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.)
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 severe 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:

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<td>Take extra calcium and vitamin D supplements and exercise</td>
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<td>bones get soft and bendy because of lack of vitamin D</td>
<td></td>
<td>Take more vitamin D</td>
</tr>
<tr>
<td>swelling in the joints between the bones</td>
<td></td>
<td>Take anti-inflammatory drugs and exercise the muscles around the joint</td>
</tr>
</tbody>
</table>

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

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

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 incoming 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

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 _______________ 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:

<table>
<thead>
<tr>
<th>Description of problem</th>
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<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things that are far away look blurry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Things that are close look blurry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cornea becomes clouded, instead of being clear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra fluid pressure builds up inside the eye.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Either the cornea or the lens is uneven, which results in one area of your vision being out of focus.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You cannot tell the difference between certain colors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannot see in dim light.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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) __________________________  6) __________________________
2) __________________________  7) __________________________
3) __________________________  8) __________________________
4) __________________________  9) __________________________
5) __________________________  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: epiglottis, 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 cavity 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 make them sore for several days.

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<table>
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<th>Description of problem</th>
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<tbody>
<tr>
<td>Sore or infected papillae</td>
<td><em>It will get better by itself.</em></td>
</tr>
<tr>
<td>White sore called an ulcer</td>
<td><em>It will get better by itself.</em></td>
</tr>
</tbody>
</table>
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 cavity 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 mucus, 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!

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<tr>
<td>Runny nose</td>
<td></td>
</tr>
<tr>
<td>Stuffy nose</td>
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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.

1. _______________________
2. _______________________
3. _______________________
4. _______________________
5. _______________________
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16. _______________________
17. _______________________
18. _______________________
19. _______________________
20. _______________________
21. _______________________
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 protective 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 minerals 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 severe 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 severe 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 ____________________.

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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

AN UP-CLOSE LOOK AT A JOINT:

1) ___________________ 3) ___________________
2) ___________________ 4) ___________________

Possible answers: synovial fluid, bone, cartilage, synovial membran
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, tibialis
(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 contracts 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)

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’s 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.
**TROUBLESHOOTING:**

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

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

**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.

\[
220 - \text{(your age)} = \text{your max. heart rate} \\
\text{-------------} \\
\text{(max) - (at rest)} = \text{reserve} \\
\text{---------------} \\
\text{(reserve) x 0.75 + (at rest)} = \text{target}
\]

Your target is: ____
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, epiglottis, 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 _______________ and then needs to get rid of _______________. The respiratory system is how the body accomplishes this. 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 tiny ______________ that are made up of individual ______________. There are 600 million alveoli in your lungs! The reason there are so many of them is so that your lungs have a very large amount of ______________ that can come into contact with oxygen. If you opened up all your alveoli and flattened them out, they would cover an area the size of a tennis court! Very small blood vessels called ______________ line the ______________. The oxygen from the air diffuses right into the blood, and carbon dioxide waste diffuses out of the blood and back into the air. After the blood is infused with oxygen, if goes out into all parts of the body.

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, capillaries, alveoli, air sacs, trachea, bronchial tubes, oxygen, blood vessels, carbon dioxide, surface area
MAINTENANCE:
Get plenty of ________________. Eat ________________ foods. If your nose gets too full of ____________ use a _________________ to blow it out. Mostly, your lungs will clean themselves by coughing occasionally.
(USE EACH ONCE: tissue, exercise, mucus, nutritious)

SAFETY:
Wear a _________________ that covers your mouth and nose, when you are doing a job that stirs up a lot of dust. Don’t ______________. Learn the ________________ _______________, which can save someone’s life if they are choking. Your body has some automatic safety devices to clear dirt and small foreign objects. In the nose, the safety feature is called a _____________. In the lungs it is called a _____________.
(USE EACH ONCE: Heimlich maneuver, cough, dust mask, smoke, sneeze)

TROUBLESHOOTING:

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<th>Description of problem</th>
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<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>muscles around airways tighten and breathing is difficult</td>
<td></td>
<td>take medication (usually an inhaler)</td>
</tr>
<tr>
<td>serious virus that attacks the respiratory system, causing high fever, runny nose, terrible cough, and often leads to pneumonia</td>
<td></td>
<td>rest, drink lots of fluids, take over-the-counter medicines to deal with fever and cough</td>
</tr>
<tr>
<td>mild virus that attacks the upper respiratory system causing runny nose and sneezing</td>
<td></td>
<td>rest, drink lots of fluids, take over-the-counter medicines to deal with nasal symptoms</td>
</tr>
<tr>
<td>a seasonal allergy that causes sneezing and runny nose</td>
<td></td>
<td>take allergy medicine</td>
</tr>
<tr>
<td>an infection in the lungs</td>
<td></td>
<td>rest and take antibiotics if prescribed by your doctor</td>
</tr>
<tr>
<td>sudden contractions of the diaphragm muscle</td>
<td></td>
<td>nothing is necessary, but if you find something that works for you, do it</td>
</tr>
<tr>
<td>a piece of food gets stuck in the top of the trachea</td>
<td></td>
<td>use the Heimlich maneuver to dislodge the food</td>
</tr>
<tr>
<td>the alveoli lose their elasticity and rupture and fluid fills lungs (usually caused by years of smoking)</td>
<td></td>
<td>breathe air from a tank with a very high oxygen content, don’t get overexerted</td>
</tr>
<tr>
<td>tumors grow in the lungs, usually caused by years of smoking</td>
<td></td>
<td>chemotherapy, radiation, or surgery</td>
</tr>
</tbody>
</table>

POSSIBLE PROBLEMS: influenza, hay fever, asthma, common cold, choking, pneumonia, hiccups, lung cancer emphysema,
THE NERVOUS SYSTEM

PARTS LIST:

Basic anatomy:
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

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 easily remember the parts of a neuron.

1) ____________________
2) ____________________
3) ____________________
4) ____________________
5) ____________________

PUT THE CORRECT NAME NEXT TO THE NUMBER:

1) ____________________
2) ____________________
3) ____________________
4) ____________________
5) ____________________

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

POSSIBLE PROBLEMS: bipolar, phobia, cerebral palsy, depression, epilepsy, Alzheimer’s, coma, encephalitis, Parkinson’s disease, multiple sclerosis
**PARTS LIST:**

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

**PUT THE CORRECT NAME NEXT TO EACH NUMBER:**

Stomach, mouth, tongue, liver, appendix, pancreas, gall bladder, small intestine, large intestine, rectum, esophagus, epiglottis, 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
THE URINARY SYSTEM

PARTS LIST:

1) _______________  4) __________________
2) _______________  5) __________________
3) _______________  6) __________________

PUT THE CORRECT NAME NEXT TO EACH NUMBER:
bladder, kidneys, ureter, urethra, renal artery, renal vein

FUNCTION:

Don’t laugh-- without your urinary system, you’d be dead!
Your body produces waste products that must be gotten rid of so they don’t poison you. Your _______________ are the filters that clean waste out of your ___________.
The _____________ brings blood into the kidneys and the _____________ takes it away after it has been cleaned.
(Things related to the kidney are “______________.”)
One individual filtration unit in the kidney is called a ____________. After the blood is filtered, the leftover water containing the _____________ goes down through the _____________ and into the _______________. (The word bladder just means storage bag of some kind. To be technically correct, you’d have to called this one “urinary bladder.”) Thankfully, a special muscle, called a _____________ muscles, keeps the exit of the bladder shut until you are ready to get rid of the urine. Otherwise, you’d be leaking all the time!

(USE EACH ONCE: bladder, kidneys, renal, nephron, ureters, sphincter, blood, renal artery, renal vein, wastes)

MAINTENANCE:

When your bladder is full, just empty it! There isn’t much else you have to do to maintain your urinary system. It just keeps cleaning your blood all time, non-stop, without you even thinking about it!

SAFETY:

Don’t wait too long to empty your bladder when it is full. You don’t want the system clogging up all the way to the kidneys.

TROUBLESHOOTING:

Occasionally, the bladder can become infected. This requires antibiotics.
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, blocking

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:

<table>
<thead>
<tr>
<th>Description of problem</th>
<th>Name of problem</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>thyroid does not produce enough of its hormone</td>
<td>take artificial thyroid hormones</td>
<td></td>
</tr>
<tr>
<td>thyroid produces too much of its hormone, causing</td>
<td>have radiation treatment to intentionally kill off thyroid a bit</td>
<td></td>
</tr>
<tr>
<td>pancreas does not produce enough insulin</td>
<td>take insulin</td>
<td></td>
</tr>
<tr>
<td>pancreas produces too much insulin</td>
<td>eat</td>
<td></td>
</tr>
<tr>
<td>pituitary gland does not make enough of its growth hormone, causing person not to grow enough</td>
<td>take growth hormone</td>
<td></td>
</tr>
<tr>
<td>pituitary makes too much of its growth hormone, causing person to grow too much</td>
<td>see a specialist for treatment of pituitary gland</td>
<td></td>
</tr>
</tbody>
</table>

POSSIBLE ANSWERS: giantism, dwarfism, diabetes, hypoglycemia, hypothyroidism, hyperthyroidism,
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.

(The 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, lymphocyte, and monocyte light purple or light blue. Color the outside portion of the eosinophil pink, and leave the neutrophil white.)

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 floating 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 immune system how to make _____________ against them.

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

TROUBLESHOOTING:

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

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

Parts list:
1) epidermis  2) dermis  3) fat layer or subcutaneous layer  4) hair
5) muscle  6) sebaceous gland  7) sweat gland  8) deep pressure sensor
9) heat sensor (or could be cold sensor, depending on what your source picture looks like)
10) cold sensor (or could be heat sensor, depending on what your source picture looks like)
11) pain sensors  12) light pressure sensor  13) vein (or could be artery)
14) artery (or could be vein)  15) fat cells

Skin function:
1) to keep germs out of the body
to keep us warm, keep us cool, keep our blood inside, make us waterproof, etc.
2) The epidermis keeps germs out, senses light pressure, pain, hot and cold, and makes us waterproof. It also contains the pigment that helps protect us from the UV rays from the sun.
The dermis contains the sweat glands that keep us cool, the sebaceous glands that make our skin oily and waterproof. The dermis also contains the nerves that sense deep pressure,
The fat layer helps to keep us warm and also makes us look nicely rounded in just the right places.
3) to keep us cool
4) under the skin
5) wider
6) lips, cheek, fingertips / back of arms and legs, the back
7) to make oil that keeps us waterproof
8) epidermis
9) the tiny erector muscle’
10) round, oval, flat
11) fingertips
12) melanin

Maintenance:
soap and water

Safety:
1) sunscreen
2) poison ivy, poison oak, or there may be other plants in your area
3) insect repellent

Trouble shooting:
We leave this up to you. Each family has their own favorite remedies.

**************

EYES

Parts list:
1) optic nerve  2) retina  3) lens  4) pupil (the hole)
5) iris  6) cornea  7) ciliary muscles  8) vitreous humor
9) sclera  10) blind spot  11) fovea  12) rectis muscle
13) macula  14) conjunctiva  15) blood vessels

Put the number of the part next to its description. Numbers listed in order going down.
2, 6, 5, 3, 7, 1, 8, 4, 12, 10, 9, 13, 15, 14, 11

Function:
The words are used in this order: pupil, retina, upside down, optic nerve, lens, muscles, comes, rods, cones, rods.

Special feature:
Words are used in this order: iris, gets bigger, gets smaller, dark, light
Maintenance:
Words are used in this order: lacrimal, tears, lacrimal, tears

Things you should do:
1) once a year    2) A

Safety:
Responses will vary.

Troubleshooting:
NOTE: Please substitute your own remedies of you are aware of alternative treatments!
When things faraway look blurry you are near-sighted and need glasses or contact lenses.
When close things look blurry you are far-sighted and need glasses or contact lenses.
Clouded corneas are called cataracts. They often require surgery, or perhaps special medicines.
When extra fluid builds up inside the eye we call it glaucoma. This often requires medicines or surgery.
When the cornea or lens is uneven this results in an astigmatism. Corrective lenses or lasik surgery are commonly used.
When you can’t tell the difference between certain color, it is called color blind. Nothing needs to be done.
When you can’t see in dim light this is called night blindness. See an eye doctor for the proper treatment.

************************

EARS
Parts list:
1) outer ear  2) ear canal  3) ear drum  4) hammer  5) anvil
6) stirrup  7) cochlea  8) semi-circular canals  9) auditory nerve  10) eustachian tube

Function of parts, in order going down:
2, 9, 7, 3, 1, 10, 5, 4, 6, 8

Safety:
Wear ear plugs. Don’t puncture your ear drum.

Troubleshooting:
Doctors often prescribe antibiotics for ear infections. (NOTE: There are other remedies available, too. Does your family use any that work?)
Inner ears often feel itchy because of allergies.
If water gets stuck in your ear, use a Kleenex to get it out.
If you feel dizzy, there’s a medicine that thins the fluid of the inner ear, making you less dizzy.
If you can’t hear properly you might need a hearing test.

************************

TONGUE
Parts list:
1) sweet  2) salty  3) sour  4) bitter  5) epiglottis  6) taste buds  7) papillae

************************

NOSE
Parts list:
1) nostril  2) nasal cavity  3) nerve endings  4) olfactory bulb  5) olfactory nerve

Maintenance:
Use a tissue to blow your nose.

Safety:
1) Wear a dust mask when doing a dusty job.  2) sneeze

Troubleshooting:
List your family’s favorite remedies.
**BONES**

**Parts list:**
1) cranium  2) scapula  3) rib cage  4) ulna  5) radius  6) carpals  7) metacarpals  
8) phalanges  9) patella  10) clavicle  11) humerus  12) sternum  13) vertebrae  14) pelvis  
15) femur  16) tibia  17) fibula  18) tarsals  19) metatarsals  20) phalanges  21) mandible

**Inside a bone:**
1) compact bone  2) marrow  3) spongy bone  4) periosteum  5) blood vessels  6) Haversian canals

**Function:**
The periosteum is the covering around the bone. Peri means around and osteum means bone. The marrow in the middle produces blood cells. The compact bone makes the bone very strong. The air spaces in the spongy bone reduce the overall weight. 
The cranium is a protective covering for the brain. The movable bone attached to your skull is called the mandible, also called the jaw. The vertebrae protect the spinal cord. 
The humerus bone sounds like it might be funny... is actually the end of the ulna. 
The scapula is a fancy name for the shoulder bone. 
.. two bones in your lower arm the ulna and the radius... 
Bones in your wrist are called carpals, in middle of hand are metacarpals, in fingers are phalanges. 
The largest bone in your body is the femur. At the top it joins with the pelvis and at the bottom with the tibia and fibula. 
The knee is protected by the patella. Your ankle has tarsals, the middle of your foot metatarsals, and your toes phalanges.

**Maintenance:**
1) calcium and phosphorus. List your favorite high-calcium foods (such as dairy products or dark green veggies) and your favorite phosphorus foods (such as fish, nuts, squash and beans). 2) D, rickets

**Safety:**
1) safety helmet  2) shin guards  3) steel-toed boots  4) face mask

**Troubleshooting:**
break, fracture, osteoporosis, rickets, arthritis

**Joints:**
E) ball and socket C) pivot D) immovable A) hinge B) sliding

**Up-close look at joint:**
1) bone  2) cartilage  3) synovial fluid  4) synovial membrane

***************

**MUSCLES**

**Parts list:**
1) deltoid  2) pectorals  3) abdominals  4) biceps  5) quadriceps  6) triceps  7) latissimus dorsi  
8) gluteus maximus  9) hamstrings  10) gastrocnemius  11) Achilles tendon  12) frontalis  
13) obicularis oculus  14) obicularis oris  15) sternocleidomastoid  16) brachioradialis  17) tibialis  18) gracilis

**Function:**
contract, pull, push, pairs, bicep, tricep, quadriceps, hamstrings, tendon

**What makes up a muscle:**
1) muscle  2) bundle  3) fiber or fascicle  4) myofibril

**Maintenance:**
use, active, lift, food, eat, car, gas, brain, hungry, sodium, magnesium, potassium

**Troubleshooting:**
ice, aspirin, ibuprofen, tendon, tendonitis, tear, surgery
CIRCULATORY SYSTEM

HEART
Parts list:
1) right atrium  2) left atrium  3) right ventricle  4) left ventricle  5) valves
6) aorta  7) pulmonary artery  8) superior vena cava  9) inferior vena cava
10) pulmonary veins  11) pericardium  12) myocardium (heart muscle)

Maintenance:
fat, rest, exercise, doctor

Troubleshooting:
Going down: heart attack, hypertension, hypotension, arrhythmia, murmur

RESPIRATORY SYSTEM

Parts list:
1) nasal cavity  2) tongue  3) vocal chords  4) trachea  5) lungs  6) diaphragm
7) bronchial tubes  8) epiglottis  9) esophagus

Every cell needs oxygen. Air comes in through the mouth or nose. The muscle that pulls air in is the diaphragm. The nasal cavity is lined with little hairs that catch dust particles. The air goes down through the trachea, then through the bronchial tubes, then into the lungs. The lung is filled with tiny blood vessels... waste product called carbon dioxide...

There is a special area of your brain that control breathing.

Maintenance:
1) exercise  2) nutritious  3) mucus  4) tissue

Safety:
1) dust mask  2) smoke  3) Heimlich maneuver

Troubleshooting:
Going down: asthma, influenza, common cold, hay fever, pneumonia, hiccups, choking

NERVOUS SYSTEM

PARTS LIST:
Basic anatomy:
1) cerebellum  2) brain stem  3) corpus callosum  4) cerebrum  5) pituitary gland
6) midbrain  7) hippocampus  8) hypothalamus  9) thalamus

Functional areas:
A) balance  B) vision  C) sense of where your body is in space  D) senses
E) control of muscles  F) thinking, figuring, deciding  G) hearing
H) automatic functioning of heart and lungs

Brain close up:
1) skull  2) dura mater  3) arachnoid  4) pia mater  5) cortex

One single cell in the nervous system is called a neuron. Parts of neuron:
1) nucleus  2) cell body  3) dendrites  4) axon  5) terminal knobs
The gap is called the synapse. The chemicals are called neurotransmitters. 7) synapse 8) neurotransmitters

A) neuron  B) glial cells  C) cerebrospinal fluid
There are special neurons called glial cells. They are not involved in sending electrical signals. Instead, they just protect and nourish the others. The empty spaces between the cells are filled with cerebrospinal fluid.

a) arms  h) hands  h) heart  l) lungs  s) stomach  i) intestines  p) pancreas  k) kidneys  b) bladder  l) legs  f) feet
Function:
In order: thinks, controls, brain stem, heart, lungs, waking, sleeping, spinal cord, vertebrae

Midbrain paragraph:
hungry, full, anger, love, memories, whole

Last paragraph:
cerebellum, eyes, senses, muscles, frontal, ears

Maintenance:
muscles, brain, think, nutritious, vitamins, minerals

Safety:
reflexes, hot, spine, brain, muscles

Picture: signal going from the spine to the muscles, signal going to the spine, reflex loop...back to your arm/hand

Troubleshooting:
Going down:
coma, epilepsy, Alzheimer’s, phobia, bipolar, depression, cerebral palsy, Parkinson’s, multiple sclerosis, encephalitis

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DIGESTIVE SYSTEM

Parts list:
1) mouth  2) tongue  3) salivary glands  4) trachea (mislabeled on diagram as 6)
5) esophagus  6) stomach  7) liver  8) gall bladder  9) pancreas  10) small intestines
11) large intestine  12) rectum  13) appendix  14) duodenum  15) epiglottis

A) villi  B) capillaries  C) blood vessel

Function:
Food enters through the mouth. Digestion begins here, as the salivary glands make saliva. Your teeth grind... When you swallow the food enters a tube called the esophagus. The flap is the epiglottis. The food mush goes to the stomach...
The tube that attaches the stomach to the intestines is the duodenum (doo-ODD-den-um). Then juices from the pancreas and gall bladder. The juices in the gall bladder were made by the liver. When the food gets to the large intestine, the water is absorbed. The last part of the digestive system is the rectum.

Maintenance:
1) fiber  2) obesity  3) healthy, sugar, fat

Safety:
1) vomiting  2) gag  3) Heimlich maneuver, lungs, chew

Troubleshooting:
Going down: ulcer, heartburn, diarrhea, appendicitis, diabetes, stomach virus

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URINARY SYSTEM

Parts list:
1) kidneys  2) renal vein  3) renal artery  4) ureters  5) urinary bladder  6) urethra

Function:
Your kidneys are the filters that clean waste out of your blood. The renal artery brings blood into the kidneys, and the renal vein takes it away... Things related to the kidney are “renal.” One individual filtering unit is a nephron. The leftover water containing the wastes goes down through the ureters and into the bladder. A special muscle called a sphincter muscle keeps the exit closed.

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ENDOCRINE SYSTEM

Parts list:
1) pituitary  2) thyroid  3) thymus  4) adrenals  5) pancreas  6A) ovaries  6B) testes
7) pineal  8) parathyroid

Function:
Going down: 2, 1, 4, 6A, 6B, 3, 5

Hormones are essential... They are produced by glands called endocrine glands.... Hormones are chemical messengers. They influence the flow of substances in and out of cells, to maintain.... Endocrine glands put their hormones right into the blood stream. Some medicines work by blocking the hormone’s action... This is the case with fever-reducing medicines. They block the hormone that tells your temperature control system to raise the temperature.

Your adrenal glands are part of your body’s emergency system. If you are startled...your adrenal glands release adrenalin. This causes an increase in pulse and respiration rates.

Your pancreas is part of your digestive system. It releases the hormone insulin.

Troubleshooting:
Going down:
hypothyroidism, hyperthyroidism, diabetes, hypoglycemia, dwarfism, gigantism

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LYMPH SYSTEM

Surrounding the cells of your body is a fluid that picks up particles and wastes that are not able to return to the blood. They lymph system is a series of tubes that drains the fluid, cleans it, and puts it back into the blood stream. In certain places, the lymph tissue forms a clump called a node, where bacteria... The tonsils and adenoids...

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BLOOD

Parts list:
White cell is in the middle. Donuts are red cells. Small particles are platelets. Surrounding fluid is plasma.
The four types of blood are A, B, AB and O. The other characteristic is RH factor.

Function:
1) red, oxygen, erythrocytes, nucleus
2) white, immune, leukocytes, pathogens, antibodies, engulf, phagocytes
3) platelets, scab, marrow
4) plasma, water, proteins, sugars, salts, gases.

Maintenance:
iron, (meat, liver, eggs, fish, spinach, beans, watermelon), sodium, potassium, magnesium

Safety:
1) wash  2) pathogens  3) donating  4) pressure, heart, stitches  5) vaccines, antibodies

Troubleshooting:
Going down: hemophilia, anemia, altitude sickness, leukemia, infection, sickle-cell anemia