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) _________________________
4) _________________________
5) _________________________
6) _________________________
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 function 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:

<table>
<thead>
<tr>
<th>Description of problem</th>
<th>What to do about it</th>
</tr>
</thead>
<tbody>
<tr>
<td>dry, itchy skin (“eczema”)</td>
<td></td>
</tr>
<tr>
<td>insect bite</td>
<td></td>
</tr>
<tr>
<td>sunburn</td>
<td></td>
</tr>
<tr>
<td>warts (caused by viruses that attack skin)</td>
<td></td>
</tr>
<tr>
<td>infected cut</td>
<td></td>
</tr>
<tr>
<td>bruise (broken blood vessels beneath the surface of the skin)</td>
<td></td>
</tr>
<tr>
<td>infected hair follicle (often called a “pimple”)</td>
<td></td>
</tr>
<tr>
<td>hives (red bumps caused by an allergy)</td>
<td></td>
</tr>
</tbody>
</table>
YOUR SENSING DEVICES: EYES

PARTS LIST:

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:

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

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

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:

<table>
<thead>
<tr>
<th>Description of problem</th>
<th>Name of problem</th>
<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) __________________________
2) __________________________
3) __________________________
4) __________________________
5) __________________________
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 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.

TROUBLESHOOTING:

<table>
<thead>
<tr>
<th>Description of problem</th>
<th>What to do about it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sore or infected papillae</td>
<td>It will get better by itself.</td>
</tr>
<tr>
<td>White sore called an ulcer</td>
<td>It will get better by itself.</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 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:

<table>
<thead>
<tr>
<th>Description of problem:</th>
<th>What to do:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runny nose</td>
<td></td>
</tr>
<tr>
<td>Stuffy nose</td>
<td></td>
</tr>
</tbody>
</table>
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. ____________________________
6. ____________________________
7. ____________________________
8. ____________________________
9. ____________________________
10. ____________________________
11. ____________________________
12. ____________________________
13. ____________________________
14. ____________________________
15. ____________________________
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 _____________ bone. 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 ____________________.

TROUBLESHOOTING:

<table>
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<tr>
<th>Description of problem</th>
<th>Name of problem</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>broken bone</td>
<td></td>
<td>Put bone in a cast (usually)</td>
</tr>
<tr>
<td>crack in bone</td>
<td></td>
<td>Possibly wear a cast (or a brace)</td>
</tr>
<tr>
<td>bones get brittle as you age</td>
<td></td>
<td>Take extra calcium and vitamin D supplements and exercise</td>
</tr>
<tr>
<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
- Pivot
- Immoveable
- Hinge
- Sliding

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, flexor carpi ulnaris

(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 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)
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:

<table>
<thead>
<tr>
<th>Description of problem</th>
<th>Name of problem</th>
<th>What to do</th>
</tr>
</thead>
<tbody>
<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</td>
<td></td>
<td>usually requires no treatment, except if very severe</td>
</tr>
<tr>
<td>when 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 answers: 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: ________
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, epiglotis, 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, bronchial 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)

TROUBLESHOOTING:

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

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

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.

1) ___________
2) ___________
3) ___________
4) ___________
5) ___________

PAUT THE CORRECT NAME NEXT TO THE NUMBER:

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) ____________________

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

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.

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)
### TROUBLESHOOTING:

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<tr>
<th>Description of problem</th>
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<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 too 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
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 that 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 particles that can be absorbed by the body.
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, small intestine, large intestine, rectum, gall bladder, pancreas, liver, mouth, salivary glands, teeth, epiglottis, duodenum

MAINTENANCE:
1) One thing that can keep your digestive 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:

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<th>Description of problem</th>
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<tbody>
<tr>
<td>a sore in the wall of the stomach</td>
<td>take medicine</td>
<td></td>
</tr>
<tr>
<td>a burning feeling in the esophagus</td>
<td>take an antacid</td>
<td></td>
</tr>
<tr>
<td>solid waste comes out too wet</td>
<td>don’t eat, just drink clear liquids until it gets better</td>
<td></td>
</tr>
<tr>
<td>infection of appendix</td>
<td>go to the hospital</td>
<td></td>
</tr>
<tr>
<td>malfunction of pancreas-- sugars do not get digested properly</td>
<td>take insulin</td>
<td></td>
</tr>
<tr>
<td>virus attacks stomach, causing vomiting and diannahrea</td>
<td>it will get better by itself</td>
<td></td>
</tr>
</tbody>
</table>

POSSIBLE ANSWERS: diahhea, 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. Horm-
ones 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 con-
tainer 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:

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<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,
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.
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, lymphocyte, 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 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 _____________.

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

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<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