

Cell in the City

Recommended Age: 9-11

Time: 45 minutes



All living things, from the tree outside your window, to your pet, to your own body are made of many tiny living **cells**. Each cell is the smallest unit of life and is so small a microscope is needed to see it. Believe it or not, the human body is actually made of about 5 trillion cells.

Cells work together to form organs, organs work together to form body systems, and body systems work together to make the entire body tick. For example, brain cells work together to form the brain, the brain and nerves throughout your body work together to form the nervous system, and the nervous system works with all the other organ systems in your body, such as your digestive system.

While cells are the smallest living unit of life, when looking at a cell more closely you realize that it is actually subdivided into **organelles**. Organelles perform all the tasks a cell needs to do, such as using food to make energy and removing wastes. Each type of cell (some examples are muscle cells, brain cells, and blood cells) is specialized to perform the tasks they need to accomplish to keep the cell alive.

In this activity we will:

- Learn the difference
- e components of a cell
- Create analogies between cell organelles and parts of a city

Pre-Activity:

An **analogy** is a comparison of two things that are the same in some ways, but not in others. Usually, when comparing two things you may use the word “like”. For example, someone may say a light bulb is like the sun. It is an analogy since both a light bulb and the sun give off light, so they have a similar function, but what they look like is very different. The sun is a star while a light bulb clearly is not. This is an example of an analogy where the function of the two things is similar, but not what it looks like. An example of an analogy of two things that look alike but do not do similar things is that of a rope and electrical wire. They generally look very similar, but rope is used to tie things together while electrical wire is used to carry electricity. In a very good analogy, the two things being compared will be similar in BOTH what it is used for and what it looks like.

Try to think of analogies (either by what it does or what it looks like or is) for the following things:

- Lake
- Video camera
- Computer
- Airplane

Finally, try to think of some of your own analogies! Remember, some analogies are between things that do similar things, some are between things that look alike, and good analogies have a little bit of both types.

Materials

- Printout of pages 5-8 of this activity
- Scissors

- Glue stick
- A medium piece of Styrofoam
- 10 Popsicle sticks or craft sticks

Activity

****Note: Do not look at the last page of this activity until instructed****

- Cut out the descriptions of the function of each of the cell organelles and the parts of a city along the dotted lines.
- Make analogies between the functions of the cell organelles and functions of parts of a city and place the two pieces of paper next to each other. In all of these cases, the cell organelles and a part of the city will have similar functions.
- After you have matched each part of the city with a cell organelle function, check the key on the last sheet to see if you are right.
- Glue the associated cell organelle functions and the parts of a city back to back on a Popsicle stick using the glue stick.



- Poke the Popsicle sticks into the Styrofoam to make your city!



- Add extra decorations or color your Styrofoam to make it look more like a city if you would like.
- Finally, you can even use your as Popsicle stick flashcards! Try and quiz each other about the cell organelles and their functions.
 - Answer the following questions together:
 - How are the workings of a cell like and unlike a city?
 - Can you think of any other analogies for each of the organelles, such as objects that look similar to each of the organelles?
 - Finally, is there anything you can think of that both looks like AND does something similar to any of the organelles?

Summary:

Just like the many parts of a city, the organelles of a cell need to work together for it to function smoothly. When one of the organelles does not function correctly, this can result in a disorder. For example, defective lysosomes that do not get rid of excess chemicals in brain cells cause fatal Tay-Sachs disease. Therefore, it is very important that all the organelles do their jobs in the cell.

Extension:

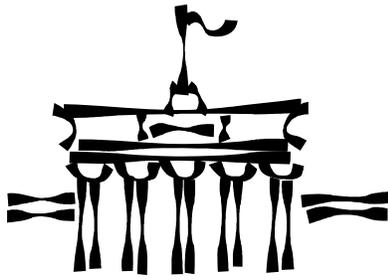
What you have made here are analogies between organelles in an animal cell and the different parts of a city. Cells in plants are slightly different than cell in animals. Many of the organelles are the same, but plants do have some additional and different organelles.

Use the additional sources to find the structure and function of plant cell organelles. How are they the same as animal cells and how are they different? Can you think of other parts of a city that do similar things to the plant cell's organelles? Make these new analogies like you did for the plant cell and make a "plant cell city!"

References:

<http://science.howstuffworks.com/cell.htm>

<http://www.cellsalive.com/cells/plntcell.htm>



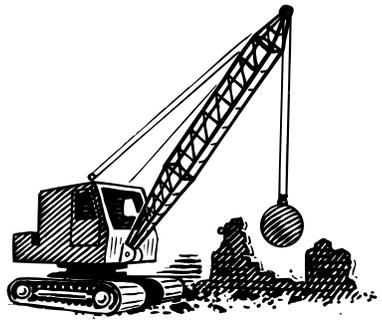
City Hall



Postal Service

City Limits

City Border



Demolition Service



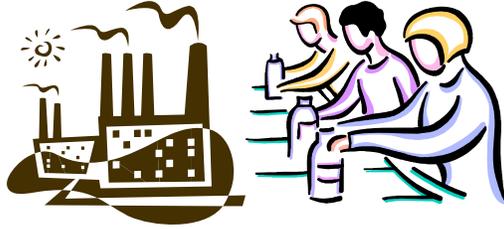
City Plans



Power Plant



Community



Manufacturing Plants



Streets and Roads



Workers

Nucleus

Function: This is a large organelle near the center of the cell that contains all the genetic material, or DNA of the cell. It is the control center of the cell or the main “building” of the cell.

Cytoskeleton

Function: This organelle holds the cell in its shape and also holds it together. Another function of this organelle is to move things around the cell.

Ribosomes

Function: These organelles create proteins that are very important to the successful function of the cell. The cell nucleus is its “boss” and “tells” it when and what proteins to make.

Mitochondria

Function: This organelle produces all the energy that the cell needs. It converts chemical energy from food into energy that the cell can use.

Smooth and Rough Endoplasmic Reticulum

Function: The rough endoplasmic reticulum takes proteins from the ribosomes attached to it and finishes manufacturing them. The smooth endoplasmic reticulum manufactures and stores chemicals that the cell can use.

Cell Membrane

Function: This organelle surrounds the entire cell and holds it together. It separates the cell from everything that is outside of it. It also controls what is able to pass into and out of the cell.

Lysosomes

Function: This organelle digests and breaks down old or damaged organelles.

Golgi Apparatus (Golgi Body)

Function: This organelle creates chemicals that it then delivers to the outside of the cell.

Cytoplasm

Function: The gel-like substance that is within the entire cell. All of the cell's organelles are supported and suspended in it.

Chromosomes

Function: Contains the genetic material that plans what type of cell it is. When a cell multiplies it is used to determine what the new cell will look like.

Key:

City Hall = Nucleus

Streets and Roads = Cytoskeleton

Community = Cytoplasm

Workers = Ribosomes

Manufacturing Plants = Smooth and Rough Endoplasmic Reticulum

Power Plant = Mitochondria

City Plans = Chromosomes

City Border = Cell Membrane

Demolition Service = Lysosomes

Postal Service = Golgi Apparatus