SCIENCE NORTH SCIENCE NORD
SUDBURY, ONTARIO, CANADA

Hard Working Organelles — Grade 8 – Cells

Lesson Plan

Assessment	Questions, observation, chart
Cross-curricular	

Big Ideas
- Cells are the basis of life.
- Cells organize into tissues, tissues into organs, organs into organ systems, and organ systems into organisms.

Learning Goals
- Cells are the basic unit of life.
- Cells contain organelles.
- Organelles have specific structures and functions.
- Compare and contrast animal and plant cells.

Specific Expectations:
1.2 assess the potential that our understanding of cells and cell processes has for both beneficial and harmful effects on human health and the environment, taking different perspectives into account
2.5 use appropriate science and technology vocabulary, including organelle, diffusion, osmosis, cell theory, selective permeability, membrane, stage, and eyepiece, in oral and written communication
2.6 use a variety of forms to communicate with different audiences and for a variety of purposes
3.1 demonstrate an understanding of the postulates of the cell theory
3.2 identify structures and organelles in cells, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain the basic functions of each
3.3 compare the structure and function of plant and animal cells

Description:
This lesson will start with reactivating what students already know about organelles and cells. In this lesson the students will learn the specific organelle structures and their functions in both plant and animal cells.

Materials/Resources:
Venn Diagram Worksheet
Hard Working Organelles Activity Reflection
Hard Working Organelles Visuals
Cells and Organelles Worksheet
Household items to represent organelles

Safety Notes:

Introduction

The assumption is that students have already been introduced to cells and organelles. Students should already know the function of the different organelles inside of cells. This lesson will start with reactivating what students already know about organelles and cells.

Ask students what they think of when they hear the word "cell". Provide the students with sticky notes, and have them write down examples of expressions that contain the word "cell". Compile the expressions. Next, ask students to come up with a definition of the word "cell". Students should come up with things like "compartments", "contain", or "holding separate".

Have students list some organelles they remember from a previous lesson. Use a Venn diagram (See Link) to compare and contrast organelles located in animal and plant cells.

Action

Students are going to make analogies between either the structure and/or function of a household object with that of an organelle. You have a choice here. You can pick objects that accurately represent the function of an organelle, for example, a battery could represent a mitochondrion or a plastic baggie could represent the cell membrane. Your second choice is to pick objects that are less obvious, but could represent an organelle morphologically or how they function.

You will need sets of objects. Functionally obvious objects may include batteries, envelopes, plastic baggies, small storage containers, dish soap, straws, building blocks, gelatine etc. Odd objects may include paper clips, blocks, candles, glue, forks, vitamins, dental floss, mints, safety pins, DVDs, etc. It is up to you whether you want each group to have the same set of objects or not.

You will need pictures of cell organelles either on posters or to show on a projector. (See Hard Working Organelles Visuals link)

Slide 2 notes: 1. Nucleolus 2. Nucleus 3. Ribosome (little dots) 4. Vesicle 5. Rough endoplasmic reticulum 6. Golgi apparatus (or "Golgi body") 7. Cytoskeleton 8. Smooth endoplasmic reticulum 9. Mitochondrion 10. Vacuole 11. Cytosol (fluid that contains organelles, comprising the cytoplasm) 12. Lysosome 13. Centrosome 14. Cell membrane

Divide students into 6 groups. Give each group a set of 6-8 odd objects. This will depend on how many organelles you cover. Give the groups 10 minutes to determine how each of their objects represents a different organelle. List the organelles to be used on the board. Have students analyze how the object somehow represents the structure and/or function of the organelle it represents.

Normal Representation:

1. Encourage students to relate the objects' functions to what they know about the functions of the various organelles.
2. After 10 minutes, discuss one organelle at a time; ask each group to explain why they chose the object they did to represent that organelle. As you talk about each organelle, make sure there is an image of it on the screen or as a poster.

3. Call to attention how groups tend to pick similar objects to represent each of the organelles. For example, the battery represents the mitochondrion because it supplies the cell with energy. The storage containers are good representatives of vacuoles because they store substances. If there are differences, ask groups to justify their thinking with examples.

Odd choices:

1. Encourage students to think outside the box and not use objects that obviously represent one organelle over another.
2. After 10 minutes, discuss one organelle at a time; ask each group why they chose the object they did to represent that organelle. As you talk about each organelle, make sure there is an image of it on the screen or as a poster.
3. Call attention to the ways each group points out different things about their objects in order to make them good representatives for the different organelles. For instance, one group might see the fork as a good representative for a cell membrane because things can squeeze through the tines, while another group chose the fork to represent the ribosomes because it makes round ribosome-like dots on food when you stab at it. Yet another group might have chosen the fork to be the chloroplast since the tines are stacked on top of each other just as the thylakoids are stacked into grana. Be open to even the most bizarre analogies as long as students use true information about the organelles. Students should have fun presenting their group's decisions, but make sure students are paying attention as other groups describe their reasoning.

Have students fill out Hard Working Organelles Activity Reflection (See Link) to see what they learned during the activity.

Adapted from Marybetth Knight Greene's lesson at Learn NC called Odd Organelles.
http://www.learnnc.org/lp/pages/4950

Consolidation/Extension

Students can fill out the chart with functions. (See Link)
Adapted from:
http://sciencespot.net/Pages/classbio.html Cell organelle chart

Further Extension:

1. Have students come up with analogies to represent how all the organelles work together inside the cell for proper function. Students can come up with a variety of ways to present their analogies. For example, students can make 3D models from household items or food, a digital story using a photo presentation app or program, a comic with multiple panels, or a diagram of the inside of the cell.
2. Students can learn about diseases associated with improper organelle function. An example would be the case study lesson plan called, Little Girl Lost: A Case Study on Defective Cellular Organelles found here:
http://sciencecases.lib.buffalo.edu/cs/collection/detail.asp?case_id=783&id=783