

EB Education Revision Guide



How to work with Cell Biology: Part 2 Specialised Cells

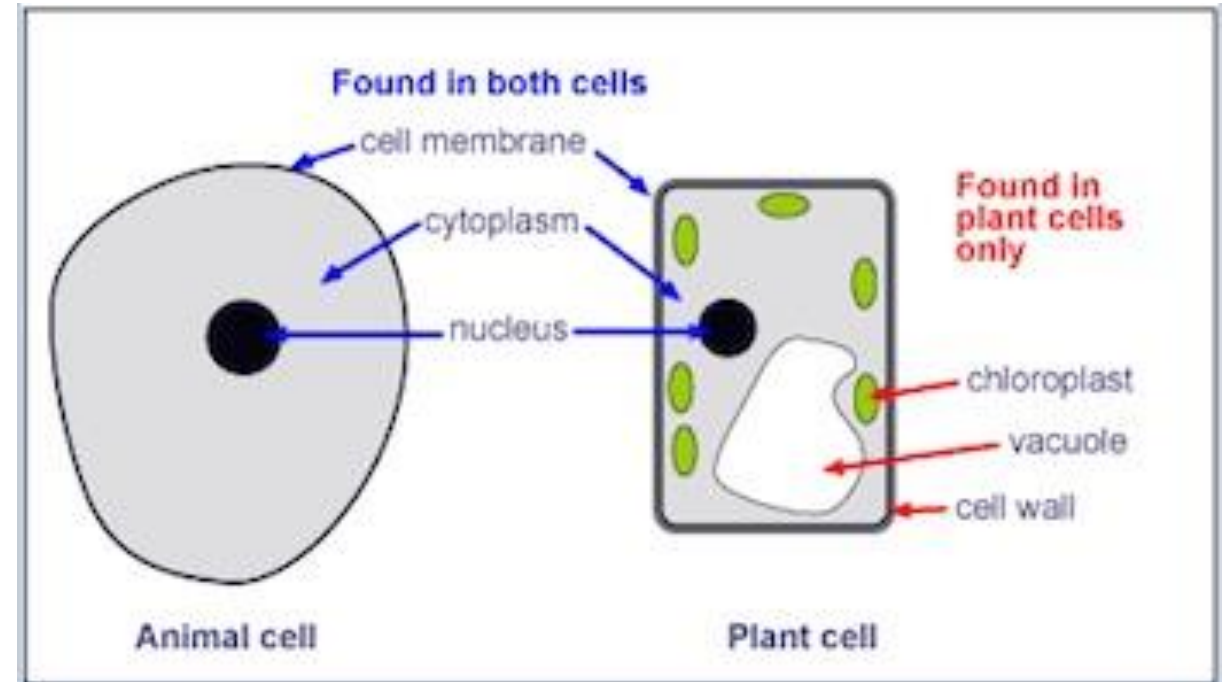
Specialised Cells

Specialised Cells.

Multicellular organisms contain many different types of cells.

These cells have different structures. Specialised cells are ADAPTED to perform a particular function.

Basic Cell Structure



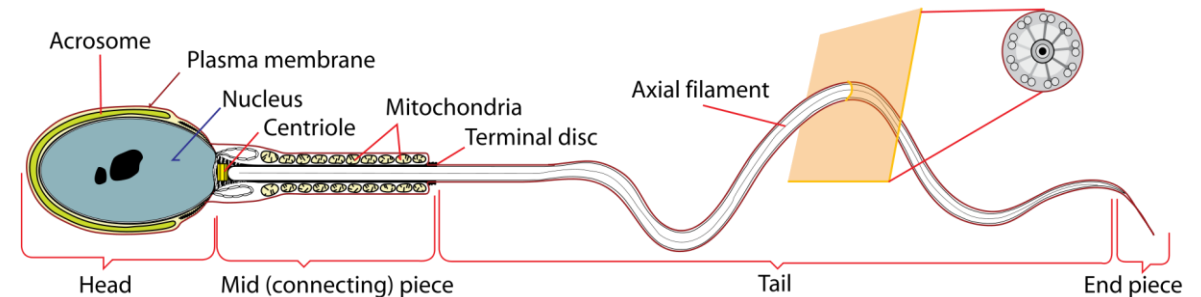
Specialised Cells

Sperm Cell

Sperm cells are specialised for reproduction. Their function is to transport the male DNA to the egg.

It has:

- A long **tail** to swim to the egg
- A **haploid nucleus** (contains half the number of chromosomes of a somatic/diploid cell)
- Lots of **mitochondria** in the neck region. These provide energy from respiration for the sperm to swim long distances
- An **acrosome** at the front of the head. Enzymes are stored here which the sperm needs to digest its way through the membrane of the egg cell



NB: you don't need to learn the terminal disc, centriole or axial filament



Egg Cell

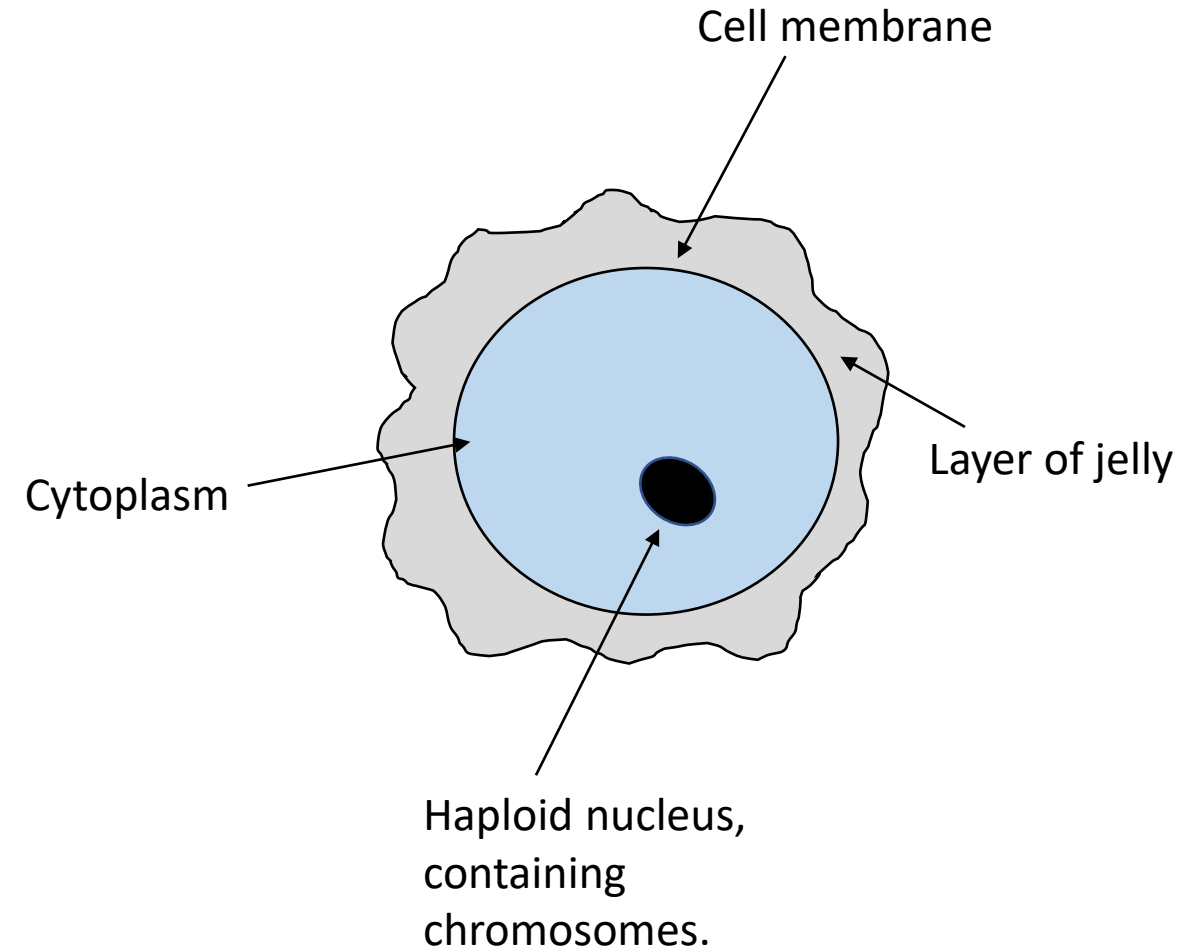
The function of the egg cell is to carry the female DNA and to provide nourishment to the embryo during the first stages of pregnancy.

It contains:

- A **haploid nucleus** (half the number of chromosomes as other body cells)
- **Nutrients** in the cytoplasm, providing nutrition to the embryo

After fertilisation, the membrane will also change its structure to prevent any more sperm getting into the egg. This is really important so that the offspring has the correct amount of DNA.

Specialised Cells

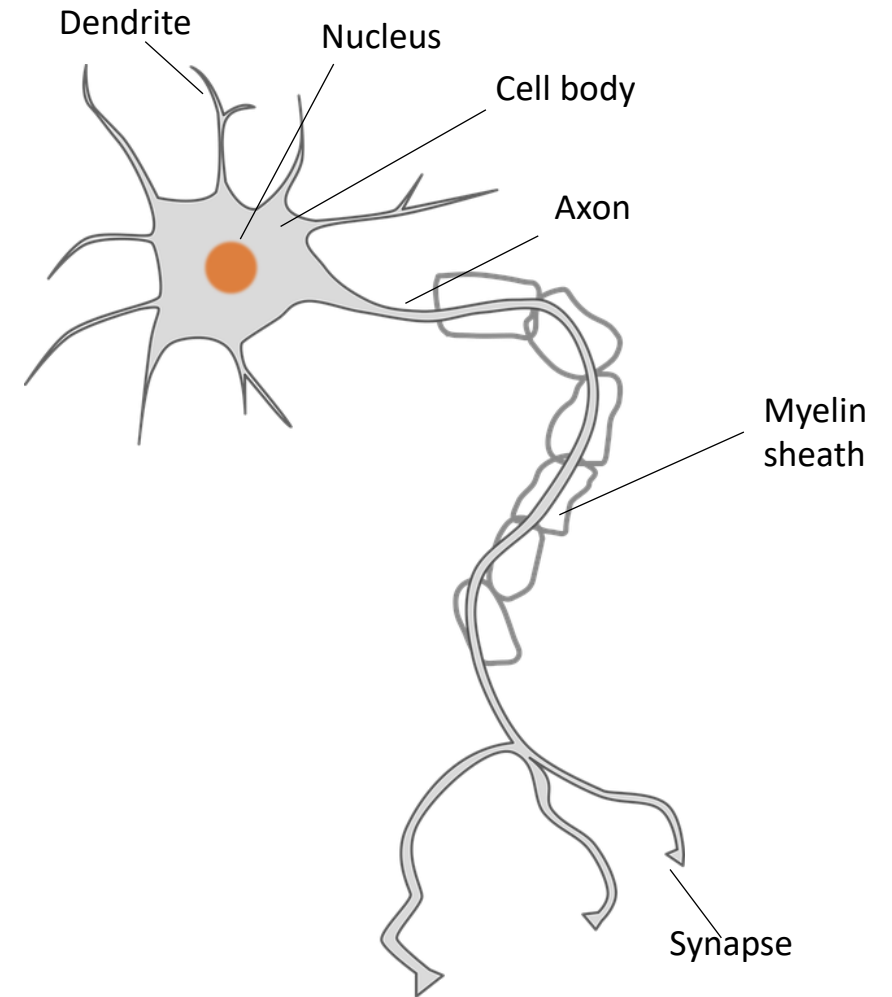


Specialised Cells

Nerve Cell

The function of the nerve cell is to carry nerve impulses around your body.

- These are extremely elongated (long) cells
- They have many branches at both ends to connect to other nerve cells
- The long axon (main branch) is covered in fat to prevent the electrical impulses leaking out of the cell



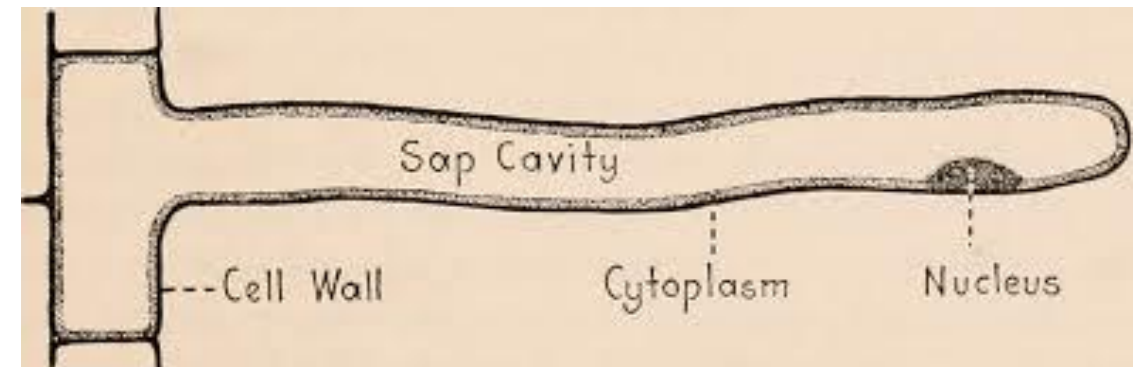
Specialised Cells

Root Hair Cell

The function of the root hair cell is to absorb minerals and water from the soil.

It has:

- A large surface area to absorb lots of water
- Thin cell wall to allow water to pass through easily
- Doesn't contain any chloroplasts

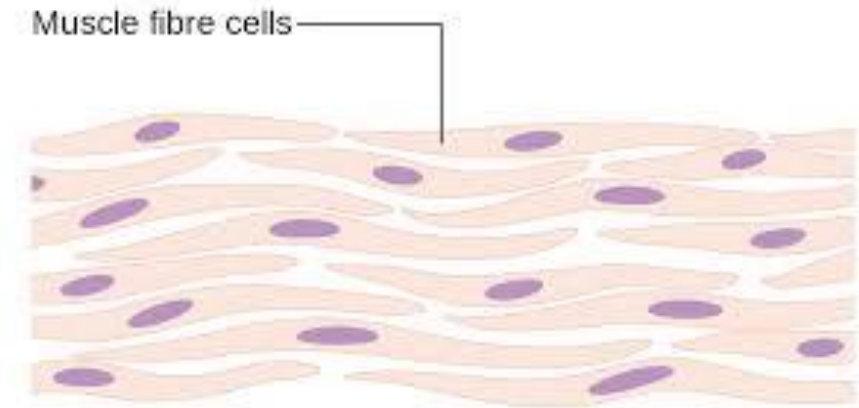


Specialised Cells

Muscle Cell

The function of muscle cells is to produce force and motion.

- It is long and thin when relaxed.
- It is short and fat when it contracts
- It has filaments inside that tighten to make it contract
- It has many mitochondria to release energy through respiration.



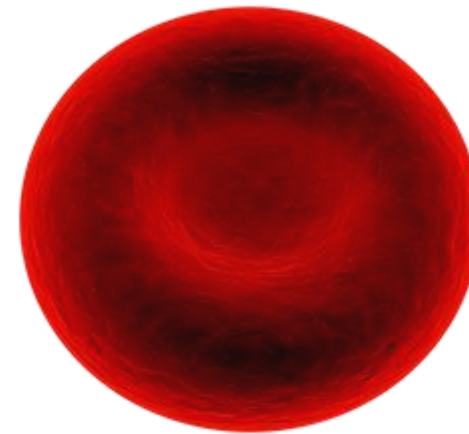
Specialised Cells

Red Blood Cell

The function of the red blood cell is to carry oxygen from the lungs to the body.

It has:

- A large surface area to volume ratio
- Contains haemoglobin which carries oxygen
- Has no nucleus to make room for more oxygen



Specialised Cells

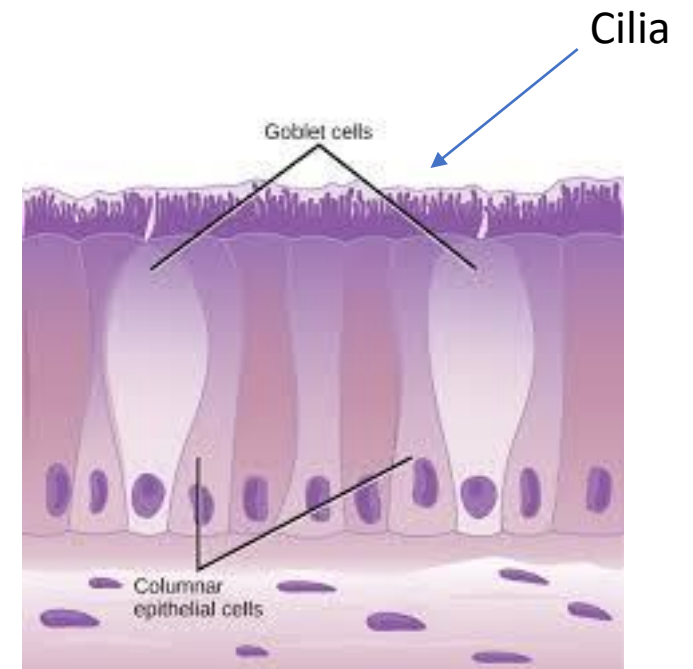
Ciliated Epithelial Cell

The function of epithelial cells is to line the surface of organs.

Ciliated epithelial cells have cilia (which are hair-like structures) on the top surface of the cell.

These cells move substances in one direction.

These can be found along the lining of the airways. They move mucus (along with all the particles trapped in it) up to the throat where it can be swallowed. This prevents it reaching the lungs.



Specialised Cells

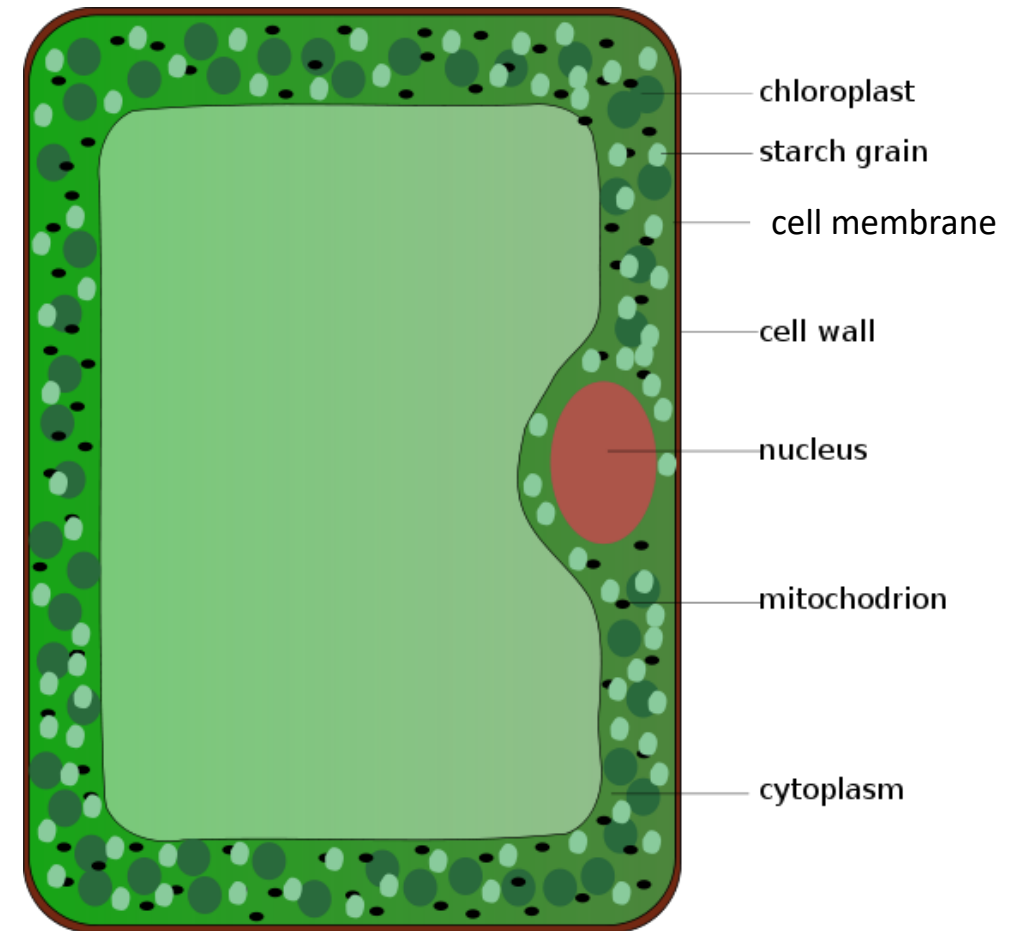
Palisade Cell

The function of the palisade cells is to carry out photosynthesis.

They are found at the top surface of a leaf.

The palisade cell is:

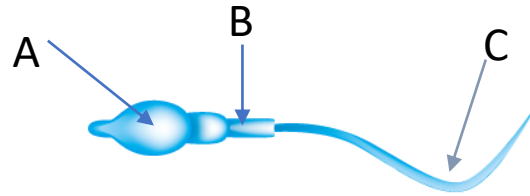
- Tall and has a large surface area to catch as much sunlight as possible
- Packed with chloroplasts to absorb sunlight



~ 20 nanometres

Your turn:

1. Below is a diagram of a human sperm cell.



a) Label structures A and C

A

C

b) What is found in structure B?

c) Sperm cells can fertilise egg cells.

What is fertilisation?

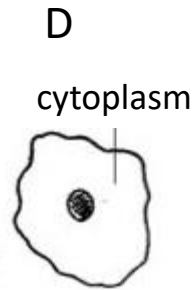
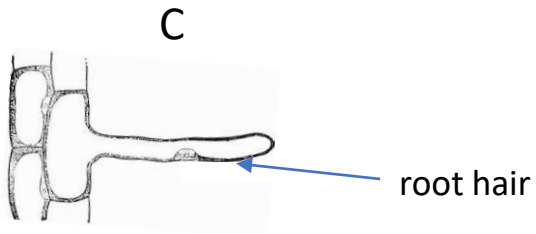
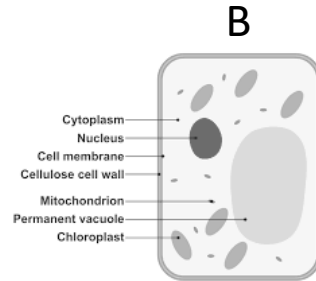
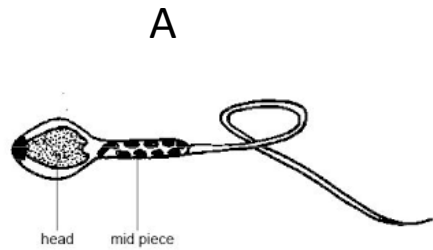
d) Describe the function of mitochondria in the sperm?

e) What is the function of the head of the sperm?



Your turn:

2. Four different types of cell are shown below.



c) Explain what cell A is adapted for.

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.....
.....
.....
.....

d) Explain what cell B is adapted for.

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.....
.....
.....

e) All the cells use oxygen.

What is the name of the process the cells use oxygen in?

.....

a) Which cells are plant cells?

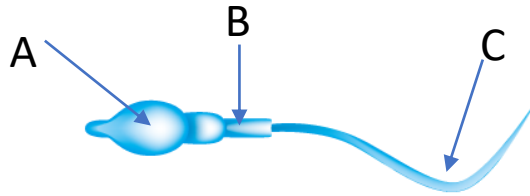
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b) What cell structures do these cells share which makes them plant cells?

.....
.....

Answers:

1. Below is a diagram of a human sperm cell.



a) Label structures A and C

A **Nucleus**
C **Tail**

b) What is found in structure B?

Mitochondria

c) Sperm cells can fertilise egg cells.

What is fertilisation?

**A sperm penetrates the egg.
The nuclei/genetic information fuses/combines
Sperm and egg are haploid cells, become diploid when zygote
formed.**

d) Describe the function of mitochondria in the sperm?

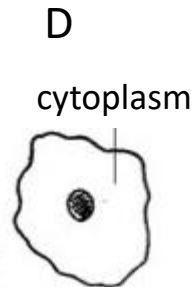
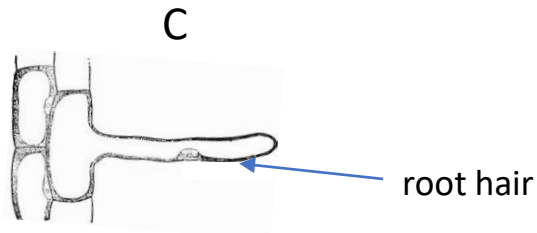
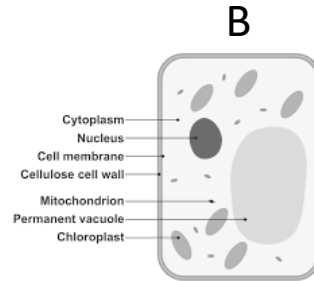
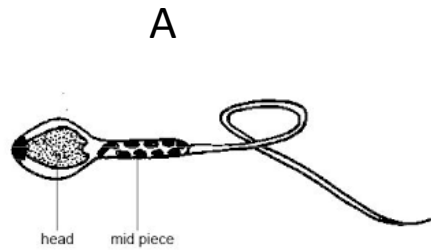
**Respiration takes place in the mitochondria to release
energy. Sperm require energy to swim long distances to
the egg.**

e) What is the function of the head of the sperm?

**The acrosome in the head contains digestive
enzymes which allow the sperm to gain
entry/penetrate the egg.
The nucleus contains DNA.**

Answers:

2. Four different types of cell are shown below.



c) Explain what cell A is adapted for.

It has a tail for swimming to the egg
 It has many mitochondria in the mid piece to provide energy for swimming
 It has DNA in its head to carry genetic information, and an acrosome which contains digestive enzymes to help it penetrate the egg.

d) Explain what cell B is adapted for.

It has many chloroplasts, which contain the green pigment chlorophyll.
 Photosynthesis takes place in the chloroplasts

e) All the cells use oxygen.

What is the name of the process the cells use oxygen in?
 Respiration

a) Which cells are plant cells?

B and C

b) What cell structures do these cells share which makes them plant cells?

They have cell walls.

They have vacuoles

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www.ebeducationservices.co.uk
contact@ebeducationservices.co.uk

0161 442 5270