عنوان الدرس ..... التاريخ / /

Subject ..... Date / /

Chp # 1

→ Short qna :

Q2- What is the difference between the resolution and magnification of light microscope and electron microscope.

Answer :

Light Microscope	Electron Microscope
Magnification	
• it has 1500 x magnificat	• it has 1 to 50 times magnification.
Resoulation	
• it has low resolution than electron microscope	• it has high resoluti than light microscope
illuminating	
• It uses light (400-700)nm as an illuminating source	• it uses electron beam (1nm) as an illuminating source.

عنوان الدرس ..... التاريخ / /

Subject ..... Date / /

Q3- Name three organelles revealed by an electron microscope-

Ans:

The organelles that are revealed by electron microscope are:

① Cytoplasm: it is a gel like substance - and holds structure in place - EM provides clear view

② Plastids: Such as chloroplast in plants, responsible for photosynthesis.

③ Mitochondria: power house of the cell - they produce energy necessary for cellular process.

Q4- Why cell wall is not present in animal cells?

Cell wall is not present in animal cell because animal cell have different structural and functional needs. the absence of a cell wall allows for greater flexibility, movement and adaptability in their functions.

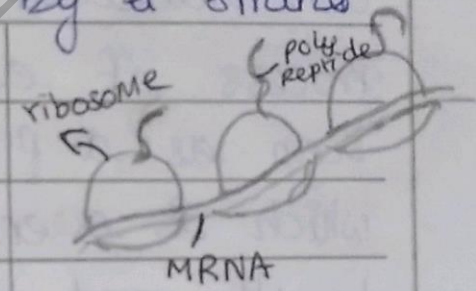
التاريخ / / ..... عنوان الدرس .....

Subject ..... Date / /

Q5- What holds the ribosomes together in a polysome?

Answer:

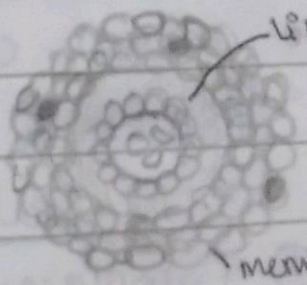
In a polysome, ribosomes are held together by a strand of (MRNA). When a sing mRNA molecule is translated by a strand by multiple ribosomes. it forms a structure called polysome. ribsomes attach to the MRNA at specific site.



Q6- What would happen if there would be no lysosome in human cells?

Answer:

The absence of lysosomes would severly disrupt cellular homeostasis, waste management, and immune response, ultimately jeopardizing the overall health of the organism. it can lead to potential diseases and disorder. eg: tay sachi diseas



التاريخ / / ..... عنوان الدرس

Subject ..... Date / /

Q7- Why lysosomes are called suicidal bags ?

Answer :

Lysosomes are known a suicidal bags because they contain digestive enzyme that can breakdown various biomolecules - they do the process of autophagy - This process can be seen as a process of programmed cell death which is essential for maintining overall cellular health and homeostasis -

Q8- Name the structurs and organelles which are common in • plant cell • animal cell • prokaryotic cell

Answer :

① Cell membrane : All three types have it
② Cytoplasm : The jelly like substance .
③ Ribosomes : sites of protein , may differ in size
④ DNA : genetic material
⑤ Cyteskeleton : Provides structure and support -

عنوان الدرس ..... التاريخ / /

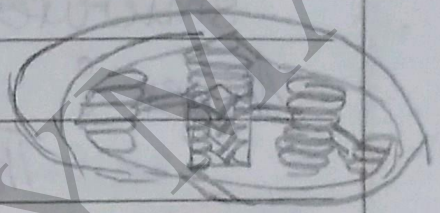
Subject ..... Date / /

Q9- How is chloroplast similar to a bacterium?

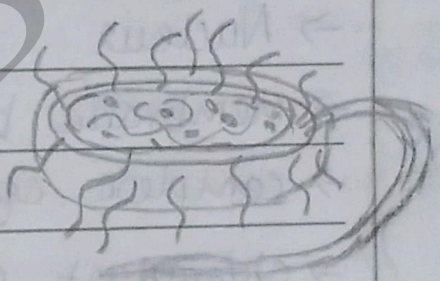
Answer:

Chloroplast is similar to bacterium in some key ways:

- They likely originated from bacteria.
- Both have double membrane
- Both have circular DNA
- They have similar ribosomes
- Both reproduce independently
- They have their own DNA



→ Chloroplast



→ bacterium

Q10- Name the organelles of eukaryotic cell and write their specif functions-

Answers:

Mitochondria - Breakdown sugar into energy for the cell- (ATP)

Chloroplast - Uses light energy to make food for plant cells-

Nucleus - it is the control centre of the cell - it is responsible for regulating gene expression and cell division.

التاريخ / / ..... عنوان الدرس

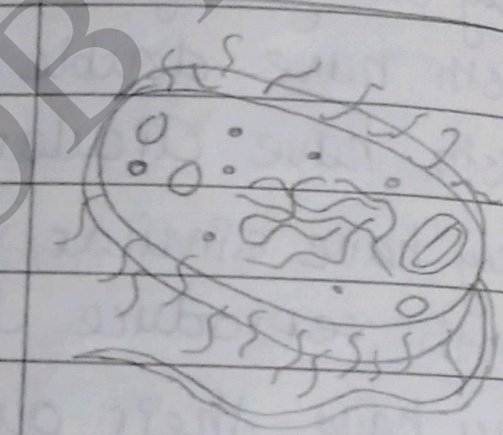
Subject ..... Date / /

Q11- What are prokaryotic cells? List the structures missing in prokaryotic cells.

Answer:

They are simple, unicellular organisms without some structures like:

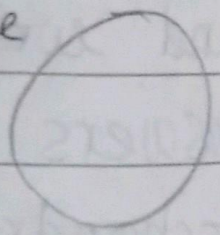
→ Nucleus
→ membrane bound organelles
→ complex cytoskeleton
→ chloroplast or centrioles

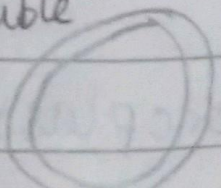


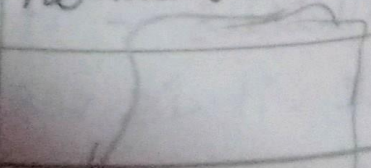
Q12- What organelles are single double and lacking any membrane?

Answer:

Single membrane	no membrane	double membrane
ER	Ribosomes	Nucleus
golgi apparatus	Cytoskeleton	Mitochondria
lysosomes	Centrioles	chloroplasts
peroxisomes	Proteasomes	







عنوان الدرس ..... التاريخ / /

Subject ..... Date / /

Q13- Compare the chemical composition of nucleoplasm with that of cytoplasm.

Nucleoplasm	Cytoplasm
Location	
inside the nucleus.	outside the nucleus, within cell mem
Composition	
Nucleotides, enzyme, DNA RNA, proteins	water, salts, protein lipids, carbohydrates
Function	
Supports nuclear components site of DNA and RNA	site of metabolic process, supports organelles

Q14- Explain the nucleoli are the areas where ribosomes are assembled.

Answer:

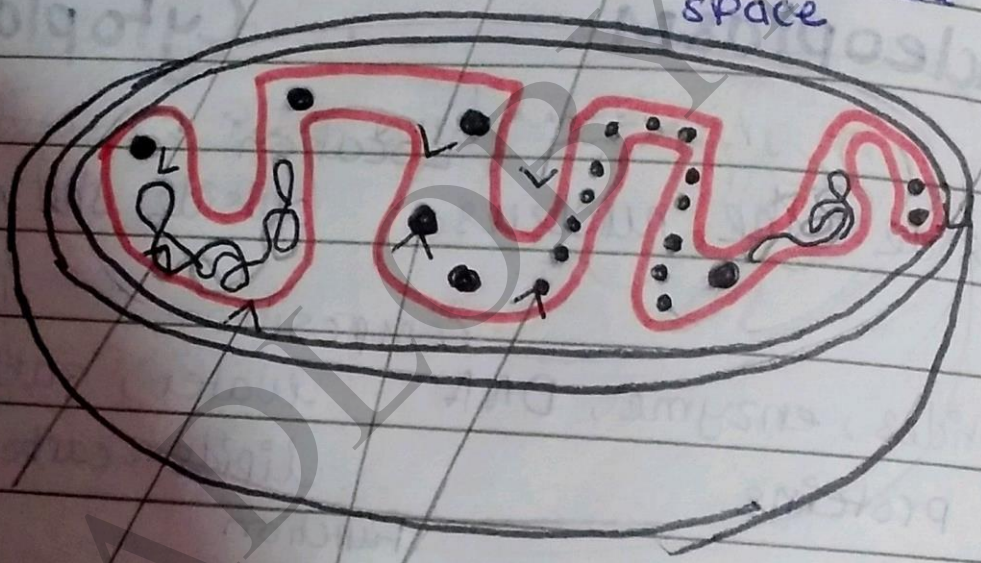
the nucleoi serve as assembly sites for ribosomes, bringing togther rRNA and ribosomal protcins to create the machinery needed for protcin synthesis in the cell.

التاريخ / / ..... عنوان الدرس

Subject ..... Date / /

Q15- Draw a labelled diagram of a section through :

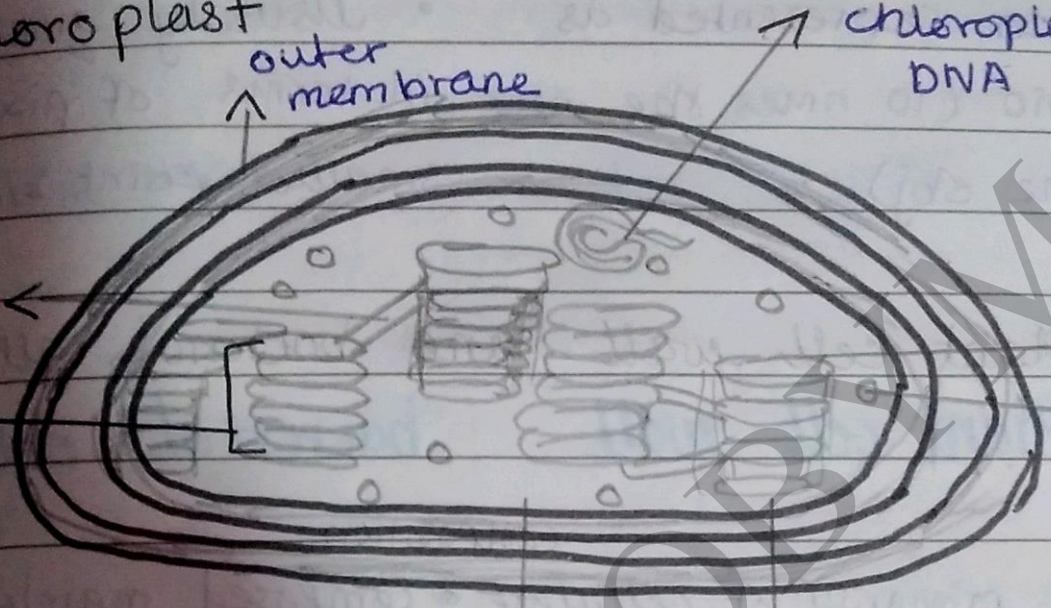
(a) mitochondrion



التاريخ / / ..... عنوان الدرس

Subject ..... Date / /

(b) chloroplast



Q16- Write the difference between :

Magnification	Resolution
Defination	
• The process of enlarging the appearance of an object	• The ability to distinguish fine details in an image
purpose	
• increase the size compared to actual obj size	• allows the identification of small features
effect	
• does not necessarily improve the level of detail	• higher resolution results is clearer view

عنوان الدرس .....

/ / التاريخ .....

Subject ..... Date / /

Measurment	
• often represented as a ratio (10 times the size of the obj)	• Usually quantified in terms of pixels or smallest point b/w 2 points

(b) Plant cell wall and bacterial cell wall.

Plant cell wall	bacterial cell wall
Composition	
• Made primarily of cellulose a carbohydrate she provides structural support.	• composed mainly of peptidoglycan, a polymer consisting sugar and amino acid.
function	
• Provides support, protection and maintain cell shape involved in preventing acessiv water uptake.	• Protects the bacterium maintains its shape and prevents osmotic lysis.
permeability	
• Semi-permeable, allowing passage of water, gases and some dissolved substances.	• its permeability can be selective

التاريخ / / ..... عنوان الدرس .....

Subject ..... Date / /

(c) cytoplasm of eukaryotic and prokaryotic cell -

eukaryotic	Prokaryotic
structure	
• gel like substance it contains cytosol and organelles	• gel like substance contains cytosol but lacks organelles.
complexity	
• its is more complex with highly organized structure.	• it is simplier with fewer internal organelles
Nucleoid	
• the cytoplasm surrounds the nucleus it is the house of genetic material	• in this the genetic material is ~~present~~ located in nucleoid not enclosed in membrane

عنوان الدرس .....

/ / التاريخ .....

Subject ..... Date / /

(d) rough ER and smooth ER

Rough ER	Smooth ER
presence of ribosomes.	
• the ribosomes are attached to its surface, to give rough appearance.	• ribosomes are not present on its surface
function	
involved in synthesis and modification of protein especially those are secreted inserted or sent to lysesomes	involved in synthesis of lipids, steroid, hormones and detoxification. it also stores calcium ions.
location	
found in cells that produce large amount of proteins.	found in cells that are involved in lipid production such that liver cells and gonadal cells.

التاريخ / / ..... عنوان الدرس .....

Subject ..... Date / /

(e) chromatin and chromosomes

Chromatin	Chromosomes
Structure	
• it is a loose, thread like structure made up of DNA and proteins.	• These are compact, rod like structures formed by highly coiled chromatin.
function	
stores genetic information and involved in trascription (copying of DNA into RNA)	carry genetic information in form of genes and esure equal distribution.
Condensation	
chromatin condenses into chromosomes during cell division.	are condensed form of chromatin that allows seperation.

عنوان الدرس .....

التاريخ / ..... Date / /

Subject .....

Q17- What are vesicels and what function they form ?

Answer :

Vesicels are small, membrane - bound sacs - they transport materials between different organelles to the cell membrane for secretion.

- The store substances
- it contains digestive enzyme to break down waste.
- it is involved in endo and exocytosis -

Q18 - What are the techniques that can be used to study plasma membrane.

Answer :

To study plasma membrane, several techniques are commonly used :

- Electron Microscopy
- Fluorescence Microscopy
- Transmission Electron Microscopy

Plasma membrane ... material across the cell. Transport across ... and ionic concentration within the cell for enzyme activity.

The techniques used in studying cell membrane

The biophysical imaging techniques, such as atomic force microscopy and super-... fluorescent microscopy, have been developed to study biological structures. Scanning ... microscopy (SEM) is one of the fundamental techniques for membrane characterization ... the morphology and topography data of the prepared membranes. SEM can be ... determine the pore size in the case of a porous membrane.

1.6 CELL SIGNALING

The process by which cells communicate with other cells within their body or with the ... environment is called cell signaling. Or simply the transfer of information from one ... another is called **cell signaling.** Q-19 (a)

Ligands and Receptors

The signaling **molecules** are also known as **ligands**. They initiate signaling. Different ty... molecules can serve as signaling molecules. They can be proteins, lipids, amino ... metabolites, gases and many others.

The proteins that respond to ligands are called **receptors**. Signaling molecules and rece... exist in several varieties; however, a signaling molecule will bind to a specific receptor ... typically binds only one type of signaling molecule.

1. **Reception:** Reception is the target cell's detection of a signal molecule coming from ou... the cell. A chemical signal is detector when it binds to a receptor protein located at ... cell's surface or inside the cell.

of light microscope

Magnification: The magnification is the capacity of an optical instrument to increase the size of an object than its original size. The objects which cannot be seen by naked eye can also be observed by increasing magnification. Different lenses have different magnification powers which are represented by the letter 'X' that means that the number of times than original size. Therefore, a lens of 10X magnification can increase the size of an object of 1 μ m to 10 μ m.

The total magnification can be calculated by multiplying the objective lens value by the ocular lens value. Maximum magnification of a light microscope is 1500 X, using a 100X objective and 15X ocular lens. An electron microscope can magnify specimens between 1 and 50 million times depending on which type is used.

Resolution: It is a measure of the microscope's ability to distinguish between two points which are close together on an object. If a microscope can clearly distinguish between the two points, it has a good or high resolution. The resolution of naked eye is 0.1mm. This resolution cannot be increased by increasing magnification. The resolving power of a light microscope is 250 nm. The resolving power of an electron microscope is 0.2 nm.

Difference: The difference between magnification and resolution is that magnification is the ability to make small objects seen larger by using optical instruments e.g., microscope. Resolution is the ability to distinguish two objects from each other.

1.3.1. Electron Microscopy

Principle of Electron Microscopy: It uses the beam of accelerated electrons to visualize the specimens and has a high resolution.

in the body or a laboratory, stem cells
cells called daughter cells.

These daughter cells become either new stem cells or specialized cells (differentiation) with a more specific function, such as blood cells, nerve, cells, liver cells, heart muscle cells or bone cells. No other cell in the body has the natural ability to generate new cell types.

into more specialized types of cells.

A stem cell can be defined as "It is a cell with the unique ability to develop into specialized cell types in the body."

Nerve cells

Liver cells

Advantages of using stem cells: New cells

Types of stem cells

Researchers categorize stem cells, according to their potential to differentiate into other types of cells. The full classification includes:

Totipotent: These stem cells can differentiate into all possible cell types. The first few cells that appear as the zygote starts to divide are totipotent.

Pluripotent: These cells can turn into almost any cell. Cells from the early embryo are pluripotent.

Multipotent: These cells can differentiate into a closely related family of cells. Adult hematopoietic stem cells, for example, can become red and white blood cells or platelets.

Oligopotent: These can differentiate into a few different cell types. Adult lymphoid or myeloid

Exocytosis and endocytosis are two processes that [illegible] materials that cannot diffuse through the lipid bilayer to cross the cell membrane.

Endocytosis

Endocytosis is the process by which substances are engulfed within the cell membrane, which then forms a vesicle containing the ingested material.

The two main subtypes of endocytosis are Phagocytosis and Pinocytosis.

Phagocytosis

Phagocytosis is the process through which phagocytes, or liver cells ingest or consume other cells or particles. A phagocyte may be Amoeba or white blood cells. Some species e.g., sponges, *Amoeba* have a way of feeding called phagocytosis. Extensions of the cytoplasm, termed **pseudopodia** ('false feet'), sense, surround and enclose the target, creating a **vacuole** or **phagosome** on the inside of the cell membrane. In higher animals phagocytosis is primarily a defensive mechanism to infection and antigens.

Phagocytosis

pits, as they are coated with proteins causes the coat
pit to invaginate and become a coated vesicle, bringi
the desired ligand into the cell.

Exocytosis

Exocytosis is the process by which the transfer of material takes place from inside of the cell to the outside of the cell. It is an active transport. Vesicles are packaged within the cell and transported to the cell membrane, where their **phospholipid bilayers** fuse. This allows the contents to be released outside the cell. Exocytosis is used in many areas of the body, including neurotransmitter release at synapses or release of secretions in the sweat glands.

التاريخ / / ..... عنوان الدرس

Subject ..... Date / /

- Freeze - fracture EM
- Cell fractionation
- Mass spectrometry.

Q 20- What are the advantages of using stem cell.

Answer:

Stem cells offer advantages in regenerative medicine, disease treatment personalized therapies, drug testing and research. They can repair damaged tissues, provide personalized treatments model diseases for drug development.