

# Cell Expo

## Episode 1: Cell models

### Introduction

In the Cell Expo Unit the students take on the role of exhibition designers commissioned by the National Science Museum to develop an exhibition on cells, including 3D plant and animal cell models; posters on plant and animal cell structure and function, and the range of cell types; hands-on activities about the movement of substances around, in and out, and between cells; and a brochure to support the exhibition. They are commissioned to carry out the work by an officer at the National Science Museum, Ms. Kannikar, who oversees the work. They are advised and guided by a cell biologist Professor Jutharat, who introduces them to the science of cells and helps them to develop their knowledge and understanding to enable them to carry out the various tasks required to create the exhibition.

Episode 1 will require 2 lessons plus homework time to complete (or 3 lessons if you do not use homework time).

In this episode the students are introduced to Ms Kannikar, taken on a virtual tour of the National Science Museum and then introduced to the four tasks they will need to carry out to develop the exhibition. This episode then focuses on the first task the development of the 3D plant and animal cell models. They are introduced to Professor Jutharat who shows them how to use a microscope so that they can look at and draw plant and animal cells. She then introduces them to the different components that they may have been able to see, and they identify the components both plant and animal cells have, and those that only plant cells have, through discussion and activities. With their new knowledge and understanding they then develop their 3D models of plant and animal cells. They finally present their models to Ms. Kannikar.

### Keywords

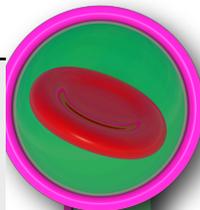
Cell, light microscope, cytoplasm, nucleus, cell membrane, small vacuoles, large vacuole, chloroplast, cell wall

### Learning objectives

- 1 To observe and explain the shapes and characteristics of cells of unicellular and multi-cellular organisms.
- 2 To observe and compare the main components of plant and animal cells.

### Learning activities

90 mins



## Engage

10 mins

Introducing the context and identifying what the students know about cells. Why do we need 3D models of cells?

- Slide 1 Introduce the students to the new unit.
- Slide 2 Emphasise the objectives for the lesson.
- Slide 3 Introduce the students to Ms. Kannikar, what she does and that they are exhibition designers that she would like to commission to develop an exhibition on cells. They will be working for her.
- Slide 4 Ms. Kannikar takes the exhibition developers on a virtual tour of the National Science Museum (NSM). You will do this by taking the students on the virtual tour, introducing them to the different exhibitions. Use the following link: [http://www.nsm.or.th/nsm2008/vr\\_museum/](http://www.nsm.or.th/nsm2008/vr_museum/)
- Slide 5 Introduces the four tasks that the exhibition company have to carry out to develop the exhibition.
- Slide 6 - 7 Make the students think about why they have to make 3D models of cells.
- Slides 8 - 11 The students are introduced a biologist Professor Pong. Challenge them to think about what cells are and introduce the idea that cells are the fundamental unit of living things. Ask them to think about the size of cells, and what they can use to see them because they are so small.

## Explore

25 mins

The exhibition developers try to find information for developing cell models by observing cells under the microscope and learning what the different components that they see are. They look at unicellular and multi-cellular organisms

- Slide 12 Introduce the idea of using a light microscope to see the cell. You will now take on the role of Professor Pong and show the students how to use the microscope correctly and safely.
- Slide 13 Give the students the Student Support Sheet 1, *The light microscope* and ask them to label the parts of the microscope.
- Slide 14 Let the students observe different cells from prepared slides of plant and animal cells, unicellular and multi-cellular. They should draw what they can see in the table on the Student Support Sheet 2, *Looking at cells*. Facilitate during this time, helping students to use and focus their microscopes. Give time for students to draw what they see on the Student Sheet. Ask them if they can see only one cell or are there many cells. Also ask them to describe their shapes (they will develop the concept that unicellular and multi-cellular organism and that cells have different shapes).



Slide 15 The questions encourage the students to think about their cell observations and the similarities and differences between the cells, and those of plant and animal cells.

**Explain**

**10 mins**

Students are introduced to the components of cells and have the opportunity to discuss the different components of plant and animal cells, and their similarities and differences

Slide 16 The students are introduced to the components of the cells through labelled diagrams of cells. They should be asked to compare them with their drawings and observations. You should ask the students to label the components on their drawings.

Slides 17-20 These questions encourage students to think about the similarities and differences between plant and animal cells. This should be done as a whole class discussion. The students should now complete Student Support Sheet 3, *Plant and animal cells* and Student Support Sheet 4, *Cell components*.

**Elaborate**

**25 mins**

Developing 3D cell models to introduce cells and their components visitors to the exhibition.

Slide 21 The students start the task of developing their 3D models of plant and animal cells. For making the model, the students can use their own ideas which they will brainstorm, or search for information to make the model. You can provide a range of different materials that the students can choose to use or provide a particular set of materials. The students will require a lesson plus homework time to complete this task (or two lessons). It is a very effective learning experience. Set a strict deadline! Students apply their knowledge and understanding about cells and cell components to develop the 3D cell models.

**Evaluate**

**20 mins**

Students present and explain their models and answer questions to test their understanding.

Slide 22 The students should present their models to Ms Kannikar (you), explaining the various structures and reasons for their design decisions.

Slides 23-28 Challenge the students by asking them to identify the components of other types of cells such as red blood cell, muscle cell, nerve cell, root hair cell and guard cell. Do this by showing the picture only and then revealing the labels for each cell in turn. Then discuss their observations.

Slide 29 The students discuss their learning with their partner or team.

## Assessment and differentiation

### Formative Assessment

Take the opportunity to assess the students during questioning and whilst facilitating through questioning and observation when the students are observing the cells under the microscopes, completing the tasks on the Student Sheet and developing and presenting their 3D models.

### Differentiation

Some students may require additional help and support when using the microscopes, completing SS1 and when generating ideas for developing their models.

## Preparing for the lesson

### RESOURCES USED

Student Support Sheet 1: The light microscope  
Student Support Sheet 2: Looking at cells  
Student Support Sheet 3: Plant and animal cells  
Student Support Sheet 4: Cell components

### EQUIPMENT REQUIRED

#### Engage

Use the Virtual Tour of NSM to introduce the students to the National Science Museum.

#### Explore

For each group of 2-4 students:

- Light microscope.
- A variety of permanent slides of cells (Unicellular and multi-cellular plant and animal cells).

For each student:

- Student Support Sheet 1: The light microscope
- Student Support Sheet 2: Looking at cells

#### Explain

For each student:

- Student Support Sheet 3: Plant and animal cells
- Student Support Sheet 4: Cell components

#### Elaborate

For each group:

- Materials for making the cell models will depend on the students' creativity and on the materials available and affordable. Materials could include: card board boxes, polythene bags, polystyrene newspaper, coloured paper, balls, play dough, coloured pens, plane paper, string, and pencils etc.

The following is one method for making model a gelatine cell model.

Materials:

- Packet of colorless gelatine
- Warm water
- Plastic spoon
- Rectangular or round pan
- Various craft materials

Method:

1. Dissolve a packet of colourless gelatine in warm water. Pour the gelatine into a rectangular pan (for a plant cell) or a round pan (for an animal cell).
2. Allow gelatine to cool for about one hour in the refrigerator.
3. While waiting for the gelatine to begin to set, choose different materials that resemble each of the cell structures found in the cell you are modeling (plant or animal cell).
4. Insert these materials into the gelatine before it begins to solidify.
5. Return your cell model to the refrigerator and allow it to solidify overnight.

**Evaluate**

None



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