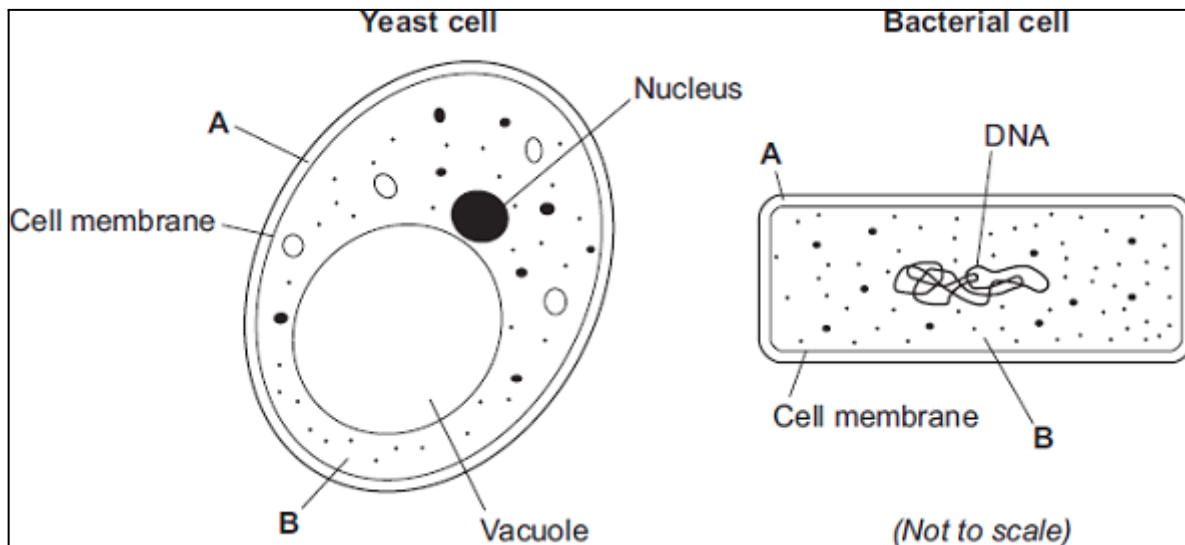


## GCSE Cells revision.



Name:



1. What is the key difference between prokaryotic and eukaryotic cells?

Eukaryotic cells have membrane bound organelles like mitochondria, chloroplasts and a nucleus.

Prokaryotic cells do not have any membrane bound organelles.

2. What is genetic material?

DNA is the genetic material found in cells - It may be loose in the cytoplasm or stored as chromosomes in the nucleus.

3. How is the genetic material stored in a eukaryotic cell?

DNA is stored as chromosomes within the nucleus of eukaryotic cells.

4. How is the genetic material stored in a prokaryotic cell?

DNA is stored as a loop within the cytoplasm of a prokaryotic cell.

5. What is the general difference in size when comparing prokaryotic and eukaryotic cells?

Eukaryotic cells are much bigger than prokaryotic cell

1. What is an organelle?

Organelles are subcellular structures found within cells eg Mitochondria, chloroplasts, ribosomes

2. What is the function of the nucleus? (Hint what does it store)

The nucleus stores DNA in the form of chromosomes which come in pairs. Humans have 23 pairs or 46 chromosomes in total

3. What is the function of the cytoplasm?

The cytoplasm is the site of most of the chemical reactions which take place within the cell.

4. What is the function of the cell membrane?

The membrane is partially permeable - this means that it allows the entry or exit of certain substances from the cell.

5. What is structure A and what is its function?

ignore

1. What are ribosomes responsible for? (be specific about how they do their job)

Ribosomes are the organelles responsible for the synthesis of proteins using free amino acids from within the cytoplasm.

2. What is the function of a chloroplast?

Chloroplasts are organelles which contain a green pigment called chlorophyll. Chloroplasts allow plant cells to carry out photosynthesis.

3. What is the pigment stored in chloroplasts called?

Chlorophyll

4. What does a permanent vacuole contain?

The vacuole contains cell sap. This is a solution of salts and sugars. The vacuole allows for storage and provides support to the cell.

5. What is the function of the cell wall in a plant and bacterial cell

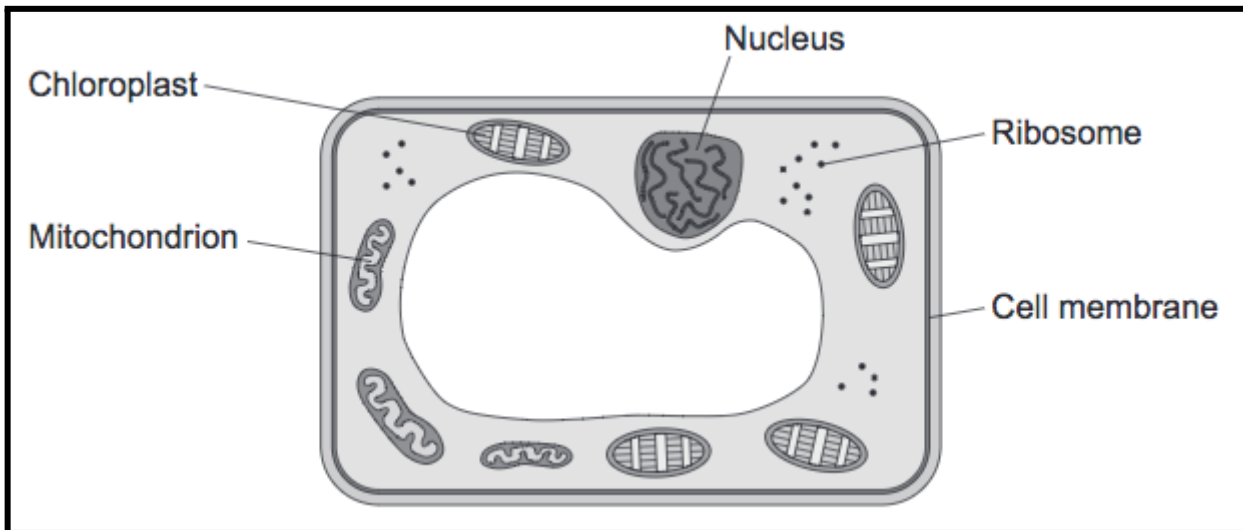
The cell wall provides rigidity and support. The rigidity protects the cell from bursting due to osmosis.

6. Why is it not possible to find mitochondria in prokaryotic (bacterial cells)

A mitochondria is about the same size as a bacterial / prokaryotic cell, so they would not be able to fit into a bacterial cell.

7. What is the only organelle found in both prokaryotic and eukaryotic cells?

Ribosomes



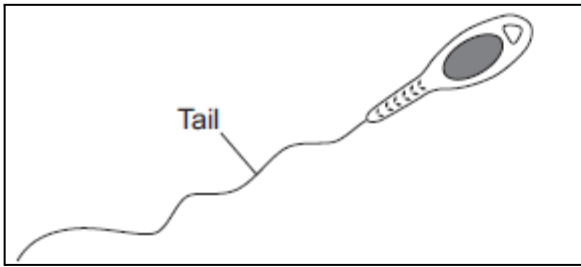
The parts of a plant cell have different functions.

Glucose and proteins are made in plant cells.

Describe how the parts of a plant cell are involved in the production of glucose and Proteins.

[6 marks]

|                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| → Carbon dioxide diffuses across the cell membrane from a high to a low concentration, into the cytoplasm                                                                         |
| → Carbon dioxide then diffuses into the chloroplast, which using chlorophyll and light energy from the sun carries out the process of photosynthesis producing the sugar glucose. |
| → The energy stored within the glucose molecule is then released in the process called aerobic respiration which takes place in the mitochondria.                                 |
| → The energy released during aerobic respiration is supplied to the ribosomes which use the energy to synthesis proteins from amino acids                                         |
| → To do this the ribosomes use the genetic code stored within the genes, which are found within the chromosomes, which is how the DNA is stored within the nucleus of the cell    |
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1. What is the function of sperm cells and how are they specialised to allow them to carry out their function?

- Sperm cells are male gametes (sex cells) which carry half of the fathers DNA.
- They have a tail which provides propulsion to allow them to reach the egg
- The head piece has an acrosome containing enzymes which allow the sperm to digest its way into the egg.
- The midpiece is packed with mitochondria which release energy during aerobic respiration for propulsion and the cells other life processes.

2. What is the function of nerve cells and how are nerve cells specialised to carry out their function?

- The nerve cell is long, so that nerves can run to and from different parts of the body to the central nervous system.
- The cell has extensions and branches, so that it can communicate with other nerve cells, muscles and glands.
- The nerve cell is covered with a fatty sheath, which insulates the nerve cell and speeds up the nerve impulse.

3. What is the function of muscle cells?

- Muscle cells have protein fibres within them that allow them to contract which allows movement
- Contraction requires a lot of energy, so mitochondria are packed with mitochondria to allow this.

4. Where are root hair cells found and how are they specialised to allow they to carry out their role in the root?

- Root hair cells are found on the root.
- They are very small but numerous which increases the surface area of the root
- This increases the surface area for osmosis, the movement of water and also the movement of mineral ions by diffusion and or active transport,

5. Where are xylem cells found and how are they specialised to allow them to carry out their function?

→ Xylem cells are found in the leaves, stem and roots of plants

→ They are specialised cells which form vessels, which allow the movement of water and minerals in a process called transpiration.

6. Where are phloem cells found and how are they specialised to allow them to carry out their function?

→ Phloem cells are found in the leaves, stems and roots of plants

→ They are formed from specialised cells to form vessels which allow the movement of sugars and amino acids through the plant in a process called translocation.

7. What happens during the process of differentiation?

→ Unspecialised Stem cells divide

→ One of the unspecialised cells then differentiates to become a more specialised kind of cell.

8. What is the formula for magnification?

Magnification = Observed size

Actual size

9. What does the term resolution mean?

→ The ability of a microscope to be able to distinguish between two separate objects.

10. What is the advantage of using an electron microscope?

→ Very high magnification

→ Very high resolution (able to distinguish between two separate objects /organelles)

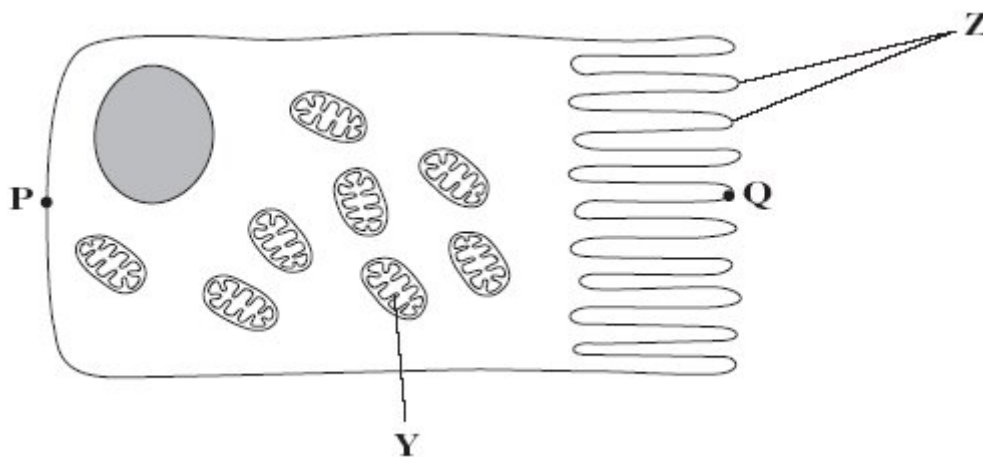
11. What are the disadvantages of using an electron microscope?

→ Cells or organisms are dead as they need to be coated in gold and under a vacuum when being viewed.

12. What is the advantage of using a light microscope?

→ Cells or organisms are still alive so life process can be observed in a living cell.

13. What are the disadvantages of using light microscopes?



(a) (i) Name organelle Y.

Mitochondria

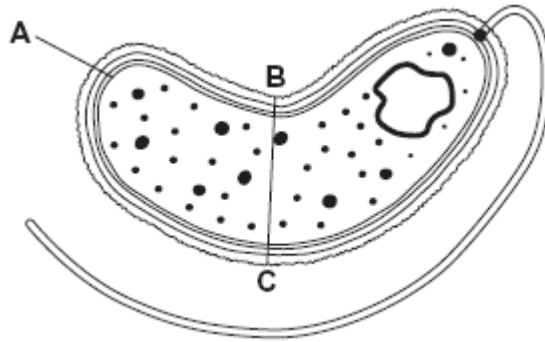
(1)

(b) This diagram shows the cell magnified 1000 times. Calculate the actual length of the cell between points P and Q. Give your answer in  $\mu\text{m}$ . Show your working.

$$a = \frac{o}{M}$$

A =

Answer .....  $\mu\text{m}$



x50000

- (d) Calculate the actual width of the cholera bacterium between points B and C. Give your answer in micrometres and show your working.

Answer .....  $\mu\text{m}$

## Cell division

1. How is DNA stored within the nucleus of eukaryotic cells?

→ As pairs of homologous chromosomes found within the nucleus of the cell.

2. What are found along the length of each chromosome?

→ Genes - sections of DNA that provide the genetic code for the synthesis of a protein



3. Why does mitosis occur?

→ For growth to occur an organism needs to increase the number of its cells.

→ Mitosis needs to occur to replace dead or damaged cells

4. What is the end result of mitosis?

→ Two genetically identical daughter cells

## Stem Cells

1. What is a stem cell?

→ A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation.

2. What happens to stem cells when they divide?

→ They differentiate allowing one of the unspecialised daughter cells to differentiate into a specialised cell

3. Where are human stem cells obtained from?

→ Adult stem cells can be obtained from sources such as bone marrow.

→ Embryonic stem cells are obtained from human embryos.

4. What medical conditions are hope to be treated using stem cells?

→ Type 1 diabetes

→ Paralysis

5. What happens during embryo cloning?

→ In therapeutic cloning an embryo is produced with the same genes as the patient.

6. What is an advantage of therapeutic cloning?

→ Stem cells from the embryo are not rejected by the patient's body so they may be used for medical treatment.

Cell Transport

1. Define diffusion.

→ Diffusion is the spreading out of the particles of any substance in solution, or particles of a gas, resulting in a net movement from an area of higher concentration to an area of lower concentration.

2. Name four substances which diffuse into or out of cells.

→ Oxygen and glucose diffuse into cells to allow aerobic respiration to occur.

→ Glucose and amino acids - the products of digestion, diffuse from the intestinal tract into the bloodstream.

→ Carbon dioxide - the waste product from respiration diffuses out of cells.

→ Urea produced from the breakdown of amino acids diffuses out of cells.

3. Which three factors affect the rate of diffusion?

→ Increasing the surface area for diffusion

→ Increasing the concentration gradient across the membrane

→ Temperature

4. What happens to the surface area to volume ratio as an organism increases in size?

|                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------|
| → The surface area to volume ratio decreases.                                                                   |
| → The organism needs to rely on internal exchange membranes to allow diffusion eg intestinal tracts and lungs.  |
| → The organism needs a mass transport system to allow transport material and maintain a concentration gradient. |

4. What types of organs do organisms have in order to increase the rate of diffusion? Give four examples of these organs.

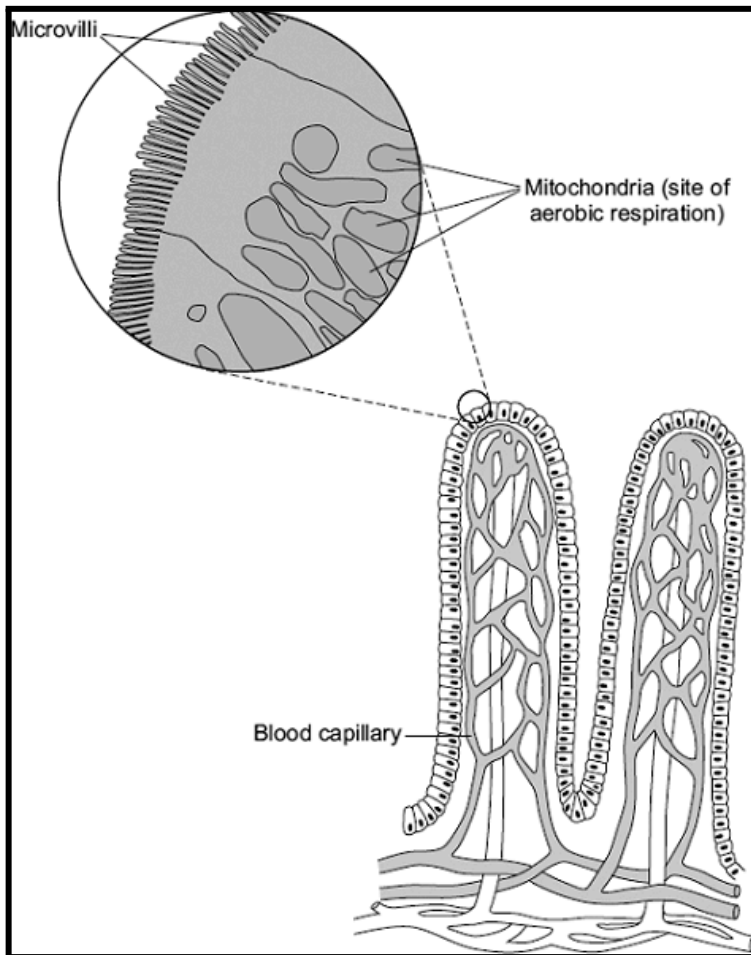
|                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------|
| → increasing surface area. Eg lungs, gills, intestinal tracts                                                                          |
| → a membrane that is thin, to provide a short diffusion path, having flattened cells eg alveoli to minimise the distance for exchange. |
| → having an efficient blood supply to maintain concentration gradients                                                                 |
| → being ventilated - Breathing to maintain a concentration gradient                                                                    |

5. Why do single celled organisms not have these organs?

|                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------|
| → Single celled organisms have very large surface area to volume ratios.                                                            |
| → Bacteria are all surface with not much inside, so the distance that substances need to travel to diffuse into the cell is minimal |

6. How is an organism's exchange surface eg lungs adapted to increase the rate of diffusion? (Think about RODs SAD TOES!)

|                                                                                |
|--------------------------------------------------------------------------------|
| → Increased surface area                                                       |
| → Maintaining a high concentration gradient                                    |
| → Keeping the distance for diffusion / exchange to a minimum - thin membranes. |
|                                                                                |
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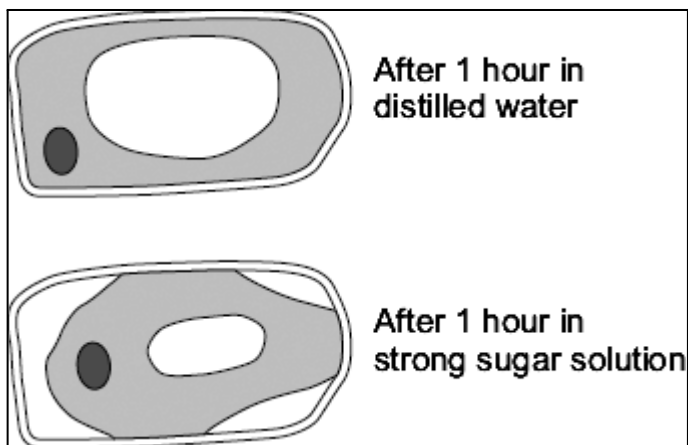


Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

|                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------|
| → many villi and microvilli                                                                                      |
| → Provide a large surface area for exchange.                                                                     |
| → Many capillaries provide a blood supply                                                                        |
| → maintain a concentration gradient to maximise the rate of diffusion.                                           |
| → Thin wall of villi and capillary - one cell thick to minimise the distance that food molecules need to travel. |
| → Many mitochondria for aerobic respiration                                                                      |
| → Provide the energy for active transport - moving molecules or ions against a concentration gradient            |

1. What is osmosis and how does it work?

- Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane. or
- Osmosis is the diffusion of water from a high water potential to a low water potential through a partially permeable membrane. Or
- Osmosis is the diffusion of water from a high water concentration to a low water concentration through a partially permeable membrane.



3. Explain what has happened to the cell after 1 hour in distilled water.

- Water has moved by osmosis from a high water potential from the cells surroundings to a low water potential into the cell( water has moved from a more dilute to more concentrated solution)
- Causing the cell to become turgid - full of water.

4. Explain what happened to the cell placed in a strong sugar solution for 1 hour.

- Water has moved by osmosis from a high water potential in the cell to a low water potential outside the cell (water moved from a more dilute to a more concentrated solution)
- The cell has lost water causing it to be plasmolysed.

5. Suggest would would happen if a red blood cell was placed in distilled water.

- Water would move from a more dilute solution outside the cell to a more concentrated solution inside the cell (high water potential to low water potential)
- Causing the cell to burst
- Because animal cells like blood cells have no cell wall to protect from osmotic pressure.

6. What is active transport?

→ Active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient).

→ This requires energy from respiration.

7. How is active transport different from diffusion?

Active transport is active ( it requires energy to move substances against a concentration gradient)

Diffusion is passive - it does not need energy to move substances down a concentration gradient.

Active transport needs membrane carrier proteins to transport these substances against a concentration gradient

→ Diffusion does not need carrier proteins.

8. Explain why active transport is important for plants.

→ Active transport allows mineral ions to be absorbed into plant root hairs from very dilute solutions in the soil.

→ Plants require ions such as nitrate, magnesium, potassium and phosphates for healthy growth.

9. Explain why active transport is important for animals.

→ It allows sugar molecules to be absorbed from lower concentrations in the gut into the blood which has a higher sugar concentration.

→ Sugar molecules are used for cell respiration.

10. What is present in the cell membrane to allow active transport?

→ Carrier proteins

