Name, #, Date _____

Organelle Structure & Function Information

Place a # next to each organelle as you read about it (cell membrane is #1 for example). Then, find that organelle on the cell image we labeled in class, and label it with that number. This will help you make the connection between what the organelle LOOKS like, and its FUNCTION in the cell.

Organelles found in both animal and plant cells:

The **cell membrane** is the 'skin' that surrounds the entire cell. This porous membrane allows the passage of water and some small molecules through passive diffusion. Other molecules and ions are able to enter the cell through specialized pores that shuttle solutes through the phospholipid bilayer that makes up the cell membrane. The cell membrane is also sometimes called the plasma membrane.

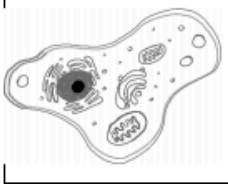
Cytoplasm is everything inside the cell that isn't the nucleus. Both organelles and the cytosol make up the cytoplasm.

Cytosol is the liquid inside the cell. Everything inside the cell that isn't an organelle is cytosol.

"Organelles" is the general name for the various structures inside the cytoplasm.

The **nucleus** is the control centre and the source of genetic information for the cell. By releasing genetic information, the nucleus is able to control the cell's functioning. The nucleus is almost always near the centre of the cell.

Chromatids are a long sequence of genetic information in the form of DNA. In a resting cell, these long strings of information aren't visible in the nucleus. As the cell prepares to divide, the chromatids coil up to form **chromosomes**, which are visible with a microscope in a stained cell.



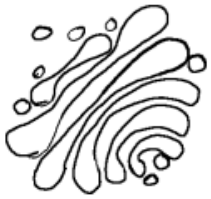
The **nucleolus** is the dark area in the centre of the nucleus. Among other functions, the nucleolus makes ribosomes.

Attached to the nucleus are the two types of endoplasmic reticulum. The **smooth endoplasmic reticulum** (smooth ER) releases lipids, such as hormones, that are used both in the cell and in neighbouring tissues.

The **rough endoplasmic reticulum** (rough ER) looks rough because it is studded with ribosomes. **Ribosomes** synthesize (make) proteins from amino acids. Amino acids are linked to each other, like beads on a string, to make a long chain called a polypeptide. Proteins are made from one or more polypeptides. Ribosomes are also found inside the cytoplasm and inside the nucleus.

After a polypeptide has been synthesized by a ribosome, it travels through the rough ER. Signalling glucoses (sugars) are attached along its length as the polypeptide passes through the rough ER. These sugars will help identify important parts of the polypeptide to other organelles.

Once the polypeptide has reached the edge of the rough ER, a small piece of the ER membrane is pinched off with the polypeptide inside, separating the polypeptide from fluids and ions in the cytoplasm. This pinched-off piece of membrane is called a **transport vesicle**.



Transport vesicles fuse with the membrane of the **Golgi apparatus**, and release their contents. As the polypeptide travels through the Golgi apparatus, it gains further signalling sugars and is grouped into proteins with other polypeptides. The Golgi apparatus often looks a lot like the smooth endoplasmic reticulum, and it can be difficult to tell them apart. The difference is that the smooth ER shares a membrane with the nucleus, and so will always be next to the nucleus, while the Golgi apparatus has its own membrane, and can be anywhere in the cell. (Note: Golgi apparatus is always capitalized because it is named after a person.)

The Golgi apparatus pinches off a **secretory vesicle**, and the polypeptide is now ready for use by other organelles, or for export outside of the cell.

The cell uses the chemical energy from sugars, proteins, and fats, in its **mitochondria** (singular: mitochondrion). This organelle is often called the powerhouse of the cell, since it provides the energy for the cell to do its various metabolic tasks.

Peroxisomes contain enzymes that break down hydrogen peroxide to give oxygen. They are found close to mitochondria and chloroplasts in the cell, and are involved in the production of energy by these organelles. Peroxisomes look much like lysosomes, however peroxisomes are generally bigger than lysosomes and are found surrounding mitochondria and chloroplasts, while lysosomes can be found anywhere in the cell.

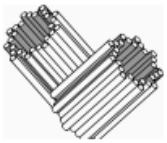
The **cytoskeleton** is the structure that gives a cell shape, holds organelles in place, and lets parts of the cell move. It is comprised of microfilaments, intermediate filaments, and microtubules.

Microfilaments allow the contraction and expansion of a cell, which allows cells to move in space. Microfilaments are the smallest and thinnest component of the cytoskeleton.

Intermediate filaments hold the organelles in place within the cytosol and anchor the nucleus in place. They are thicker than microfilaments, and thinner than microtubules.

Microtubules are the thickest structure in the cytoskeleton, and create a 3-dimensional lattice within the cell that allows organelles to move within the cell.

Organelles found mostly in animal cells



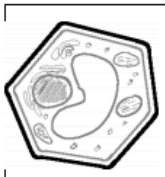
Centrioles organize the spindle during cell division.

Lysosomes are the clean-up crew of the cell. They break nutrient particles into smaller pieces so that other organelles can use these fragments as a source of energy, and for other metabolic activities. Lysosomes also break down damaged organelles, freeing their components for re-use.

A **flagellum** is a bundle of microfilaments projecting out of the cell, creating a structure that looks like a tail. When this structure contracts, the cell is able to propel itself. Flagella are anchored to the cell at **basal bodies**.

Cilia are very similar in structure to the flagella, but they tend to be shorter, and are usually found in groups on the cell surface.

Organelles found only in plant cells



The **cell wall** surrounds plant cells, beyond the cell membrane. The wall is made of cellulose, a glucose polymer that is quite rigid. The cell wall gives plant cells shape and structure – this is why plant cells tend to have straighter sides than animal cells. The cell wall also attaches cells to their neighbours.

Plants use **chloroplasts** to turn sunlight into CO_2 into food for themselves. Chloroplasts also give plants their green colour. They look like flat stacks of disks.

The **central vacuole** is always near the middle of the cell. Plants store water and other materials in these storage tanks, keeping them separate from the cytosol. Central vacuoles also perform the same functions as a lysosome, digesting nutrients and organelles into their components.