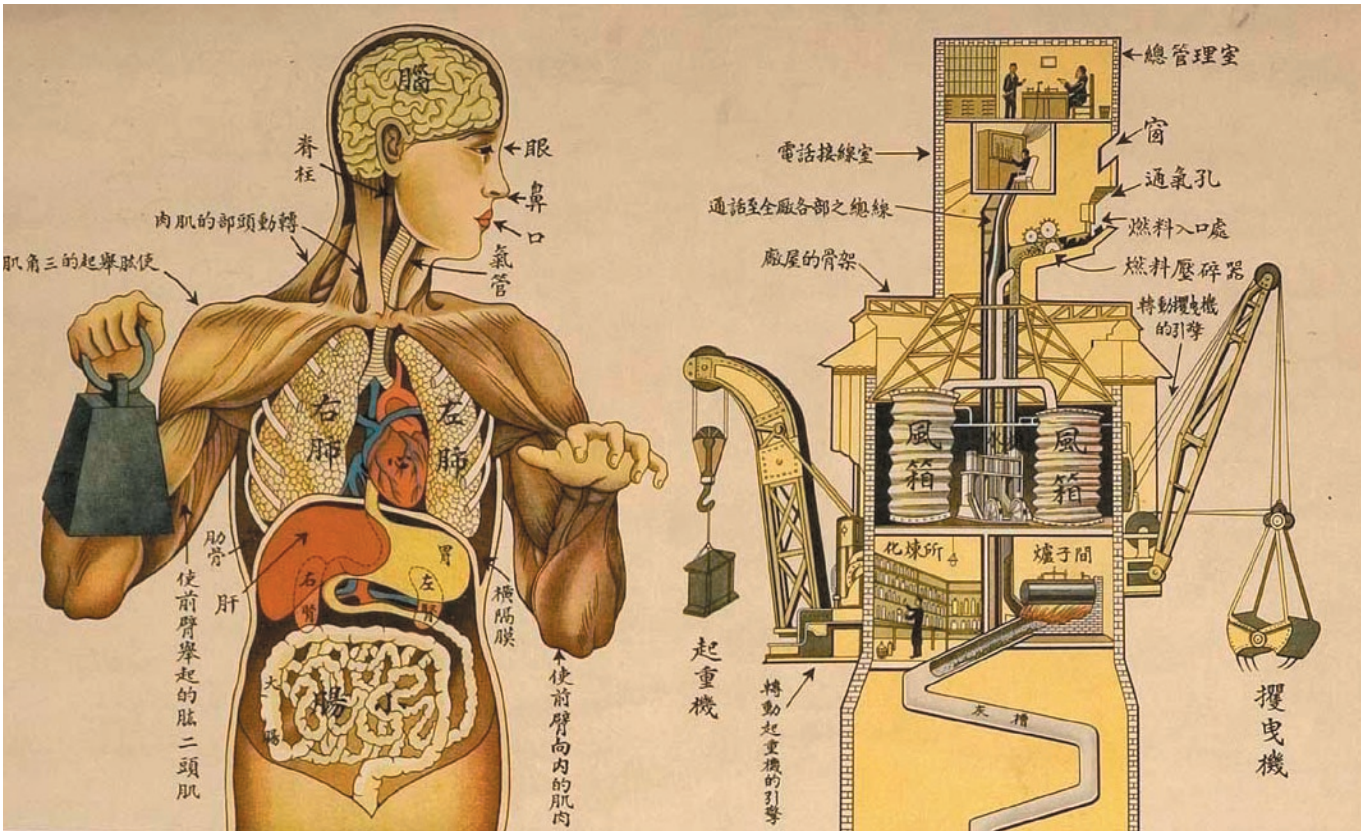
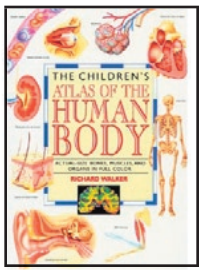
OWNER'S GUIDE TO THE

HUMAN MACHINE



A study guide for middle grades

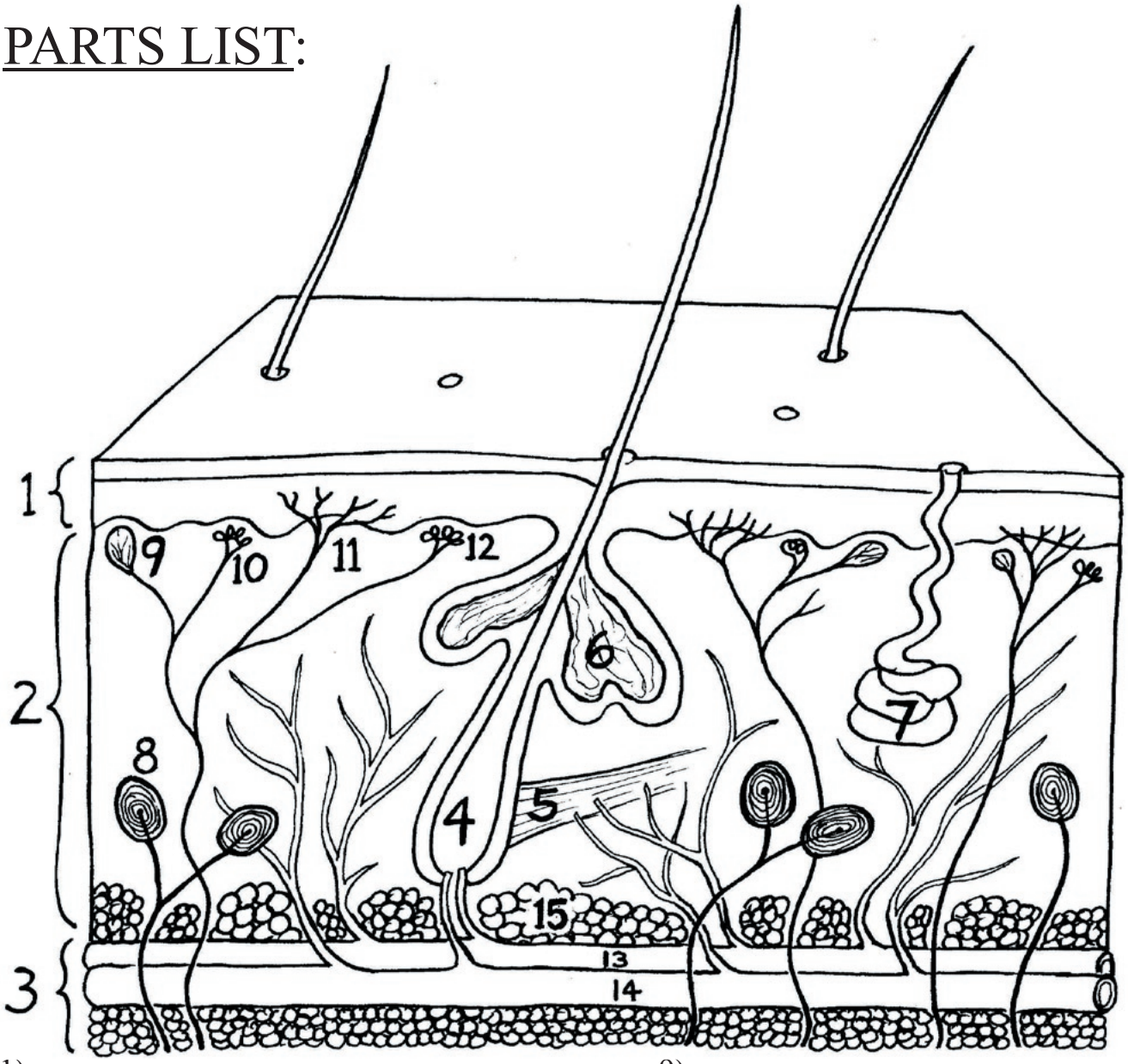
(downloadable on ellenjmchenry.com)



Recommended for use with The Children's Atlas of the Human Body by Richard Walker, published by Millbrook Press, ISBN 1-56294-732-X (However, this book is not absolutely required. You may be able to substitute other good reference books or web sites.)

YOUR OUTER COVERING: SKIN

PARTS LIST:



1) _____
2) _____
3) _____
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7) _____
8) _____
9) _____
10) _____
11) _____
12) _____
13) _____
14) _____
15) _____

Possible answers: hair, muscle, blood vessel (artery), blood vessel (vein), deep pressure sensor, light touch sensors, pain sensors, cold sensor, heat sensor, sebaceous gland, epidermis, dermis, fat layer, fat cells, sweat gland

COLOR: hair and skin: the color of your hair and skin / artery with its smaller capillaries: red / vein and its smaller capillaries: blue / fat cells: yellow / muscle: pink / sweat gland and sebaceous gland: orange / optional: trace over nerves with blue?

FUNCTION:

1) The skin's most important job is to keep _____ out of the body.
   Name one other function of the skin: _____
2) Your skin has three layers. Tell the function of each.
   Epidermis: _____
   Dermis: _____
   Fat layer:_____
3) The funtion of the sweat glands is: _____.
4) Are fingernails and hair alive? _____
5) If you are too hot, do the blood vessels in your skin get wider or more narrow? _____
6) Are there any muscles in your skin? _____
7) What is the function of the sebaceous gland? _____
8) Which layer of your skin is constantly flaking off dead cells and growing new ones? _____
9) When you get goosebumps, the hairs on your skin stand up straight. What pulls them up? _____
10) Straight hair has shafts that are what shape? _____ Wavy hair has shafts that are _____.
    Curly hair has shafts that are _____.
11) On what part of the skin do you find whorls and loops? _____
12) The correct name for the pigment that colors the skin is _____.

MAINTENANCE:

When your skin gets dirty simply wash it with _____ and _____!

SAFETY:

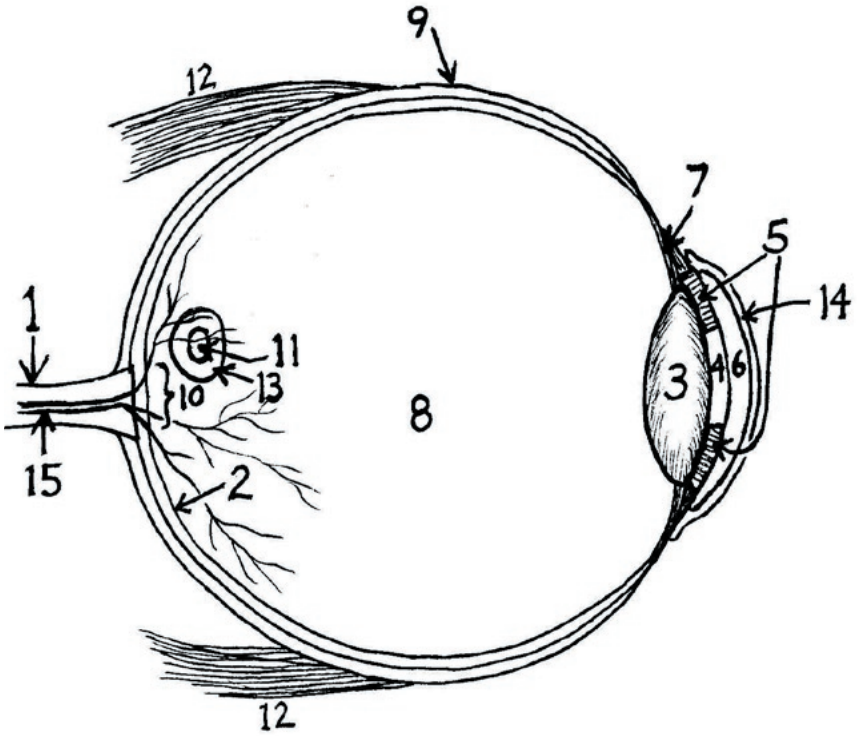
1) Remember to put on _____ before going out in the sun.
2) Learn to recognize the plant called _____ _____ so you can avoid it in the woods.
3) If you are going into an area with a lot of bugs, you might want to put on _____

TROUBLESHOOTING:

Description of problem	What to do about it
dry, itchy skin ("eczema")	
insect bite	
sunburn	
warts (caused by viruses that attack skin)	
infected cut	
bruise (broken blood vessels beneath the surface of the skin)	
infected hair follicle (often called a "pimple")	
hives (red bumps caused by an allergy)	

YOUR SENSING DEVICES: EYES

PARTS LIST:



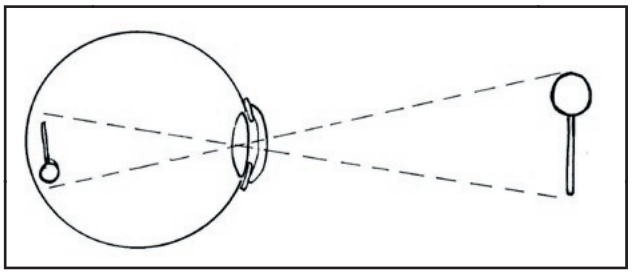
1) _____ 2) _____ 3) _____
4) _____ 5) _____ 6) _____
7) _____ 8) _____ 9) _____
10) _____ 11) _____ 12) _____
13) _____ 14) _____ 15) _____

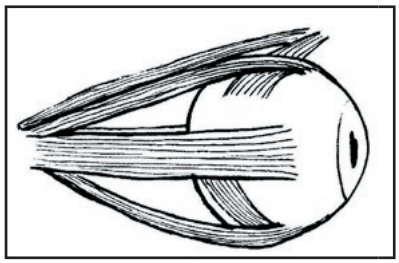
Possible answers: cornea, lens, pupil, iris, blood vessels, sclera, optic nerve, retina, rectis muscle, vitreous humor, blind spot, ciliary muscle, fovea, macula, congunctiva

PUT THE NUMBER OF THE PART NEXT TO ITS DESCRIPTION:

_____ The back of the eye (contains light-sensing cells)
_____ The clear protective layer outside the iris.
_____ The part of the eye that contains colored pigments.
_____ The part that focuses the in-coming light on the back of the eye.
_____ The part that changes the shape of the lens.
_____ The part that connects the eye to the brain.
_____ The fluid that fills the eye and helps it maintain its round shape.
_____ The hole that lets light into the eye.
_____ The thing that moves your eye up and down.
_____ The area on the area where you can't see because it's where the optic nerve comes in.
_____ The "white" of your eye.
_____ A place on the retina where there is a concentration of color-sensing "cones."
_____ Where the eye's blood supply comes in.
_____ The very outer layer of tissue covering the front of the eyeball.
_____ The center of the macular area.

FUNCTION:





Light enters your eye through the _____.
The image of what you are seeing is projected onto the _____, but it appears _____.
The electrical signals are sent to your brain through the _____ _____, and it is up to your brain to turn the image right-side up. The _____ is responsible for projecting a nice, sharp image onto the retina. _____ around the eye can push or pull the lens, making it thicker or thinner, depending on whether the thing you are focusing on is near or far away. Light sensing cells are of two kinds: _____, which sense color, and _____ which sense only shapes and motion. The _____ are what you use the most, during the day. The _____ are what allow you to see at night.

POSSIBLE ANSWERS: lens, muscles, upside down, rods, cones, pupil, optic nerve, retina

Many muscles are attached to the eyeball. They can pull the eye left or right, up or down. This allows you to scan your whole environment quickly and easily.

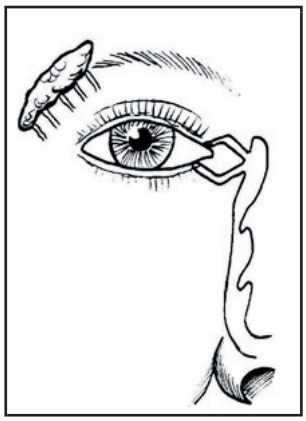
Trivia: An animal that cannot turn its eyes at all (not even one little bit) is the snowy owl It must turn its head instead of its eyes! Fortunately, it can move its head in any direction, even backwards.

SPECIAL FEATURE: AUTOMATIC ADJUSTMENT FOR LIGHT INTENSITY

In front of your lens is a ring called the _____. It automatically adjusts its size according to how much light there is. If there is not very much light, it _____ _____ to let as much light in as possible. If there is a lot of light, it _____ _____ restricting the amount of light that gets in. This adjustments are happening all the time, without you even noticing it. The only times you become very aware of this feature are when you go into somewhere very _____after being out in bright light, or when you go suddenly go out into the _____ after being somewhere very dark. It can take your iris several minutes to fully adjust to extreme changes in the amount of light.

USE EACH WORD ONCE: dark, light, iris, gets bigger, gets smaller

MAINTENANCE:



Your eyes have a high-tech washing system that does all the washing for you! Your _____ gland, located inside your head, above your eye, produces _____, which keep the eye wet. If something should get into your eye, signals will be sent to your brain, telling the _____ gland to make a whole bunch of _____ right away! This washes the dirt out. The extra fluid then drains out of the eye through two tubes that drain into the inside of the nose (nasal cavity).

USE EACH WORD TWICE: tears, lacrimal gland.

THINGS YOU SHOULD DO:

1) Children should have their vision checked how often? _____
   (Possible answers: once a day, once a week, once a month, once a year, once in a lifetime)
2) This vitamin can help your eyes stay healthy: _____ (Possible answers: A, B, C, D, E)

SAFETY:

Eyes are very delicate. They need to be protected when you do any kind of activity that might throw particles into your eye. Safety goggles keep your eyes safe. Name three activities that you, personally. might do that would require safety goggles:

1) _____
2) _____
3) _____

SPECIAL BUILT-IN SAFETY FEATURE: THE BLINK

Your eyes are equipped with an automatic safety feature that will prevent most particles from entering your eye. (This does not mean you don't need to wear safety goggles when you are doing something dangerous, though. When you are doing something that you know could be dangerous to your eyes, you still must wear safety goggles!) However, you can't go around wearing goggles all the time, so when life throws a nasty little surprise in your direction, your eyes will automatically close.

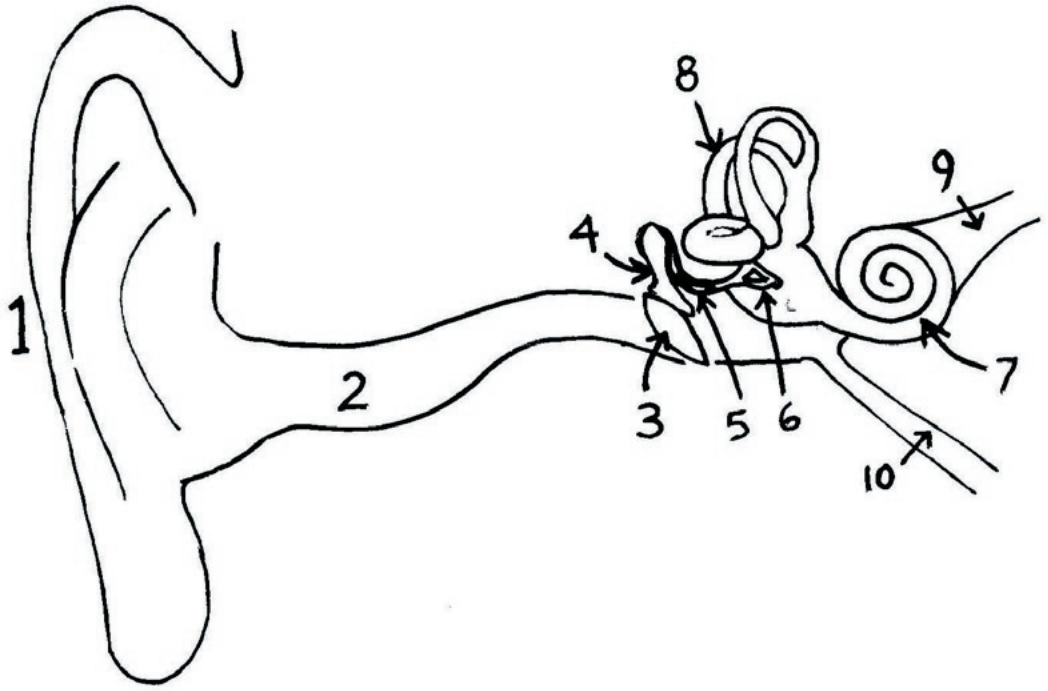
TROUBLESHOOTING:

Description of problem	Name of problem	What to do
Things that are far away look blurry.		
Things that are close look blurry.		
The cornea becomes clouded, instead of being clear.		
Extra fluid pressure builds up inside the eye.		
Either the cornea or the lens is un-even, which results in one area of your vision being out of focus.		
You cannot tell the difference between certain colors.		
Cannot see in dim light.		

Names of problems: color blindness, night blindness, glaucoma, cataracts, near-sighted, far-sighted, astigmatism
Possible remedies: glasses or contact lenses, have surgery, eye drop medicine, learn to live with it, eat more vitamin A
(You may list more than one remedy for a problem.)

YOUR SENSING DEVICES: EARS

PARTS LIST:



1) _____
2) _____
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6) _____
7) _____
8) _____
9) _____
10) _____

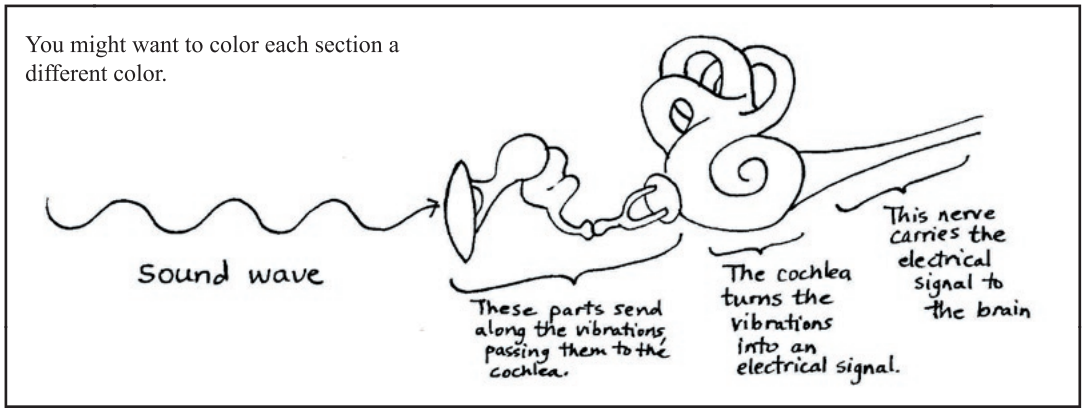
WRITE IN CORRECT PART ON EACH NUMBERED LINE ABOVE: hammer, anvil, stirrup, ear drum, ear canal, outer ear, eustachian tube, cochlea, semi-circular canals, auditory nerve

WRITE THE CORRECT PART NUMBER ON THE LINE THAT MATCHES ITS DESCRIPTION:

_____ The tube that goes from the outside to the inside. It secretes a waxy substance that traps dust.
_____ The part that sends the electrical signal to the brain.
_____ The part that looks like a snail, and which turns physical vibrations into electrical signals.
_____ Sound waves come into the ear and hit this part.
_____ This part is designed to catch as many sound waves as possible.
_____ This part helps to maintain equal pressure on either side of the eardrum.
_____ This part receives vibrations from the ear drum.
_____ This part transfers vibrations from the hammer to the stirrup.
_____ The shape of this part might remind you of a piece of horse riding equipment. This part transfers the vibrations into the cochlea.
_____ This part gives you a sense of balance.

FUNCTION:

What we call sounds are actually vibrations in the air around us. We can't see them and usually can't feel them, unless they are very loud. We wouldn't know these vibrations were there if it were not for our ears, which turn sound vibrations into electrical signals that our brain can understand.



Another job done by your inner ear is to help you balance. The semi-circular canals are lined with fine hairs and fluid. When your head moves, the fluid inside moves, which moves the little hairs, which stimulate nerve endings, which send electrical signals to your brain,

MAINTENANCE:

Your ears are self-cleaning. The ear canal makes a waxy substance that traps dirt and particles. The wax then dries up and falls out. If you happen to get too much ear wax and it starts clogging your ear, you might need to take a wet cotton swab and very carefully clean it out.

SAFETY:

1) Extremely loud sounds can hurt your ears. If you have to be near a loud sound, you should wear:

_____

2) Poking deep into your ear canal can be dangerous. If you go too deep, you might puncture your _____.

TROUBLESHOOTING:

What did the doctor say? Can you match the complaint on the left with what the doctor said to do?

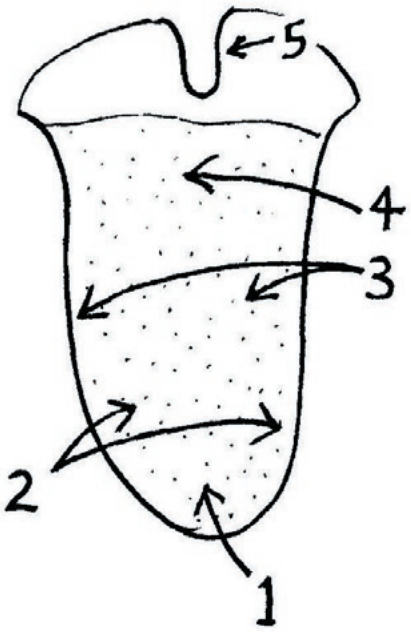
Inner ear hurts because of an inner ear infection	"Take a Kleenex and roll the end to a point, and gently push it into the ear canal. You can go all the way to the eardrum because the Kleenex is too soft to hurt the eardrum."
Inner ears feel itchy	"Take some allergy medication. This symptom is often caused by an allergic reaction."
Water stuck in ear after swimming	"Let's give you a hearing test so see if you have mild deafness."
Feel dizzy	"Take this medicine. It will make the fluid in the semicircular canals less thick."
Can't hear high or low sounds	"Take this antibiotic for 10 days. Take Tylenol for pain."

YOUR SENSING DEVICES: TASTE

PARTS LIST:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____

WRITE THE NAME NEXT TO THE NUMBER: epiglotis, salty area, bitter area, sweet area, sour area, papillae, taste buds



FUNCTION:

There are about 10,000 taste buds on your tongue. But the very small bumps on your tongue are not the buds, they are called papillae. The taste buds line the edges of the papillae. Taste buds have a short life span and must constantly be replaced. Children have many more taste buds than adults, which explains why they are most sensitive to strong tastes and generally prefer less spicy foods. (Maybe this isn't true for you. If so, you are the exception to the rule.)

If there are only four kinds of taste, then why are there so many flavors? What we think of as taste is actually a combination of smell and taste. Your nose is an important part of sensing flavors, as anyone knows who has had stuffed up sinuses. That's also why holding your nose helps you eat something you don't like!

Another important function of the tongue is to shape sounds into words. You would not be able to communicate very well without your tongue.

The epiglottis is a finger-like thing that hangs in your throat right above the back of your tongue. It closes off your nasal cavitiy when you swallow. Otherwise your food would come out your nose!

MAINTENANCE:

Brush your tongue lightly with your toothbrush while you are brushing your teeth.

SAFETY:

Very hot drinks can burn your papillae and amke them sore for several days.

TROUBLESHOOTING:

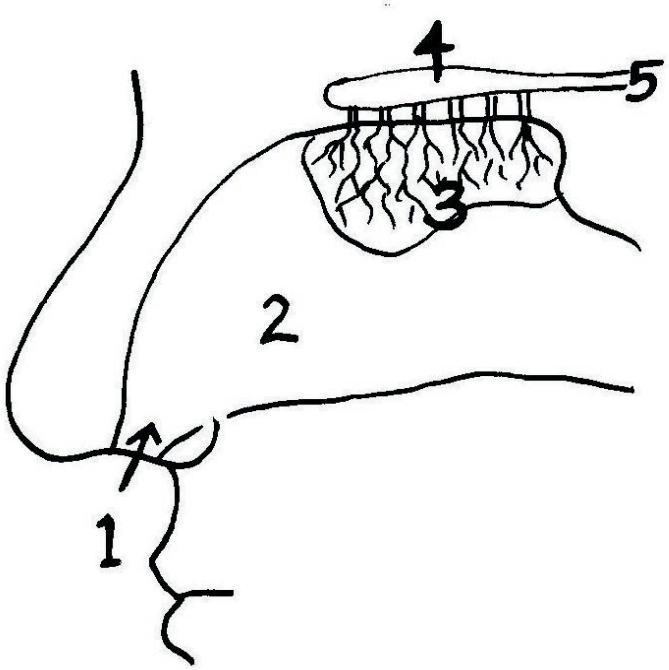
Description of problem	What to do about it
Sore or infected papillae	*It will get better by itself.*
White sore called an ulcer	*It will get better by itself.*

YOUR SENSING DEVICES: SMELL

PARTS LIST:

1) _____
2) _____
3) _____
4) _____
5) _____

WRITE THE NAME NEXT TO THE NUMBER: nostril, olfactory bulb, olfactory nerve, nerve endings, nasal cavity



FUNCTION:

The area of your nasal cavitiy that senses smells is about the size of a postage stamp, but it has over 25 million smell receptors in it-- that's a lot packed into a small space! The nerve endings, or receptors, are covered with mucus. Particles in the air are dissolved in the muscus, and thus come into contact with the receptors. These receptors send signals to the olfactory bulb, which sends signals through the olfactory nerve to the brain. The area of the brain that processes smell signals is very close to a prime memory storage area. Some scientists think this is why you never forget a smell.

MAINTENANCE:

If you get too much mucus in your nose, be polite and use a _____ to _____ your nose.

SAFETY:

1) Wear a _____when you are doing a job that stirs up dust.
2) Your body has an automatic emergency cleaning system. If something irritating gets into the nose, muscles will suddenly and forcibly contract, forcing air out through the nose at a tremendous speed, taking the particles with it. We call this a _____.
3) Don't put your nose right down near something that might be harmful. Use your hand to "waft" the smell up to your nose. Be especially careful of products that contain ammonia. It burns!

TROUBLESHOOTING:

Description of problem:	What to do:
Runny nose	
Stuffy nose	

YOUR SKELETAL SYSTEM

PARTS LIST:

Identify the twenty-one major bones of the human skeleton shown in the diagram below. Write your answers in the numbered spaces on the left. Use the terms listed: carpels, clavicle, cranium, femur, fibula, humerus, mandible, metacarpals, metatarsals, patella, pelvis, phalanges, radius, ribs, scapula, sternum, tarsals, tibia, ulna, and vertebrae.

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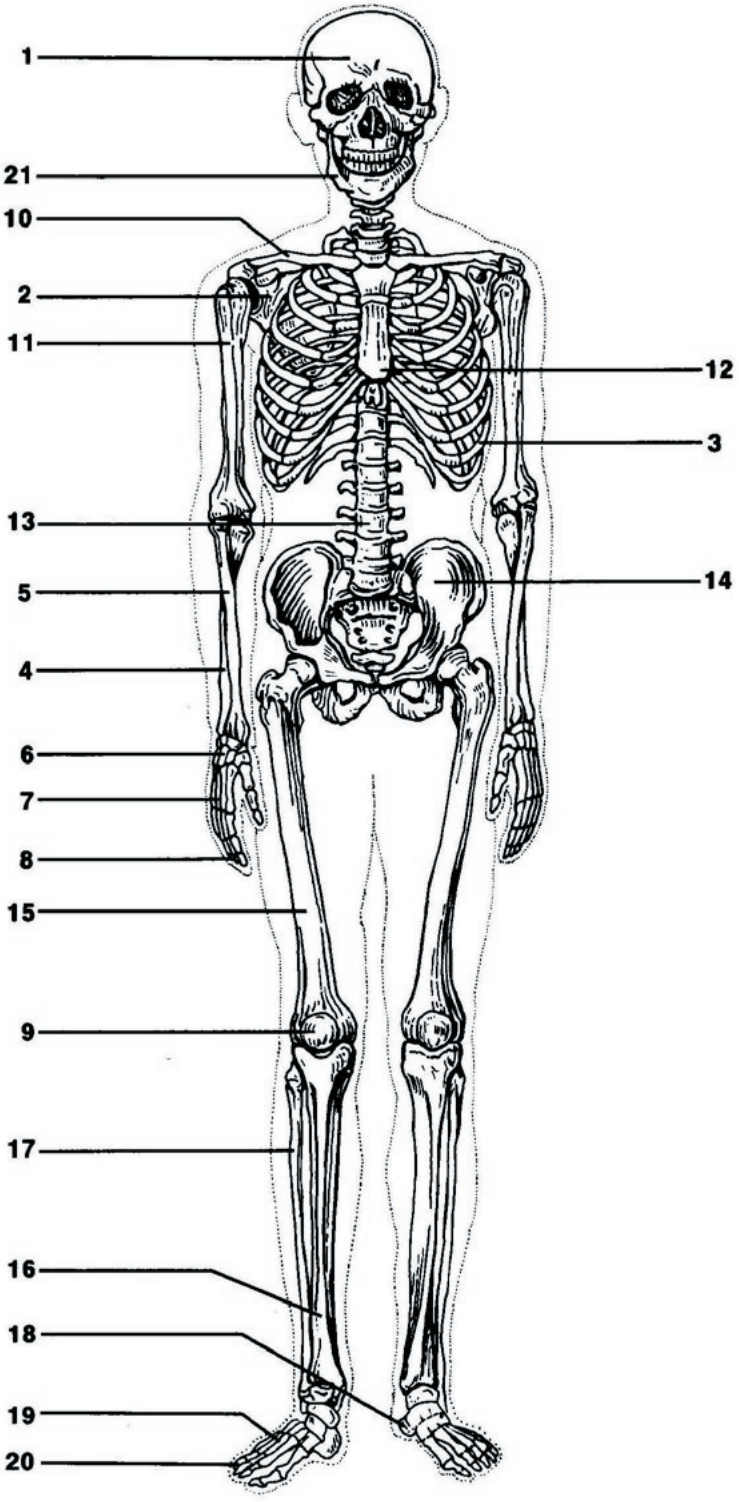
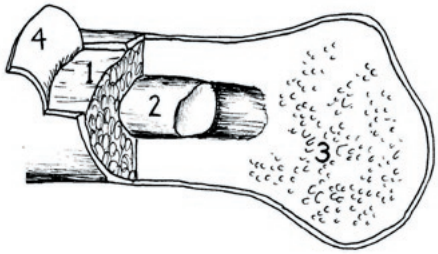
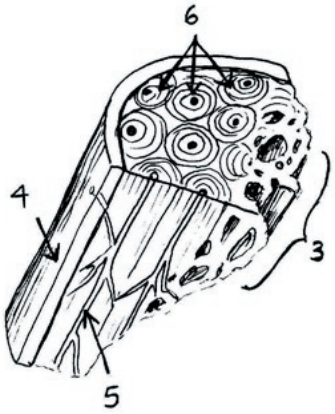


INSIDE A BONE:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____





Possible answers: marrow, compact bone, spongy bone, blood vessels, periosteum, Haversian canals

FUNCTION:

The _____ is the covering around the bone. *Peri* means _____ and *osteum* means _____. The _____ in the middle produces _____ cells. The _____ bone makes the bone very strong. The air spaces in the _____ bone reduce the overall weight of the bone, so you don't have to lug around a heavy skeleton.

The _____ is a protectuve covering for the brain. The moveable bone attached to your skull is called the _____, commonly known as the jaw. The _____ protect the spinal column, yet remain flexible enough so that you can bend your back.

The _____ bone sounds like it might be funny, but it is not at all related to the word "humorous." The truth is that the word "umer" was Latin for "upper arm." (Pretty boring, huh?) What people call the "funny bone" is actually the end of the _____ bone. (And hitting your funny bone is anything but funny, as you know if you have ever hit it. It hurts!) The _____ _____ is a fancy name for the shoulder blade. Somehow or other, scientists missed giving a hard name to the rib bone. Your ribs are simply your ribs. The reason you have two bones in your lower arm, the _____ and the _____, is so that you can rotate your hand around without moving your upper arm. (Try it!) The bones in your wrist are called _____. The bones in the middle of your hand are the _____ and in your fingers are the _____ _____.

The longest bone in your body is your _____. At the top it joins with the _____ bone, and at the bottom it joins with the _____ and the _____. The knee joint is protected by the _____, commonly known as the knee cap. The group of bones that make up your ankle are called the _____. The bones in the middle of your foot are called the _____ and the ones in your toes are called the _____.

MAINTENANCE:

1) The hardness of your bones is due to the minerals c_____ and ph_____. Eat foods that contain these mineral so that your body will have enough of the mineral to keep your bones strong. Foods that contain calcium include: _____, _____, _____ and _____ Foods that contain phosphorus include _____ and _____.
2) In addition to the above mineral, your bones also need this vitamin: _____ A severage shortage of this vitamin can give you a condition known as _____, in which your bones become soft and start to bend.

SAFETY:

1) Your cranium does a pretty good job of protecting your brain, but when you play very rough sports or do some other activity that could result in a sevcre blow to your head, you need to wear a _____
2) When you play soccer you need to protect your lower legs bones by wearing these: _____
3) People who work in jobs where heavy objects could fall onto their feet need to protect their metatarsals and phalanges by wearing _____.
4) If you play the position of catcher in the game of baseball, you need to protect the bones in your face from getting hit by a baseball going 90 miles per hour. Catchers wear a _____.

TROUBLESHOOTING:

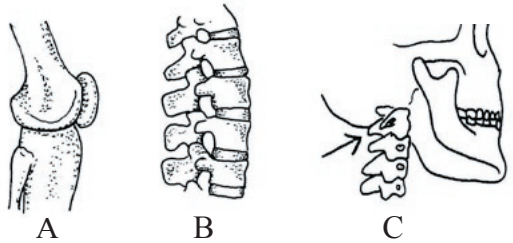
Description of problem	Name of problem	What to do
broken bone		Put bone in a cast (usually)
crack in bone		Possibly wear a cast (or a brace)
bones get brittle as you age		Take extra calcium and vitamin D supplements and exercise
bones get soft and bendy because of lack of vitamin D		Take more vitamin D
swelling in the joints between the bones		Take anti-inflammatory drugs and exercise the muscles around the joint

Possible answers: osteoporosis, break, rickets, fracture, arthritis

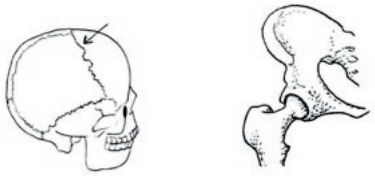
JOINTS: WHERE BONE MEETS BONE:

There are basically three types of joints. Can you figure out which picture goes with these names?

___ ball and socket _____ hinge
___ pivot ____ sliding
___ immoveable

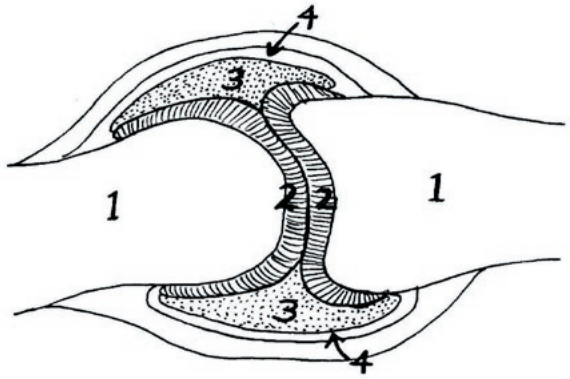


A B C



D E

AN UP-CLOSE LOOK AT A JOINT:

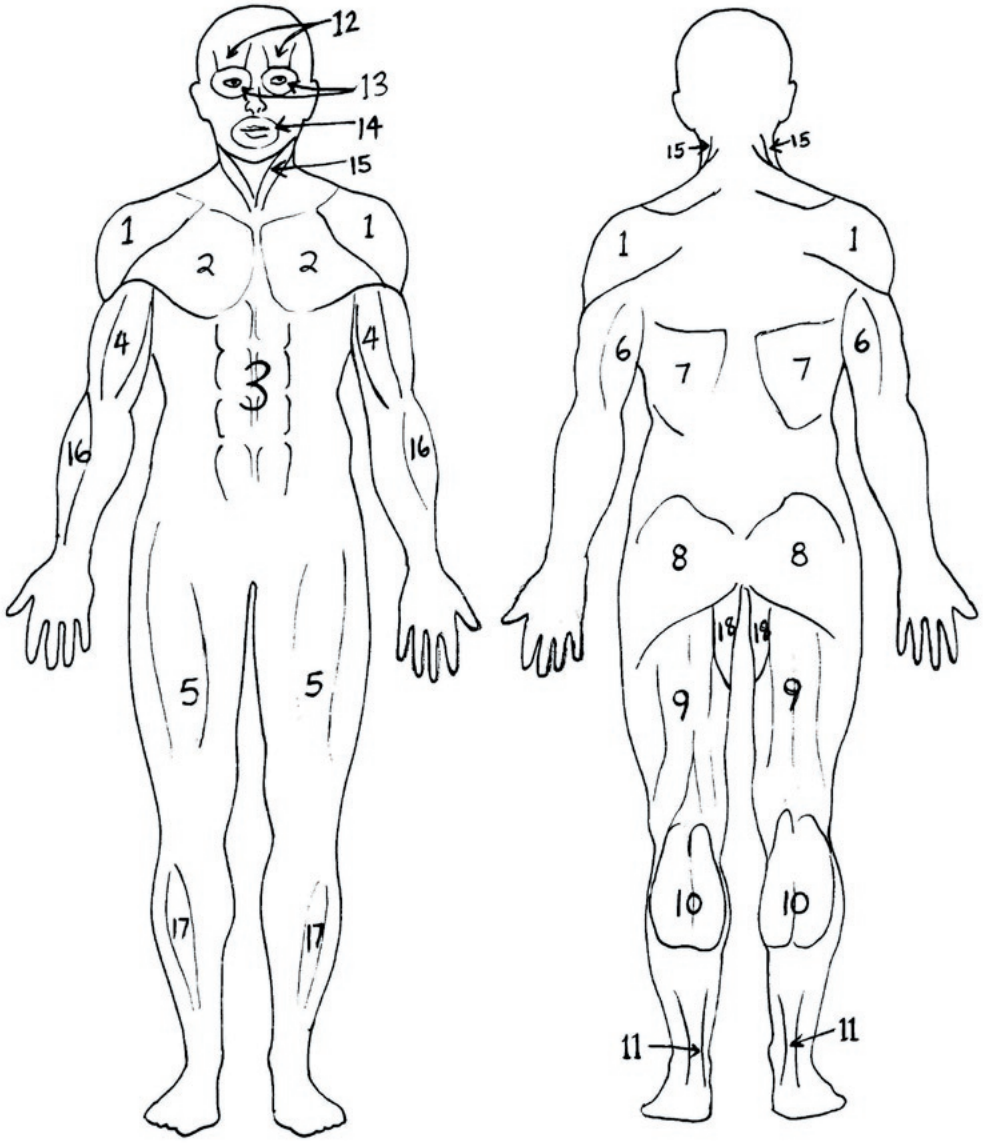


1) _____ 3) _____
2) _____ 4) _____

Possible answers: synovial fluid, bone, cartilage, synovial membran

YOUR MUSCLES

PARTS LIST:



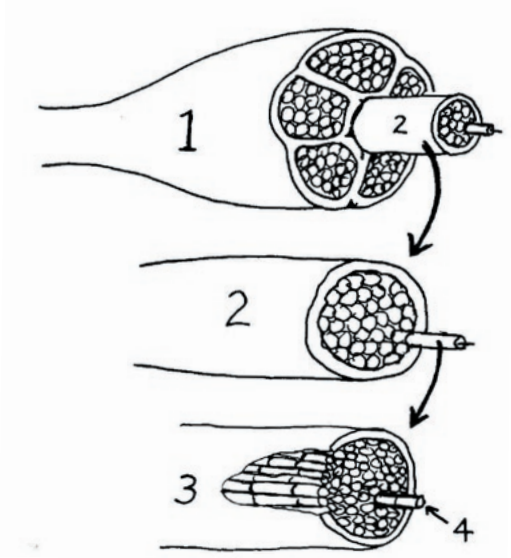
1) _____ 7) _____ 13) _____
2) _____ 8) _____ 14) _____
3) _____ 9) _____ 15) _____
4) _____ 10) _____ 16) _____
5) _____ 11) _____ 17) _____
6) _____ 12) _____ 18) _____

PUT THE CORRECT NAME BESIDE EACH NUMBER:
frontalis, orbicularis oris, orbicularis oculi, sternocleidomastoid, biceps, triceps, Achilles tendon, abdominals, deltoid, pectoralis, latissimus, gluteus maximus, gracilis, gastrocnemius, quadriceps,"hamstring," brachioradialis, flexor carpiulnaris
(As you can see, most of the muscles have difficult names. The bones were easier, don't you think? These are the hardest names in this manual, especially gastrocnemius with its silent "c"!)

FUNCTION:

Muscles can do one thing: _____. A muscle can _____ but it cannot _____. Therefore, muscles must work in _____, one on one side, one on the other. For example, the _____ is on the top side of your upper arm and contrats to pull the arm towards the chest; the _____ is on the bottom side of the upper arm and works to straighten the arm back out again. Another good example of a muscle pair can be found on the upper leg: the _____ and the _____.
The incredibly tough but somewhat stretchy tissue that connects muscles to bone is called a _____

(USE EACH OF THESE ONCE: quadriceps, hamstring, bicep, tricep, pull, push, contract, pairs, tendon)



WHAT MAKES UP A MUSCLE?
1) _____ 2) _____
3) _____ 4) _____
POSSIBLE ANSWERS:
muscle, myofibril, bundle, fiber

MAINTENANCE:

To keep your muscles strong you must _____ them.
Keeping _____ will help keep your muscles in good shape. If you want to increase your muscle strength beyond normal, you can _____ weights.
Muscles require lots of energy to move. The _____ you _____ is your body's fuel, just like a _____uses _____. You have a special sensor in your _____ that will tell you when you are running low on fuel. This sensor will make you feel _____.
If you injure a muscle, stop using it and it will get better. Your body knows how to fix it.
Make sure you eat foods that contain _____, _____, and _____.
These minerals are essential to the function of your muscles.
(USE EACH OF THESE ONCE: lift, use, active, food, hungry, gas, eat, car, brain, sodium, potassium, magnesium)

SAFETY:

There isn't a whole lot you can do to keep your muscles safe. Fortunately, your muscles are extremely tough and can pretty much take care of themselves. Obvious "no-brainer" guidelines would include not trying to lift objects that are massively too heavy for you to lift, or not doing an exercise so many times that you get very sore.

TROUBLESHOOTING:

If you injure a muscle, the first thing to do is put _____ on it, to prevent swelling. After that, you can take _____ or _____ to help keeping swelling at a minimum. Try not to use the muscle while it is healing. If the _____ (connecting the muscle to the bone) gets inflamed, it is called _____ and can be treated the same way as a pulled muscle. If it does not get better, it may need to be checked by a doctor to see if there is a _____ that needs to be fixed using _____

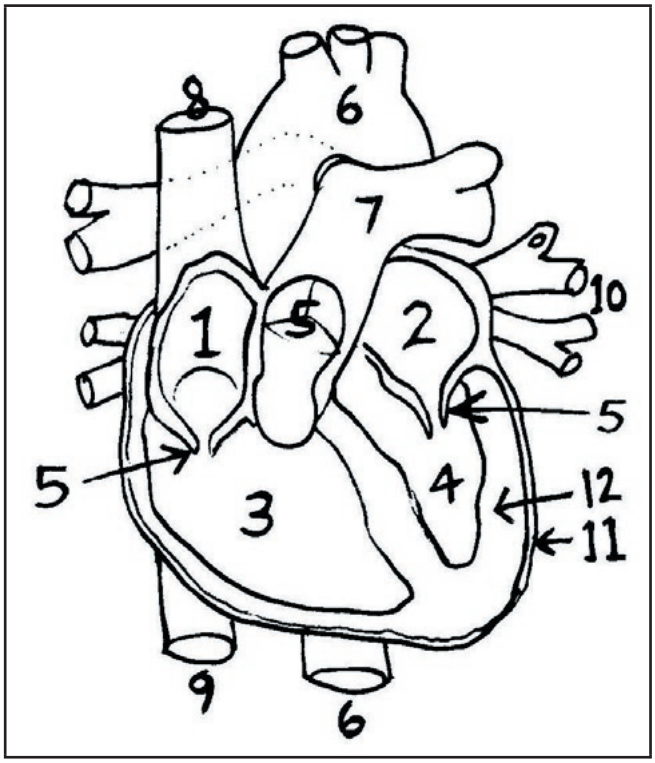
(USE EACH OF THESE ONCE: tear, ice, surgery, ibuprofen, aspirin, tendon, tendonitis)

THE CIRCULATORY SYSTEM

PARTS LIST:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____
10) _____
11) _____
12) _____

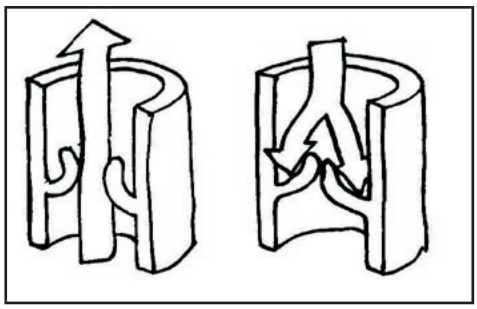
WRITE THE CORRECT PART NAME NEXT TO THE NUMBER: aorta, pulmonary artery, pulmonary veins, valves, right atrium, left atrium, right ventricle, left ventricle, superior vena cava, inferior vena cava, pericardium, myocardium



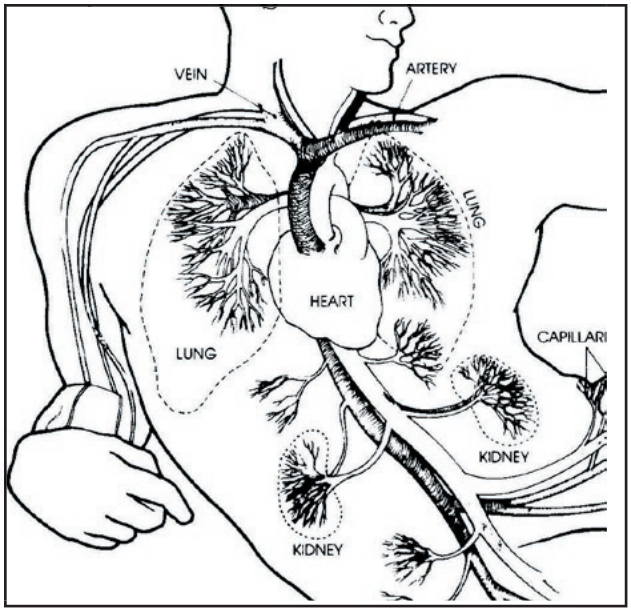
FUNCTION:

In a way, you have two circulatory systems. Each one begins and ends at the heart. The systemic system branches out to all parts of the body. The pulmonary system is much shorter and just goes to the lungs and back. Each system has both arteries leading away from the heart, and veins leading back to the heart.

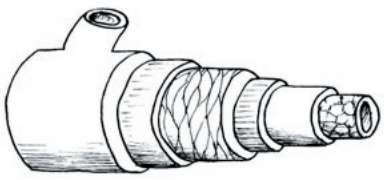
Blood only flows in one direction because of valves inside the heart and inside the arteries and veins. The valves only open one way.



TRIVIA: If you could lay all your blood vessels end to end, the line would be about 60,000 miles long!

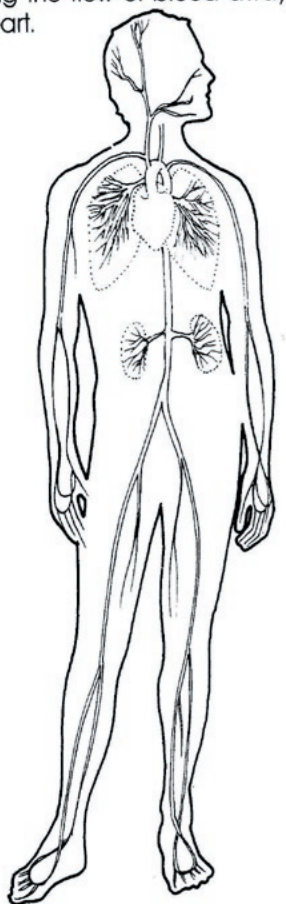


Look at how many layers a blood vessels is made of. At least one of these layers is muscle, so your vessels can expand and contract.



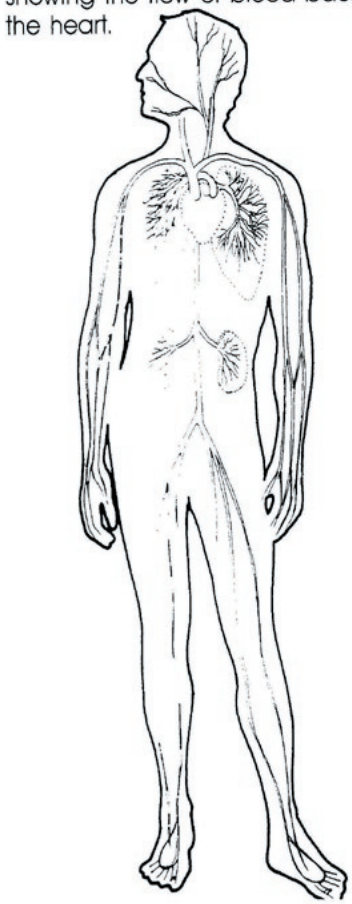
Arteries

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.



MAINTENANCE:

Eat foods low in _____. Get plenty of both _____ and _____.

Have your _____ listen to your heart at least once a year.

(Possible anwers: doctor, fat, exercise. rest)

SAFETY:

Find your target heart rate if you are going to begin an aerobics program (jogging, running, aerobics, etc.) Check your pulse during exercise.

220-(your age)= your max. heart rate

(max) - (at rest) = reserve

(reserve) x 0.75 + (at rest) = target

Your target is: _____

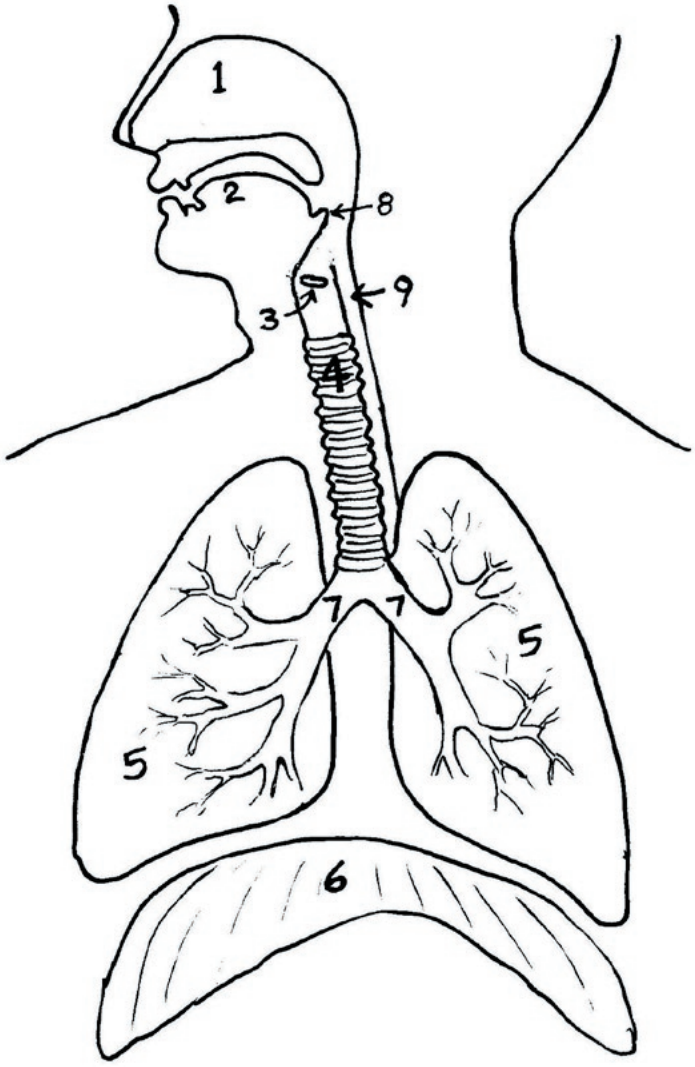
TROUBLESHOOTING:

Description of problem	Name of problem	What to do
damage to the myocardium		take medication, rest, change diet, gentle exercise
blood pressure too high		take medicine that relaxes the muscles that line the blood vessels
blood pressure too low		eat salty foods, possibly take medication
irregular heartbeat		medication or pacemaker
a slight flutter is heard when listening to heartbeat		usually requires no treatment, except if very severe

POSSIBLE PROBLEMS: hypertension, hypotension, murmur, heart attack, arrhythmia,

THE RESPIRATORY SYSTEM

PARTS LIST:



1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____

PUT THE CORRECT PART NAME NEXT TO EACH NUMBER:
lung, trachea, bronchial tubes, vocal chords, tongue, nasal cavity, epi-glotis, diaphragm, esophagus

(Note: The esophagus is not really part of the respiratory system but it is attached to the trachea, so it is included in the drawing.)

FUNCTION:

Every cell in the body needs _____, The respiratory system is how the body delivers it. Air first comes in through the _____ or the _____. The muscle that pulls air in is called the _____. The _____ is lined with little hairs that filter the air and catch dust particles. Then the air goes down through the _____ and then into the _____ and finally out into the lungs. The lung is filled with tiny _____ that take the oxygen from the air. The blood leaves the lungs and goes out into all parts of the body, giving oxygen to the cells. When the cells are done with the oxygen, they make a waste product called _____ and they need to get rid of it. The blood also picks up this waste and carries it back to the lungs, where it leaves the body when you breathe out. Then you breathe in again and the cycle starts over again. Breathing is automatic; you don't have to think about doing it. There is a special area of your _____ that controls breathing, even while you are asleep.

USE EACH ONCE: nasal cavity, nose, mouth, brain, diaphragm, trachea, broncial tubes, oxygen, blood vessels, carbon dioxide

MAINTENANCE:

1) Get plenty of _____.
2) Eat _____ foods.
3) If your nose gets too full of _____ use a _____ to blow it out.

(USE EACH ONCE: tissue, exercise, mucus, nutritious)

SAFETY:

1) Wear a _____ _____ that covers your mouth and nose, when you are doing a job that stirs up a lot of dust.
2) Don't _____.
3) Learn the _____ _____, which can save someone's life if they are choking.

(USE EACH ONCE: Heimlich maneuver, dust mask, smoke)

Heimlich maneuver

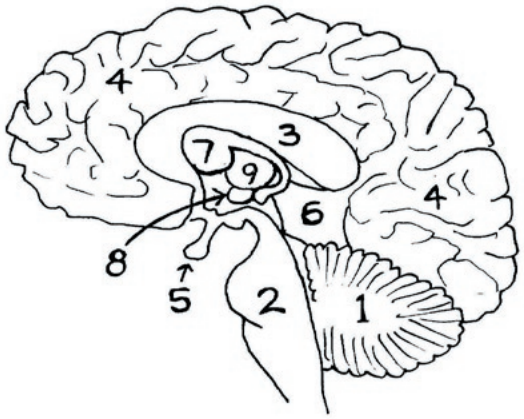
TROUBLESHOOTING:

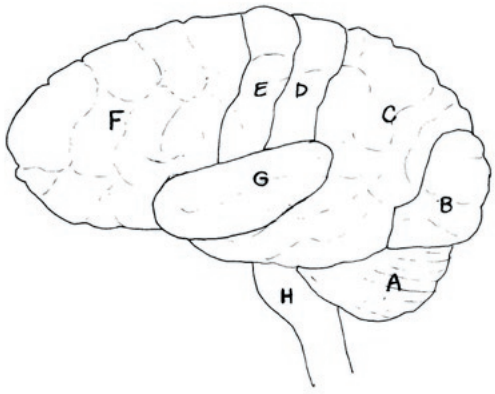
Description of problem	Name of problem	What to do
muscles around airways tighten and breathing is difficult		take medication (usually an inhaler)
serious virus that attacks the respiratory system, causing high fever, runny nose, terrible cough, and often leads to pneumonia		rest, drink lots of fluids, take over-the-counter medicines to deal with fever and cough
mild virus that attacks the upper respiratory system causing runny nose and sneezing		rest, drink lots of fluids, take over-the-counter medicines to deal with nasal symptoms
a seasonal allergy that causes sneezing and runny nose		take allergy medicne
an infection in the lungs		rest and take antibiotics if prescribed by your doctor
sudden contractions of the diaphragm muscle		nothing is necessary, but if you find something that works for you, do it
a piece of food gets stuck in the top of the trachea		use the Heimlich maneuver to dislodge the food

POSSIBLE PROBLEMS: influenza, hay fever, asthma, common cold, choking, pneumonia, hiccups

THE NERVOUS SYSTEM

PARTS LIST:





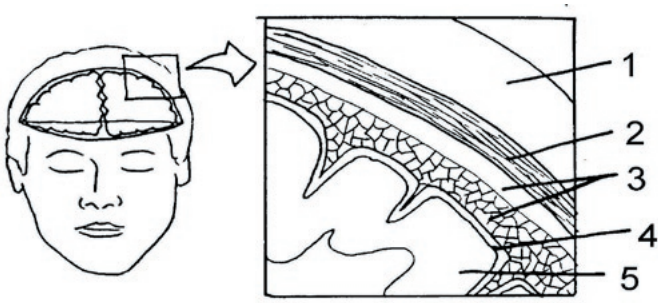
Basic anatony:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____

PUT THE CORRECT PART NAME NEXT TO THE NUMBER: thalamus, hypothalamus, brain stem, cerebrum, cerebellum, hippocampus, pituitary gland, corpus callosum, midbrain

Functional areas: PUT THE CORRECT LETTER NEXT TO THE DESCRIPTION:

_____ vision _____ hearing _____ senses
_____ thinking,figuring, deciding
____ balance _____ control of muscle movement
_____ automatic functioning of heart and lungs
_____ sense of where your body is in space



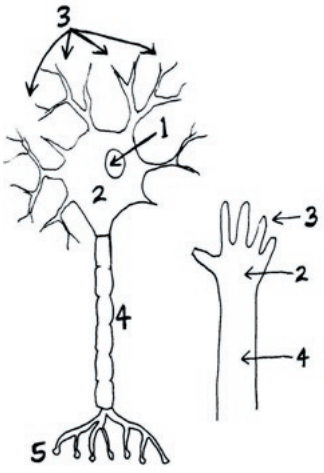
1) _____
2) _____
3) _____
4) _____
5) _____

(pia mater, dura mater, skull, cortex, arachnoid)

One single cell in the nervous system is called
a neuron. Here is a picture of a a typical neuron cell.The hand next to it shows you how you can easisly remember the parts
of a neuron.

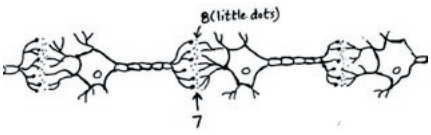
1) _____
2) _____
3) _____
4) _____
5) _____

PUT THE CORRECT NAME NEXT TO THE NUMBER:



The neurons line up end to end, and pass the elctrical signal down the line. However, between neurons they must jump a gap called the _____. Chemicals called_____ must carry the signal across this gap.

7) _____
8) _____
(neurotransmitters, synapse)

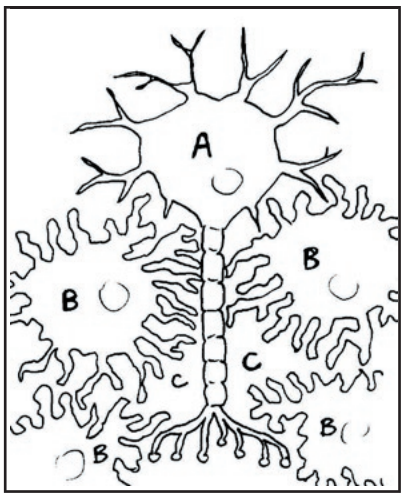


PARTS, con't

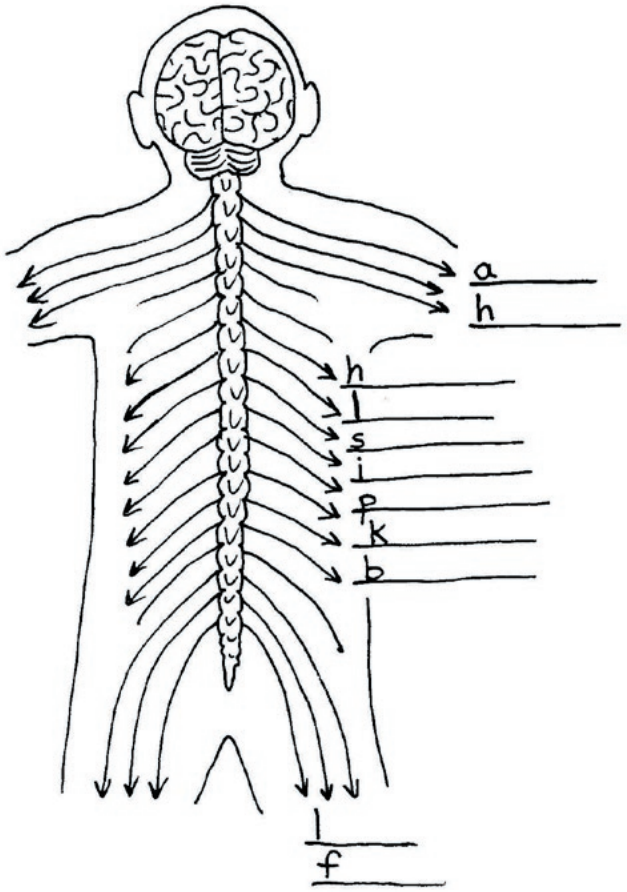
A) _____
B) _____
C) _____

There are special neurons called _____ cells. They are not involved in sending electrical _____. Instead, they just _____ and _____ the the others. The enpty spaces between the cells are filled with _____.

Possible answers: glial cells, cerebrospinal fluid neuron, signals, protect, nourish



Nerves leave the brain through the spinal cord. It's kind of like a highway down your back, with various exits to parts of the body. Can you figure out which exits lead to which body parts? The place where the exit is corresponds to the location of the body For example, the place where the nerves go to your heart is very close to where the heart actually is.



FUNCTION:

Your brain is not only the part of you that _____, it also is the part that _____all the body systems. Most of what your brain does, it does automatically, without any thought on your part. Your _____ controls the automatic functioning of your _____and _____. Even when you are asleep, this area of your brain keeps working. Speaking of sleeping, this area of your brain also controls your _____ and _____ cycle. The bottom of your brain stem narrows down into a cord, called the _____. It runs all the way down your back and is protected by bones called _____.

USE EACH OF THESE ONCE:
First paragraph: spinal cord, vertebrae, thinks, waking, sleeping, brain stem, controls, heart, lungs

FUNCTION, con't.

The midbrain does lots of things. There is an area that controls your appetite and tells you when you are _____ and when you are _____. There is also an area that controls your emotions, such as _____ and _____. This is also the area where _____are stored. A special part called the hippocampus (which is Latin for "seahorse" because is sort of looks like one) plays librarian for you, filing and retrieving memories. The midbrain is also responsible for coordinating the functions of all the different areas of the brain. It lets all the parts work together as a _____.

There is a large, extra wrinkly lobe right at the bottom of the brain, called the _____. This part is in charge of keeping your balance when you walk, run, or even do gynnastics. Right above this part is the area that is connected to your _____, which is kind of strange because it is so far away from them! There are two strips that runs over the top and down the sides of the middle of the brain. One of them processes information gathered by your _____ and the other is called the "motor cortex" and controls the movement of your _____. The very front part of your brain is called the _____ lobe. This is where you do all your thinking and decision making. It communicates with the other areas of the brain, though, so that your decisions involve sight, sound, memories, and feelings. On both sides of your head is an area called the temporal lobe. This area is connected to your _____, which are right next door. Your speech center is also located in this area. Your brain is split into two halves, left and right. Your corpus callosum connects the two halves and makes them work together.

USE EACH OF THESE ONCE:
Second paragraph: memories, anger, love, whole, hungry, full
Third paragraph: eyes, ears, muscles, frontal, cerebellum, senses

MAINTENANCE:

Just as your _____ get stronger when you use them, so your _____ gets stronger when you use it! Doing activities that callenge your brain to _____ makes your brain get better at thinking. Eating _____ food is also very important for your brain. Your brain needs a good supply of _____ and _____ in order to function properly.

USE EACH OF THESE ONCE: vitamins, minerals, brain, muscles, think, nutritious

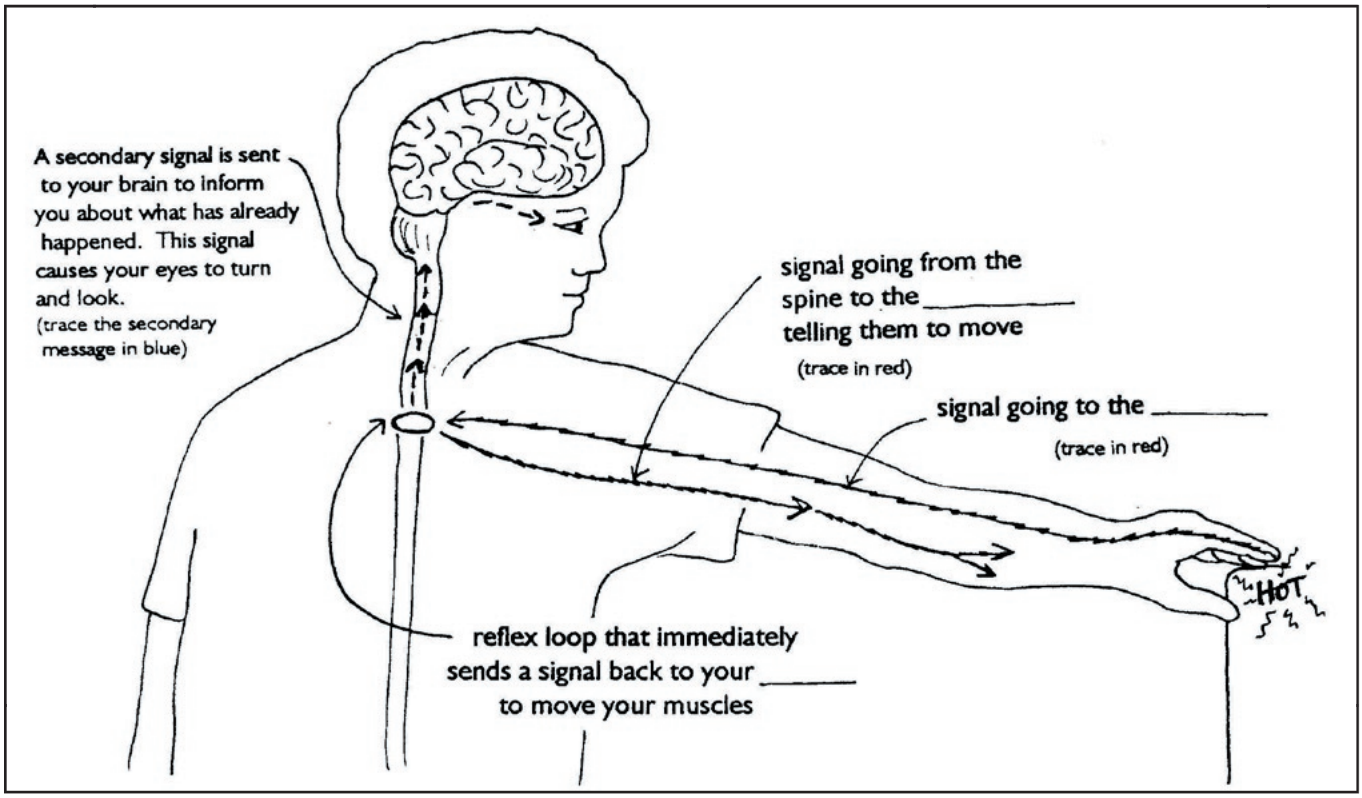
SAFETY:

Your nervous system has amazing automatic safety system built in, called _____. When an emergency stimulus is sensed, such as your hand touching something very _____, the signal only has to go to a relay center in your _____. It does NOT have to travel all the way to your _____, because that would take too long. The relay center in your spine activates the appropriate _____ ___ causing you to jerk your hand back very quickly. A split second afterwards, a follow-up signal is sent to the brain to tell you what just happened.

(USE EACH OF THESE ONCE: brain, spine, reflexes, hot, muscles)

SAFETY, con't.

Fill in the three blanks, and color as indicated.



TROUBLESHOOTING:

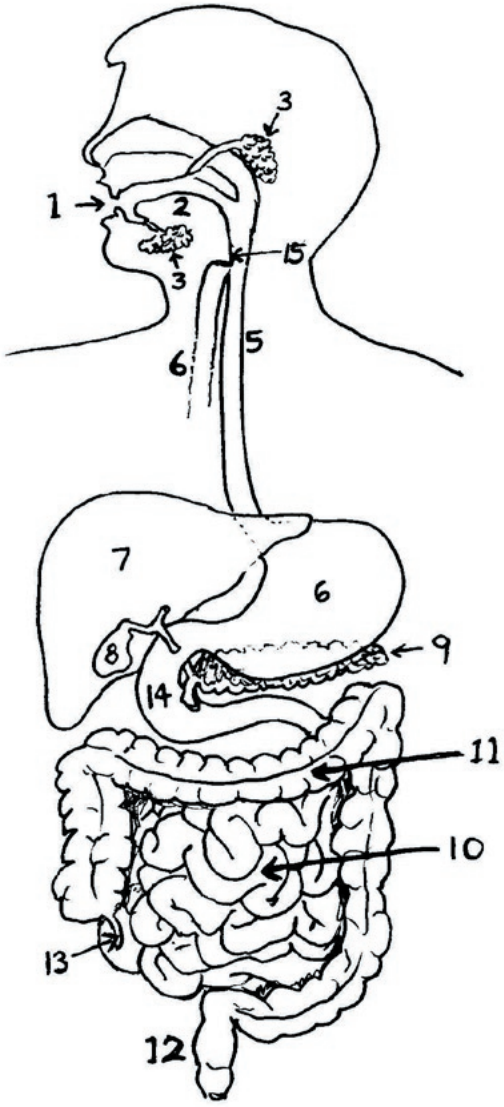
Description of problem	Name of problem	What to do
unconsciousness resulting from injury or drugs		stay in the hospital under the care of special doctors
electric signals firing at the wrong time, causing seizures		take medication that keeps seizures to a minimum
a disease causeed by aging in which you lose your memory		there isn't much you can do (experimental medicines, maybe)
abnormal fear of something		see a psychologist for help with it
extreme swings in emotion and mood, alternating between to high and too low		take medication
feeling sad and tired all the time because the neurons are not sending signals the way they should		take medication
damage to the cerebrum at birth, causing permanent paralysis and discoordination of muscles		learn to live with it
nervous disorder common in elderyt people, causes muscle tremors		medication, learn to live with it
deterioration of the protective sheaths around the axons		medication, learn to live with it
inflammation of the brain		go to hospital

POSSIBLE PROBLEMSs: bipolar, phobia, cerebral palsy, depression, epilepsy, Alzheimer's, coma, encephalitis, Parkinson's disease, multiple sclerosis

THE DIGESTIVE SYSTEM

PARTS LIST:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____
9) _____
10) _____
11) _____
12) _____
13) _____
14) _____
15) _____

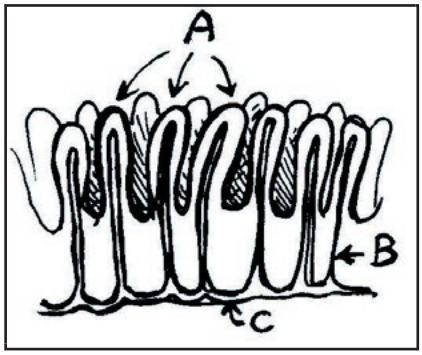


PUT THE CORRECT NAME NEXT
TO EACH NUMBER:
stomach, mouth, tongue, liver, appendix, pancreas,
gall bladder, small intestine, large intestine, rectum, esophagus,
epiglotis, salivary glands, duodenum, trachea

(NOTE: The trachea is not really part of the digestive system, but is shown here because it is attached to the esophagus.)

The walls of the small intestine are lined with tiny hair-like structures called villi. They are lined with blood vessels that absorb the nutrients

A) _____
B) _____
C) _____
(capillaries, blood vessel, villi)



FUNCTION:

Food and water enter the digestive system through the _____. Digestion begins here, as the _____ make _____ that begins to break down starchy foods such as bread. Your _____ grind and mash the food to make it soft and mushy. When you _____ the food then enters a tube called the _____. The flap that prevents the food from going into the trachea is called the _____. The food mush then goes into the _____ where it is mixed and mashed even more, The tube that attaches the stomach to the intestines is called the d_____. In this area, Then, juices from the _____and _____ are mixed in. (The juices in the gall bladder were made by the _____.) As the food travels through the small intestine, it is broken down into very

small molecules that can enter your blood and be taken to all parts of the body. When the food gets to the _____ the water is absorbed out of it. By now it is considered to be waste, not food. Your body is all done with it. When it gets to the very last part of the digestive system, the _____, it then leaves the body.

USE EACH OF THESE ONCE: stomach. saliva, swallow, mall intestine, large intestine, rectum gall bladder, pancreas, liver, mouth, salivary glands, teeth, epiglotis, duodenum

MAINTENANCE:

1) One thing that can keep your digesgtive system working well is to get plenty of _____ in your diet. Goods sources of this include fruits, vegetables, and whole grains. It's function is to keep things moving along in the digestive tract.
2) Beware of serious over-eating, as it could lead to _____, which puts stress on all parts of your body.
3) Choose _____ snacks, and don't eat too much _____. Don't eat more than your body needs, because extra calories get stored as _____.
(USE EACH ONE ONCE: healthy, sugar, fiber, fat, obesity)

SAFETY:

1) Your body comes with some built-in safety devices. One of these is that when something bad gets into your stomach, your stomach will automatically try to get rid of it by pushing it back out again. This reflex is called _____. It's not pleasant, but it's a lifesaver sometimes!
2) Another reflex, but higher up in the system is called the _____ reflex. It will try to clear things stuck at the back of the throat.
3) If something gets so stuck that your gag reflex can't get it out, you will need someone to do the _____ which will force air out of your _____ and hopefully pop the object out of your throat. Always try to _____ your food thoroughly to try to eliminate big chunks that could get stuck easily.
4) (USE EACH OF THESE ONCE: chew, Heimlich maneuver, vomiting, gag, lungs)

TROUBLESHOOTING:

Description of problem	Name of problem	What to do
a sore in the wall of the stomach		take medicine
a burning feeling in the esophagus		take an anit-acid
solid waste comes out too wet		don't eat, just drink clear liquids until it gets better
infection of appendix		go to the hospital
malfunction of pancreas-- sugars do not get digested properly		take insulin
virus attacks stomach, causing vomitting and diahhrea		it will get better by itself

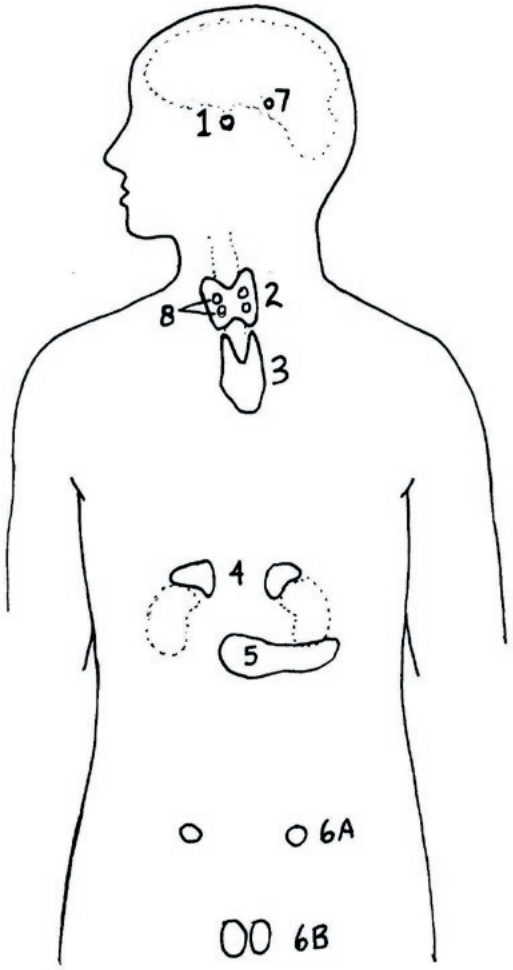
POSSIBLE ANSWERS: diahhrea, appendicitis, stomach virus, ulcer, heartburn, diabetes

THE ENDOCRINE SYSTEM

PARTS LIST:

1) _____
2) _____
3) _____
4) _____
5) _____
6A) _____(female only)
6B) _____(male only)
7) _____
8) _____

WRITE THE CORRECT PART NAME
NEXT TO THE NUMBER:
ovaries, testes, pancreas, pituitary gland, thymus,
thyroid, parathyroid, adrenalin glands, pineal gland



FUNCTION:

PUT THE CORRECT PART NUMBER NEXT
TO THE DESCRIPTION:
_____ located on either side of the trachea,
regulates blood pressure, heart rate, body temp,
weight gain or loss, and physical growth
_____ located at the base of the brain, controls
general growth and development during childhood, and
also stimulates development of ovaries and testes during a
person's teenage years
_____ located above the kidneys, these glands maintain salt balance in body, as well as releasing a chemical called adrenaline, which immediately stimulates the body for emergency action
_____ produces female hormones
_____ produces male hormones
_____ this gland is most active during childhood, and seems to stimulate the immune system
_____ this organ controls the level of sugar in the blood

Hormones are essential to the functioning of your body. They are produced by glands called _____ glands. We tend to think of hormones as only being related to male and female issues, but this is not true. Most of your hormones operate everyday and keep you alive. Hormones are chemical _____ that signal certain cells to act certain ways. They influence the flow of substances in and out of _____, to maintain the right amount of chemicals in the right places. Endocrine glands put their hormones right into the _____. Though the hormones reach all parts of the body, they only affect the specific cells they are meant to affect. Some medicines work by _____ the hormone's action on its target cells. This is the case with _____ reducing medicines. They block the hormone that tells your _____

control system to raise the temperature.

Your _____ glands are part of your emergency system. If you are startled or scared, in a split second, your adrenal glands release the hormone _____ into your blood. Immediately, this hormone causes an increase in _____ and _____ rates. Your body is now ready for action.

Your pancreas is part of your _____ system. You may remember seeing it in an earlier section. It releases the hormone _____ which tells your body to get sugar molecules out of the blood stream and into temporary storage in your muscles.

The pineal gland is somewhat of a mystery to scientists, but seems to be involved with metabolism somehow (how your body makes and burns energy).

USE EACH OF THESE ONCE: blood stream, endocrine, cells, insulin, digestive, messengers, fever, adrenal, adrenaline, temperature, pulse, respiration

MAINTENANCE:

There isn't very much you need to do to maintain your hormonal system. You can help your adrenal glands by getting enough salt if you are a person who exercises a lot. (But too much salt isn't good, so don't overdo it!) Your thyroid needs iodine, which is why they put it in salt. Look on a large salt container and you will see the word "iodized" which means they put iodine in.

SAFTEY:

Your endocrine system is part of your built-in safety system. It will let you be ready for action, should you get into an emergency situation.

TROUBLESHOOTING:

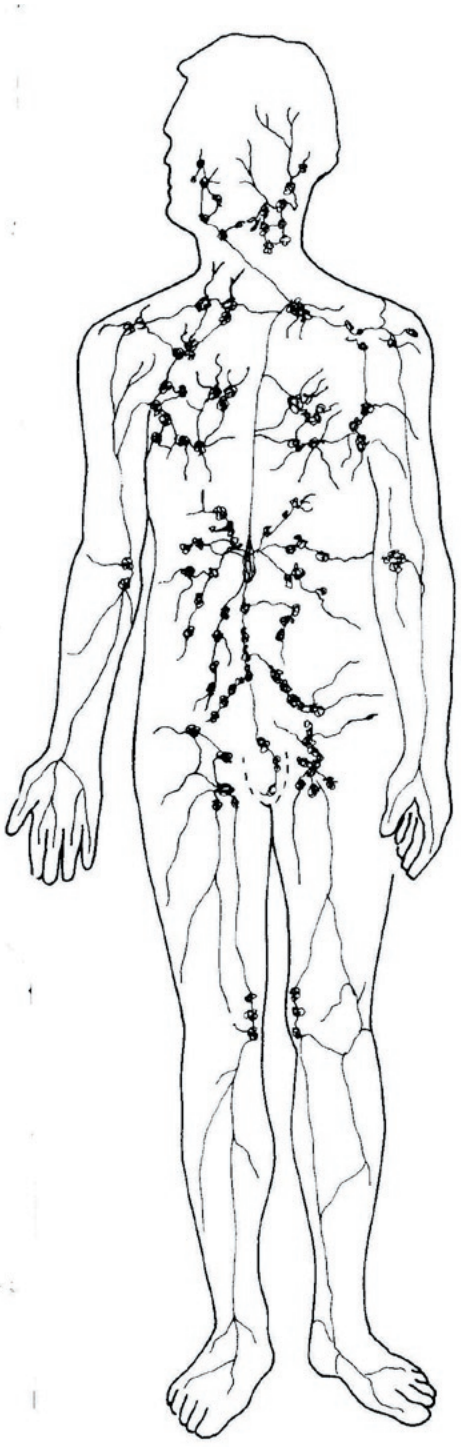
Description of problem	Name of problem	What to do
thyroid does not produce enough of its hormone		take articifial thyroid hormones
thyroid produces too much of its hormone, causing		have radiation treatment to intentionally kill off thyroid a bit
pancreas does not produc enough insulin		take insulin
pancreas produces too much insulin		eat
pituitary gland does not make enough of its growth hormone, causing person not to grow enough		take growth hormone
pituitary makes too much of its growth hormone, causing person to grow too much		see a specialist for treatment of pituitary gland

POSSIBLE ANSWERS:giantism, dwarfism, diabetes, hypoglycemia, hypothyroidism, hyperthyroidsim,

THE LYMPH SYSTEM

Surrounding the cells of your body is a _____that picks up particles and _____ that are not able to return to the blood. The _____ system is a series of tubes that drains the fluid, _____ it, and puts it back into the blood stream. In certain places, the lymph tissue forms a clump called a _____, where _____ and other infectious organisms are removed from the lymph fluid. The _____ and _____ in your throat are also part of the lymph system.

USE EACH ONCE: adenoids, fluid, tonsils, bacteria, wastes, cleans, lymph, node



YOUR SPLEEN

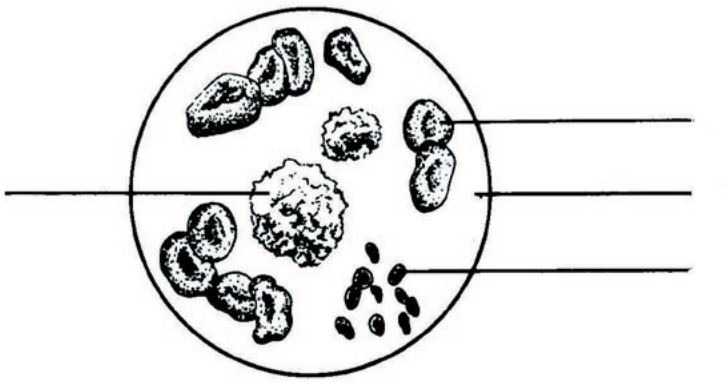
Here is a strange organ. It's near your stomach and pancreas but it doesn't have anything to do with digestion. It does a similar job to your lymph nodes, but it isn't really part of the lymph system, either. The spleen is in charge of getting rid of old or damaged blood cells.

BLOOD

PARTS LIST:

Write the correct name of each part on the line pointing to it.

(Color the red cells red. Make the center of the white cell purple.)



The four types of blood are: _____, _____, _____ and _____. The other characteristic of blood is the _____ factor, which can be + or -.

TYPES OF WHITE CELLS:

Another name for white cells is leucocytes. There are five kinds of leucocytes: (Color the central portion of each leucocyte dark purple or blue. Color the outside portion of the basophil, lymphopcyte, and monocyte light purple or light blue. Color the outside portion of the eosinophil pink, and leave the neutrophil white.)

basophil eosinophil neutrophil lymphocyte monocyte

FUNCTION:

1) The _____ cells carry _____ to all the cells in your body. Their proper scientific name is _____. These cells are the only ones in your body that do not have a _____. The chemical in these cells that actually carries the oxygen is _____.
2) The _____ cells are part of your _____ system that fights infections. White cells are also called _____. They actually get out of your blood stream and into the fluid between cells, which is where many disease-causing agents are (called _____). Some white cells make _____ that act as tags on foreign invaders. Other white cells _____ (similar to an ameba!) anything they find with a tag on it. These "eating cells" that engulf are called _____.
3) The _____ are part of the clotting system that stops bleeding and makes a _____. Blood cells are made in your bone _____.
4) The watery stuff your blood cells float in is called _____. Most of it is made of _____. Things you will find flosting in this fluid, besides blood cells, are _____, _____, _____, _____, and dissolved _____.

USE EACH ONCE: white, red, marrow, scab, immune, oxygen, sugars, leucocytes, erythrocytes, phagocytes, water, proteins, pathogens, plasma, nucleus, salts, hormones, antibodies, hemoglobin, engulf, gases

MAINTENANCE:

This mineral is particularly helpful to your blood because it carries oxygen: _____ Good sources of this mineral are these foods: _____, _____ and _____.
In addition to this mineral, you also need salts such as so_____, po_____ and ma_____

SAFETY:

1) To keep yucky microscopic parasites out of your blood, make sure you _____ your hands after playing outside.
2) Do not touch other people's blood. You don't know what _____ (things that cause disease) might be in it.
3) Adults might want to consider _____ blood so that hospitals can use it for emergencies.
4) If you get a large cut, put _____ on it, and elevate it above your _____. Have an adult look at it to see if it needs _____.
5) Shots called _____ can protect your body against invaders by telling your immuine system how to make _____ against them.

USE EACH ONCE: wash, stitches, pressure, donating, antibodies, pathogens, heart, vaccines

TROUBLESHOOTING:

Description of problem	Name of problem	What to do
blood does not clot		take clotting chemicals
blood cells do not carry oxygen very well, so you feel tired all the time		take iron supplements
blood does not have enough red cells because you are in thin air		drink lots of water, lie down and rest
a problem with your white cells, which are called leukocytes		chemotherapy
lots and lots of bacteria or viruses in your body-- white cells are having trouble getting rid of them		moist heat, antibiotics for bacteria, rest and patienced for viruses
red blood cells are shaped like oval instead of circle		see a specialist-- there is a lot of new research going on right now

POSSIBLE ANSWERS: anemia, sickle-cell anemia, altitude sickness, hemophilia, infection, leukemia