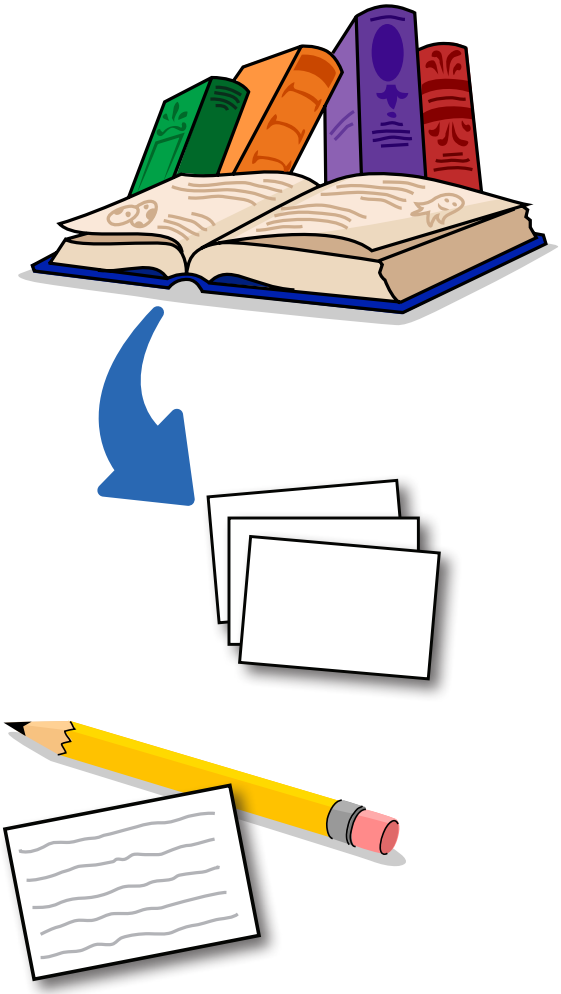
Biology Bits

Bite-size Science

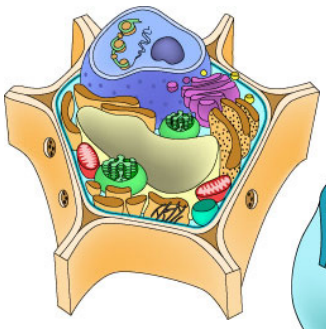


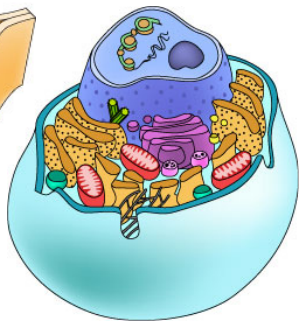
Trying new things can be hard. When you play a new sport, you have to learn and remember a whole new set of rules. When you try new food, you may end up not liking it (and you may even wish you could spit it out). The same goes for school. Learning information can be really hard and sometimes scary.

With food, what's the best way to start with something new? Trying a very small piece. You can take a tiny bite…taste it, feel the texture of it, and decide if you want more. Just like with new food, new information can also be easier to learn if you start off with really tiny bites.

Biology Bits stories are a great way for you to learn about biology a little bit at a time. We've broken down information into pieces that are very tiny—bite-sized, we call them. You can try just reading the Biology Bits at first. Cutting out the cards will let you organize them however you want, or use them as flashcards while you read.

Then, when you're ready to move on, use the empty cards to write out what you learned. You can copy what was already written, or try to write it in your own words if you are up for a challenge. Just remember, don't bite off too much at once!





Parts of a Cell

BITS

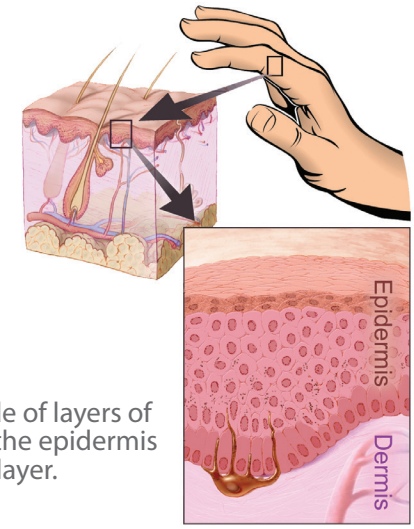
Written by Karla Moeller

For more information on cells, visit:
http://askabiologist.asu.edu/content/cell-parts

This set of bits will teach you about the tiny world on which life depends: **the parts inside a cell.**

Hungry for more bits? Visit:
http://askabiologist.asu.edu/activities/biology-bits

Life cannot exist without cells. Your body is made of many types of cells. Cells come in all kinds of shapes and sizes. They make your skin, your bones, your muscles, and much more. For this reason, it is important to understand what makes cells work.



Your skin is made of layers of cells, including the epidermis and the dermis layer.

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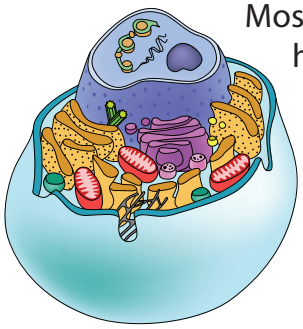
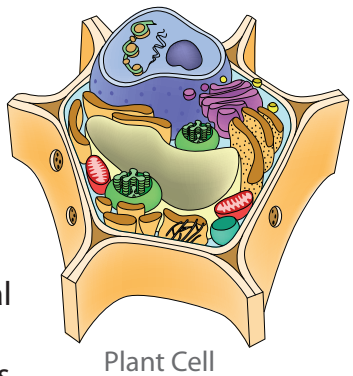
All cells are made of tiny parts. We call these parts organelles, a word that means "little organs". Cells can have more or fewer types of organelles.



Animal Cell

Most plant cells have some parts that are not found in animal cells. These parts let plants make food using energy from the sun.



Plant Cell

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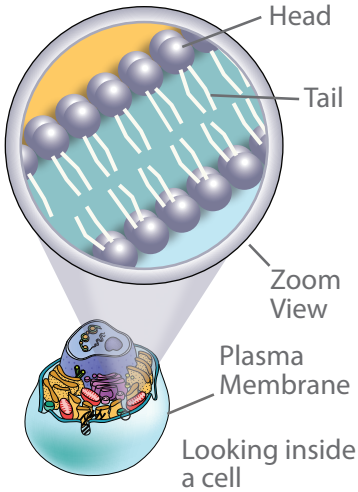
In pictures, the insides of cells often appear to have very clear shapes. But from the outside, cells look more like they are covered in a thick film. This film is the plasma membrane, and it covers the whole cell. The membrane is made of two thin layers of fat molecules (lipids) called fatty acids. Each fatty acid has two sides—the head and the tail. When the layers match up, the tails face the inside of the membrane and the heads point out.



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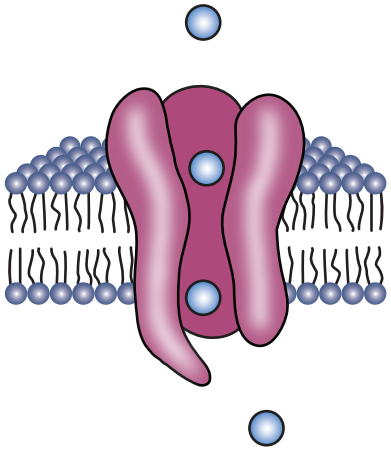
Molecules need to get in and out of cells. But with a membrane that covers the whole cell, how can stuff move in and out? Little holes in the cell membrane let items travel in or out of cells. These holes are made of special proteins that can move or open in the middle. We call them channels or pores. Certain parts of the membrane also let some water through.



Side view of a channel / pore that allows some items to move into and out of the cell.

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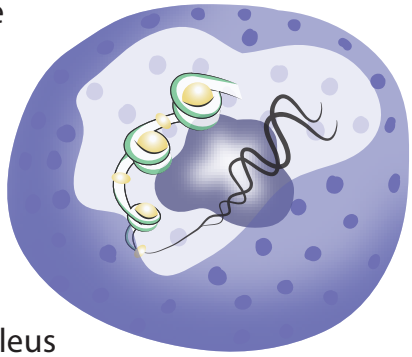
Welcome to the nucleus. It is the largest organelle and the control center of the cell. It holds instructions on how to build and run the cell. We call these instructions DNA, which is short for deoxyribonucleic acid. These are the instructions that made your whole body. The nucleus also holds a smaller part of the cell called the nucleolus. This organelle helps build ribosomes, which are cell parts that make proteins.



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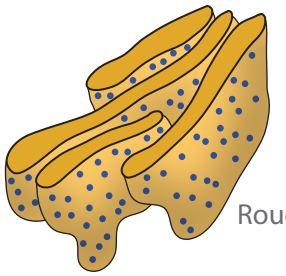
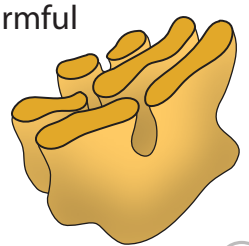
In the cell is a structure that looks a bit like a maze. It sits just outside the nucleus. This structure is the endoplasmic reticulum (ER), and it is made of thin-walled tubes. This organelle makes most of the proteins and lipids, like fat, in the cell. Some of the ER is rough, with little balls built into the wall. This rough ER makes proteins. The other ER is smooth. It makes lipids and stops harmful materials from hurting the cell.



Rough ER

Smooth ER



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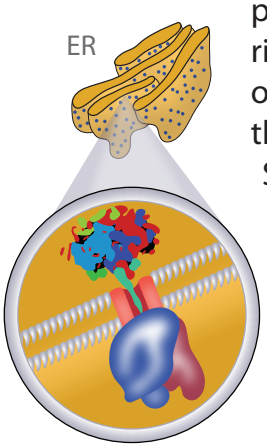
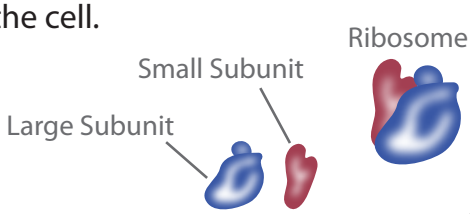
Proteins help your body do all kinds of jobs. They're important, so there is an organelle that just helps make proteins. We call it the ribosome. Each ribosome is made of two subunits, a large one and a small one. Many ribosomes sit in the wall of the endoplasmic reticulum (ER). Some are also found in other parts of the cell.





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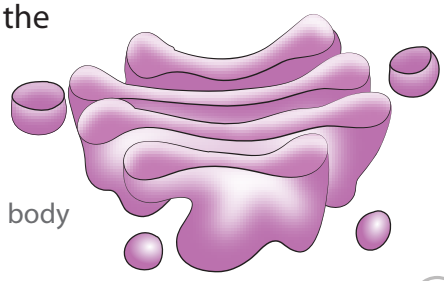
Cells are busy. They make items and ship them out of the cell to other cells in the body. How does a cell keep track of it all? The Golgi complex is the shipping center of the cell. It get proteins from the endoplasmic reticulum, wraps them up, and ships them out of the cell.
This organelle was named after the scientist Camillo Golgi, which is why Golgi is capitalized.



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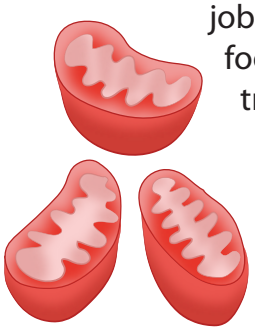
To do work, cells need a lot of energy. But food like the meat and vegetables you eat can't be used as is by cells. It must be changed into something cells can use. This is the job of the mitochondria. This organelle uses food energy to make ATP, or adenosine triphosphate. Not all cells have the same amounts of mitochondria. Cells that do more work usually have more of these organelles. Heart muscles are an example of hard-working cells with lots of mitochondria.



Cells that have to do more work need more mitochondria.

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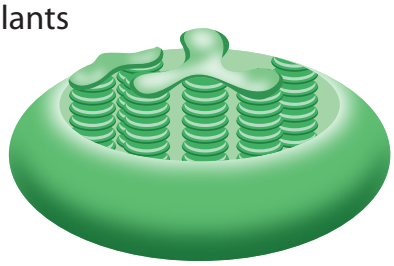
Plants use the sun's energy to make their own food. To do this job, they need special cell parts. The chloroplast is an organelle that is found in plant cells. It is not in animal cells. It holds chlorophyll, which is a pigment that can trap the sun's energy. The sun's energy can then be stored in carbohydrates, a form of energy plants can use. Chlorophyll is also what makes plant leaves look green.



Chloroplast

Chloroplasts hold chlorophyll, which is what makes plants green. It is used to convert light energy into plant food.

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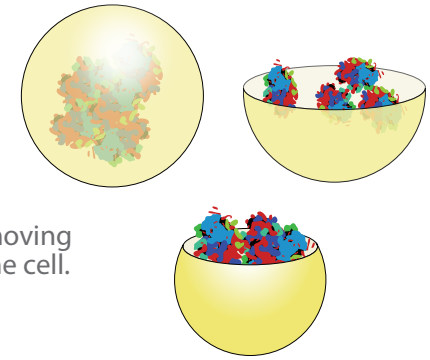
Most cells are always busy making molecules. After a molecule has been made, it usually needs to be moved within the cell. This job is for vesicles, which means "small vessels". Vesicles store products and move them around the cell. You can think of them as the mail trucks of the cell.



Vesicles are busy moving things around in the cell.

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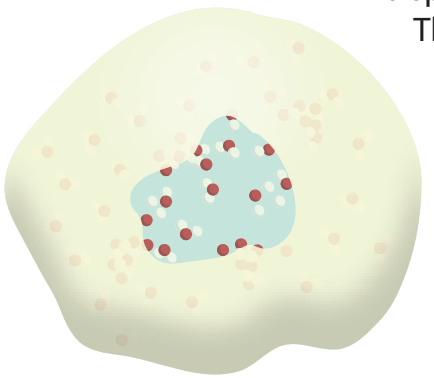
If you look at a plant cell, you might see an organelle that is big and that looks clear inside. This is the vacuole. It is sort of a space in the middle of the cell. The vacuole stores water, sugars, and other items the cell might use.



Vacuoles often look as big or bigger than a nucleus. They are only found in plant cells and plant cell storage centers.

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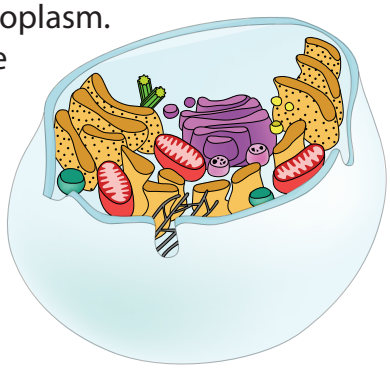
There are lots of cell parts, and some are on different sides of the cell. The clear stuff in between these parts is called cytosol. There is also a word that sounds kind of the same, yet means something else—cytoplasm. Cytoplasm is what we call all the parts within the cell, aside from the nucleus. Though the cell parts might not make it look like it, the cytoplasm is mostly water.



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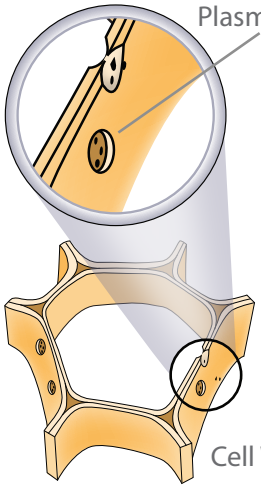
The cell membrane isn't the only thing that covers some cells. Plant cells also have a cell wall. The cell wall helps support the cell and keep it safe. The cell wall wouldn't let anything into or out of the cell if it weren't for one special kind of structure. Openings called plasmodesmata let stuff into and out of plant cells. They let cells share materials with nearby cells.



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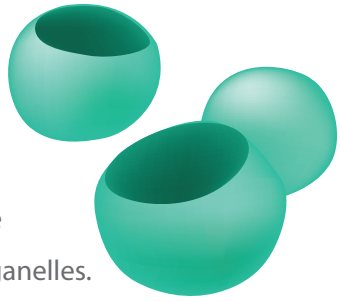
Cells do a lot of work, which means they make a lot of waste. Waste is not good for the cell. Some wastes or other stuff in the cell can be toxic, which means they can hurt the cell. To keep them from hurting the cell, these materials need to be broken down. This is where peroxisomes come in. They are small organelles that break down toxic materials.



Peroxisomes are tiny toxic waste managment organelles.

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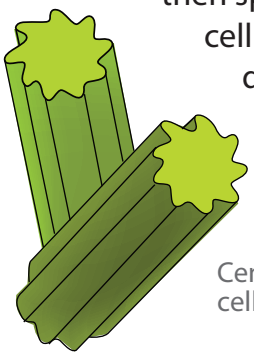
Plant cells aren't the only cells with special organelles. Animal cells have centrioles, which aren't found in other cell types. A key part of a cell's life is division. The cell grows, then splits into two cells. Many of the parts of a cell need to be moved around before this division can occur. Centrioles help reorganize cells during cell division. They move large groups of DNA around before a cell divides.



Centrioles move DNA around cells during cell division.

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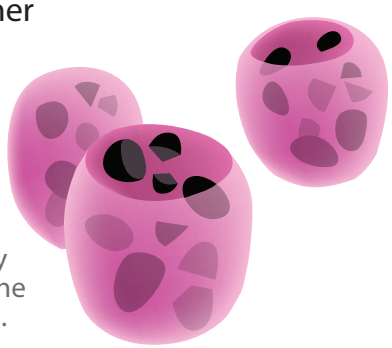
When you build something, you need to have all the right parts ready. The same is true for cells. To build molecules like proteins, cells need the right parts. They get these by reusing the parts from other molecules. Lysosomes break large molecules into smaller pieces. The pieces can then be used by the cell to build new products.



Lysosomes are busy recycling parts so the cell can reuse them.

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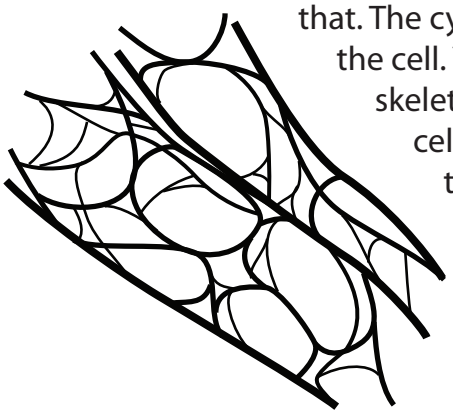
Cells may look like big balloons with parts inside that slosh around. But a cell needs—and has—a lot more structure than that. The cytoskeleton is the structure of the cell. You can think of it like a cell skeleton that reaches all parts of the cell. It helps shape and support the cell. It also helps move things around within the cell.



The cytoskeleton gives cells their shape and helps move items around the cell.

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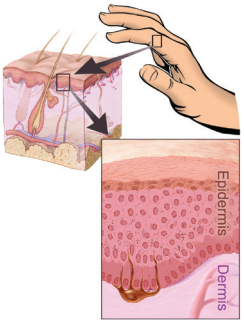

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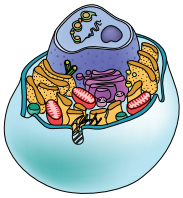

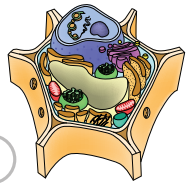

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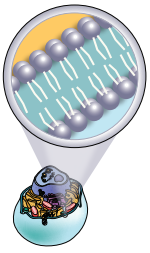

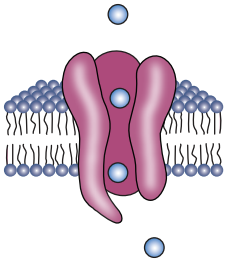

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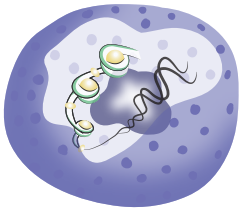

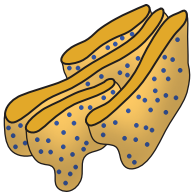

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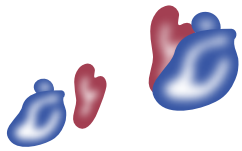

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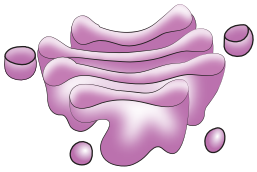

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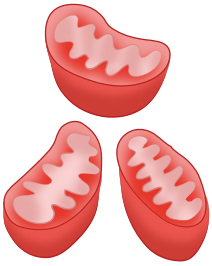

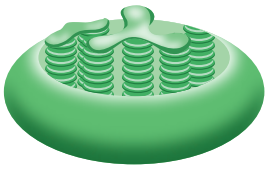

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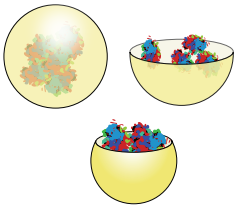

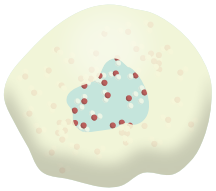

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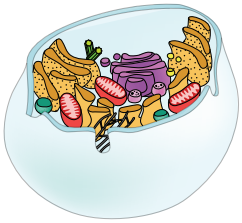

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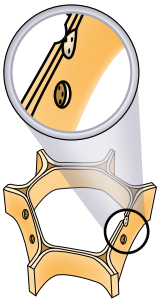

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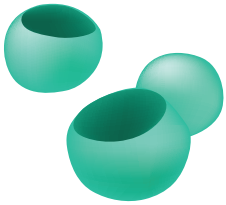

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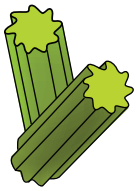

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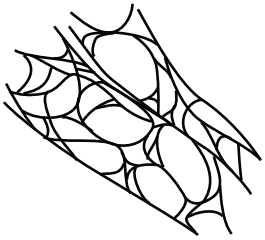

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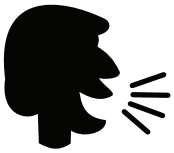
Deoxyribonucleic Acid – [de-ox-se-ri-bow-**new**-clay-ic] [**as**-id]
Endoplasmic reticulum – [**end**-uh-plaz-mik] [ri-**tick**-you-lum]
Adenosine triphosphate – [uh-**den**-oh-seen] [try-**fos**-fate]



How do you say?

Centriole – [**sen**-tree-ol]
Chloroplast – [**klor**-uh-plast]
Cytoplasm– [**si**-toe-pla-zem]
Cytoskeleton – [si-toe-**skel**-a-ton]
Golgi complex – [**goal**-gee] [**com**-plex]
Lysosome – [**lie**-suh-sohm]
Mitochondria – [mi-ta-**kon**-dree-a]
Peroxisome– [per-**rocks**-ee-sohm]
Ribosome – [**ri**-ba-sohm]

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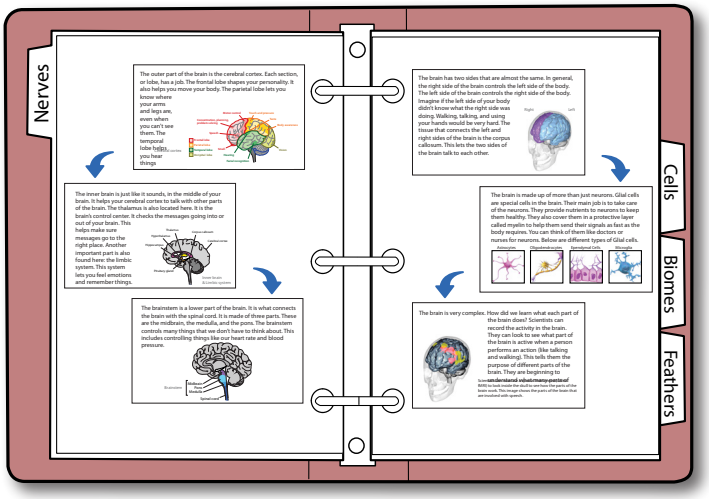
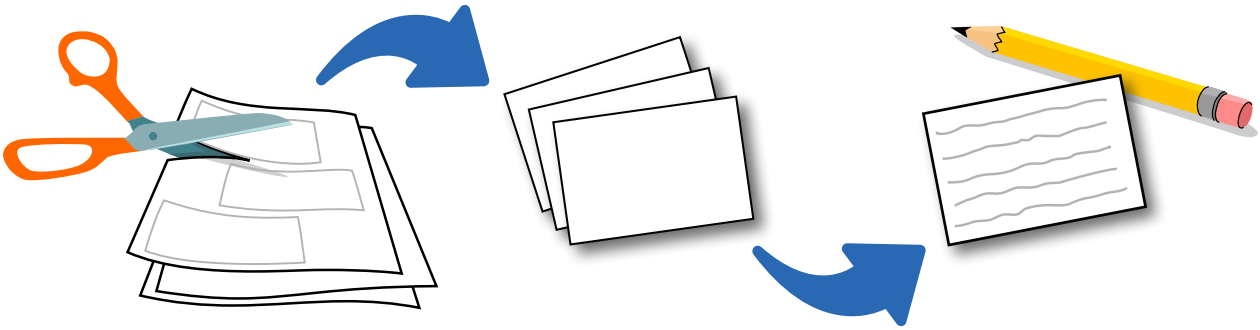


Instructions

Ready to begin? You can use these bits in many ways. You can print the pages and place them in a notebook for review. You can also cut each card out to re-organize them any way you want.

The empty cards can be used to write out what you learned in your own words, or to copy what's already written. Also included is a pronunciation guide, to help you learn how to say the more complicated words.



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