

Exercises on Lesson 2

● Understand

● Apply

● Higher Thinking Skills

1 Choose the correct answer :

- Microscopes help scientists to discover that is the building unit of living organisms bodies.
a. brick b. cell c. the Sun d. energy
- The body of simple living organisms as bacteria consists of (Minia 2024)
a. one cell only. b. different cells.
c. many cells. d. ten cells only.
- You can see the cells of all the following under microscope, except
a. onion. b. human skin. c. leaf. d. stone. (Giza 2024)
- All the following are from parts of microscope, except
a. eyepiece. b. stage. c. coverslip. d. mirror.
- When you examine a piece of onion under microscope using the low power objective lens, you will see the cells of onion in size.
a. small b. medium c. big d. very big
- The modern microscope helps scientists to discover all the following information about the cell, except that
a. the cell is the building unit of living organisms bodies.
b. some simple living organisms consists of one cell only.
c. living organisms that contain complex systems consists of many cells.
d. all living cells have the same parts which have the same function.

2 Put (✓) or (x) :

- Robert Hooke used his microscope to observe cells of some samples of plant parts. ()
- The body of a living organism that contains complex systems, consists of one cell only. ()
- All objective lenses of microscope have the same focusing power. ()
- The modern microscopes help scientists to discover more information about the cell. ()
- We can see the examined sample in bigger size when using the high power objective lens. ()
- The function of coarse focus and fine focus is making the image of a sample very clear under microscope. ()

3 Complete the following sentences using the words below :

(low power – objective lenses – the cell – small – living organisms)

- 1. Robert Hooke named each of tiny particles that he saw under his microscope as
- 2. The cell is the building unit of bodies.
- 3. Different focusing power of allow us to see the components of cells.
- 4. You can see cells of an examined sample in size by using the objective lens of the microscope.

4 Give reasons for :

- 1. Scientists tend to use microscopes in their researches.
.....
.....
- 2. We must rotate the coarse focus and fine focus during examining a sample under microscope.
.....
.....

5 What happens if ...?

- 1. Scientists did not invent the microscopes.
.....
.....
- 2. You examine a sample of plant cells using the low power objective lens of a microscope.
.....
.....

6 Look at the opposite figures, then choose the correct answer from those between brackets :

- 1. The opposite figures represent
(plant cells – animal cells).
- 2. Figure (1) indicates that we use the
(low power – high power) objective lens of a microscope, because the cells appear
(less clearly – more clearly).
- 3. Figure (2) indicates that we use the
(low power – high power) objective lens of a microscope, because the cells appear
(less clearly – more clearly).

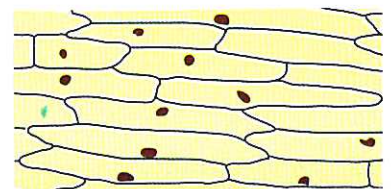


Figure (1)

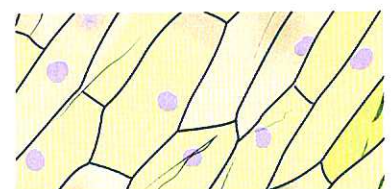


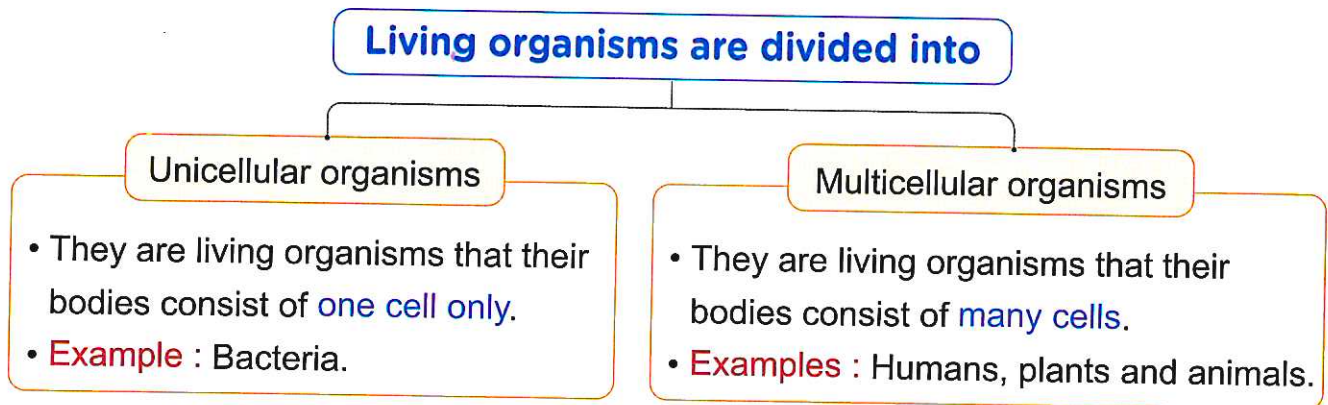
Figure (2)

LESSON THREE

Activity 7 The Parts of a Cell

► Put (✓) or (x) :

1. Cells differ in shape and structure. ()
2. The human body consists of one cell only. ()
3. The body of bacteria is composed of one cell only. ()



? **Give reason for ...**

1. **Bacteria are unicellular organisms.**
Because their bodies consist of one cell only.
2. **A horse is one of the multicellular organisms.**
Because its body consists of many cells.

Structure of multicellular organisms bodies :

- The number of cells in plants and animals differs from species to another.
- The human body contains about 40 trillion cells (40 trillion = 40,000,000,000,000)

► **The structure of most of the multicellular organisms bodies are organized into five levels, which are :**



► Let's see the structure of the human body as an example of multicellular organisms :

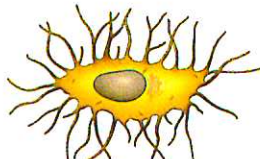
Cells

- The human body contains different shapes of animal cells.

Examples :



Muscle cell



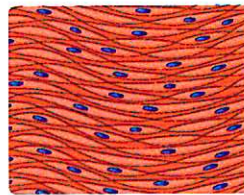
Bone cell

Form

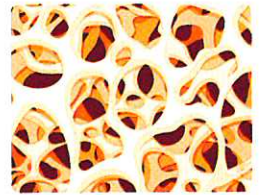
Tissues

- Each tissue is often composed of a group of similar cells that do the same function.

Examples :



Muscle tissue



Bone tissue

Form

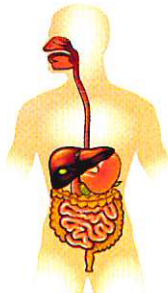
Systems

- Each system is composed of a group of different organs to do a certain function.

Examples :



Respiratory system



Digestive system

Form

Organs

- Each organ is composed of a group of different tissues joined together to do its own function.

Examples :



Heart



Stomach

Form

Whole body

- The human body is composed of a group of different systems that work together.



Human body

Cell parts :

► Most of animal cells and plant cells are composed of some main parts which are :

1 Cell membrane (Plasma membrane)

It surrounds the cell from outside (especially the animal cell).

2 Cytoplasm

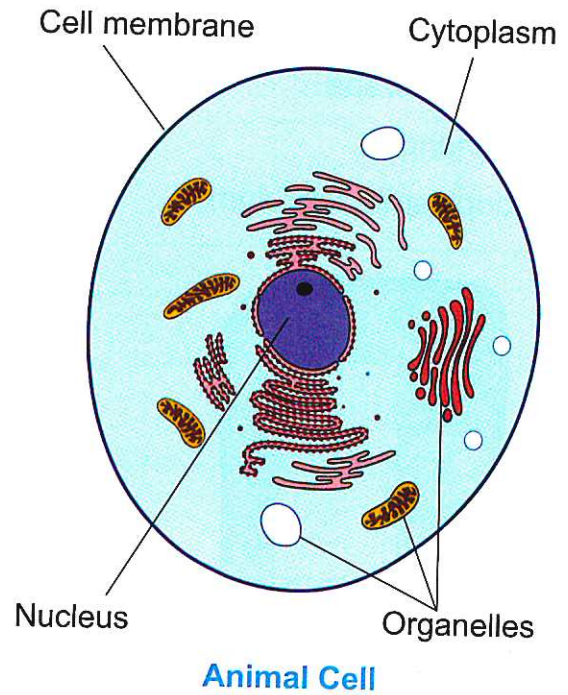
It is a gelatinous liquid (thick liquid) which is found inside the cell.

3 Nucleus

It is often located at the center of the cell.

4 Organelles

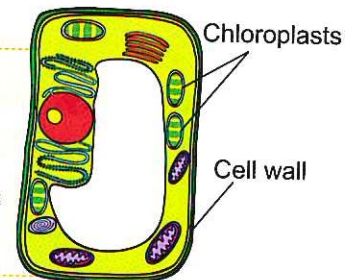
- They are different tiny structures inside the cell.
- Each type of organelles has a special function.



Animal Cell

Notes

1. The plant cell is surrounded by a **cell wall** from outside.
2. The cell wall is made up of a substance called **cellulose**.
3. A special type of plant cell has the ability to make the photosynthesis process as it contains special organelles called **Chloroplasts**.



Plant cell

? Give reason for ...

The cell works as a living system.

Because it consists of many organelles that work together to perform a specific function.

Check your understanding

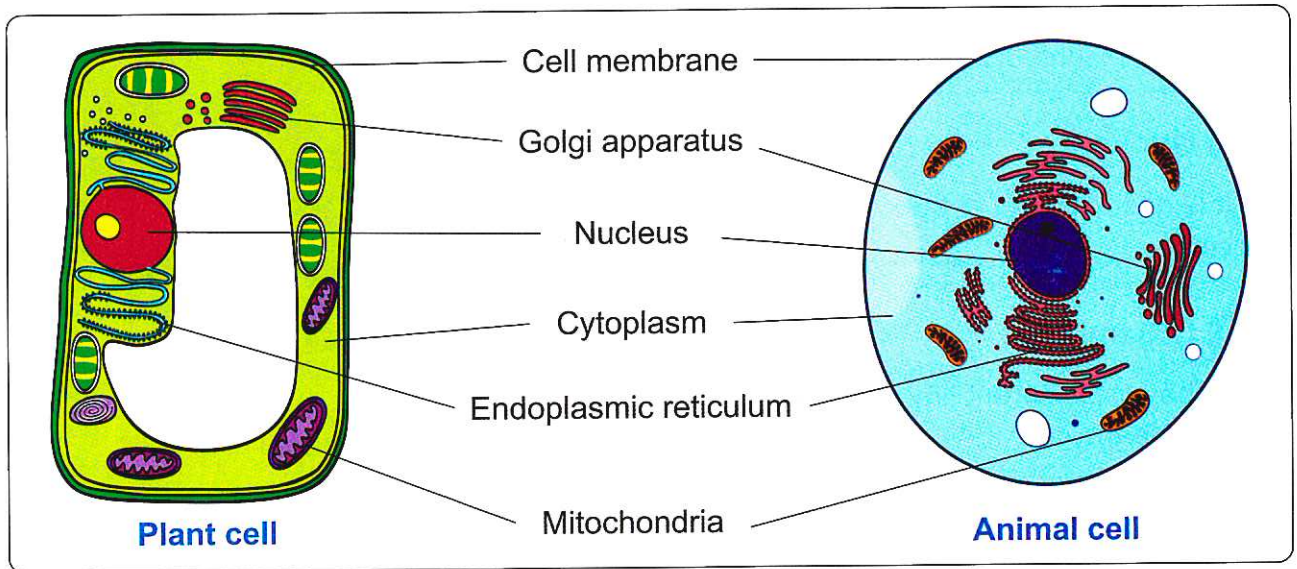
► Complete the following sentences using the words below :
(cellulose – cytoplasm – similar cells)

1. The thick liquid inside the cell is called
2. A group of forms a tissue.
3. The cell wall is made up of a substance called

Activity 8 The Functions of Cell Parts

- Although multicellular organisms are made up of many cells that differ in shape and structure, most cells have some common characteristics, where most cells contain :

- Cell membrane.
- Mitochondria.
- Endoplasmic reticulum.
- Cytoplasm.
- Nucleus.
- Golgi apparatus.



► In this activity, we are going to study the function of the common parts of most cells as follows :

Cell membrane

It is the outer lining of the cell.

Functions :

1. It protects the cell.
2. It controls the substances that can enter or leave the cell through the "selective permeability" feature.



Note

Selective permeability feature means that the cell membrane allows some substances to pass through it into the cell, while it prevents some other substances from entering the cell.

Mitochondria

- They are from the organelles of the cell.
- They are known as the "powerhouses" of the cell.

Function :

They provide the cell with the energy it needs by converting sugar inside the cell into energy through the "cellular respiration".

Cellular respiration :

It is the process that takes place inside the mitochondria, where oxygen is used to obtain the chemical energy stored in food to help the cells make their functions.

Cytoplasm

Function :

It is the gelatinous liquid (thick liquid) inside the cell in which all other cell parts (nucleus and organelles) float.

Nucleus

Function :

It controls all the cell activities such as :

- Formation of proteins.
- Cell division to form new cells.

Endoplasmic reticulum

It is one of the organelles of the cell.

Function :

It helps in assembling (collecting) and transporting proteins inside the cell to build and repair the cell.

Golgi apparatus

It is one of the organelles of the cell.

Function :

It helps in packing and transporting different materials :

- between the cells.
- out of the cell.



Check your understanding

► Put (✓) or (x) :

1. Cytoplasm controls the cell division to form new cells. ()
2. The cell organelles float in the cytoplasm. ()

In the Assessment Book :

Try to answer :

Self-Assessment (3)

float
chemical energy
cellular respiration

يطفو
الطاقة الكيميائية
التنفس الخلوي

packing
assembling

تغليف
تجميع

transporting
cell division

نقل
انقسام الخلية

Exercises on Lesson 3

● Understand

● Apply

● Higher Thinking Skills

1 Choose the correct answer :

- The body of a unicellular organism consists of
 - one cell only.
 - many different cells.
 - one organ only.
 - many similar cells.
- All the following organisms are examples of multicellular organisms, except
 - human.
 - horse.
 - bacteria.
 - apple tree.
- Which of the following is the correct arrangement of the structure of most of multicellular organisms bodies ? *(Aswan 2024)*
 - Similar cells → Organs → Tissues → Systems.
 - Similar cells → Tissues → Organs → Systems.
 - Organs → Tissues → Systems → Similar cells.
 - Tissues → Similar cells → Organs → Systems.
- Stomach is composed of a group of different
 - bacteria.
 - systems.
 - organs.
 - tissues.
- All the following parts are from the main parts of the animal cell, except
 - cell membrane.
 - cytoplasm.
 - cell wall.
 - nucleus.*(Cairo 2024)*
- The gelatinous liquid which is found inside the cell is known as
 - nucleus.
 - cytoplasm.
 - cell membrane.
 - organelles.
- The structure of the plant cell which is made up of cellulose is the
 - cell membrane.
 - nucleus.
 - cell wall.
 - cytoplasm.
- A plant cell has the ability to make the photosynthesis process due to the presence of inside it.
 - mitochondria
 - chloroplasts
 - nucleus
 - cytoplasm
- The organelles which provide the cell with its needed energy are called
 - endoplasmic reticulum.
 - golgi apparatus.
 - mitochondria.
 - cell membrane.*(Alex. 2024)*
- Selective permeability means that the cell membrane controls
 - the energy which is produced inside the cell.
 - the food which is consumed by the cell.
 - the substances which are transported inside the cell.
 - the substances that can enter or leave the cell.

11. All the following are functions of the cell membrane of an animal cell, except that it
 - a. protects the cell.
 - b. has the selective permeability feature.
 - c. provides the cell with its needed energy.
 - d. surrounds the cell from outside.
12. The two cell organelles which are responsible for transportation process are
 - a. mitochondria and golgi apparatus.
 - b. endoplasmic reticulum and golgi apparatus.
 - c. endoplasmic reticulum and mitochondria.
 - d. mitochondria and chloroplasts.
13. The nucleus is responsible for controlling (Cairo 2024)
 - a. formation of proteins only.
 - b. cell division only.
 - c. formation of proteins and cell division.
 - d. formation of proteins and energy production.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Mitochondria	a. All other cell parts float in it.
2. Endoplasmic reticulum	b. They provide the cell with its needed energy.
3. Cytoplasm	c. It helps in packing and transporting different materials between the cells and out of the cell.
4. Golgi apparatus	d. It is made up of cellulose.
5. Chloroplasts	e. It helps in collecting and transporting proteins inside the cell.
	f. It is responsible for making photosynthesis process inside plant cells.

1. 2. 3. 4. 5.

3 Put (✓) or (x) :

1. Bacteria and horse are considered as multicellular organisms. ()
2. Respiratory system consists of a group of different organs that do the function of respiration process. ()
3. The human body contains about 40 million cells. ()

- 4. Chloroplasts are found in the cells of banana plant leaves. *(Luxor 2024)* ()
- 5. The cells of a monkey are surrounded by a cell wall from outside. ()
- 6. The nucleus is found in the center of most cells. ()
- 7. All cell parts that are found inside the cell are floating in the cytoplasm. ()
- 8. The selective permeability feature takes place through the cell wall. ()
- 9. The endoplasmic reticulum is responsible for collecting and transporting proteins inside the cell to build and repair the cell. ()
- 10. Mitochondria convert sugar inside the cell into the energy needed to make the cell do its vital processes. *(Alex. 2024)* ()
- 11. Cellular respiration takes place inside cells with the help of the golgi apparatus. *(Cairo 2024)* ()

4 Complete the following sentences using the words below :

(selective permeability – chloroplasts – nucleus – cellular respiration)

- 1. The organelles that are found in the plant cell only are
- 2. The cell membrane controls the substances that can enter or leave the cell through the feature.
- 3. The part of the cell that is responsible for cell division is known as the
- 4. The process by which the cell obtains its needed energy is called

5 Write the scientific term of each of the following :

- 1. They are living organisms, that their bodies consist of one cell only. (.....)
- 2. They are living organisms, that their bodies consist of many cells. (.....)
- 3. It is a gelatinous liquid, that is found inside the cell. (.....)
- 4. It is the structure, that surrounds the animal cell from outside. (.....)
- 5. It is often located at the center of the cell. (.....)
- 6. They are different tiny structures inside the cell, and each type of them has a special function. (.....)
- 7. They are cell organelles, that provide the cell with the needed energy. *(Sohag 2024)* (.....)
- 8. An organelle, that helps in assembling and transporting proteins inside the cell to build and repair the cell. (.....)
- 9. An organelle, which helps in packing and transporting different materials between the cells and out of the cell. (.....)

6 Complete the following sentences :

1. Human is considered a organism, because his body consists of many cells.
2. A muscle tissue is composed of a group of that do the same function.
3. The cells of plants is characterized by the presence of chloroplasts which are responsible for making process.
4. The plant cell is similar to the animal cell in the presence of cell membrane, , , endoplasmic reticulum and
5. The cellulose makes up the which is found in cells only. (Cairo 2024)
6. Cells of dog are surrounded by from outside. (Qena 2024)
7. Mitochondria in muscle cells convert the inside the cells into which is needed for doing different exercises.
8. Transporting proteins inside the cell to build and repair it is the function of , while transporting different materials between the cells is the function of

7 Give reasons for :

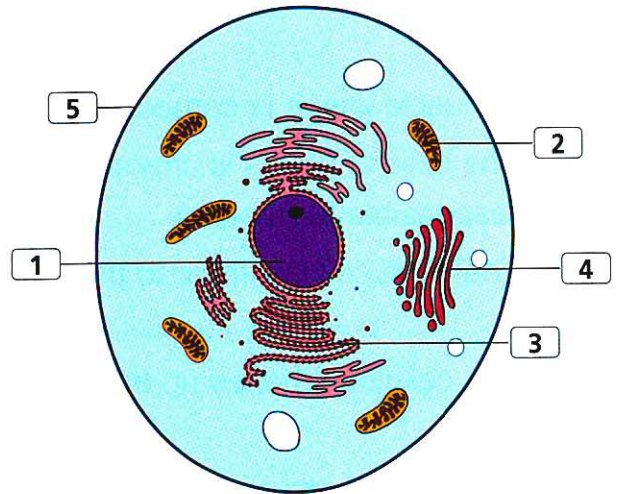
1. Cats are considered as multicellular organisms.
.....
2. Plant cells can make photosynthesis process. (Cairo 2024)
.....
3. Both of endoplasmic reticulum and golgi apparatus are involved in transportation process inside and outside the cell.
.....

8 What happens if ...?

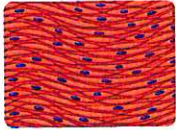



1. There are no chloroplasts inside plant cells.
.....
2. The cell membrane cannot control the selective permeability feature.
.....
3. Sugar doesn't reach mitochondria inside a cell.
.....

9 Look at the following figure, then write the correct number beside the suitable sentence :

1. Powerhouses in the cell. (.....)
2. Control the cell division. (.....)
3. Assembling and transporting proteins. (.....)
4. Control the selective permeability feature. (.....)
5. Packing and transporting different materials. (.....)



10 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. A cell	a. 
2. A tissue	b. 
3. An organ	c. 
4. A system	d. 

1.

2.

3.

4.

LESSON FOUR

Activity 9 Comparing Plant and Animal Cells

► Put (✓) or (x) :

1. The animal cell is surrounded by a cell wall. ()
2. There are common parts between animal cell and plant cell. ()

In this activity, we are going to compare between the animal cell and the plant cell.

► But, first let's see some parts that are found in the **plant cell only** and characterize it, which are :

- Cell wall.
- Chloroplasts.
- Sap vacuole.

Cell wall :

- It is made up of **cellulose**.
- It is a rigid (hard) external material that surrounds the cell membrane of the plant cell.

Function :

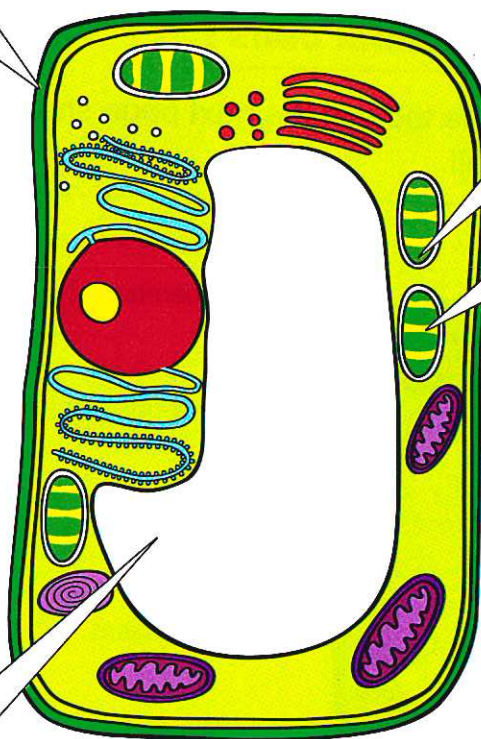
It surrounds the plant cell to give it a definite shape.

Sap vacuole :

- It is a large sac-like organelle.
- The plant cell has only one special big vacuole called "**sap vacuole**".

Function :

It stores nutrients, water and waste materials inside the plant cell.



Plant cell

Chloroplasts :

- They are organelles that contain tiny green granules.
- These granules have green color because they contain a green pigment called **chlorophyll**.

Function :

They have chlorophyll that absorbs the energy of the sunlight for the plant to make its own food through the photosynthesis process.

Notes

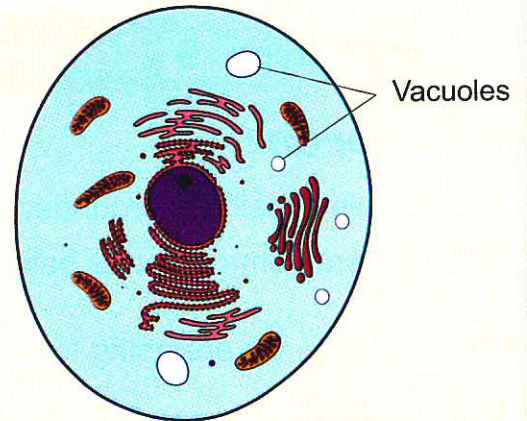
1. Vacuoles in the animal cell :

- The animal cell has many and small vacuoles.
- **Function of vacuoles in the animal cell :**
They store nutrients, water and waste materials inside the animal cell.

2. The animal cell doesn't have a cell wall, so it doesn't have a definite shape as the plant cell.

3. Animals have other structures to keep their shapes such as :

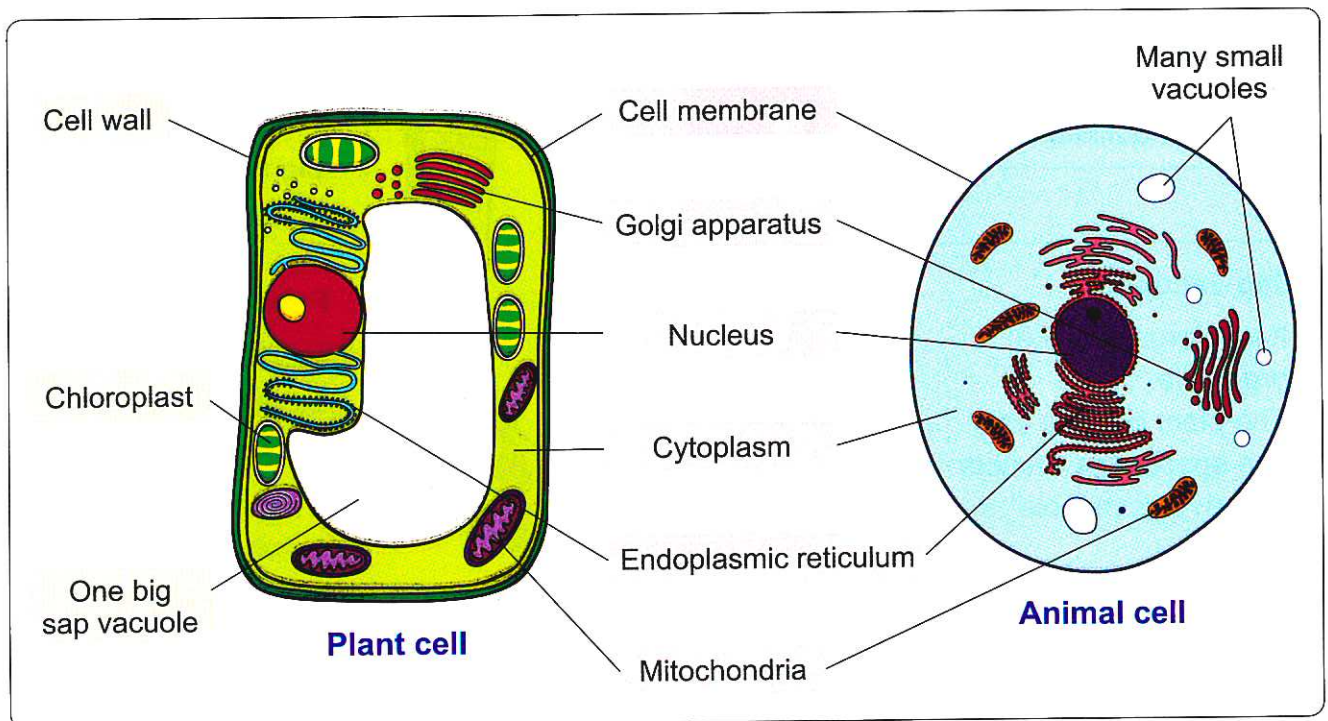
- Some animals have bones such as cats, dogs, birds... etc.
- Some animals have a hard shell-like cover called "exoskeleton" that gives them their shapes such as some insects.



Animal cell

Comparing plant and animal cells :

The following figures and the table in the next page show a comparison between the plant cell and the animal cell.



Points of comparison	Plant cell	Animal cell
Definition :	It is the main building unit of plant's body .	It is the main building unit of animal's body .
Cell membrane :	Present	Present
Cytoplasm :	Present	Present
Nucleus :	Present	Present
Mitochondria :	Present	Present
Golgi apparatus :	Present	Present
Endoplasmic reticulum :	Present	Present
Vacuole :	One big sap vacuole	Many small vacuoles
Chloroplasts :	Present	Absent
Cell wall :	Present	Absent

 **Note**

Cell organelles include mitochondria, golgi apparatus, endoplasmic reticulum, vacuoles and chloroplasts.

 **Give reasons for ...**

1. Animals cannot make their own food.

Because their cells don't contain chloroplasts.

2. The animal cell doesn't have a definite shape.

Because the animal cell doesn't have a cell wall.

3. Plant and animal cells have many of the same organelles.

Because the animal cell works similarly to the plant cell, where the organelles work in both of them similarly to provide the cell with its needs.

 **Check your understanding**

► Complete the following sentences using the words below :

(sap vacuole – cell wall – mitochondria)

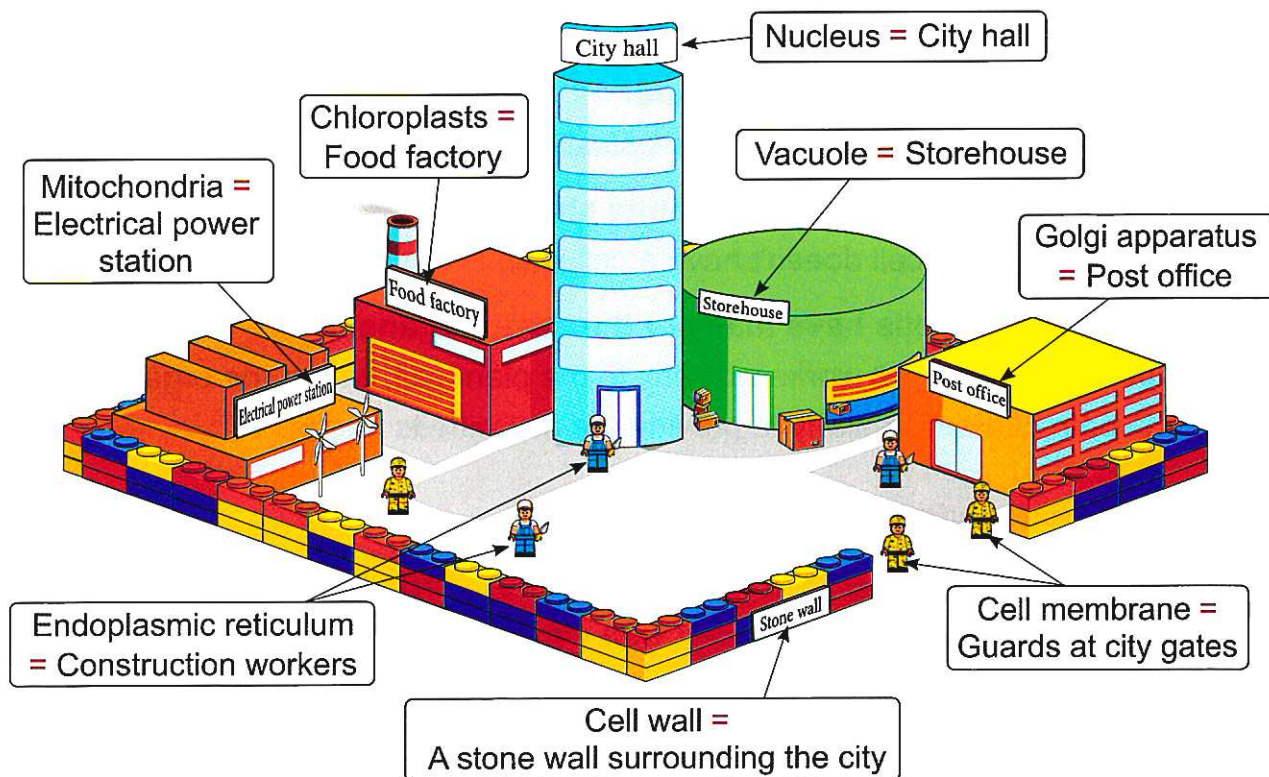
- Both animal cell and plant cell contain
- The plant cell has one big
- The animal cell doesn't have a

LESSON FIVE

Activity 10 Planning A Cell City

- In the previous activities, you have learned the different parts of cells and their functions.
 - The cell as a system looks like a city that has different buildings and structures to carry out the needed functions of the city.
- In this activity, you are going to design a city structures that could represent some different parts of the cell in the following table and figure :

Cell structures	City structures
Nucleus	City hall
Cell membrane	Guards at city gates
Mitochondria	Electrical power station
Endoplasmic reticulum	Construction workers
Golgi apparatus	Post office or Packaging factory
Vacuole	Storehouse or Storage facility
Cell wall (plants only)	A stone wall surrounding the city
Chloroplasts (plants only)	Food factory



city structures
city hall
guards
packaging factory

منشآت المدينة
مجلس إدارة المدينة
حراس
مصنع التعبئة والتغليف
electrical power station
post office
construction workers
storage facility

محطة توليد كهرباء
مكتب بريد
عمال بناء
مرفق التخزين
storehouse
food factory
gates

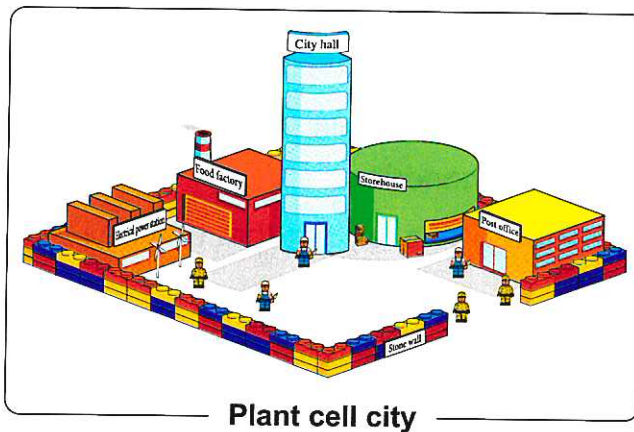
مخزن
مصنع غذاء
بوابات

Activity 11 Build A Cell City

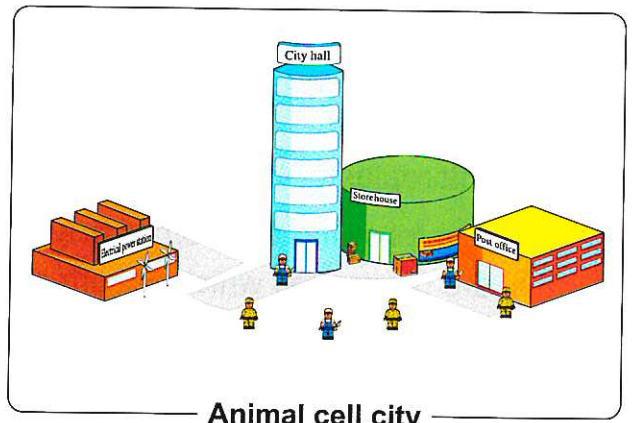
► In this activity, you will use your plan for building a cell city that you have developed in the previous activity to create a visual model of a plant cell and another model of an animal cell.

► What will you do ?

1. Review your plan for building a cell city that you created in the previous activity.
2. Build a model for the plant cell and another one for the animal cell and label the structures of each model.
3. Compare between the two models.



Plant cell city



Animal cell city



Note

There are two structures in plant cell that are not found in the animal cell, which are :

1. The stone wall surrounding the city (that represents the cell wall).
2. The food factory (that represents the chloroplasts).



Check your understanding

► Put (✓) or (x) :

1. The nucleus in the cell structure is similar to the food factory in the city structure. ()
2. Mitochondria in the cell structure are similar to the electrical power station in the city structure. ()

In the Assessment Book :

Try to answer :

Self-Assessment (4)

Exercises on Lessons 4 & 5

● Understand

● Apply

● Higher Thinking Skills

1 Choose the correct answer :

- 1. The cellulose forms the..... of plant cell.
a. cell membrane
b. cell wall
c. chloroplasts
d. sap vacuole
- 2. The function of the cell wall is
a. surrounding animal cell to give it a definite shape.
b. storing nutrients, water and waste materials inside the cell.
c. surrounding plant cell to give it a definite shape.
d. making food of plants by photosynthesis process.
- 3. All the following structures are found in onion cells only and not found in fish cells, except (Aswan 2024)
a. cell wall.
b. one sap vacuole.
c. chloroplasts.
d. mitochondria.
- 4. All the following are from characters of chloroplasts, except that they
a. are organelles which absorb sunlight.
b. contain tiny green granules.
c. are found in both plant and animal cells.
d. contain chlorophyll pigment.
- 5. All the following can be stored inside sap vacuole of plant cell, except
a. energy. b. nutrients. c. water. d. waste materials.
- 6. The animal cell doesn't have a definite shape, because it doesn't have a
a. cell membrane. b. cell wall.
c. chloroplast. d. nucleus.
- 7. All the following animals have bones in their bodies, except (Dakahlia 2024)
a. cats. b. dogs. c. birds. d. insects.
- 8. The animal cell cannot make photosynthesis process, because it doesn't have (Cairo 2024)
a. nucleus. b. chloroplasts. c. mitochondria. d. sap vacuole.
- 9. The structure which is found in the cells of a banana tree leaf and not found in the cells of a cat is
a. nucleus. b. golgi apparatus. c. cell membrane. d. cell wall.
- 10. Most plants appear in color due to the presence of chlorophyll pigment in their cells. (Giza 2024)
a. yellow b. blue c. green d. red

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Cell wall	a. stores nutrients, water and waste materials inside the plant cell.
2. Chloroplasts	b. surrounds the plant cell to give it a definite shape.
3. Sap vacuole	c. gives the animal cell its definite shape.
4. Chlorophyll	d. are organelles that contain tiny green granules.
	e. absorbs the energy of sunlight to help plant cells to make photosynthesis process.

1.

2.

3.

4.

3 Put (✓) or (x) :

1. The cell wall surrounds the cell membrane of animal cells. (*Kafr El-Sheikh 2024*) ()
2. There is one big vacuole in each cell of onion plant. ()
3. Chlorophyll is responsible for absorbing the energy of sunlight to make the food of plants. ()
4. The green color of plants is due to the presence of vacuoles in their cells. ()
5. There are many small vacuoles in the cells of a bird. ()
6. The exoskeleton gives some insects their shapes. (*Dakahlia 2024*) ()
7. The cells of human don't have definite shape due to the absence of cell membrane. ()
8. The horse can make its own food due to the presence of chloroplasts in its cells. ()

4 Complete the following sentences using the words below :**(exoskeleton – chlorophyll – cellulose – storehouses)**

1. The substance that forms the cell wall of the plant cell is known as
2. Some insects have definite shape due to the presence of which covers their bodies.
3. The cells of living organisms contain vacuoles that act as in the city.
4. Green plant leaves absorb the energy of sunlight by the help of in chloroplasts.

5 Write the scientific term of each of the following :

1. It surrounds the plant cell to give it a definite shape. (.....)
2. A big sac-like organelle in the plant cell, that stores nutrients, water and waste materials. (.....)

- 3. They are organelles, that contain tiny green granules and found in plant cells only. (.....)
- 4. It is a green pigment, that absorbs the energy of sunlight to make photosynthesis process in plants. (.....)

6 Complete the following sentences :

- 1. The cell wall is made up of and gives the plant cell its definite
- 2. The plant cell contains one big which stores nutrients, water and waste materials, while the animal cell contains many small which do the same function as in plant cell.
- 3. Apple tree leaves can make photosynthesis process due to the presence of in its cells.
- 4. The presence of pigment gives most plants their green color.
- 5. The chlorophyll absorbs the energy of to allow the plant to make its own food by process.
- 6. The cells of animals don't have definite shapes due to the absence of
- 7. The body of a bird has that give this bird its definite shape.

7 Give reasons for :

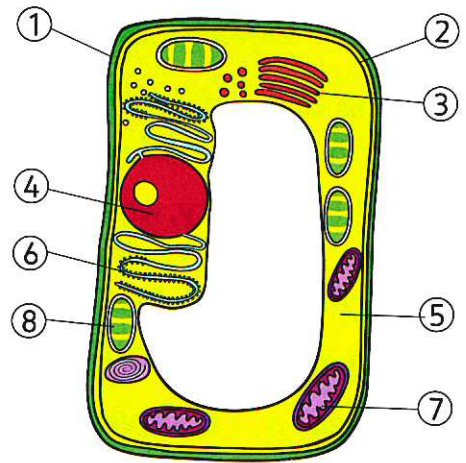
- 1. The plant cell has a definite shape. *(Luxor 2024)*
.....
- 2. The chlorophyll absorbs the energy of the sunlight.
.....
- 3. Mitochondria act as electrical power stations in cities. *(Giza 2024)*
.....
- 4. Vacuoles act as storehouse in cities.
.....

8 What happens if ...?

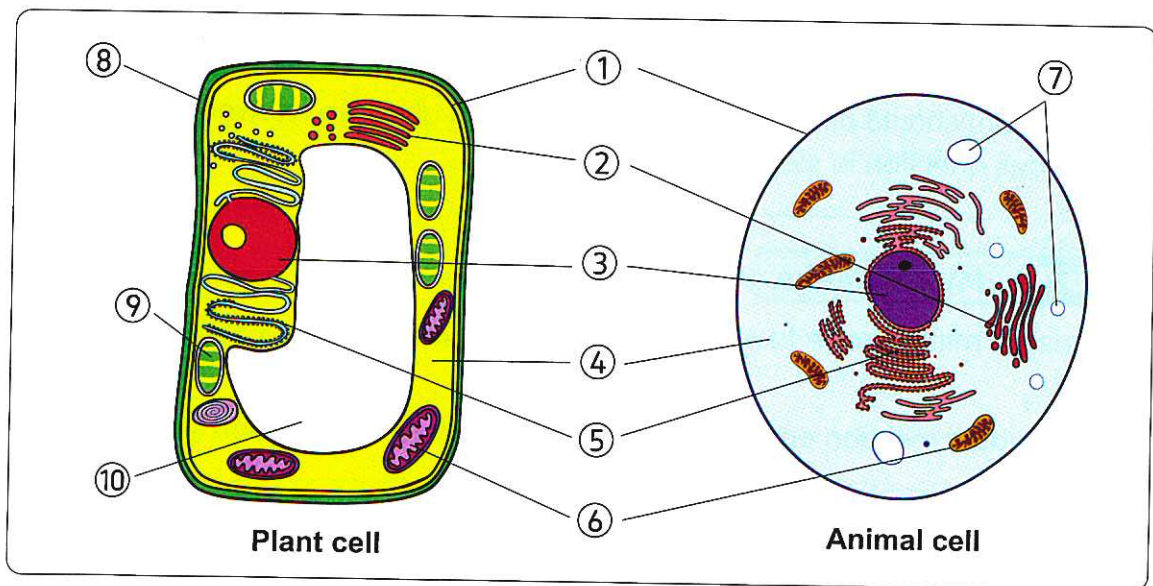
- 1. The animal cell is surrounded by a cell wall.
.....
- 2. Chloroplasts are found in the structure of the animal cells.
.....
.....
- 3. There are no bones found in the body of the cat.
.....

9 Look at the opposite figure, then complete the following sentences :

1. Structures number and are found in plant cell only.
2. Structures number , , and are found in both plant cell and animal cell.
3. Structure number acts like the city hall in cities.
4. Structure number is considered as the food factory of plant cell.



10 Label the following figures that show the differences between plant cell and animal cell :



(Assiut 2024)

- | | | | |
|---------|----------|---------|---------|
| 1. | 2. | 3. | 4. |
| 5. | 6. | 7. | 8. |
| 9. | 10. | | |

LESSON SIX

Activity 12 Record Evidence Like a Scientist

- ▶ In this concept, you have learned a lot about the structure of different types of cells, and the function of each of their parts.
- ▶ **In this activity**, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps :

• Step ① : The Question.

• Step ② : My Claim.

• Step ③ : My Evidence.

• Step ④ : My Scientific Explanation.

Step ① The Question What is a cell ?

Step ② My Claim

The cell is the main building unit of the living organism's body and all living organisms consist of one or more cells.

Note

Your claim should be formed of a sentence that gives an answer for the previous question in step ①.

Step ③ My Evidence

I can use a microscope to examine a slide of plant cells or a slide of animal cells.

Note

You should mention enough and suitable evidence that support your claim.

Step ④ My Scientific Explanation

- The cell is the main building unit of any living organism.
- Each of the cell components and its organelles has a specific function, where :
 - The cell membrane protects the cell and contains its components.
 - Cytoplasm is a thick liquid where all the cell components float.
 - The nucleus controls all the cell activities.
 - Mitochondria supplies the cell with the needed energy.

Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.

Activity 13 STEM in Action

Careers and Cell Biology :

- Cells are very tiny, where the diameter of an animal cell is about (0.001 cm).

Cell biologists :

- They use the microscope to magnify cells, so they seem larger.
- They work in laboratories and do experiments to study how cells work inside living organisms and how cells respond to different variables.
- They analyze data and present their conclusions to other researchers.
- Some cell biologists work with doctors to study how cells can work to repair body parts or how cells respond to different medicines.
- Some other cell biologists work in agriculture to study how plant cells respond to different environmental factors.



Note

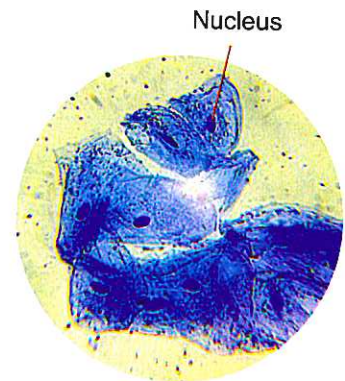
Cell biologists are scientists who study cells.



Cell biologists

Staining Cells :

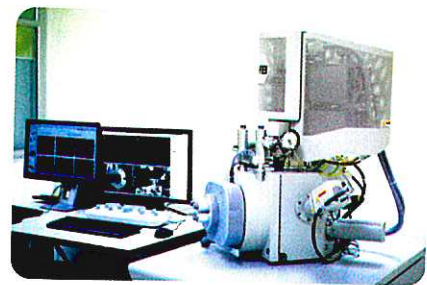
- Cells are usually **clear** and **colorless**, so it is hard to see their structures under microscope.
- **Stains (dyes)** are used to add color and make the cell's structures more visible (clearly).
- There are different types of stains, where some stains are used to highlight one part of cells and make it more visible such as "**methylene blue**" dye that helps you see the **nucleus** as a blue area in a sample of cheek lined membrane cells.



Cheek cells under microscope

Cells in 3D :

- Scientists have built a microscope that shows the cell in 3D, which means that they can see the top, sides and layers of a cell.
- **How does the 3D microscope work ?**
- The 3D microscope takes pictures of a cell in layers.
 - Then, a computer puts these layers together.
 - Finally, colors are added to the formed image.



3D microscope

diameter
experiments
variables

فُطْر
تجارب
متغيرات

stains/dyes
layers
cell biologists

صِبْغَات
طبقات
علماء الخلية

laboratories
respond
analyze

المعامل
يستجيب
يحلل

researchers
agriculture
cheek

باحثين
زراعة
الخد

► **How does the 3D microscope help scientists and doctors ?**

- The 3D microscope helps cell biologists to learn more about cell components and how cells divide.
- The 3D microscope helps doctors to treat cancer which is caused by cells that divide too quickly.



Check your understanding

► **Complete the following sentences using the words below :**

(methylene blue – cell biologists – 3D microscope)

1. The device that allows scientists to see the top, sides and layers of a cell is called
2. We can use dye to make the nucleus of a cell more visible.
3. Scientists who study cells are known as

Review on Concept (1.1)

To review this concept look at the **Assessment Book** "Part 2 : Final Revision".

In the Assessment Book :

Try to answer :

- Self-Assessment (5)
- Model Exam on Concept (1.1)

Exercises on Lesson 6

● Understand

● Apply

● Higher Thinking Skills

1 Choose the correct answer :

- Cell biologists use microscopes to magnify the to appear larger.
a. stones b. bricks c. cells d. rocks
- Cell biologists do experiments and analyze data to study all the following, except
a. how cells respond to different medicines.
b. how rocks are formed on Earth's surface.
c. how cells can work to repair body parts.
d. how plant cells respond to different environmental factors.
- To see the structure of a cell under microscope we must color it by using
a. stains. b. water. c. sunlight. d. vinegar.
- Methylene blue dye helps us to see the of the cell as a blue area under microscope.
a. cytoplasm b. golgi apparatus
c. chloroplasts d. nucleus
- The 3D microscope can help in all the following , except that it helps
a. cell biologists to learn more about cell components.
b. scientists to know how planets revolve around the Sun.
c. doctors to treat some diseases as cancer.
d. cell biologists to learn more about how cells divide.

2 Put (✓) or (x) :

- Cells are very large, as the diameter of an animal cell is about 0.001 cm. ()
- Cell biologists are scientists who study rocks. (Giza 2024) ()
- Cell biologists work in laboratories and do experiments to study how cells work inside living organisms. ()
- Cells are usually clear and colorless, so it is easy to see their structures under microscope. ()
- The 3D microscope can help doctors to treat cancer disease. ()

3 Write the scientific term of each of the following :

- They are scientists who study cells. (.....)
- A stain that is used to color the nucleus of the cell in blue color. (.....)
- The microscope that helps us to see the top, sides and layers of the cell. (.....)

4 Complete the following sentences using the words below :

(methylene blue – microscope – agriculture – cell biologists – doctors)

- 1. Cell biologists use a to magnify cells of bacteria.
- 2. Cell biologists work in to study plant cells and their respond to different environmental factors.
- 3. Cell biologists work with to study how cells can work to repair the human body parts. *(Cairo 2024)*
- 4. To see the nucleus of a cell under microscope, we can stain the cell with.....
- 5. The 3D microscope can help to learn more about how cells divide.

5 Give reasons for :

- 1. Some cell biologists work with doctors.

.....
.....

- 2. We must stain cells before examining them under microscope.

.....
.....

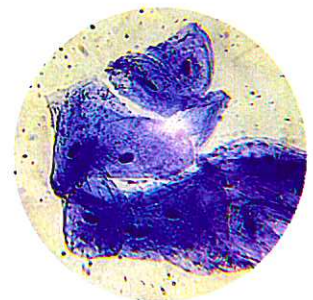
6 What happens if ...?

We stain a sample of cheek cells with methylene blue dye.

.....
.....

7 Look at the opposite picture, then complete the following sentences :

- 1. These cells seem large, because they are magnified by using a
- 2. The structure of the cell which appears clearly with blue color in the opposite picture is the
- 3. These cells are stained by dye.

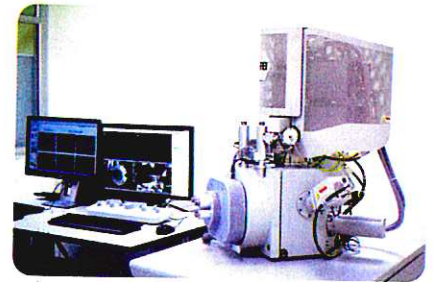


Cheek cells

8 Look at the opposite picture, then answer the following questions :

(A) Put (✓) or (X) :

1. This device helps doctors to treat some diseases such as cancer. ()
2. This device doesn't need a computer to do its functions. ()
3. This device helps cell biologists to see the cells in 3D. ()



3D microscope

(B) Rearrange the following sentences in the right order to show how this device works :

- A computer puts these layers together. (.....)
- Colors are added to the formed image. (.....)
- It takes pictures of a cell in layers. (.....)

1 (A) Choose the correct answer :

(5 marks)

- Growth of a living organism results from increasing the of cells in its body.
a. length b. size c. number d. mass
- You can see the cells of all the following under microscope , except
a. onion. b. human skin. c. leaf. d. stone.
- The two cell organelles which are responsible for transportation process are
a. mitochondria and golgi apparatus.
b. endoplasmic reticulum and golgi apparatus.
c. endoplasmic reticulum and mitochondria.
d. mitochondria and chloroplasts.
- The structure that is found in the cells of a banana tree leaf and not found in the cells of a cat is
a. nucleus. b. golgi apparatus.
c. cell membrane. d. cell wall.

(B) Give a reason for the following :

Plant cells can make photosynthesis process.

.....
.....

2 (A) Correct the underlined words :

(5 marks)

- The coarse focus and stage of a microscope are used to make the image of the examined sample clear. (.....)
- The animal cell has one big vacuole called sap vacuole. (.....)
- The body of a living organism that contains complex systems consists of one cell only. (.....)
- Mitochondria provide the cell with its needed food. (.....)

(B) What happens if ...?

There are no chloroplasts in plant cells.

.....

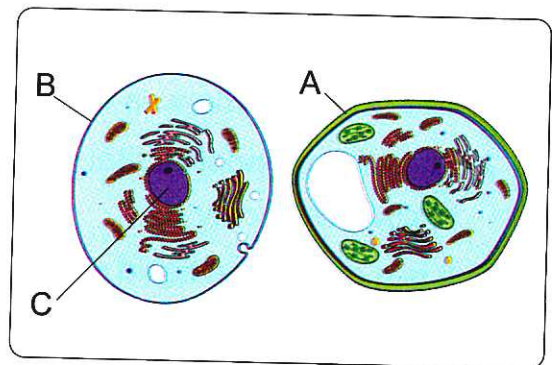
.....

3 (A) Write the scientific term of each of the following :*(5 marks)*

1. The component of the cell that allows water to enter and exit it. (.....)
2. They are living organisms, that their bodies consist of many cells. (.....)
3. A stain, that is used to color the nucleus of the cell in blue color. (.....)
4. It is a green pigment, that absorbs the energy of sunlight to make photosynthesis process in plants. (.....)

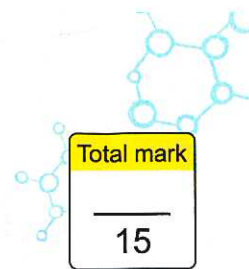
(B) Look at the opposite figure, then complete the following sentences :

1. Structure is found in plant cells only.
2. Structure allows water to go inside and outside the animal cell.
3. Structure is found in most of animal cells, and it is not found in some of them.



Model Exam 2

On Concept [1.1]



1 (A) Put (✓) or (X) :

(5 marks)

1. The animal cell is similar to the plant cell in shape and structure. ()
2. Cell biologists work in laboratories and do experiments to study how cells work inside living organisms. ()
3. The nucleus is found at the center of most cells. ()
4. We can see the cells of all living organisms with the naked eye. ()

(B) What happens if ...?

The animal cell is surrounded by a cell wall.

.....

2 (A) Write the scientific term of each of the following :

(5 marks)

1. The scientist who was the first person that use the word cell. (.....)
2. They are organelles that contain tiny green granules and found in plant cells only. (.....)
3. It is a gelatinous liquid which is found inside the cell. (.....)
4. The main building unit of the living organism's body that can do all vital activities. (.....)

(B) Give a reason for the following :

The cell works as a living system.

.....

.....

3 (A) Choose the correct answer :

(5 marks)

1. All the following living organisms bodies are build up of many cells, except
a. human. b. fish. c. plant. d. bacteria.
2. The structure of plant cell which is made up of cellulose is the
a. cell membrane. b. nucleus.
c. cell wall. d. cytoplasm.

