

CAIE Biology A-level

Topic 1: Cell Structure

Flashcards

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State the units for millimeters (mm), micrometres (μm) and nanometres (nm) relative to centimetres (cm).



State the units for millimeters (mm), micrometres (μm) and nanometres (nm) relative to centimetres (cm).

1 cm =

10 mm

10000 μm

10000000 nm



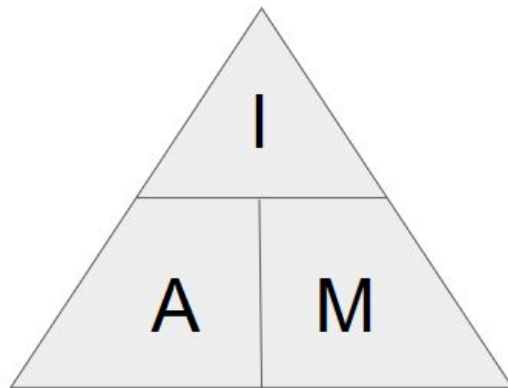
What is the equation for calculating the actual size of a specimen in microscopy?



What is the equation for calculating the actual size of a specimen in microscopy?

$$\text{actual size} = \frac{\text{image size}}{\text{magnification}}$$

You should be familiar with rearranging this equation to account for the data provided.



Define magnification.



Define magnification.

The number of times an image is larger than the original.



Define resolution.



Define resolution.

The smallest distance between 2 points where the 2 points can still be distinguished.



What are the two types of microscope?



What are the two types of microscope?

Optical microscopes and electron microscopes.



Which type of microscope has better resolution?



Which type of microscope has better resolution?

Electron microscopes, because the wavelength of an electron is shorter than the wavelength of light.



Describe the structure of the nucleus.



Describe the structure of the nucleus.

The nucleus is surrounded by the nuclear envelope, a double membrane. Nuclear pores enable movement of molecules into and out of the nucleus.

The genetic material is found within the nucleus, usually as chromatin.

The nucleolus is a region within the nucleus that synthesises ribosomes.

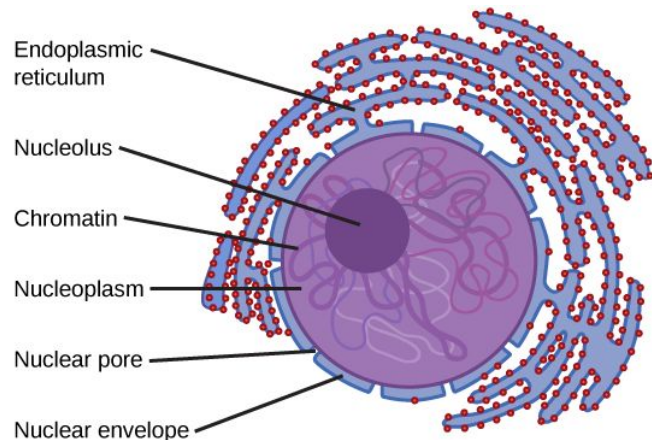


Image by OpenStax; CC BY 4.0;
https://cnx.org/contents/GFy_h8cu@10.8:FPF-phh_T@14/Eukaryotic-Cells#fig-ch04-03-04



What are the roles of the nucleus?



What are the roles of the nucleus?

To store the genetic material (DNA) of the cell.

To synthesise ribosomes.

To regulate production of messenger RNA for protein synthesis.



What are the functions of the cell surface membrane?



What are the functions of the cell surface membrane?

It encloses cell to form the boundary between the cytoplasm and the outside environment.

To control the movement of substances in and out of the cell, as it is selectively permeable.

Contains proteins and important molecules for cell signalling and recognition.



How does the structure of the rough endoplasmic reticulum (RER) relate to its function?



How does the structure of the rough endoplasmic reticulum (RER) relate to its function?

The RER contains ribosomes on its surface for the synthesis of proteins.

The RER membranes spread extensively throughout the cell for the transport of proteins.



How does the structure of the smooth endoplasmic reticulum (SER) differ from that of the rough endoplasmic reticulum (RER)?



How does the structure of the smooth endoplasmic reticulum (SER) differ from that of the rough endoplasmic reticulum (RER)?

The SER does not have ribosomes on its outer surface.



What is the function of the smooth endoplasmic reticulum (SER)?



What is the function of the smooth endoplasmic reticulum (SER)?

The SER synthesises and transports lipids.



Describe the structure of mitochondria.



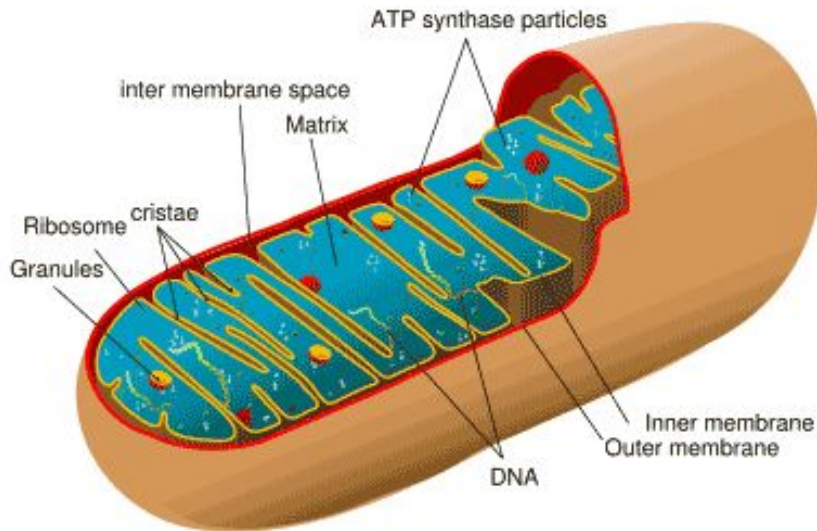
Describe the structure of mitochondria.

Oval-shaped.

Double membrane bound, inner membrane folded into cristae.

Contains jelly-like fluid called the matrix.

Contains circular DNA and 70S ribosomes.



<http://palaeos.com/metazoa/glossary/images/mitochondrion.gif>



Which important process occurs at the mitochondria?



Which important process occurs at the mitochondria?

Aerobic respiration, which produces ATP. The ATP is used for energy-requiring processes.



State the function of the Golgi Body.



State the function of the Golgi Body.

Modification and packaging of protein and lipids for exocytosis or distribution within the cell. It also produces lysosomes.



What are lysosomes?



What are lysosomes?

Vesicles from the Golgi body that contain digestive enzymes e.g. proteases, lipases and lysozymes.



List the functions of lysosomes.



List the functions of lysosomes.

They hydrolyse ingested pathogens in phagocytes.

They digest old, worn out organelles in the cells.

They break down cells after cell death.



What are the two types of ribosome, and where are they found?



What are the two types of ribosome, and where are they found?

80S ribosomes are found in eukaryotic cells - in the cytoplasm and on the RER.

70S ribosomes are found in prokaryotic cells, chloroplasts and mitochondria.



Describe the structure of ribosomes.



Describe the structure of ribosomes.

Ribosomes contain two subunits. Each subunit is made up of a ribosomal RNA molecule and a protein.



What is the function of ribosomes?



What is the function of ribosomes?

Protein synthesis.



State the function of centrioles and microtubules.



State the function of centrioles and microtubules.

Centrioles replicate during interphase and organise microtubules during mitosis.

Microtubules compose the cytoskeleton to give structure and allow transport within the cell.



What is a cilium?



What is a cilium?

A cilium is a hair-like structure that projects from a cell. The cilium may be able to move (motile) or be stationary (non-motile).



What role do cilia play in the respiratory system?



What role do cilia play in the respiratory system?

The cilia on respiratory epithelial cells waft mucus and pathogens or foreign material upwards and out of the lungs.



What are microvilli?



What are microvilli?

Microvilli are small protrusions of the cell membrane.



How do microvilli aid exchange of substances in cells?



How do microvilli aid exchange of substances in cells?

The microvilli increase the surface area of a cell to increase the efficiency of exchange. For example, the epithelial cells of the intestines have microvilli to absorb the products of digestion.

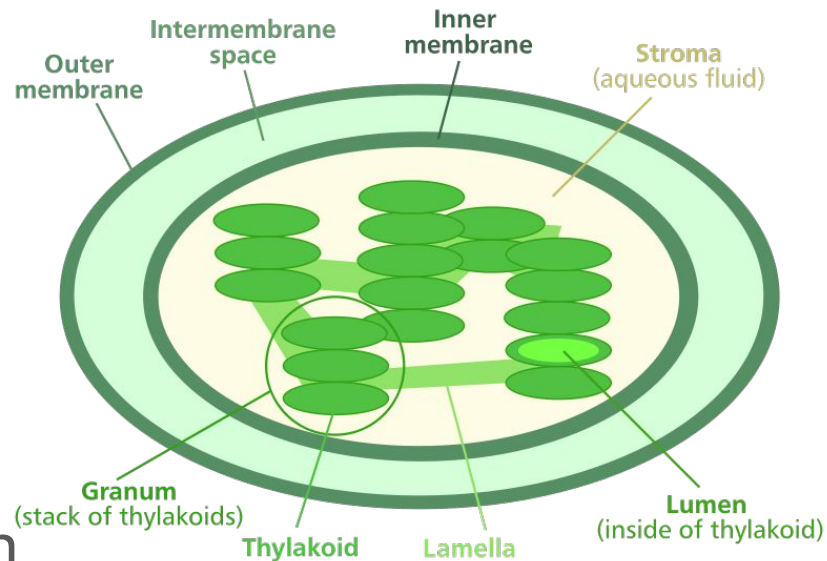


Describe the structure of chloroplasts.



Describe the structure of chloroplasts.

Chloroplasts have a double membrane and contain a fluid called stroma. Within the chloroplast, thylakoids are arranged into interconnected stacks of grana. They also contain 70S ribosomes and circular DNA.



https://en.wikipedia.org/wiki/File:Chloroplast_diagram.svg



Name the photosynthetic pigment in chloroplasts.



Name the photosynthetic pigment in chloroplasts.

Chlorophyll.



What is the function of chloroplasts?



What is the function of chloroplasts?

Photosynthesis, producing glucose, oxygen and some ATP.



Which eukaryotic cells contain a cell wall?



Which eukaryotic cells contain a cell wall?

Plant cells, algal cells and fungal cells.

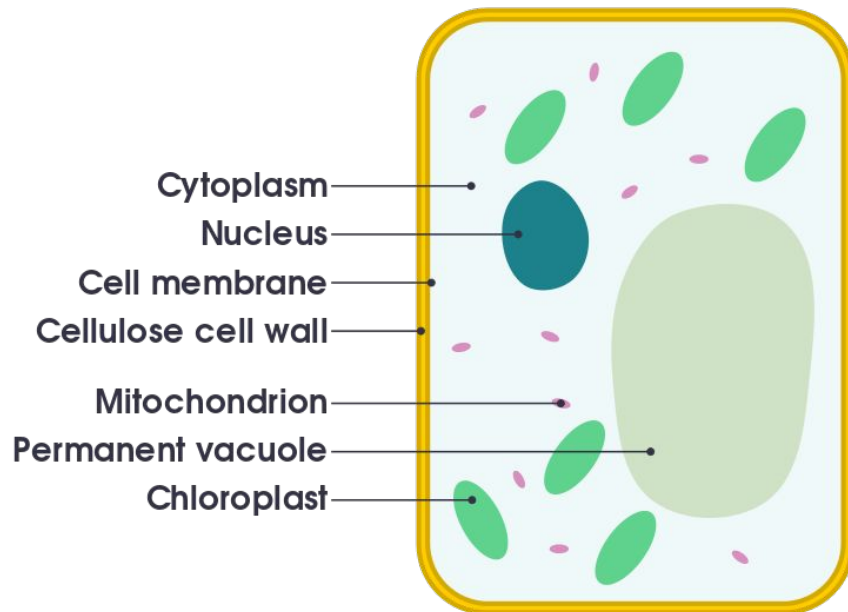


Name the main constituent of plant cell walls.



Name the main constituent of plant cell walls.

Cellulose.



By domdomegg - Own work, CC BY 4.0,
<https://commons.wikimedia.org/w/index.php?curid=46468379>



Identify the functions of the plant cell wall.



Identify the functions of the plant cell wall.

It provides mechanical strength to the plant.

It protects the cell from osmotic lysis.

It can regulate the movement of water.



In which type of cell are plasmodesmata found?



In which type of cell are plasmodesmata found?

Plant and algal cells.



What are the functions of plasmodesmata?



What are the functions of plasmodesmata?

To allow the uninterrupted flow of materials via the symplastic route, and the efficient exchange of substances between cells without having to cross the cell wall and membrane.



Name the membrane surrounding the large permanent vacuole.



Name the membrane surrounding the large permanent vacuole.

The tonoplast.



State the function of the large permanent vacuole.



State the function of the large permanent vacuole.

Stores cell sap, which contains sugars, pigments and waste substances.

Role in maintaining turgor pressure.

Acts as a temporary food store.



Name the organelles and cell structures that are present in plant cells, but not in animal cells.



Name the organelles and cell structures that are present in plant cells, but not in animal cells.

A cell wall

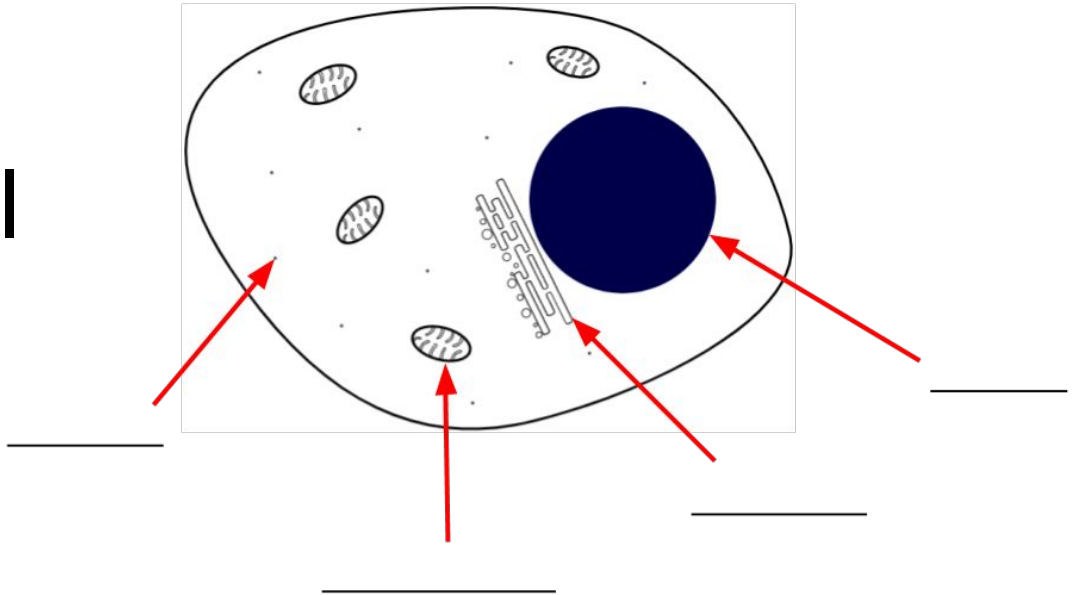
Chloroplasts

Large permanent vacuole and tonoplast

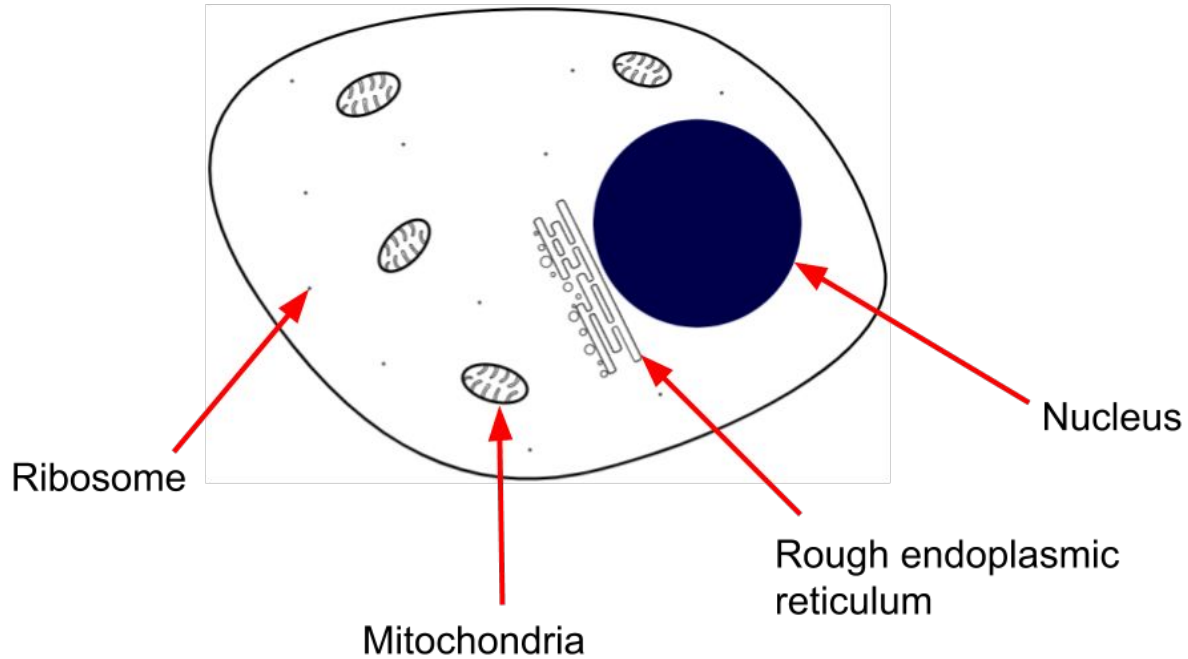
Plasmodesmata



Label the cell structures.



Label the cell structures.



Bacterial cells are what kind of cell?



Bacterial cells are what kind of cell?

Prokaryotic cells.



Compare eukaryotic and prokaryotic cells.



Compare eukaryotes and prokaryotes

Prokaryotic	Eukaryotic
Small 1-5 μ m diameter, usually unicellular	Large- up to 40 μ m, usually multicellular
No membrane-bound organelles, no nucleus	Organelles may feature no membrane, a single membrane or a double membrane, true nucleus
Circular DNA- plasmid rings	Linear chromosomes associated with histones
70S ribosomes	80S ribosomes
Peptidoglycan cell wall	Cell wall made of cellulose (plants) or chitin (fungi)
No endoplasmic reticulum	Features endoplasmic reticulum



Outline the key features of viruses.



Outline the key features of viruses.

They are acellular structures.

Viruses contain nucleic acids (either RNA or DNA) surrounded by a protein coat known as a capsid. The capsid can have attachment proteins to gain access to host cells.

Viruses possess no organelles or ribosomes and so rely on host cells to synthesise the components of viral particles.

Some viruses may have a phospholipid envelope surrounding the capsid e.g. HIV.

