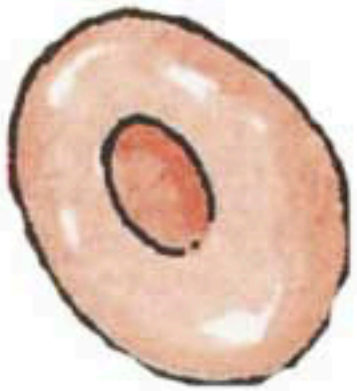
Teacher Guide

Topic: Cells

Vocabulary

- Amoeba: a one-celled creature
- Membrane: the thin outer wall of the cell
- Nucleus: the part of a cell that is responsible for directing cell activity



Discussion Starters

Q: What are all living things made up of?
A: Cells. Some living things have more, some have less. An amoeba may only have one cell, while an elephant has trillions and trillions of cells.

Q: How many cells make up your body?
A: About 100 trillion!

Q: Are all human cells the same?
A: No. There is a wide variety of sizes, shapes and functions. Humans have bone cells, muscle cells, skin cells, nerve cells, blood cells and many more. Each has it's own kind of work to do.

Q: How are cells like members of an orchestra or band?
A: They all must work together in harmony to do their job well.

Q: What do cells do all day?
A: Cells are constantly taking in food and oxygen, changing it into energy and releasing waste.

Poem

Cells are tiny,
yes it's true
But tiny cells
add up to you
Bone cells, blood cells,
nerve cells too
Small cells, all cells
through and through

Amazing Facts

- ✓ Some cells are so tiny you could fit 250,000 of them on the period at the end of this sentence.
- ✓ White blood cells help fight germs by surrounding them and "gobbling them up."
- ✓ Millions of cells die each day and millions of new ones are made to take their place.

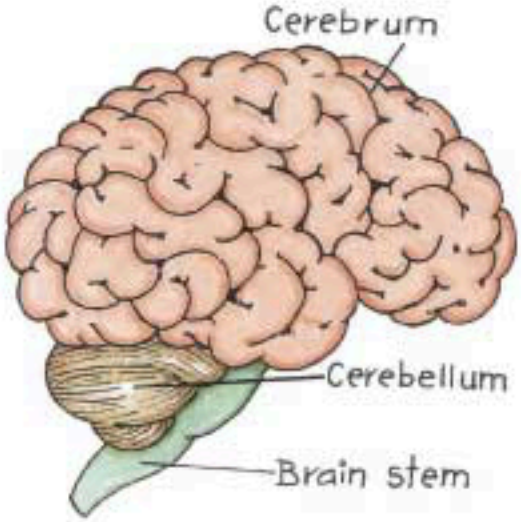
Slim Says:

"Each and every cell in your body needs good food and clean air. So treat your cells well – eat right and get lots of exercise."

Topic: Brain and the Nervous System

Vocabulary

- Cerebrum: the largest part of the brain, where most thinking is done
- Cerebellum: a smaller part of the brain found below and behind the cerebrum that coordinates muscle movement
- Brain Stem: the small part of the brain at the top of the spinal cord that controls involuntary muscle movement and reflexes
- Neuron: the basic working unit of the nervous system which has an axon and many dendrites that carry nerve impulses



Discussion Starters

Q: How big is the human brain?
A: It weighs just under 3 pounds and is about the size of a softball.

Q: Do humans have the biggest brains?
A: No. Elephants and whales have bigger brains, but human brains are the largest in proportion to over-all body weight.

Q: Can you name three important parts of the brain, and explain what they do?
A: The **cerebrum** which is the site of memory, reasoning, decision making, and voluntary control. The **cerebellum** which helps coordinate smooth muscle movement. The **brain stem** which controls how fast the heart beats, how many breaths you take, and controls reflexes.

Q: How are the two hemispheres of the brain different?
A: The left cerebrum is the seat of logic and step-by-step thinking. The right cerebrum is the seat of creativity and pattern recognition.

Q: How do messages get to your brain?
A: Through nerves, which branch out to reach each part of the body. Sensory nerves carry messages to your brain. Motor nerves carry orders back to muscles.

Slim Says:

"When you go bike riding, roller blading, or skate boarding, be sure to wear a safety helmet to protect your brain if you should take a fall."

Poem

Your brain is the
busiest place on earth
Thinking and dreaming
and learning since birth
Deciding and guiding
the things that you do
Night and day working
its job never through

Amazing Facts

- ✓ In less than a second, about 100,000 nerve cells can send messages to and from your brain
- ✓ The brain uses 25% of all the oxygen you breathe but it only weighs about 1/50th of your total weight.
- ✓ 85% of the brain is made up of water.
- ✓ Inside your skull, your brain floats in a special fluid that cushions it from injuries.

Topic: The Senses

Vocabulary

- Sense organ: a body part such as the eye or ear that can receive stimuli such as light or sound
- Sense receptor: the nerve cell that receives the stimulus

Discussion Starters

Q: How does your brain get information about the outside world?
A: Through the senses. They are like reporters sending a non-stop stream of information to the brain.

Q: If you couldn't see, how would you learn what was happening around you?
A: You would rely on other senses to provide information. You might listen more intently, or smell more deeply.

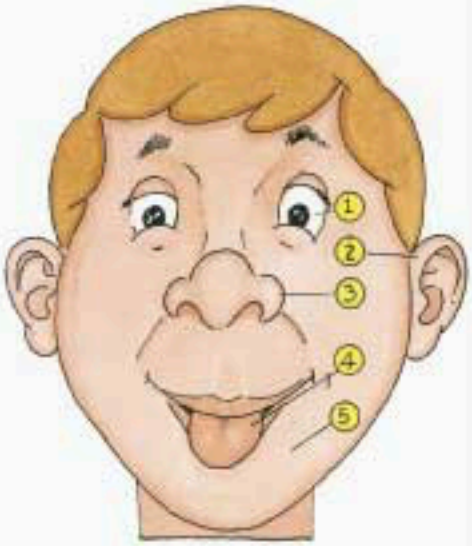
Q: Which sense do you think is the most important? Which is the least?
A: There is no right answer. It is a matter of opinion.

Q: Why does some food taste bland when you have a stuffed nose?
A: Our senses of smell and taste are linked. Odors from foods help us to taste more fully. If your nose is stuffed, you may not be able to tell the difference between certain foods, especially if the foods have the same texture.

Q: Why are sight and hearing called *distance senses*?
A: Sight and hearing can give us information about what is far away from us. Touch and taste are *close senses*, giving information only about what is within arm's reach. Smell gives some distance information, but is much less useful to us than sight and hearing.

Slim Says:

"You depend a lot upon your sense of sight and hearing. If you ever notice any problems like blurry vision or ringing in your ears, tell a parent right away so you can get checked by a doctor."



Poem

Letting you know what's going on
Bringing you pleasure and pain
Five sensational senses are
Reporting it all to the brain

What you taste and what you smell
Everything you touch as well
What you see and what you hear
are all reported, sharp and clear

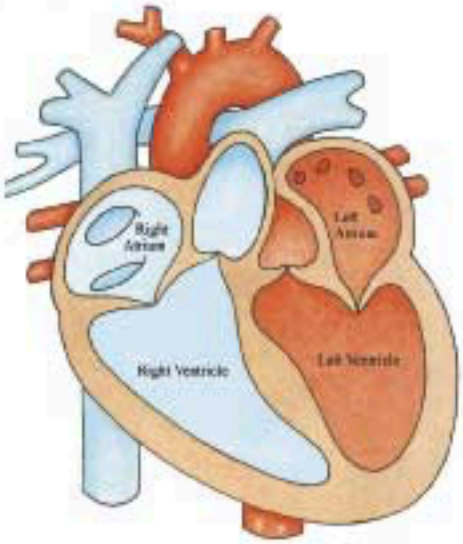
Amazing Facts

- ✓ Scientists state that there are really more than five senses. The others include a sense of balance, a sense of where the body is located in space, a sense of cold and heat and a sense of pain.
- ✓ The loudest sounds we hear are millions of times louder than the softest sounds we can hear.
- ✓ There are about 9,000 taste buds inside the bumps on your tongue.

Topic: Heart

Vocabulary

- Atrium: either of the two upper chambers on each side of the heart
- Ventricle: either of the two lower chambers on each side of the heart
- Cardiac Muscle: another name for the heart muscle



Discussion Starters

Q: Why is the heart considered the strongest muscle?
A: It works the hardest. Night and day, year after year it keeps pumping.

Q: What job does the heart do?
A: It pumps blood through the body.

Q: How big is the heart?
A: About the size of your fist.

Q: Where is the heart located?
A: It hangs in the center of the chest, between the lungs and just under the breastbone. (Thanks to the "Pledge of Allegiance" most people think the heart is on the left side. It is only tipped a tiny bit more to the left side and this is the place it is easiest to feel and hear the heart beat.)

Q: Why is exercise good for your heart?
A: Yes. Your heart is a muscle, and like all muscles it grows stronger with use. A strong heart can pump more blood each time it beats.

Poem

Lub-dub, lub-dub
inside your chest
lub-dub, lub-dub
no time for rest
Lub-dub, lub-dub
your mighty heart
is pumping blood
To every part

Amazing Facts

- ✓ Your heart is about the same size as your fist and grows at about the same rate.
- ✓ A baby's heart beats about 135 times per minute. That's faster than a grown-up's heart, which beats about 75 times a minute.
- ✓ Your heart will beat more than one million times in the next two weeks.

Slim Says:

"If you want a strong and healthy heart, you need to exercise for about 30 minutes straight without stopping. You need to do this five days a week."

Topic: Circulation

Vocabulary

- Arteries: the blood vessels that carry blood from the heart
- Veins: the blood vessels that carry blood to the heart
- Capillaries: the blood vessels that connect the arteries and veins
- Circulation: the continuous movement of blood through the heart and blood vessels

Discussion Starters

Q: What does the heart pump?
A: Blood.

Q: How does the blood travel?
A: Through tubes called blood vessels.

Q: How many kinds of blood vessels are there, and what do they do?
A: There are three kinds of blood vessles. Arteries carry the blood out and away from the heart. Veins return blood to the heart. Capillaries are the tinest blood vessels that connect the two.

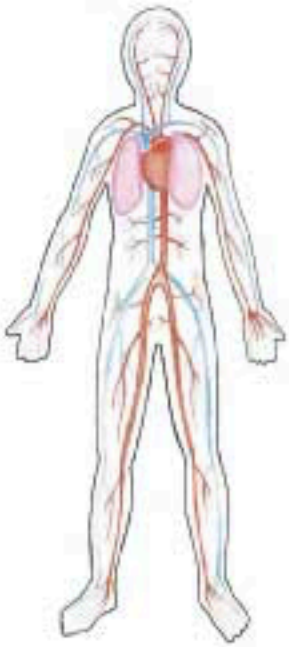
Q: What does blood carry?
A: Blood carries nutrients and oxygen to all the body's cells, and carries away waste products such as carbon dioxide.

Q: What is a pulse?
A: The pulse is the rhythm you can feel as blood is pumped through your body. It is caused by arteries stretching a bit as the blood moves through. It is not a steady flow, but rather moves at the same pace as the heart beat.

Q: Why is the movement of blood through your body called circulation?
A: Because the blood moves around and around in an endless circuit.

Slim Says:

"If you want a strong and healthy heart, you need to exercise for about 30 minutes straight without stopping. You need to do this five days a week."



Poem

Your body's system of circulation
is a wonderful method of transportation
Bringing food to every cell
transporting oxygen as well
Round and around it flows within
the river of life under your skin

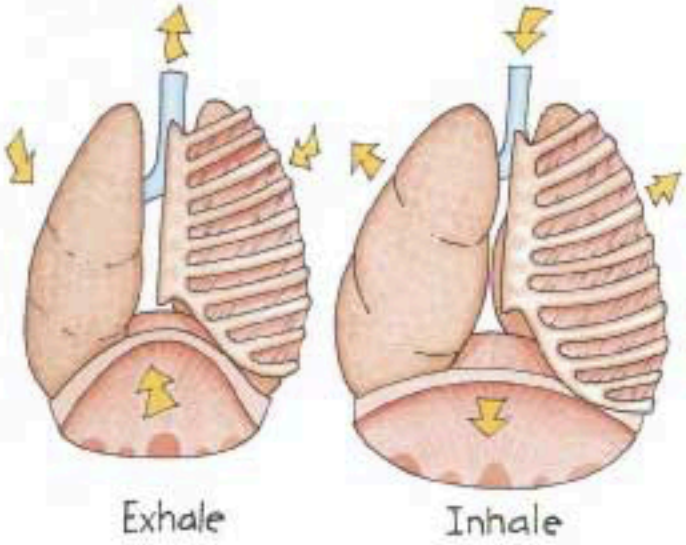
Amazing Facts

- ✓ Blood makes the round-trip body journey about 1,000 times a day!
- ✓ Blood flowing through your body changes color! When it picks up oxygen in your lungs, it turns bright red. When it drops that oxygen off to your cells, it turns darker red.
- ✓ Your body has between 60,000 and 100,000 MILES of blood vessels.

Topic: Lungs

Vocabulary

- Metabolize: the body's process for breaking down food and changing it into energy
- Intercostals: the muscles between your ribs that move your chest to help you breathe
- Diaphragm: the large muscle which separates the chest cavity from the abdomen
- Alveoli: the tiny thin-walled sacs in the lungs where the exchange of oxygen and carbon dioxide takes place



Discussion Starters

Q: How big are your lungs?
A: They are about the size of a pair of footballs and they fill your chest from the neck to the bottom of the ribs.

Q: About how many breaths do kids take each minute?
A: About 20 to 25. (Time your students for a minute.)

Q: What is in the air we breathe?
A: Invisible gases – mostly nitrogen and oxygen. There are also tiny amounts of carbon dioxide, argon and other gases.

Q: Why does the body need oxygen?
A: The body needs oxygen in order to change food into energy (metabolize). This can be compared to a candle that needs oxygen in order to burn.

Q: Is what you breathe in the same as what you breathe out?
A: No. You breathe out a lot more carbon dioxide then you breathe in. Carbon dioxide is the waste product given off by the cells after they have produced energy from food.

Q: What muscles help you breathe?
A: The muscles between your ribs, called the **intercostals**, and the **diaphragm** that separates the chest from the abdomen.

Slim Says:

"Try to breathe in through your nose most of the time. Your nose helps clean, warm and moisten the air before it reaches your lungs AND NEVER, EVER SMOKE!"

Poem

You have a pink
and lovely pair
of lungs designed
to breathe the air
To keep them healthy
as can be
Exercise and stay
smoke-free

Amazing Facts

- ✓ Your diaphragm, the muscle under your lungs, is the second hardest working muscle in your body. Just like your heart muscle, your diaphragm works day and night without ever stopping.
- ✓ We take about ten million breaths a year!
- ✓ Babies breathe faster than adults.
- ✓ The tiny air sacs in your lungs are called alveoli. You have about 600 million of them.

Topic: Bones

Vocabulary

- Skeleton: the body's framework of bones
- Minerals: parts of food, like iron and calcium, that the body needs to stay healthy
- Calcium: a silver-white metallic element that helps to form our bones
- Spongy bone: the soft inner bone material
- Marrow: the soft fatty material inside the bone that makes red blood cells

Discussion Starters

Q: Do all animals have bones?
A: NO. Worms get along well without any bones. Crabs carry their bones on the outside in the form of shells.

Q: What do bones do?
A: They hold us up. They give us shape. They protect the body's softer parts (heart, lungs, brain, etc.) from getting hurt. Bones also manufacture red blood cells.

Q: Are bones solid?
A: No, the outside is hard, but the inside is soft and contains spongy material called marrow.

Q: Why aren't bones solid?
A: If bones were solid they would be very heavy and hard to move. If they were solid, blood couldn't flow through carrying nutrients to help them grow.

Q: Where are most of the bones?
A: Over half the bones in the body are in the hands and feet.

Q: What are bones made of?
A: 30% of bone is living tissue, cells and blood vessels, 45% is mineral deposits, mostly calcium phosphate and 25% is water.

Slim Says:

"To build healthy bones, you need to get enough minerals like calcium everyday. Drinking milk, eating yogurt, or snacking on cheese can help you get what you need."

Poem

Without your bones
you couldn't stand up
or have much shape at all
Like a lump of clay
or a jellyfish
or a punctured rubber ball

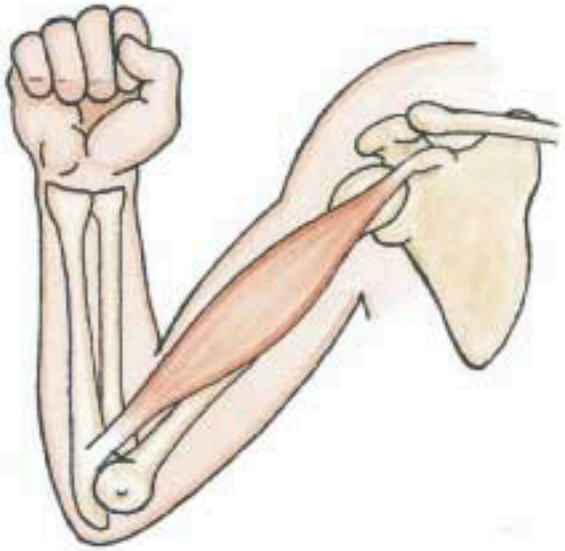
Amazing Facts

- ✓ Your bones are a blood factory. The marrow inside them manufactures millions and millions of blood cells every day.
- ✓ Babies have more than 300 bones when they're born. As a child grows older, many of these grow together and form single bones. An adult has 206 bones.
- ✓ More than half of all the bones in your body are in your wrists, hands, ankles, and feet.
- ✓ The largest bone in your body is your thighbone. The smallest is the tiny stirrup bone in your inner ear.

Topic: Muscles

Vocabulary

- Contract: when muscles fibers pull together, get shorter and "bunch up"
- Flex: another word for contract
- Voluntary Muscles: the skeletal muscles that you move at will
- Involuntary Muscles: the muscles that move automatically, for example, those that line your digestive tract
- Tendons: the bands of tough "muscle like" material that connect muscles to bones



Discussion Starters

Q: What parts of the body move bones?
A: Muscles. There are more than 600 of them doing the job.

Q: Why are there more muscles than bones?
A: Muscles must work in teams. One muscle (or group of muscles) pulls the bone in one direction and another muscle (or group) reverses the action.

Q: Why can't one muscle pull AND push?
A: Muscles are only able to do one kind of action – they can contract. Which means the muscle fibers pull in towards one other, causing them to "bunch up." When a muscle contracts, it pulls on the bone it is attached to. After the bone is moved, another muscle must contract to pull the bone back.

Q: Can you feel a muscle team at work?
A: Yes. You can feel your biceps and triceps work to move your arm.

Q: How many kinds of muscles do you have?
A: Three. **Skeletal muscles** that move the bones. They are under your control. **Smooth muscles** that push food along in digestion and squeeze blood into blood vessels and the **cardiac muscle**, which is another name for the heart. These last two kinds do their work automatically.

Slim Says:

"If muscles aren't used, they grow weaker and smaller. If you want to keep them healthy and strong, you need to exercise and eat right."

Poem

Muscles move your bones around
so you can stand, or sit back down
Muscles help you take a walk
and even help you when you talk
Just think about the things they do
all the ways they're helping you

Amazing Facts

- ✓ Muscles make up almost half of your weight!
- ✓ Muscles come in all different shapes – flat, round, long, thin, and even diamond shaped.
- ✓ You have four muscles in your tongue.
- ✓ You use your muscles even when you're sleeping. Sometimes people change positions thirty to forty times a night.

Topic: Digestion

Vocabulary

- Digestion: the process of breaking food down into nutrients needed by the body
- Alimentary Canal : another name for the digestive tract which includes the esophagus, stomach, small and large intestine
- Gastric Juice: the acid found in the stomach that helps digest food

Discussion Starters

Q: Where does digestion start?
A: In your mouth. Teeth start breaking food down physically and saliva starts breaking it down chemically.

Q: Do all your teeth do the same work?
A: No. The sharp teeth in front (incisors and canines) tear food. The flat molars behind, grind it up.

Q: Why must food be broken down?
A: Even a small piece of food like a kernel of corn is much larger than a cell. For food to be used, it must be broken down into pieces smaller than cells. These bits are nutrients.

Q: What happens to the food after it is swallowed?
A: It moves through a 30 foot long tube called the alimentary canal. This tube keeps changing shape and function. It begins as the esophagus, widens to the stomach, narrows back to the small intestine and widens again into the large intestine.

Q: Where does the food enter the blood stream?
A: Through the walls of the small intestine.

Q: What takes longer to digest, meat or bread?
A: Meat, which has lots of protein, takes more time to digest than bread which is mostly made of carbohydrates.

Slim Says:

"Help your digestion out by eating slowly. Make sure your food is well chewed before you swallow it down."

Poem

At the end of a meal
your body must deal
with the feast that was once on your plate
The food's broken down
and then carried around
by your blood at a nice steady rate
It reaches each part
so that each part can start
to get power from what you just ate

Amazing Facts

- ✓ You can listen to digestion at work! About a half hour after eating, put your ear to a friend's stomach and listen to the rumbling, sloshing, and gurgling.
- ✓ Your small intestines are between twenty and thirty feet long. That's four or five times as tall as you are!
- ✓ Food can take as long as twelve hours to make the trip all the way through your digestive system.