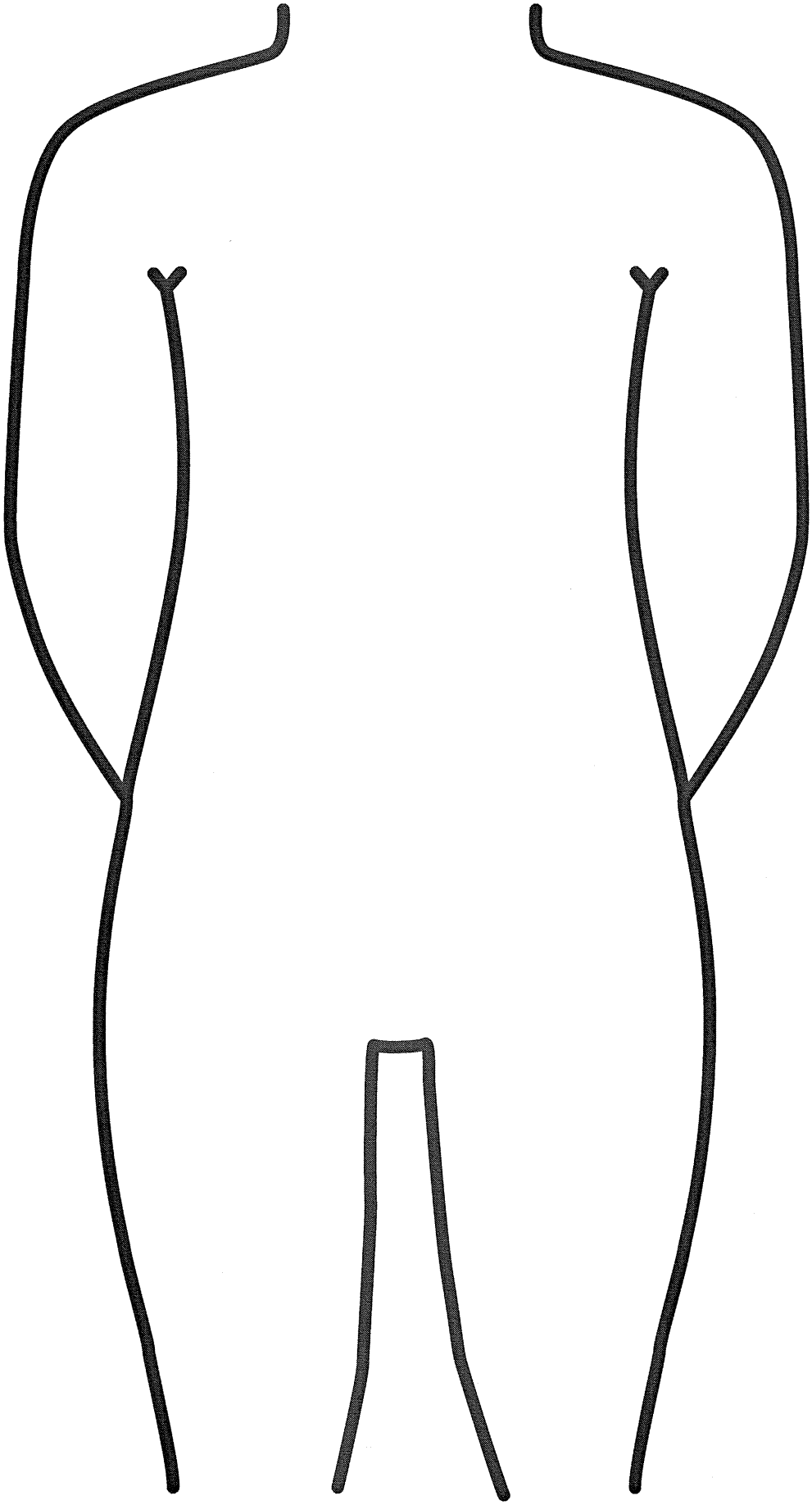
Materials:

body diagram	small marshmallows	tag board
glue	kidney beans	
cafeteria straws	scissors	
spaghetti (uncooked)	red yarn	
brown paper sack	blue yarn	

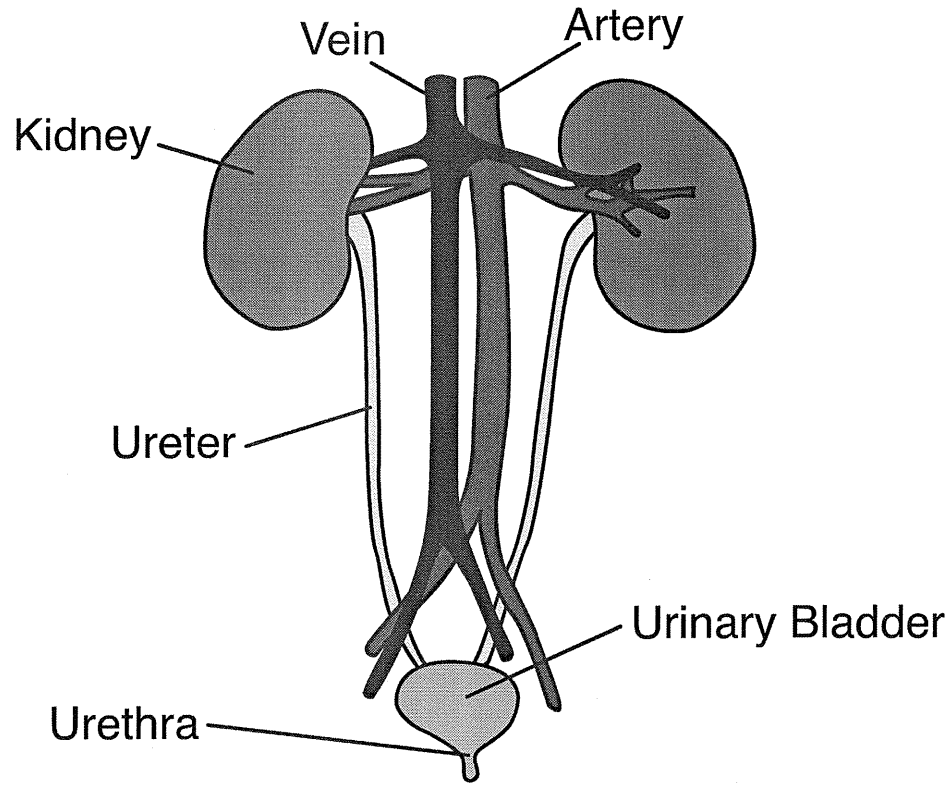
Procedure:
Each small group should have a brown lunch sack with all of their materials inside. On the outside of the bag, write what each student needs to grab out of the bag. Put the list on the overhead. Students were responsible for getting their own materials out of the bag.

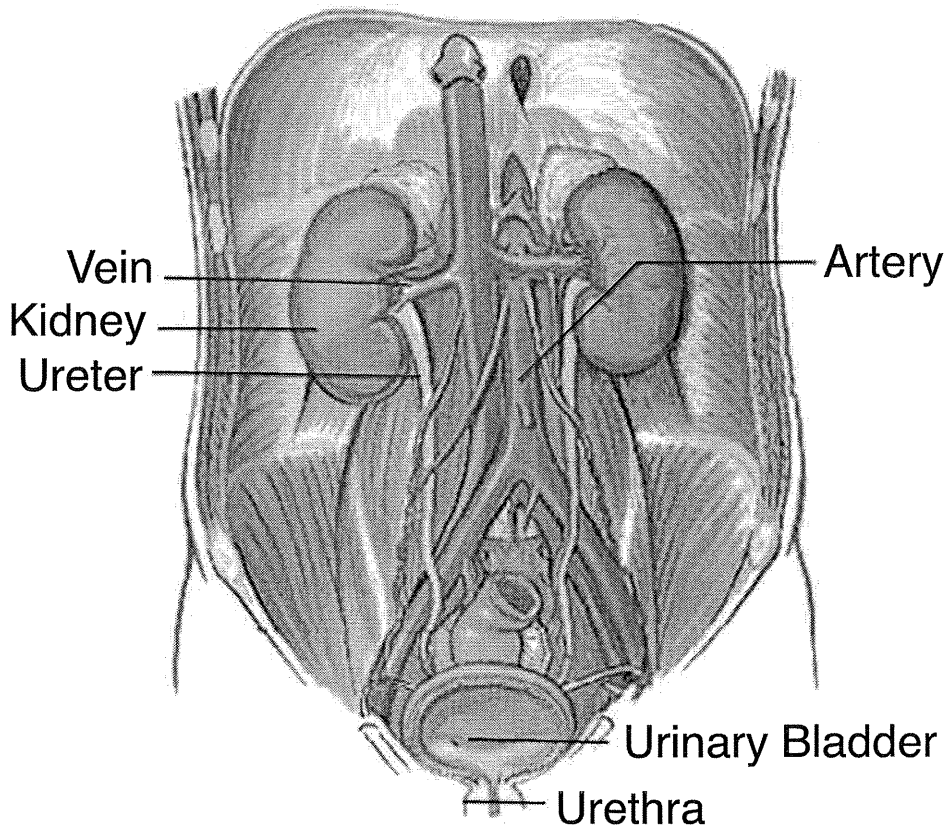
Each student needs:
3 Kidney Beans (Represents the Kidneys)
3 Spaghetti pieces (Represents the Ureters)
2 Marshmallows (Represents the Bladder)
2 Straw pieces (Represents the Urethra)
2 pieces of Red Yarn (Represents the Arteries)
2 pieces of Blue Yarn (Represents the Veins)
One of each item will be used for the key at the top of the tag board. Attach the body model to the tag board prior to the lesson.

Making the Model:
1. Glue on the kidney beans.
2. The yarn will be approx. 3 inches long. The student will have to separate the yarn into two pieces about 1/2 way up so that the arteries and the veins can go down each leg. Glue on the arteries and the veins.
3. Insert the approximately 1 inch long spaghetti lengths into the mini-marshmallow at an angle. This represents the ureters draining down into the bladder.
4. Insert the approx. 1 centimeter long piece of straw into the bottom of the marshmallow. This represents the urethra. Place glue on the marshmallow only. The spaghetti should be just high enough to‹go over the top of the yarn.



Excretory Organs



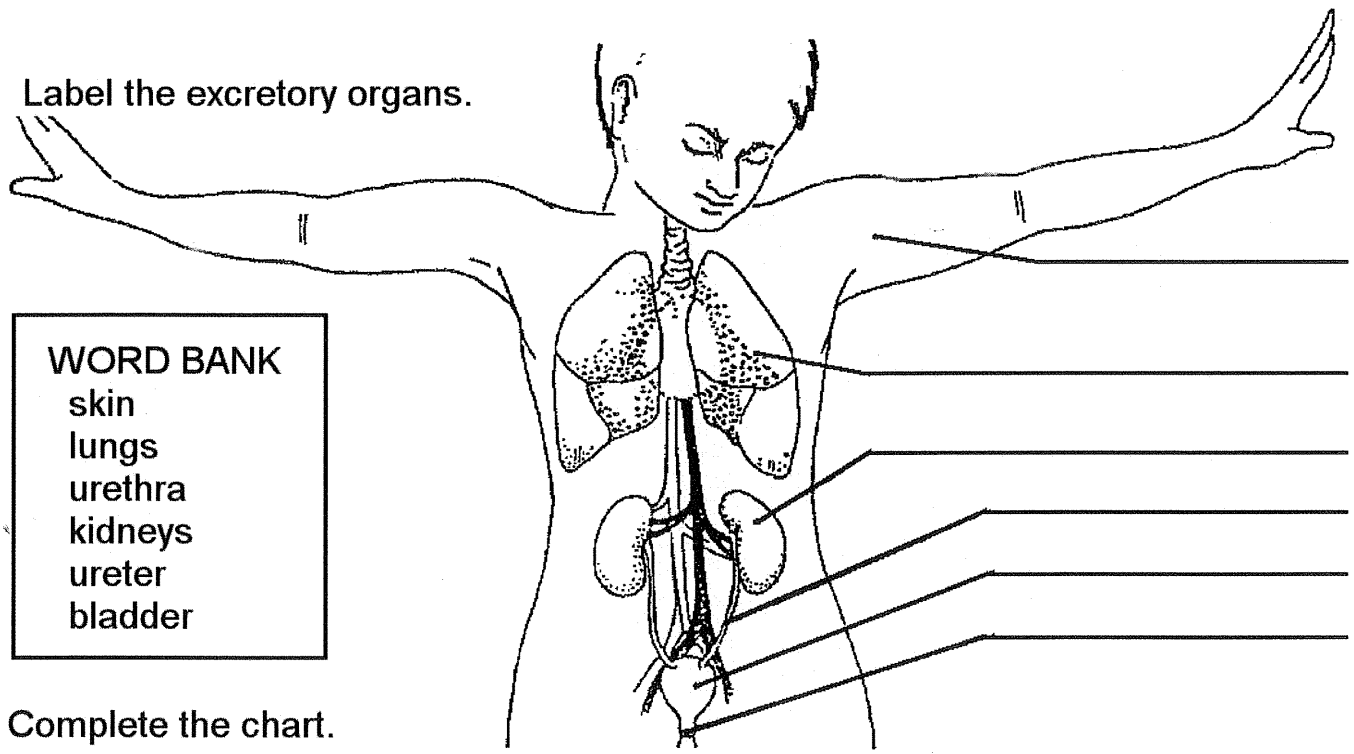


Name _____ **Date**_____

Waste Removal

The important job of removing bodily wastes is performed by the skin and the organs of the urinary and respiratory systems.

Label the excretory organs.



WORD BANK
- skin
- lungs
- urethra
- kidneys
- ureter
- bladder

Complete the chart.

Place an X in the organ column that matches the function.

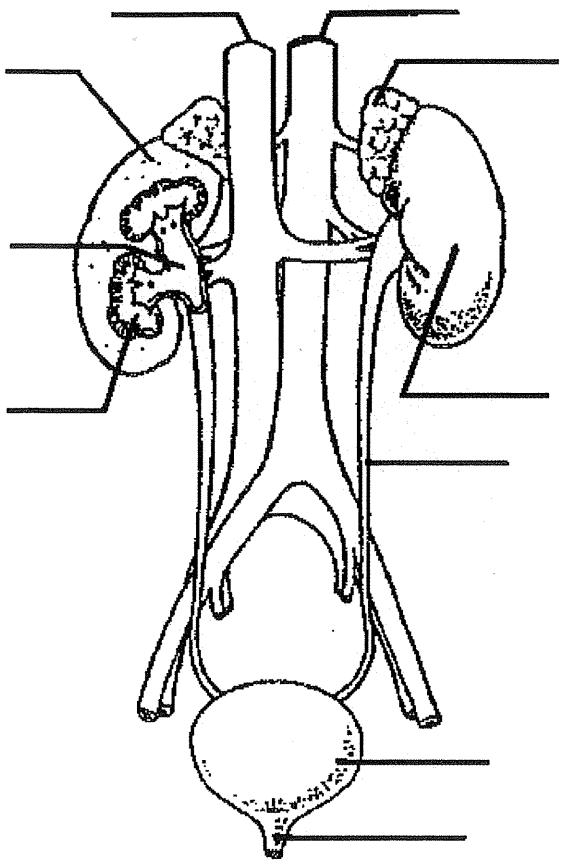
Function	Excretory Organs			
	kidneys	lungs	skin	bladder
removes water				
brings oxygen to blood				
removes salt				
stores urine				
removes carbon dioxide				
produces urine				
removes body heat				

Name _____ **Date** _____

Human Urinary Tract and Kidney

Label the parts of the human urinary system, including the human kidney, in the diagram. On another sheet of paper, give the function/purpose of each part.

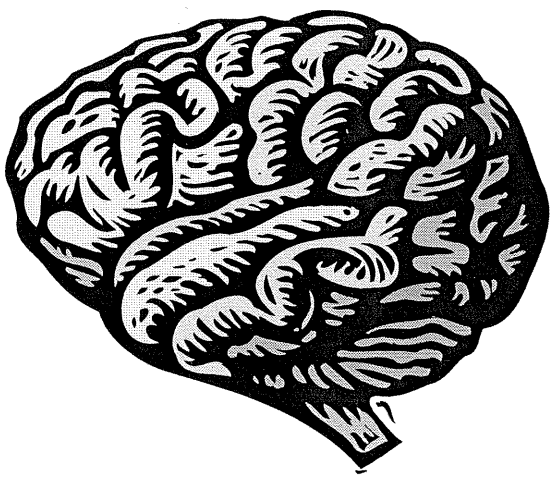
a. kidneys
b. adrenal glands
c. ureter
d. urinary bladder
e. urethra
f. renal artery
g. renal vein
h. cortex
i. medulla
j. renal pelvis



Fill in the blanks below with the correct answers.

Kidneys are the "filters" of the _____ system. They control essential balance between body salts and _____. They remove from the blood nitrogenous wastes, water, urea, nonvolatile foreign substances, excess salt and excess water. The kidney is enclosed by a connective tissue _____ and is divided into an outer _____ and an inner _____. The _____ functions chiefly for water resorption. The liquid waste, _____, collected by the kidneys passes through the _____ to the _____. The urinary bladder is a strong muscular organ that stores the urine until it can be excreted via the _____.

Nervous and Endocrine Systems



The Nervous System

Vocabulary to Know

1. Brain
2. Nerve cells
3. Nerves
4. Nervous system
5. Sensory organs
6. Spinal cord

The Endocrine System

Vocabulary to Know

1. Adrenal glands
2. Endocrine system
3. Thyroid gland
4. Pancreas gland
5. Pituitary gland
6. Ovaries
7. testes

Name_____ Date_____

The Nervous System

Lab 1

Title: A comparison of reaction time to visual and auditory stimuli

Background:

The Nervous system consist of organs that interact to control and coordinate the body's responses to changes in the environment, and to regulate growth, development, and reproduction.

While riding your bike you suddenly see a car coming towards you. You must make a split-second decision on what to do. Your reaction time, is the time it takes you to respond.

In this activity, you will compare reaction times to a visual signal and reaction times to an auditory signal. In this activity reaction time will be defined as how far the meter stick drops through the students hand.

Problem:

Do you reaction more quickly to visual or auditory stimuli?

State your hypothesis for this experiment.

If a person is given a visual and an auditory stimulus then they will react more quickly to the _____ stimulus because _____

_____

Which variable will you be manipulating in this experiment?_____

How will you measure it ?_____

Which variable will be the responding variable ? _____

How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

_____ _____

Procedure:

1. Check that you have all of the materials needed to start the experiment.
   One meter stick

2. When your teacher signals you, have one partner sit with their forearm on the surface of the desk with your writing hand extending over the edge.

3. Have your helper position the meter stick with the zero end between, but not touching, your thumb and fingers. Refer to the diagram below.

4. Instruct your partner to release the stick without warning. As soon as the stick is released, try to catch it as quickly as possible between your thumb and fingers.

5. Record the distance the meter stick fell on the data sheet.

6. Switch places with your partner and repeat steps 2 through 5.

7. Give your data to your teacher. Record the class average on the data table.

8. Repeat steps 2 through 7. However, this time the seated partner will have their eyes closed. The partner dropping the stick will drop the stick and at the same time say "now".

9. Construct a bar graph of the class results then answer the discussion/ conclusion questions.

Results:

A comparison of reaction time to visual and auditory stimuli

Student's Name	Distance Meter Stick drops (centimeters)
Visual Stimulus 1.	
2.	
Class	
Auditory Stimulus 1.	
2.	
Class	

Conclusion/Discussion:

1. To which type of stimuli did the class react more quickly? Give evidence for your answer.

---

2. Did the results agree with your hypothesis? _____If not, write a new hypothesis.

---

3. What are some other factors that might have affected the reaction times?

---

4. Describe the path the message took through your nervous system as you reacted to the meter stick being released.

Busy Body Experiment

Mazes, marker, stopwatch

Trial One-

1. Time a partner as they complete a maze start to finish.
2. Record the time.
3. Have your partner try the same maze again.
4. Record the time.
5. Try the same maze a final time.
6. Record the time.
7. Talk about the results with your partner and then switch and repeat the above steps again.

- Time should get faster each time
- Practice makes perfect
- Repetition improves learning

Trial Two-

1. Give a new maze to your partner and have them try it. Make sure to time them.
2. Record the time.
3. Talk about how this time relates to the results in trial one.

- Time on the new maze should be faster or very close to the end result in trial one.
- Repetition also helps the brain to learn other stimulation
- The more stimuli neurons received by the brain the more connections that are made.

Hands-on Activity: Build a Neuron out of Pipe Cleaners

- Take one color and roll it into a ball. This will be the cell body.
- Take another pipe cleaner and attach it to the cell body by pushing it through the ball so there are two halves sticking out. Take the two halves and twist them together into a single extension. This will be the axon.
- Take other pipe cleaners and push them through the "cell body" on the side opposite the axon. These are the dendrites. These should be shorter than your axon and there should be many dendrites.
- Wrap the 4th pipe cleaner on the end of the axon. This will be the axon terminal.

Active Game - Neuron Relay Race: 8 students

The object of the game is to be the first person to successfully walk from start to finish, with the help of his or her nerve and muscle cells (played by people).

- Section off three parts of the playing area: brain, spinal cord, and muscle. Make a start and finish line 10 to 15 feet apart.

- Assign 2 players to be the "people." Assign three players to each of them: one is a "brain neuron," one is a "spinal cord neuron," and one is a muscle cell in the leg. Explain that in order for us to move, a message has to be sent from the brain through the spinal cord, to the muscle itself.

- When a teacher says "go", the brain cells run from their brain base and tag their spine cell, who in turn run to tag their muscle cell. When they have tagged the muscle cell, the "person" whose cell it is may move forward a giant step. The cells go back to their base and then prepare to run again...until the winning person has moved all the way to the finish line.

- Explain that for a person to walk smoothly, the nerves must send messages very quickly, or people would walk like robots, like in the game.

Source: Brown University, Providence Science Outreach

Science- Lab
Block. _____

Name. _____
Date._____

Testing Skin Sensitivity

Introduction: OK, what is the largest organ in your body? Give up? It's your skin. Yeah, your skin is an organ. In fact, it's an organ that is part of many different body systems, including your nervous system. Much of the information you receive about your surroundings come from your skin. You feel heat, cold, pain and pressure through your skin. In this lab we'll find out how sensitive the skin is over different parts of our bodies.

Hypothesis: Which part of your body will be the most sensitive? Number them in order of sensitivity, from **1** (most sensitive) to **5** (least sensitive).

BODY PART	Relative sensitivity
finger tips	
back of neck	
forearm	
leg	
palm of hand	

Materials:

Partner
Toothpick card

Procedure:

1. Each group of 4 will collect data for this lab, but you will work in pairs to test each other

2. Choose a partner to work with and get a toothpick card.

3. While the subject looks away, gently press the toothpicks into his/her skin and ask if (s)he can feel one or two toothpicks. Start out with the toothpicks that are furthest apart, and gradually use those that are closer together. Use toothpicks that are progressively closer and closer together until the subject can no longer distinguish between the two (in other words, (s)he will say only 1, if you're using either one or two toothpicks). Be sure to randomly use one or two toothpicks so the subject doesn't know if it's one or two. (To be sure, you should probably poke each area about 20 times). NOTE: MAKE SURE BOTH TOOTHPICKS TOUCH AT THE SAME TIME!!!!!

Note to subject: *Be honest about what you feel. This is not a contest. If you feel one tooth pick, say so. Don't try to guess when two are used.*

3. Write down the distance of the closest points that the subject could distinguish at that body part. (See the table below)

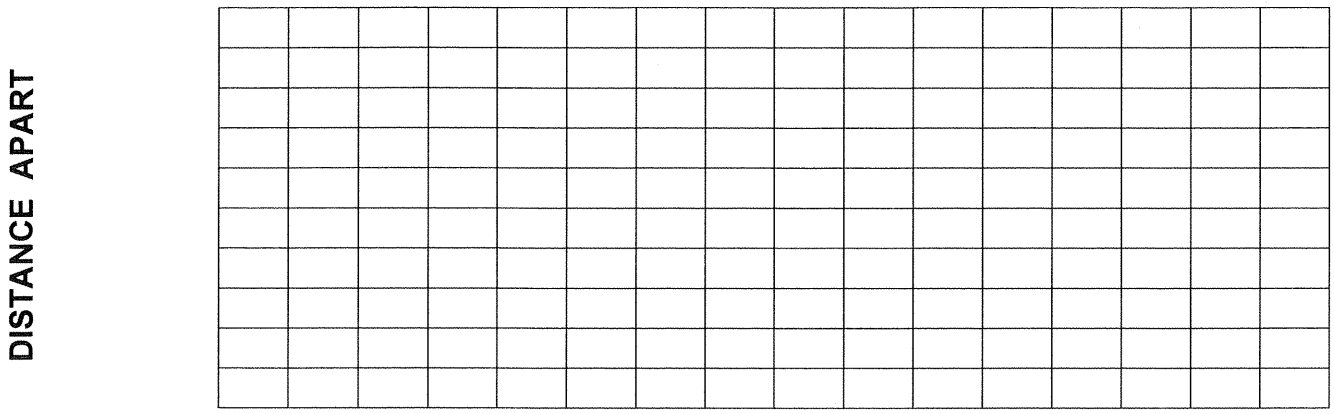
Dis-tin-guish *dis-'tin-(g)wish\vb* To perceive as being separate or different. To tell apart.

Example. Say you're trying the subject's back and he always gets it right when you try 5 cm apart. He also gets it right at 4 cm apart. At 3 cm apart, he sometimes says 1 when there are 2 and 2 when there is only 1. What number would you right down? _____cm

Write down the smallest distance that the subject can distinguish					
BODY PART	**SUBJECT 1**	**SUBJECT 2**	**SUBJECT 3**	**SUBJECT 4**	**AVERAGE**
FINGER TIP	cm	cm	cm	cm	cm
BACK OF NECK	cm	cm	cm	cm	cm
FOREARM	cm	cm	cm	cm	cm
LEG	cm	cm	cm	cm	cm
PALM OF HAND	cm	cm	cm	cm	cm

Graph the data: Graph all subject data in yellow, graph averages in red

(Title) _____



Questions:

1. Which body part was the most sensitive (on average)?

_____

2. Why is it important for that part of your body to be most sensitive?

_____

_____

3. Which body part was the least sensitive (on average)?

_____

4. How can your skin be more or less sensitive in some areas? What does this say about the placement of sensory nerves in your skin?

_____

_____

_____

5. Are all the subjects the same? If not, what can account for this?

_____

_____

_____

6. Which body system is your skin part of?

_____

7. What are 4 other sensory organs?

_____ _____

_____ _____

8. Rank the body parts tested from most to least sensitive based on the average distances.

1. _____ 2. _____ 3. _____

4. _____ 5. _____

9. How does this compare with your hypothesis?

_____

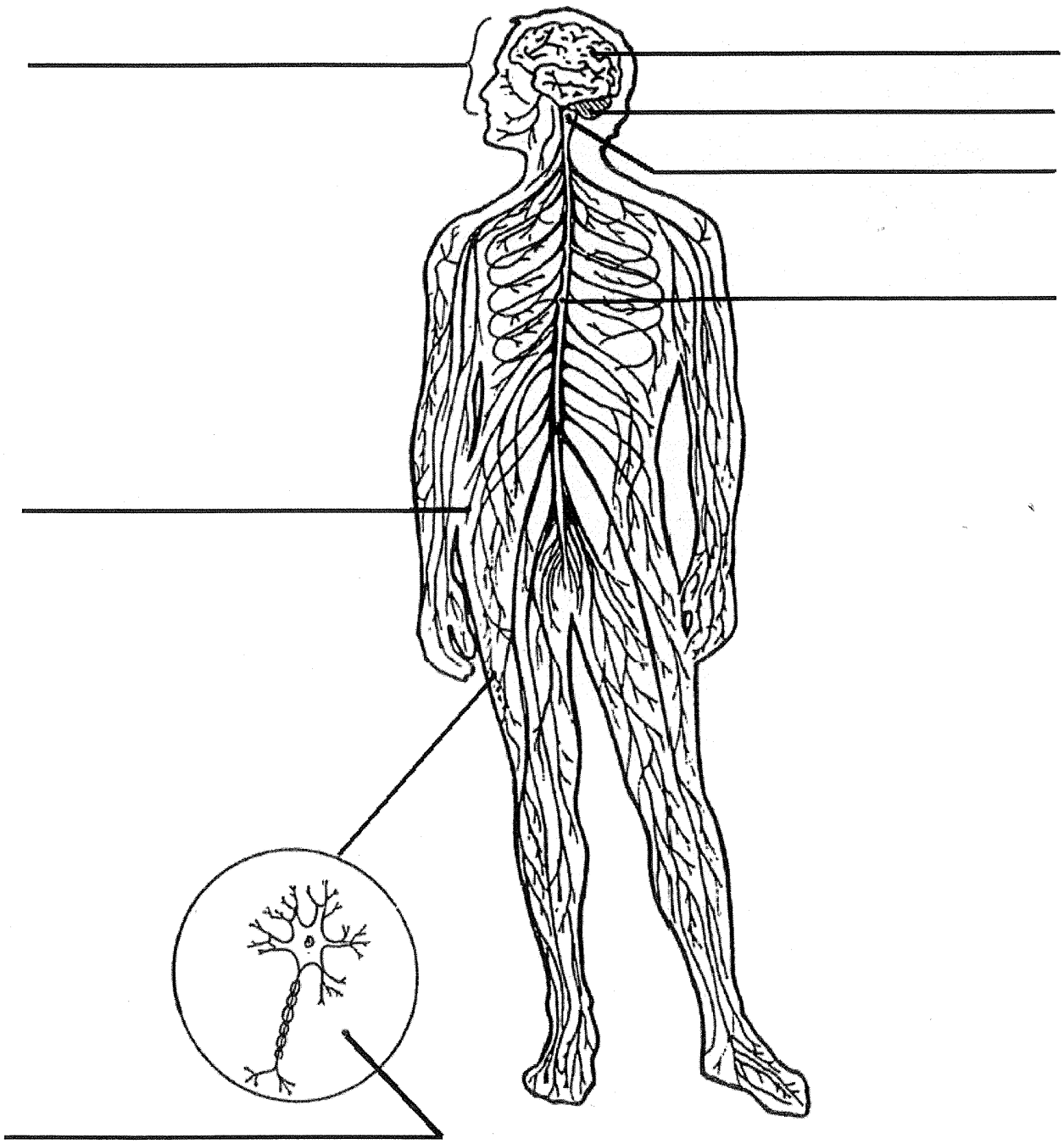
_____

_____

Name _____ **Date** _____

Your Central Nervous System

Label the parts of our central nervous system.



WORD BANK

brain	spinal cord	nerves	cerebrum
cerebellum	brain stem	nerve cell	

Name _____ **Date** _____

NERVE IMPULSE PATHWAY

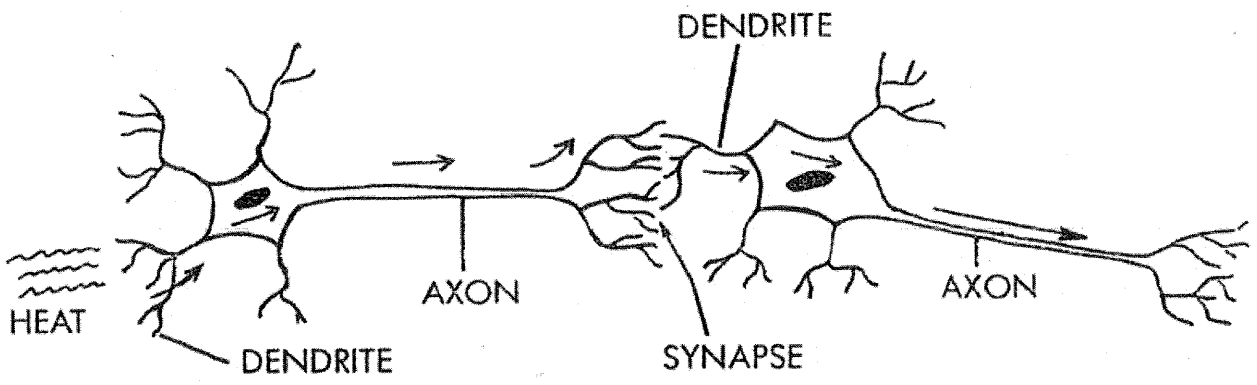


FIG. A. SYNAPSE -- the region over which an impulse must pass

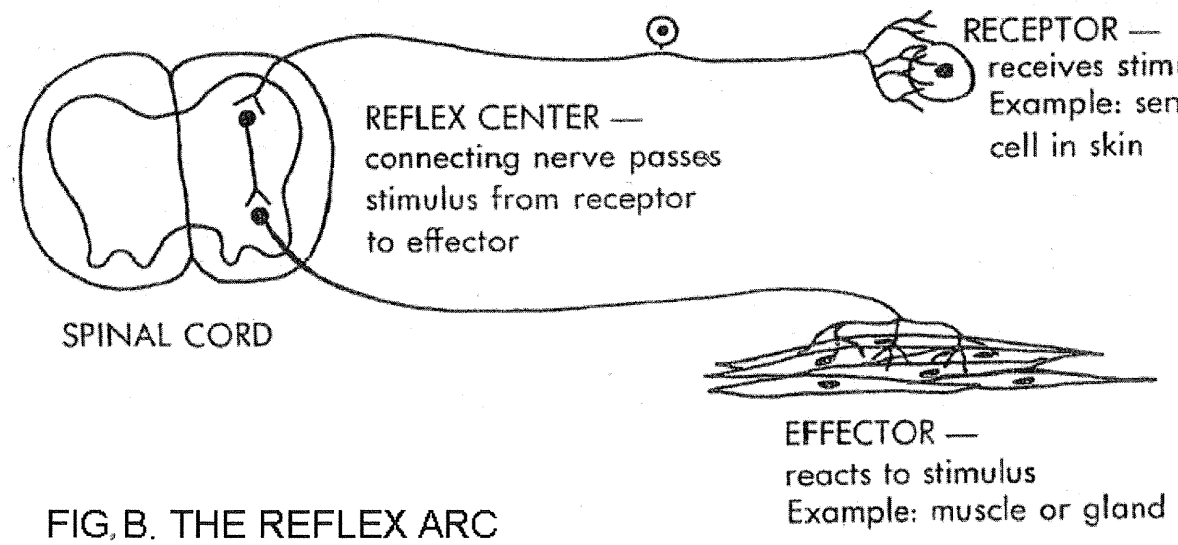


FIG. B. THE REFLEX ARC

STUDENT ACTIVITY

1. In Fig. A circle the part of the neuron that receives impulses. Draw two circles around the part of the neuron that transmits the impulse to another neuron.
2. Use arrows to show direction of nerve impulse in FIG. B.
3. Mark the following names with an "R" or "E" to indicate if they are receptors or effectors:

A) retina of eye ___ C) bicep _____

B) adrenal gland ____ D) heat sensing cells ____

Name _____ **Date** _____

NERVOUS SYSTEM

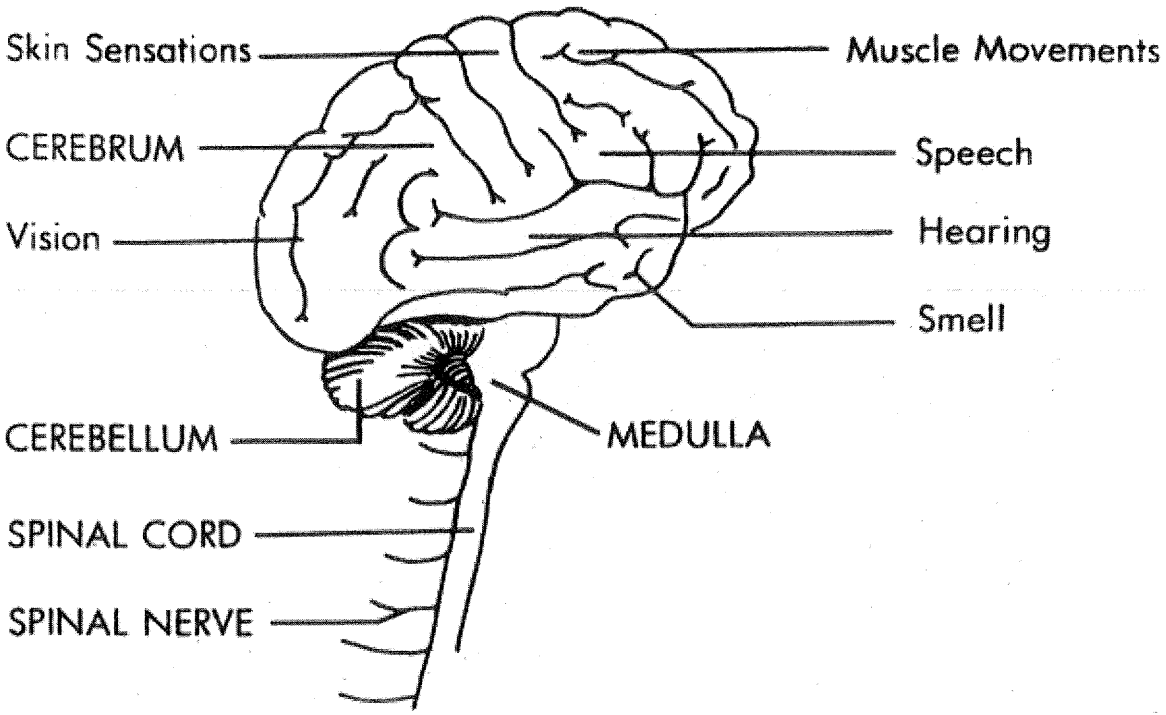


FIG. A. PARTS OF THE BRAIN AND ACTIVITY AREAS

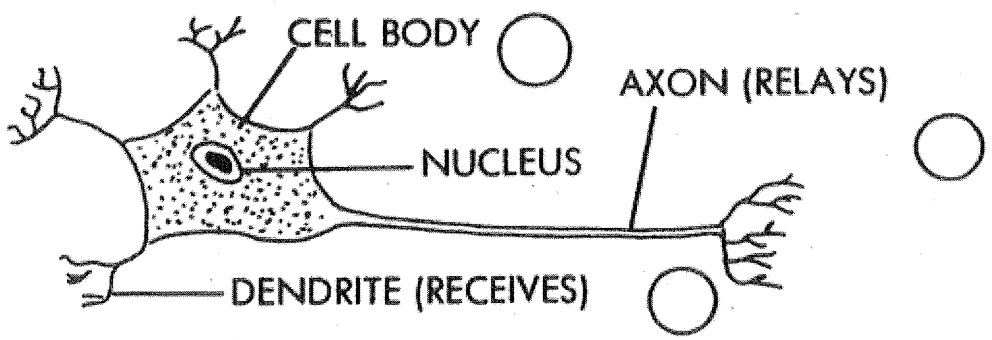


FIG. B A NEURON, NERVE CELL

STUDENT ACTIVITY

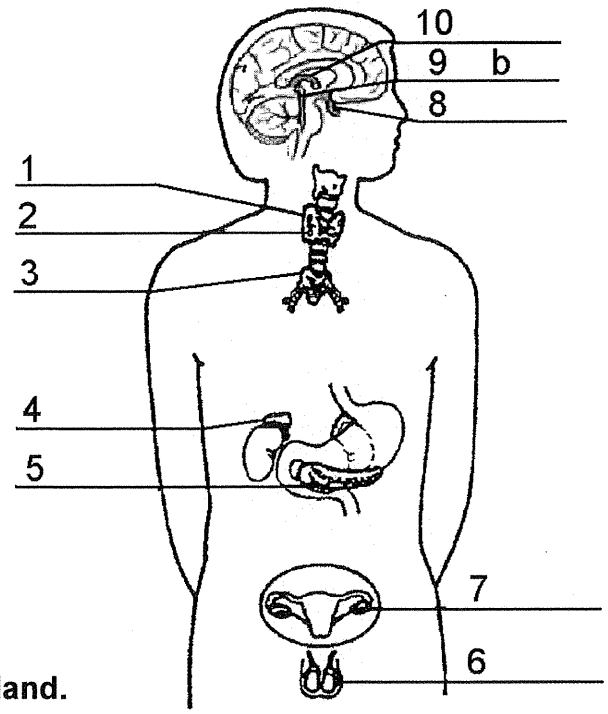
1. Put check marks next to the names of the three major parts of the brain.
2. The largest part of the brain is _____.
   The part of the brain that connects with the spinal cord is _____.
   The part of the nervous system that runs through the spinal column is _____.
3. In the circles seen in FIG. B, write the numbers 1, 2, and 3 to show the correct order of a message passing through a neuron.

Name _____ Date _____

The Human Endocrine System

Using the letters, label the following parts on the diagram of the human endocrine system.

a. pineal
b. hypothalamus
c. pituitary
d. thyroid
e. parathyroid
f. thymus
g. adrenal
h. pancreas
i. ovary (female)
j. testis (male)



Fill in the blanks with the name of the correct gland.

1. _____ gland may control biorhythms in some animals and control the onset of puberty in humans.

2. _____ gland stimulates metabolic rate.

3. _____ gland stimulates growth and the secretion of hormones from other glands.

4. _____ in females stimulates the development of secondary sex characteristics, the growth of sex organs at puberty and prompts monthly preparation of uterus for pregnancy.

5. _____ is the major area where the nervous and endocrine systems interact.

6. _____ controls blood glucose levels.

7. _____ gland initiates stress responses, increases heart rate, blood pressure and metabolic rate, dilates blood vessels, mobilizes fat and raises blood sugar levels.

8. _____ gland promotes production and growth of white blood cells.

9. _____ in males stimulates development of secondary sex characteristics, stimulates growth spurt at puberty, stimulates sperm production.

10. _____ gland regulates blood calcium level and activates vitamin D.

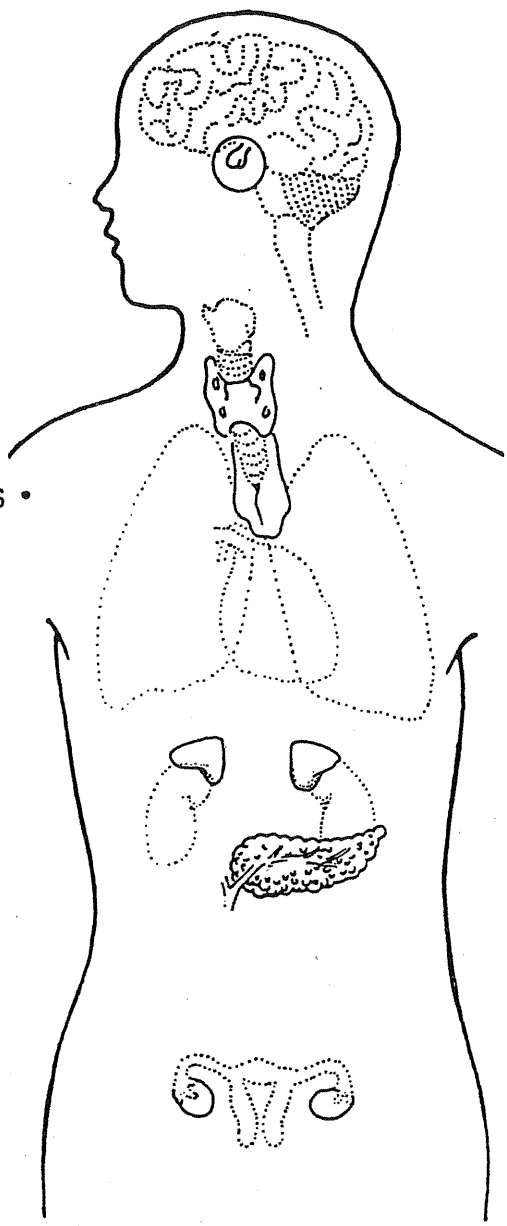
Name _____ Date _____

Glands at Work

Draw a line from the name of the gland to its picture.
Draw a line from the picture of the gland to its function.

Gland

- thyroid •
- pituitary •
- parathyroids •
- adrenal •
- thymus •
- ovaries •
- pancreas •



Function

- Controls other glands and body growth.
- Control the amount of calcium in your blood.
- Controls the rate that food is turned into energy.
- Helps the body's immune system to recognize and reject germs.
- Affects kidneys and helps you when you are excited, angry, or frightened.
- Controls the body's use of glucose.
- Produce female characteristics and initiate female bodily functions.

Reproductive System

The Reproductive System

Vocabulary to Know

1. Cervix
2. Fallopian tube
3. Female reproductive system
4. Male reproductive system
5. Ovaries
6. Penis
7. Prostate gland
8. Reproductive systems
9. Sperm ducts
10. Testes
11. Uterus
12. Vagina

How does the genetic code lead to human variations?
Recipes for a cooking model

(Source: The Human Body: How Can I Maintain and Care for Myself?, NYSTEP, c. 1995)

Through using different cookie recipes as analogies for DNA, students will develop an understanding of "genetic" characteristics or qualities and the variations that can occur. The role of the environment is incorporated. The general features of the DNA molecule are mirrored in the recipes and the final products. Students also observe how "mutations" can occur if directions are not followed.

Individual groups should not know the recipes from other groups.

Recipe 1

2 ¼ c. flour
1 t. salt
¾ c. sugar
1 t. vanilla
1 – 12 oz. pkg. Chocolate chips
1 t. baking soda
1 c. margarine, softened
¾ c. brown sugar
2 eggs

Preheat oven to 375 degrees F. Beat together margarine, sugar, brown sugar, and vanilla until creamy. Beat in eggs. Combine flour, baking soda, and salt, and gradually add the flour mixture to the margarine mixture. Stir in chocolate chips. Drop by rounded teaspoonfuls onto ungreased cookie sheets. Bake 8-11 minutes.

Recipe 2

1 ½ c. flour
1 t. salt
½ t. nutmeg
½ c. sugar
1 t. vanilla
3 c. oats
1 t. baking soda
1 t. cinnamon
1 ¼ c. margarine
¾ c. brown sugar
1 egg
1 c. raisins

Preheat oven to 375 degrees F. Beat together margarine, sugar, and brown sugar until creamy. Beat in egg and vanilla. Combine flour, baking soda, salt, cinnamon, and nutmeg. Gradually add flour mixture to margarine mixture. Stir in oats and raisins. Drop by rounded teaspoonfuls onto ungreased cookie sheets. Bake 8-11 minutes.

Recipe 3

1 ½ c. flour
1 t. salt
½ c. sugar
1 t. vanilla
3 c. oats
1 t. baking soda
1 ¼ c. margarine
¾ c. brown sugar
1 egg
1 12 oz. pkg. Chocolate chips

Preheat oven to 375 degrees F. Beat together margarine, sugar, and brown sugar until creamy. Beat in egg and vanilla. Combine flour, baking soda, and salt. Gradually add the flour mixture to the margarine mixture. Stir in oats and chocolate chips. Drop by rounded teaspoonfuls onto ungreased cookie sheets. Bake 8-11 minutes.

Recipe 4

2 ¾ c. flour
1 t. baking soda
1 ½ c. sugar
2 t. cream or tartar
½ t. salt
2 eggs
1 c. shortening or margarine, softened
3 t. sugar combined with 2 t. cinnamon

Preheat oven to 350 degrees F. Beat together margarine and sugar. Beat in eggs. Combine flour, cream of tartar, baking soda, and salt. Gradually add the flour mixture to the margarine mixture. Roll into balls the size of walnuts. Roll these balls in the sugar and cinnamon mixture until they are covered. Bake 12-15 minutes.

Discussion:

1. Make a list of the characteristics or qualities that describe their cookies. Decide on a formal set of characteristics that groups will use in descriptions of their cookies. (appearance, taste, texture, variation within a batch)

2. Have each group describe their own batch, then observe and describe other group's cookies. Decide on ways to compile their data. The groups should exchange copies of their recipes with each other, and re-examine their data and conclusions. What factors might account for differences? What was the nature of the variations within the same batch?

3. How might this activity be similar to the variability within human families?

Modeling the Genetic Code

1. Cut up four different colors of construction paper into 2 x 2 inch squares. Put assortment of 12 paper squares in two different bags, containing all four colors with a different number of each. These bags represent the genetic material in both parents.

2. In reproduction, the children receive genetic material from both parents. Have each student pull 6 paper squares from each bag, and record their results.

3. Return the squares to the bag and repeat the same procedure. Record the results. This activity may be repeated numerous times.

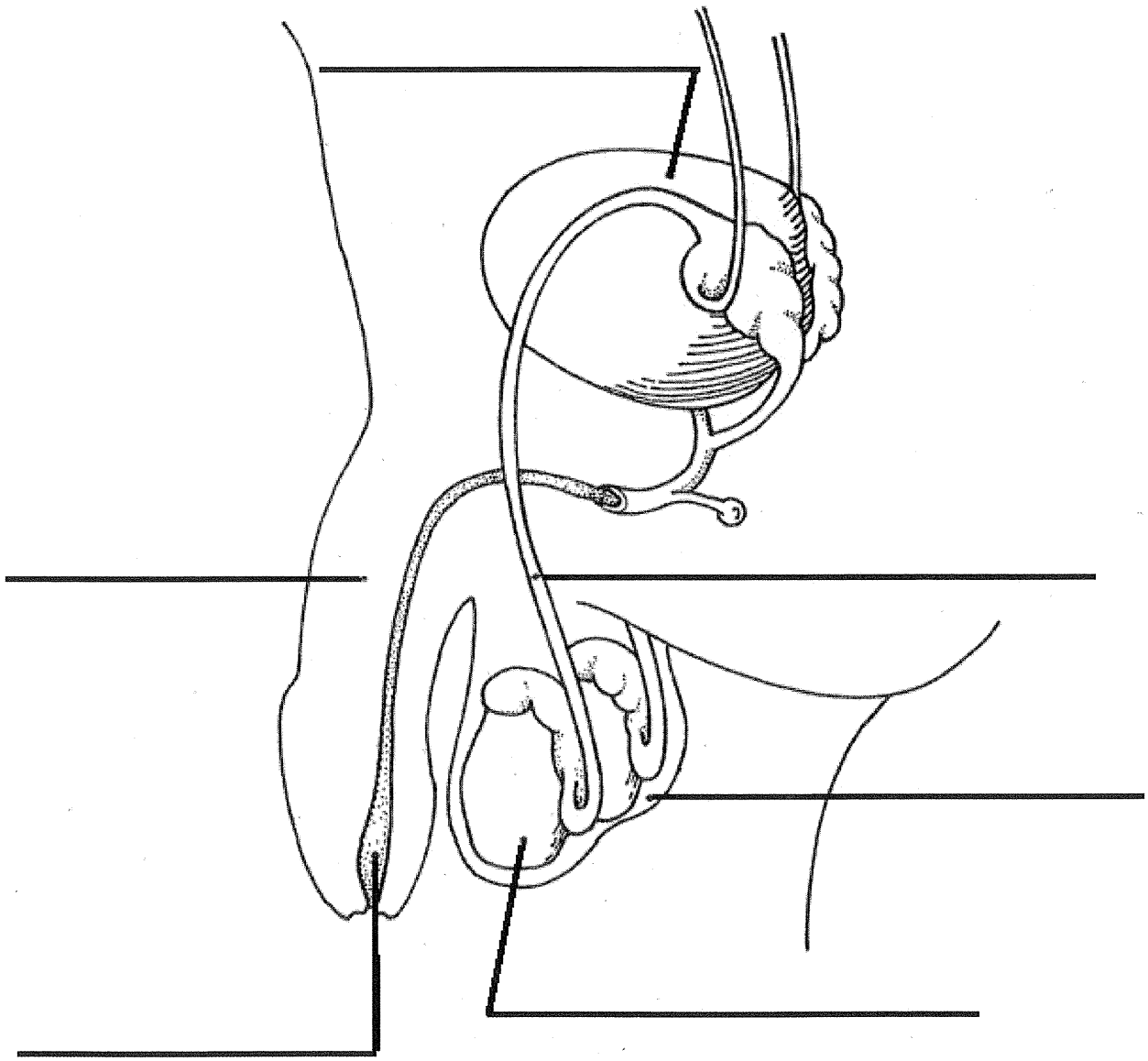
4. Look at the results. How does the genetic vary in the offspring (children) with the exact same parents? How is it the same?

5. What physical traits might the different colors of paper represent?

Name _____ Date _____

Reproductive System - Male

The purpose of the reproductive system is to create new life. Label the parts of the male reproductive system.

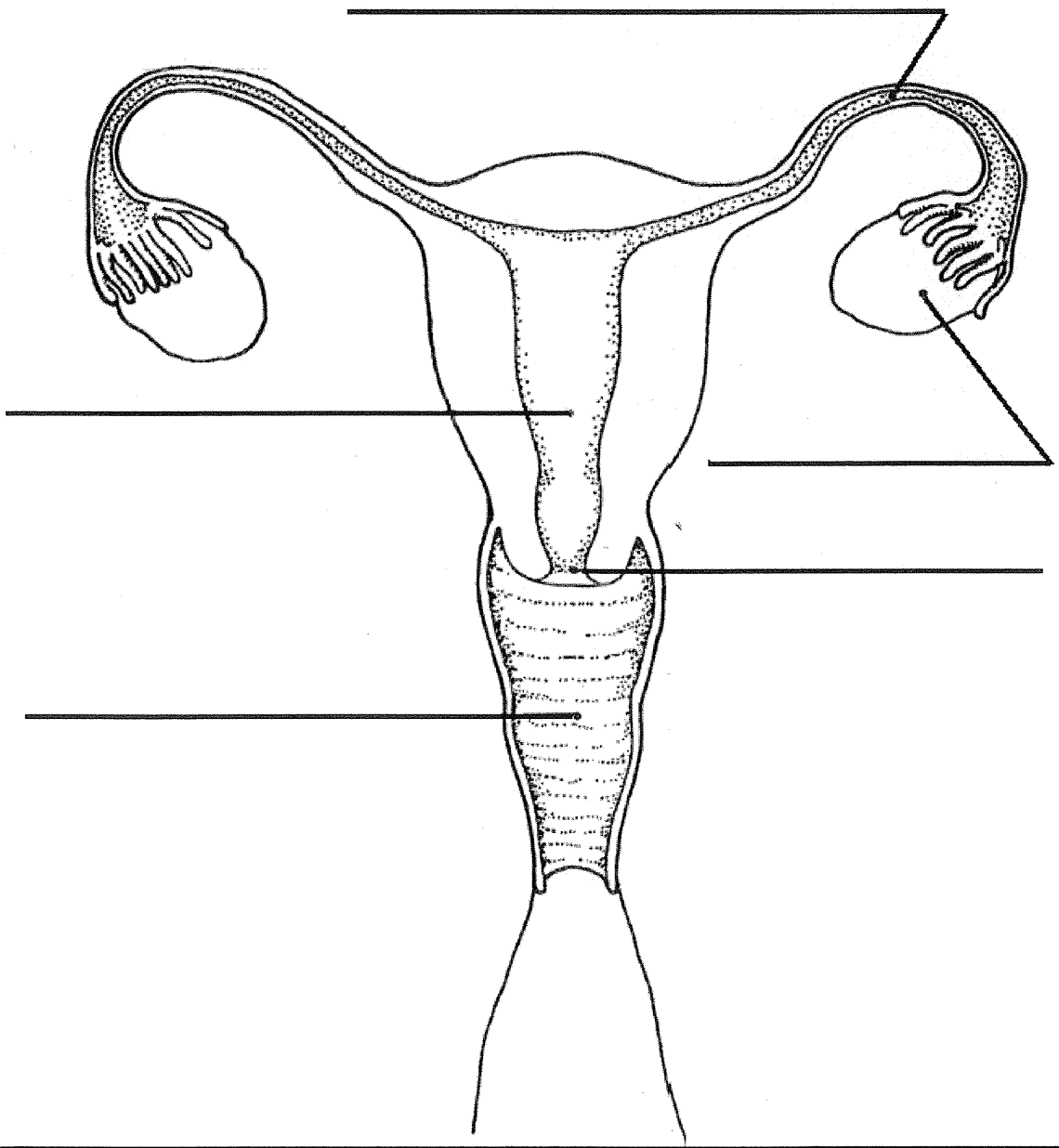


WORD BANK		
testis	**scrotum**	**penis**
urethra	**sperm tube**	**bladder**

Name _____ Date _____

Reproductive System - Female

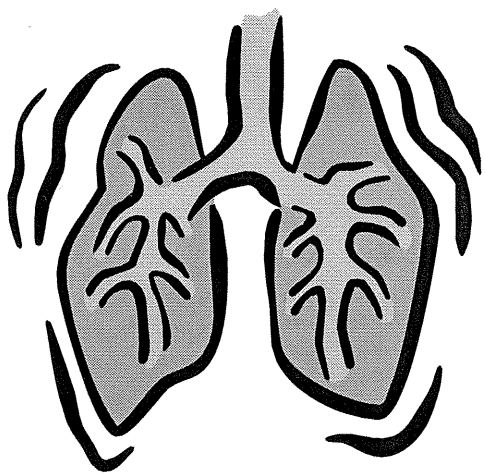
The purpose of the reproductive system is to create new life. Label the parts of the female reproductive system.



WORD BANK

ovary	**uterus**	**fallopian tube**
vagina	**cervix**	

Respiratory System

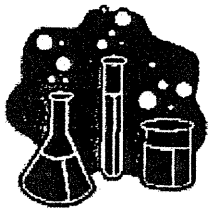


The Respiratory System

Vocabulary to Know

1. Alveoli
2. Air sacs
3. Bronchial tubes
4. Diaphragm
5. Epiglottis
6. Gas exchange
7. Lungs
8. Respiratory system
9. Windpipe

Name_____ Date_____



The Respiratory System

Lab 1

Title: The affect of height on lung capacity

Background:

Many factors may influence the amount of air a human lung can hold (lung capacity). Today we will examine the affect of one factor, height.

Problem:

Does height affect human lung capacity??

State your hypothesis for this experiment.

If the lung capacity of people of different heights is measured then _____ will have a lager lung capacity because _____

Which variable will you be manipulating in this experiment?_____
How will you measure it ?_____

Which variable will be the responding variable ? _____
How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

Procedure: Safety First!!! Do not use balloons used by other people.

1. Check that you have all of the materials needed to start the experiment.
Two meter sticks Four balloons Two pieces of string

2. When your teacher signals you, measure the height of each person in your group. Record the heights on the data table.

3. Take a few breaths. Then exhale deeply once into a balloon. Fill the balloon as much as you can, but only with air from one exhalation.

4. Hold the balloon. Have your partner measure the circumference of the balloon at its widest point with the string. Then hold the measured string along a meter stick to determine the circumference of the balloon in cm.
Record the circumference of the balloon on the data table.

5. When the class is done enter the data for the three class averages.

6. Construct a line graph based on the data chart.

Results:

The Effect of Height on Lung Capacity

Student's Name	Height (cm)	Lung Capacity (cm)
1.		
2.		
3.		
4.		
Tallest Group Average		
Middle Group Average		
Shortest Group Average		

Conclusion/Discussion:

1. Which group had the largest lung capacity? Give evidence for your answer.

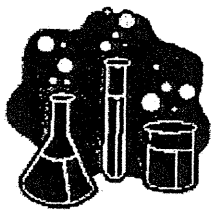
2. Did the results agree with your hypothesis? _____If not, write a new hypothesis.

3. Why is lung capacity important ?

4. How can lung capacity be increased?

5. What are some other factors that might affect lung capacity?

Name_____ Date_____



The Respiratory System

Lab 2

Title: The affect of holding your breath on breathing rate

Background:

The rate of breathing is controlled by the amount of carbon dioxide in the blood.

Problem:

How does holding your breath affect the rate of breathing?

State your prediction for this experiment.

If a person holds their breath then they will breathe _____

Which variable will you be manipulating in this experiment?_____
How will you measure it ?_____

Which variable will be the responding variable ? _____

How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

_____ _____

Procedure:

1. Working with your partner decide who will hold their breath first.

2. Record how many breath's your partner takes in one minute.

3. Have your partner hold their breath. After they exhale count how many breaths they take in the next minute. Record this on the data sheet.

4. Repeat steps two and three with the other partner holding their breath.

5. When the class is done enter the data for the class average.

Results:

The Effect of Holding Breath on Breathing Rate

Student's Name	Breaths per minute (before holding breath)	Breaths per minute (after holding breath)
1.		
2.		
Class Average		

Conclusion/Discussion:

1. When was the breathing rate faster? Give evidence for your answer.

_____

_____

2. Did the results agree with your prediction? ____

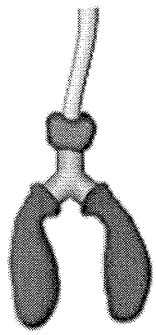
3. Why would it be important to breath more quickly when the blood had more carbon dioxide ?

Do-It-Yourself Lung Model

Materials:

An old pair of scissors (not your mother's good ones)
Six inches of surgical tubing
Three good-sized balloons
Two rubber bands
A large lump of modeling clay
A clear plastic one-liter bottle
A three-way hose connector (available at the hardware store)

Step One:

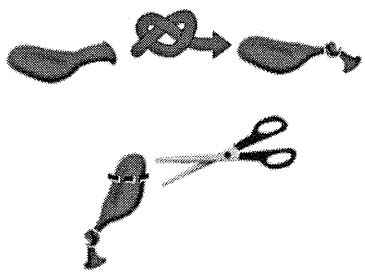


1. Push the plastic tube into one opening of the hose connector. Use the clay to make an airtight seal.
2. Tightly fix a balloon onto each of the other openings with the rubber bands, making sure the seal is airtight.

Step Two:

1. Carefully cut off the bottom 1 inch from the bottle, using the old scissors. Make sure the cut edge of the bottle is smooth.
2. Place the "lungs" (balloons and connector) inside, and seal the plastic tube into the neck of the bottle with the rest of the clay to make an airtight fit.

Step Three:

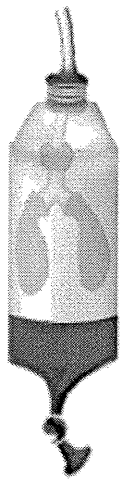


1. Tie a knot in the neck of the third balloon, then carefully cut it in half, crossways.

2. Gently stretch the half of the balloon with the knot in it over the bottom of the bottle, pulling it up around the sides. Make the balloon as taut as you can - like the top of a drum.

Step Four:

1. The lower part of the balloon represents the diaphragm, the main breathing muscle. Pull it down, as though you were inhaling.
2. This lowers the air pressure in the bottle. Air from outside rushes in and makes the two balloons expand, just like the real lungs inside your chest.



Source: University of Arizona
http://student.biology.arizona.edu/sciconn/respiratory

Name _____ Date _____

Respiratory System

The respiratory system consists of your lungs, windpipe, and the diaphragm. The lungs are about the size of a pair of footballs and fill your chest from your neck to your ribs.

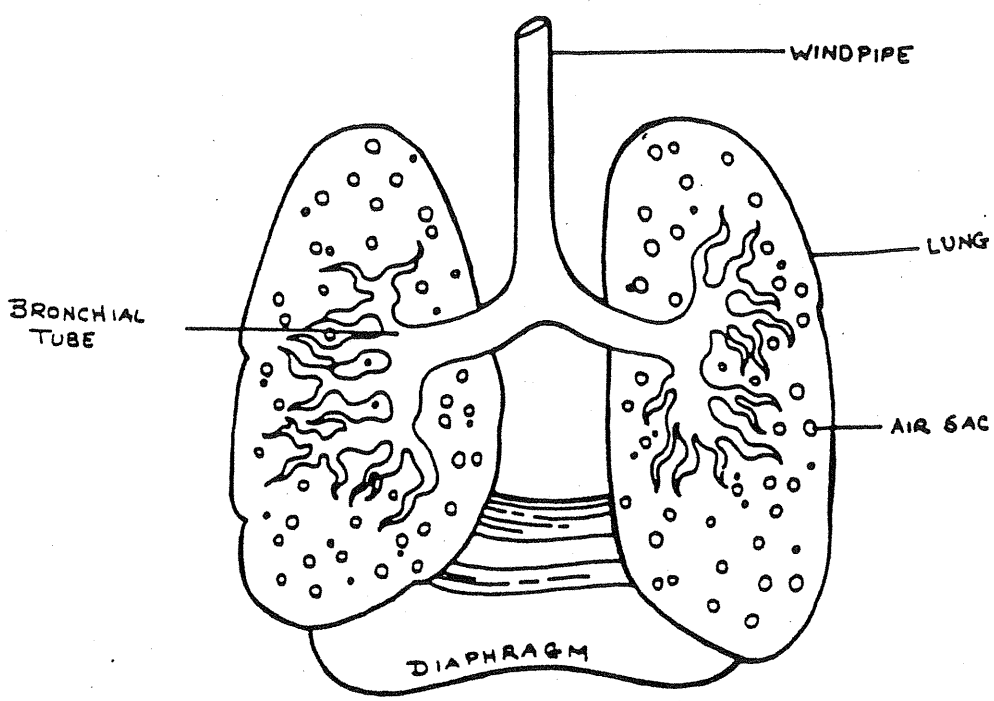
As air is inhaled and travels down your windpipe, it is warmed, becomes moist, and germs and dust are removed. The windpipe divides into two branches, called *bronchial tubes*. The bronchial tubes then divide into many smaller branches called *bronchioles*. From the bronchioles, the air enters millions of tiny air sacs that are in your lungs.

The lungs are made of spongy tissue that can expand and contract as you breathe. Many small capillaries pass through the spongy tissue in the lungs and pick up the oxygen from the tiny air sacs. The blood carries the oxygen to the heart, where it is pumped out in the blood to all the cells in the body.

When the cells burn food, they give off carbon dioxide. The blood carries this carbon dioxide from the cells back to the lungs where it is released from the body when you exhale.

The diaphragm is a muscle under the lungs that helps you breathe in and out.

You breathe about 15 times every minute or about 20,000 times a day! Not all the air you inhale is used by your body. Some of it stays in your lungs and some of it is exhaled along with carbon dioxide.



Name _____ **Date** _____

Respiratory System

Your breathing, or respiratory, system is made of many parts. Solve the respiratory riddles using the Word Bank.

1. "I'm the windpipe that brings fresh air to your lungs."

   _____

2. "There are 600 million of us tiny air sacs in your lungs. "

   _____

3. "Tra-la-la. I'm your voice box."

   _____

4. "We branch to the left and right from your windpipe."

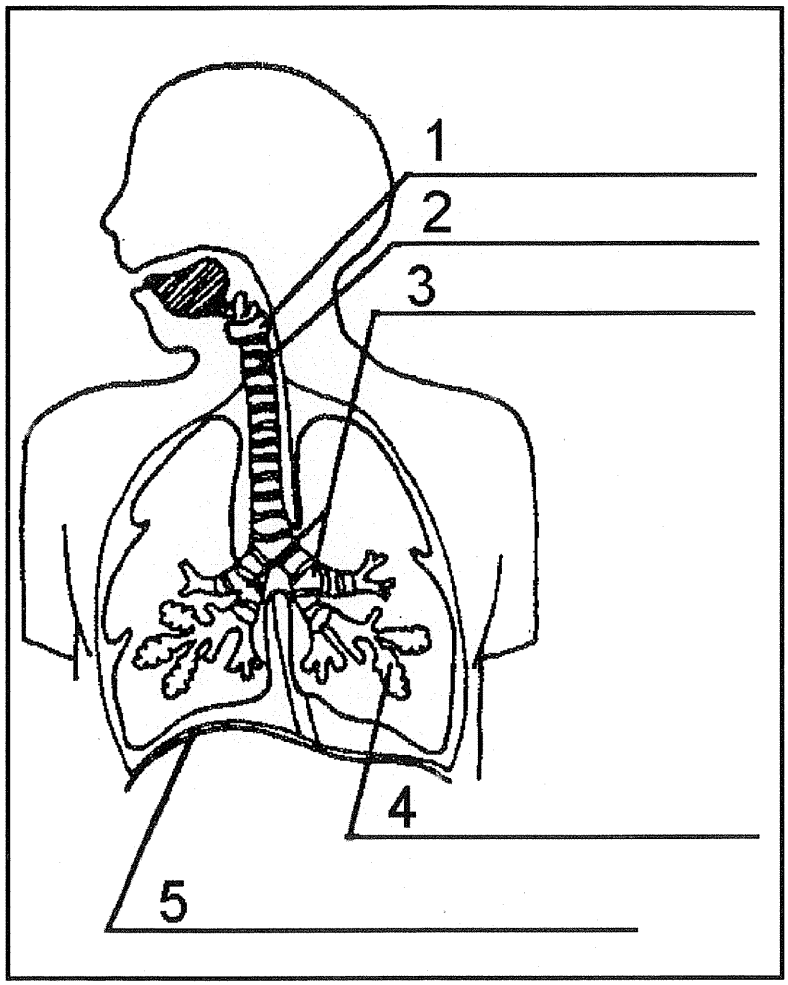
   _____

5. "I enter your blood with each breath of fresh air."

   _____

6. "I help squeeze the air out of your lungs."

   _____



Label the diagram using the words form the Word Bank.

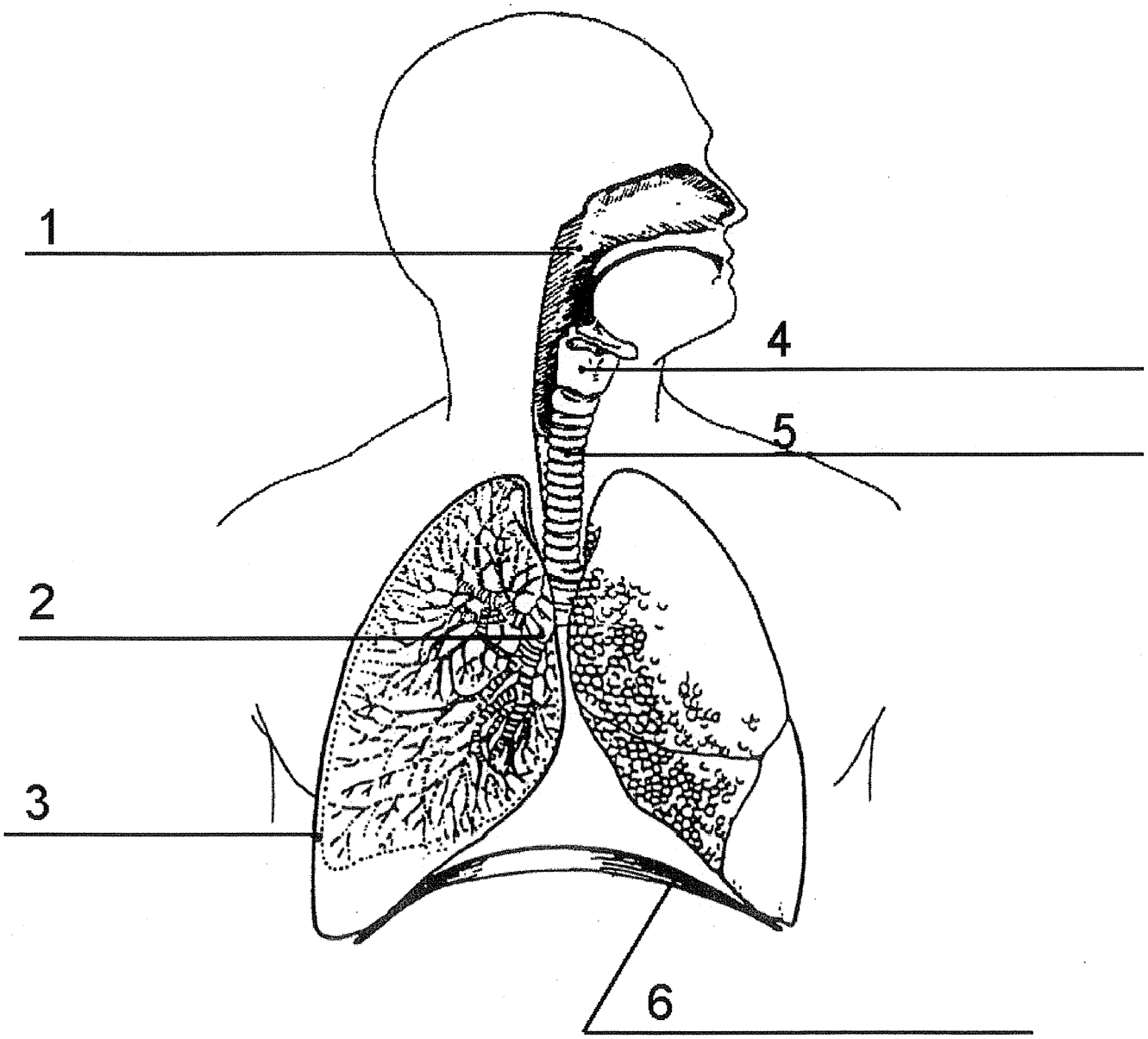
WORD BANK

alveoli
bronchial tubes
diaphragm
larynx
oxygen
trachea

Name _____ **Date** _____

YOUR RESPIRATORY SYSTEM

Using the Word Bank, label the parts of your respiratory system.



WORD BANK
Common Name (Scientific Name)

throat (pharynx)	voice box (larynx)	windpipe (trachea)
lung cover (pleura)	bronchial tube	diaphragm

Science- Worksheet Names _____
Block _____ Date _____

Heart and lungs lab

Introduction: How is your breathing related to the beating of your heart? In this experiment we'll find out. One of you, the research subject, will have your heart rate and breathing rate measured while you're resting and exercising. What do you think will happen? How are breathing and heart rate related. If we want to find out if two things are related, we can do an experiment to see if one thing changes as the other does.

Here's an example. Is how much I buy related to how much I spend? If I buy more shoes, do I pay more? Of course do. There is a direct relationship. On the other hand, is how much I buy related to how much money I have left? Yes, again. The more shoes I buy, the less money I have left. There is an indirect relationship. As the number of shoes goes up, the money I have left goes down.

The purpose of today's experiment is to find out if your heart rate is related to your breathing rate.

Hypothesis: Answer this before continuing.

What do you think will happen to your heart rate and breathing rate as you exercise?

_____

_____

Procedure: Your group will develop the procedure for this experiment. Think about the question you're trying to answer, and design an experiment that will answer it. First, work with your group to come up with a procedure. Then, choose a member of your group to present it to the class. The class will critique it and help you to refine your procedure. To help you out, I've included the instructions for taking heart rate and breathing rate.

How to take heart rate

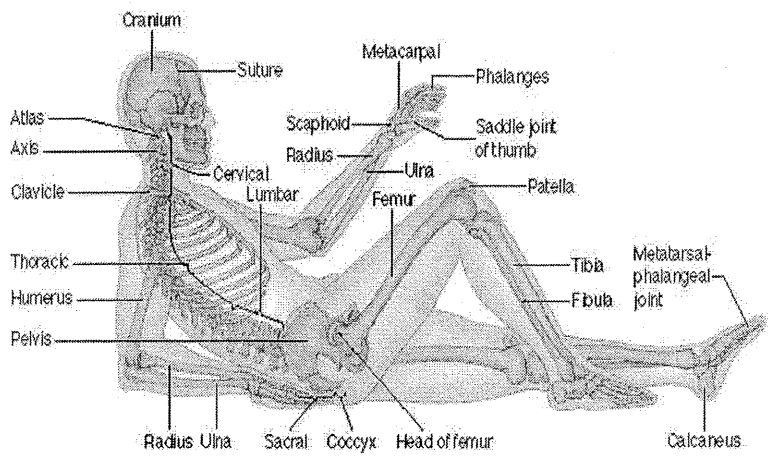
- Practice taking a pulse until you can find it easily.
- The best place to do this is where the thumb meets the wrist.
- Take it for 30 seconds and multiply by two to get heart beats per minute
- For each test (resting, light exercise, moderate exercise and heavy exercise) take the pulse at least twice to get consistent results. This will reduce the chance of making a mistake.
- Take the pulse while someone else is checking breathing rate.

How to take breathing rate

- Ask the subject to breathe normally and count the number of breaths in one minute.
- If you can't tell when (s)he is breathing, ask him/her to tap a finger with each breath.
- Take breathing rate while someone else is checking heart rate.

Data collection: Describe here how you will collect data. Make a table

Skeletal and Muscular Systems



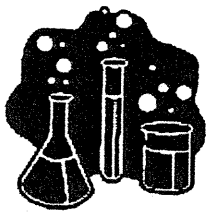
The Human Body

The Skeletal and Muscular Systems

Vocabulary to Know

1. Bone marrow
2. Bones
3. Cartilage
4. Joint
5. Ligaments
6. Locomotion
7. Muscular system
8. Muscles
9. Skeletal system
10. Tendon
11. Voluntary muscles

Name_____ Date_____



The Skeletal/Muscular System

Title: The affect of repetition on muscle performance

Background:

Many factors may influence muscle performance. Today we will examine the affect of one factor, repetition.

Problem:

Does repetition affect muscle performance?

State your hypothesis for this experiment.

If a muscular activity is repeated for a long period of time then the muscle performance will _____ because _____

_____

Which variable will you be manipulating in this experiment?_____

How will you measure it ?_____

Which variable will be the responding variable ? _____

How will you measure it ? _____

List some variables you may need to control in this experiment and how you might control them.

_____ _____

_____ _____

_____ _____

Procedure:

1. Determine which partner will be the recorder and which partner will do the arm lifts first.

2. When your teacher signals you, start doing your arm lifts counting each one aloud. When your teacher calls time continue your arm lifts but start your counting over. The recorder should
record the number of arm lifts on the data table.

3. Continue until you have completed 5 sets of arm lifts.

4.Switch partners and repeat steps two and three.

5. Graph your results creating a line graph .

Results:

The effect of repetitions on muscle performance

Time (sec)	Repetitions
First Student 0-30	
30-60	
60-90	
90-120	
120-150	
Second Student 0-30	

30-60	
60-90	
90-120	
120-150	

Conclusion/Discussion:

1. What happened to the number of arm lifts every 30 seconds? Give evidence for your answer.

2. Did the results agree with your hypothesis? _____If not, write a new hypothesis.

3. Why do muscles tire ?

4. How can muscle performance be increased?

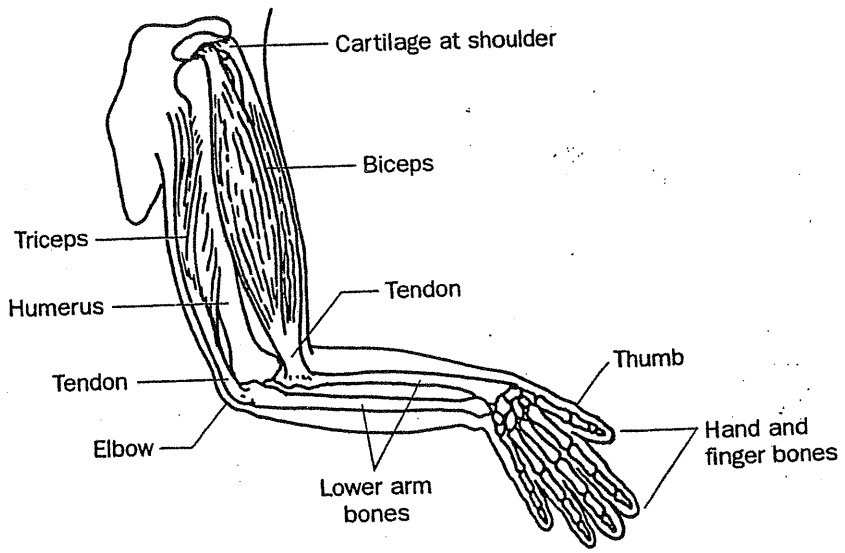
5. What are some other factors that might have affected your results?

Name _____ Date _____

An Arm Model

1. Make a model of the human arm. In the box below, draw a diagram of it. Label it, using the names of the structures on the illustration of the human arm directly below.

Human Arm



Model Arm

2. Describe what happens when the two arm bones in the model are flexed (brought closer together)?

3. Describe what happens when the two arm bones in the model are extended (moved farther apart)?

4. What are some good points of this model?

5. What are some problems with this model?

Conclusion/Discussion:

1. Describe how the arm model could be improved.

2. Predict what would happen if an arm bone was broken?

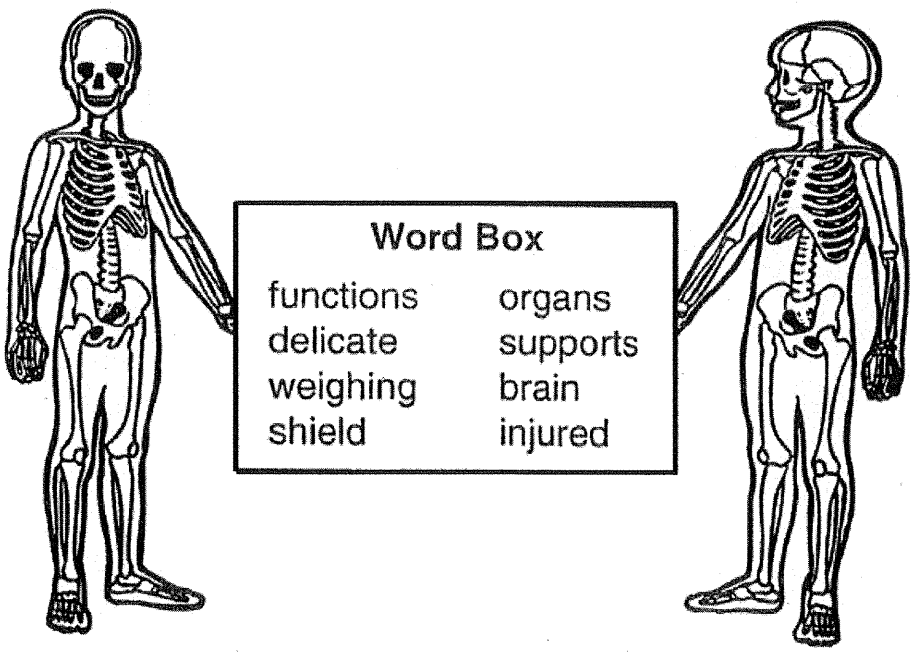
Name _____ Date _____

YOUR SKELETON

Use the **Word Box** to complete the paragraphs.

Your skeleton has two very important jobs, or _____(1). First, it holds up, or _____(2), your body's weight. The human skeleton is very lightweight but it can easily hold up a person _____(3) 200 or more pounds.

Second, some of the bones in your body protect the important _____(4) inside of you. The bones that make up the rib cage _____(5) the heart and lungs. The skull bones in your head make a strong helmet for your _____(6). Parts of your body that are _____(7) could be easily hurt, or _____(8), without bones to protect them.



Word Box

functions	organs
delicate	supports
weighing	brain
shield	injured

List two functions of the human skeleton.

A. _____

B. _____

Name _____ Date _____

The Skeletal System

Some 200 bones frame your body. They make up the skeletal system.
Without them your body'd be shapeless and you would most certainly miss 'em.

All bones have a special name, some you might already know.
The **skull** is formed by bones in your head and protects the brain below.

The many bones that run down your back are called the **vertebrae.**
The ribs are **ribs** you'll be glad to know—they're easy to learn that way!

Three separate bones make up your arm, with the **humerus** at the top.
Ulna and **radius** start at your elbow and at the wrist they stop.

Your hip bones are known as the **pelvis;** the **femur** is really your thigh.
Lower leg bones are **tibia** and **fibula,** the knee's the **patella**—oh my!

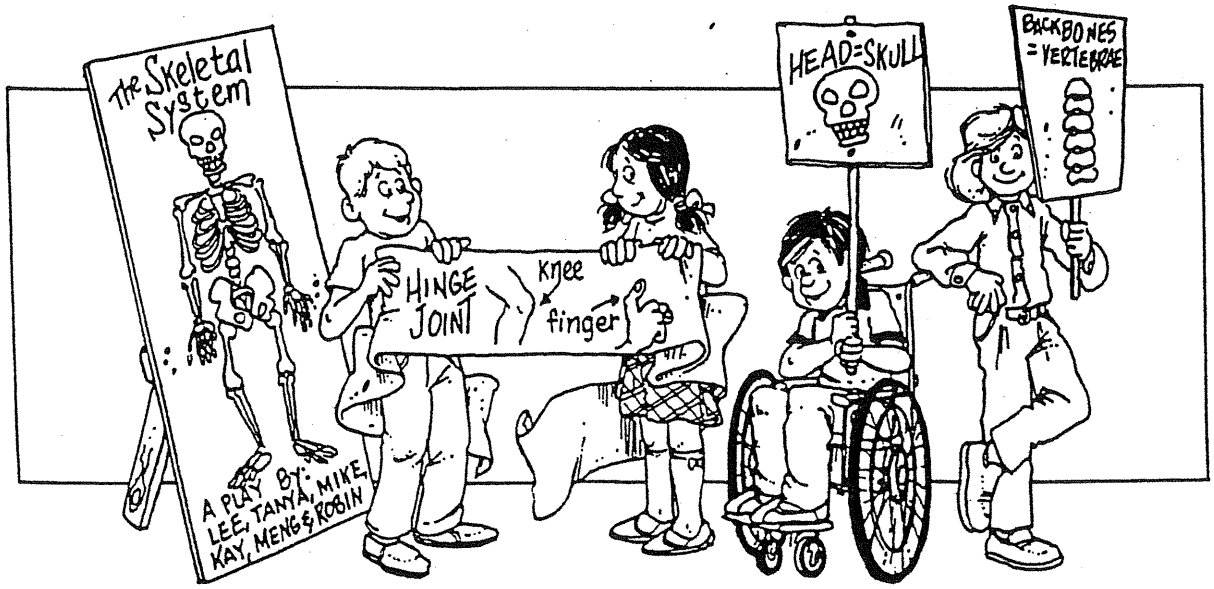
Fingers and toes are **phalanges,** while wrist bones are known as **carpals.**
Between, in your hand, are five different bones that are called the **metacarpals.**

The bones in your foot and your ankle have names that sound similar, too.
They're the **metatarsals** and **tarsals,** you have twelve that fit in each shoe.

A joint is where two or more bones meet. There are many types, you see.
To move back and forth takes a hinge joint, to see one look at your knee.

At fixed joints, like those in your skull, the bones just stay in place.
They rotate at ball-and-socket joints. Your shoulder is just one case.

So ends the tale of the skeletal system—the bones of your body's frame.
To protect your organs and give you shape is the skeleton's primary aim.



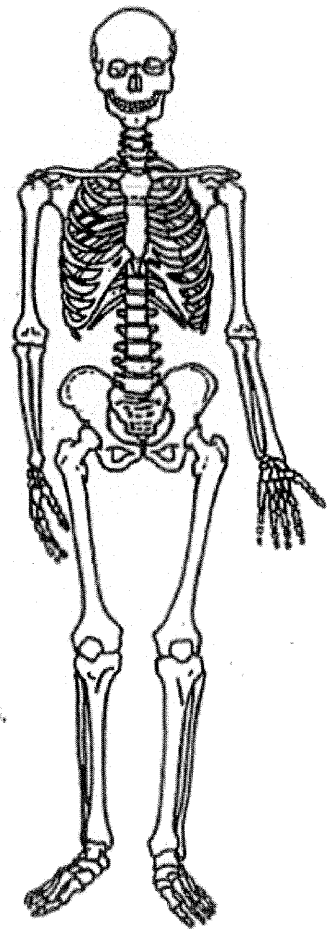
Name _____ Date _____

Framework

What gives you your **shape?** Like a house's frame, your body also has a frame. It is called your **skeleton.** Your skeleton is made of more than two hundred bones.

Your skeleton helps your body move. It does this by giving your **muscles** a place to attach. Your skeleton also **protects** the soft organs inside your body from injury.

Bones have a hard, outer layer made of **calcium.** Inside each bone is a soft, **spongy** layer that looks like a honeycomb. The hollow spaces in the honeycomb are filled with **marrow.** Every minute, millions of **blood** cells die. But you don't need to worry. The bone marrow works like a little factory, making new blood cells for you.



Use the words in bold to finish the sentences.

1. Your skeleton _ _ _ _ _ _ _ _ your soft organs. (5)
2. Bone _ _ _ _ _ _ _ makes new blood cells. (2)
3. Inside the bone is a soft, _ _ _ _ _ _ _ layer. (3)
4. Millions of _ _ _ _ _ _ _ cells die every minute. (4)
5. The hard, outer layer of bone is made from _ _ _ _ _ _ _ _. (1)
6. More than two hundred bones are in your _ _ _ _ _ _ _ _ _. (6)
7. Your skeleton is a place for _ _ _ _ _ _ _ to attach. (7)
8. Your skeleton gives your body its _ _ _ _ _. (8)

Something Special

What do you call a skeleton that won't get out of bed? Use the numbered letters above to find out.

		z						
1	2		3	4	5	6	7	8