

Unit 4 Living things and biodiversity

Key concept - Relationships- How do different organisms interact on Earth?

Related concepts - Interaction and Balance - Try to imagine how the living things you learn about interact with each other and how changes in one part of the web of life can affect the overall balance of an ecosystem.

Global concept - Scientific and technical innovation - Do you think Science and Technology is causing changes in our world? Or can it be used to help solve environmental problems?

Unit 4 KEYWORDS

- Bioelements
- Life
- Vital functions
- Photosynthesis
- Respiration
- Cell
- Fossils
- Kingdoms
- Interaction
- Scientific classification
- Biodiversity
- Monera
- Protista
- Fungi
- Plantae
- Vascular
- Nutrition
- Angiosperms
- Gymnosperms
- Animalia
- Invertebrate
- Vertebrates
- Determination key
- Viruses
- Reproduction

Task guide

The tasks and questions on the Weebly will be coloured to represent the different style of questions that you will find in your exams. The task should be completed in your "Natural Sciences" GoogleDrive document.

Green - Stating scientific knowledge

Orange - Applying scientific knowledge and understanding

Red - Analysing and evaluating information

There will also be "**extension**" tasks for students who finish tasks quickly! Also look out for *links* to interactive resources and videos.

Living Things

Task 3a:

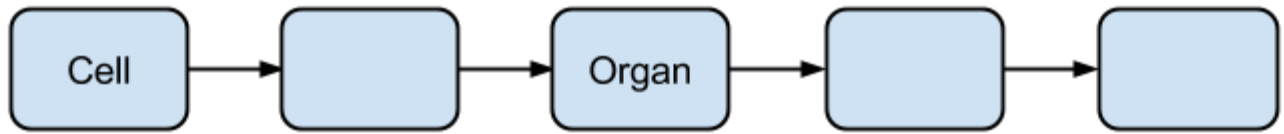
In your "Natural Sciences" Word (NSD) document copy and paste the sentence below and then complete the task:

All living things have different levels of organisation so they can perform the characteristics of life.

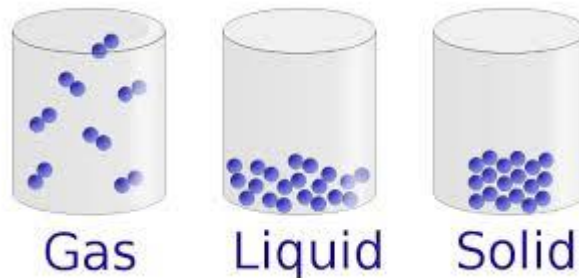
We can also organise living things into different categories so that we can study

and talk about them more easily.

Copy this diagram in Google Drawings and complete the boxes to show the organisation of living things. Then paste it into your NSD under a suitable heading.



All the life that we know of is based on one particular element: Carbon. Any molecule that contains carbon is known as an organic molecule. *Elements* are the building blocks of matter (See Unit 5), and when they are joined together, we call these *molecules*. Molecules are what you think about vibrating and moving in the different states of matter:

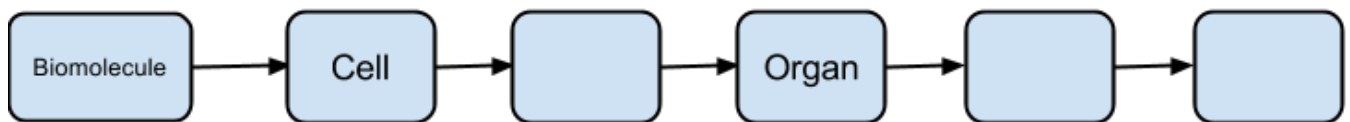


Wikimedia (2015)

Can you remember this [song](#)?

We can extend the organisation diagram to include what the cells of living things are made of: **Biomolecules**.

Update your diagram to include **Biomolecules**.



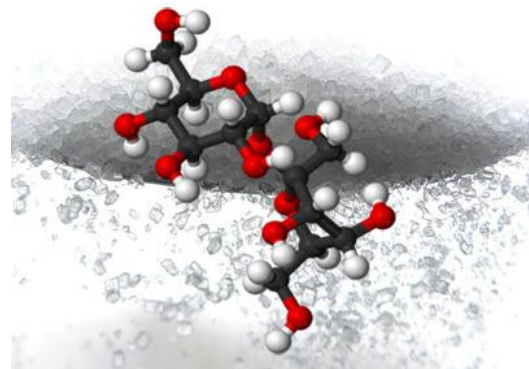
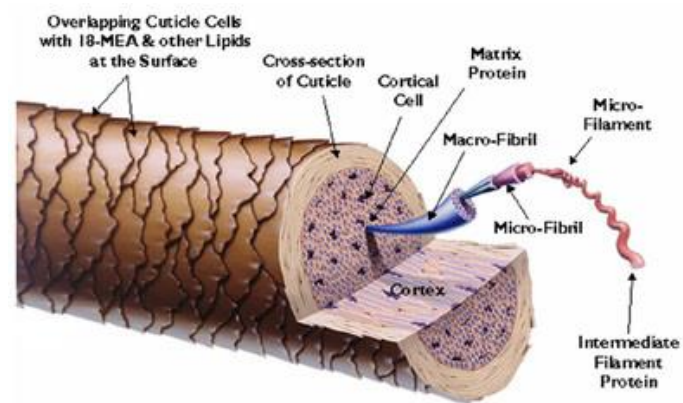
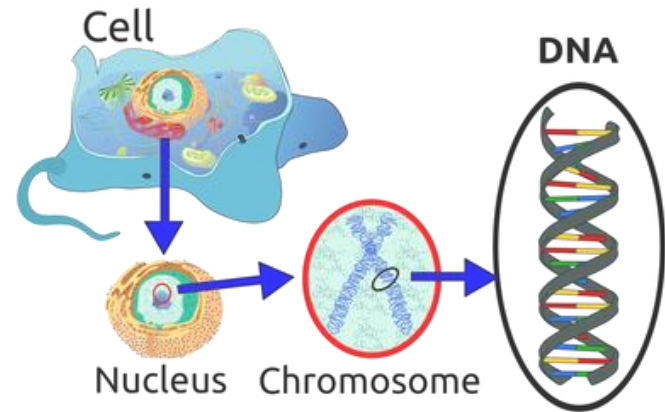
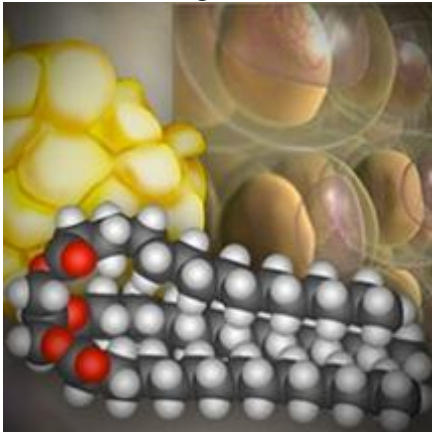
Other bioelements

Other important elements that can be found in living things include: carbon (C), hydrogen (H), Oxygen (O), phosphorous (P) and sulfur (S). These elements make up over 99% of the mass of all living things (Barrio Gómez de Agüero, 2011). You can remember them as CHONPS.

Bioelements join together to make **organic biomolecules**.

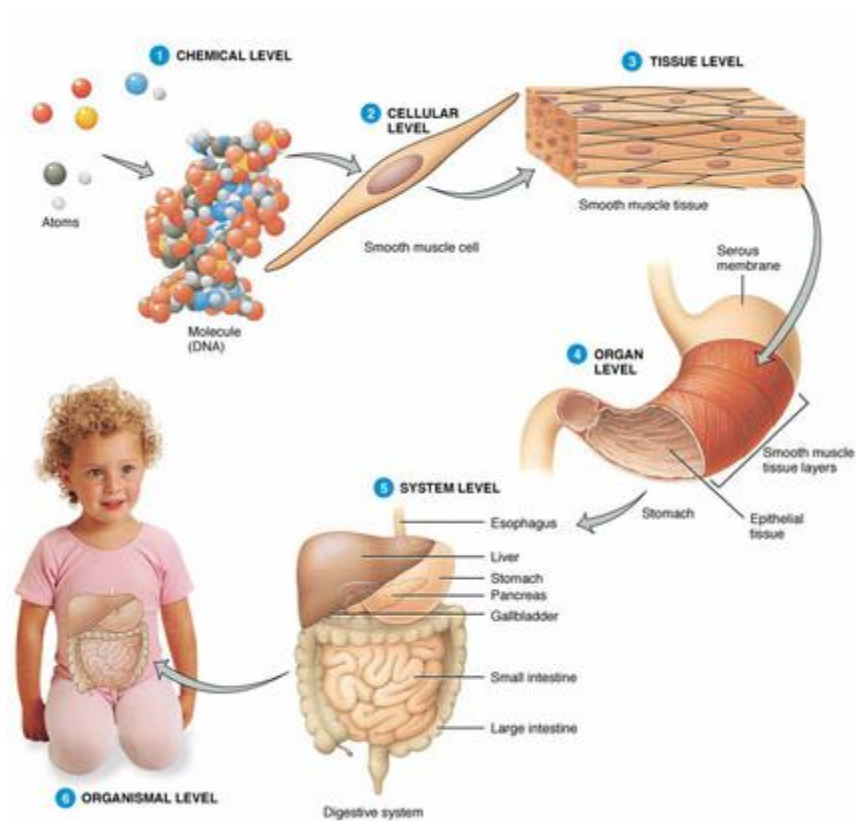
The most important ones are:

- **Sugars:** provide energy to organisms
- **Fats:** store energy
- **Proteins:** build structures (e.g. muscles, hair, etc.) and perform functions (enzymes)
- **Nucleic acids:** contain genetic information (e.g. DNA)



Task 3b:

In your NSD, insert a 4 x 3 table with the 4 different biomolecules, their function and a picture example of each. Don't forget to reference where you find the information and pictures!



Living things are also made of inorganic compounds, the main one being water.

Plants are up to 80% water and you are up to 90% water!

(Barrio Gómez de Agüero, 2011).

Check your Learning

Without looking at the diagrams, can you say the levels of organisation **backwards**?

What do all living things do?

What similarities can you find between the following organisms?





The above organisms may look very different, but they all:

- Get food
- Respond to changes in their environment
- Produce new living things

Can you remember the scientific words for these 3 *Vital Functions*?

Task 3c:

Find the 3 vital functions in the key-words section at the top of the page and make an entry in your NSD describing the meaning of each term. Copy and paste the following sentence under your heading, before your list:

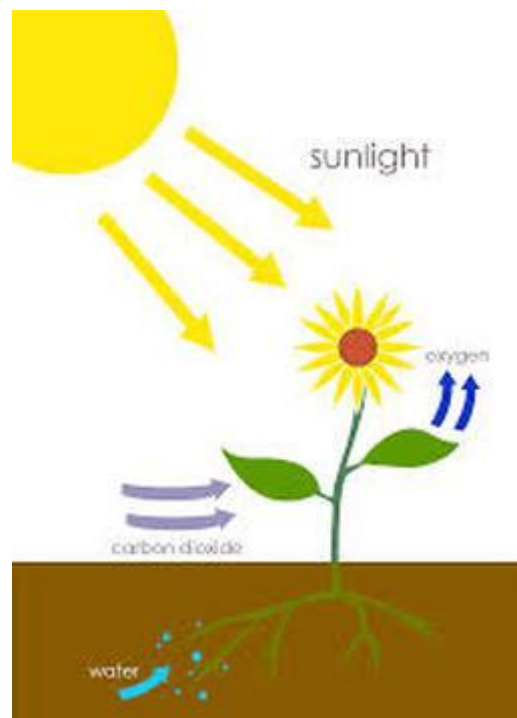
All living things perform three **vital functions**, they are:

Nutrition, Interaction and Reproduction.

How do you get your food?

We divide living things into two groups, depending on how they get their food. It depends on whether they make their own food: **Autotrophs**, or if they eat other organisms: **Heterotrophs**.

Most autotrophs use the energy in sunlight to produce glucose. Examples include *plants*, *algae* and some *bacteria*.



(Bioweb.uwlax.edu, 2015)

Heterotrophs obtain nutrients from other living things. They can be **carnivores**, **herbivores** or **omnivores**.

Task 3d:

Write an entry in your NSD about the two different types of **Nutrition**. Use [this website](#) to help you and make sure you define the terms **carnivores**, **herbivores** and **omnivores**.

The importance of Plants

We need plants on Earth to trap the energy in sunlight and provide us with food, and also to provide the oxygen we need to breathe and perform our own Vital Functions. We breathe air in because we need oxygen, but can remember what gas we breathe out? If you breathe heavily onto a piece of glass (a mirror or a window), what happens?

Task 3e:

Use [this website](#) to investigate the relationship between **photosynthesis** and **respiration**. Write the word equation for each one in your NSD. You can add an arrow into a Google Doc by using Insert:Equation and selecting arrows, or Insert:Special characters.

Does the photosynthesis equation contain everything you learnt last year? Use Insert:Drawing to create another equation with a bigger arrow and textboxes above and below it to include: Chl_r_p_y__ and S_n_i_h_

The Cell and Cell Theory

Look at your finger, can you see the cells you are made of? It took a long time for people to discover what the building blocks of all living things are. Cells are complex structures that are formed from organic and inorganic compounds. A cell performs the three vital functions that characterise life.

A living thing can be made of an individual cell (single-cell organism), like bacteria, or from many cells (multicellular organism), like you! Watch the two videos below to discover what structures make up cells and how we know they exist:

Task 3f:

Write a heading in your NSD and copy and paste the following sentence:

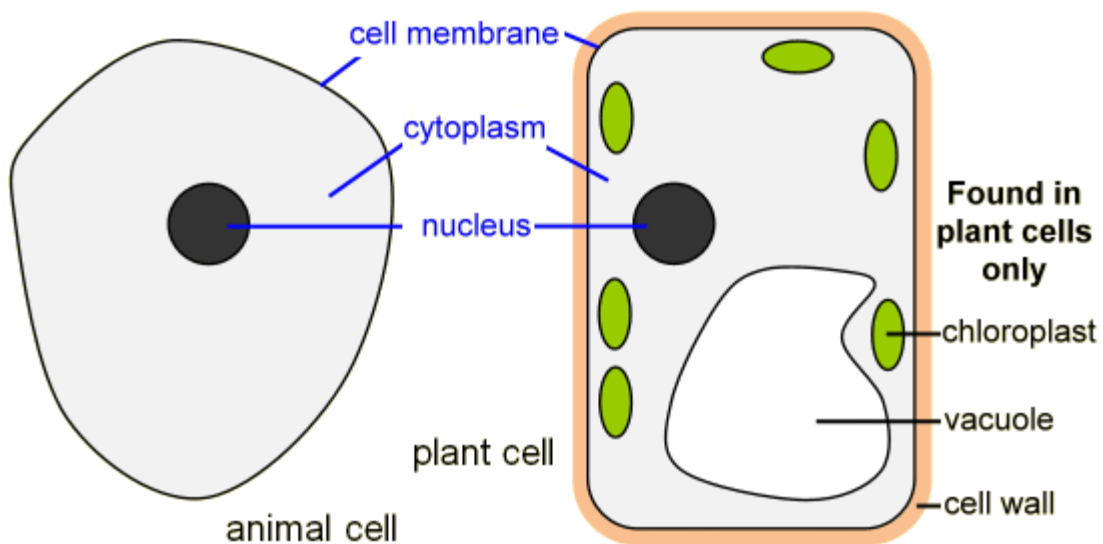
Cells are the building blocks of all living things are. Cells are complex structures that are formed from organic and inorganic compounds. A cell performs the three vital functions that characterise life.

A living thing can be made of an individual cell (single-cell organism), like bacteria, or from many cells (multicellular organism), like

Use the internet to write a definition for each of the following:

- Cell membrane
- Cytoplasm
- Nucleus
- Organelles
- Mitochondria

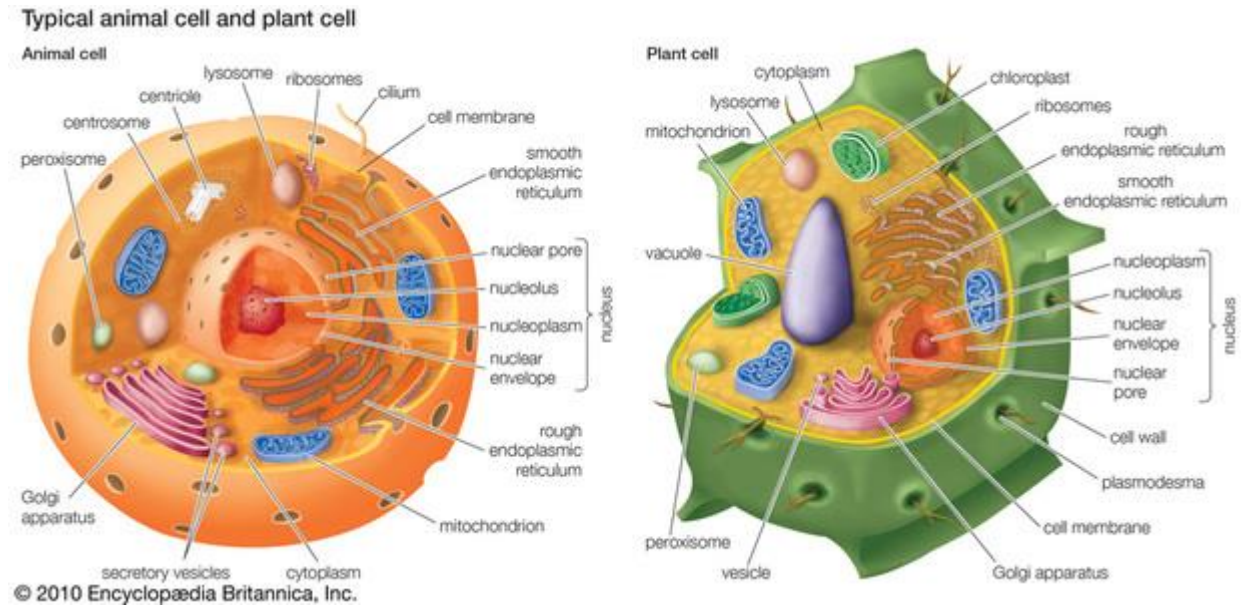
Copy this diagram of a plant and animal cell into your NSD. What are the main differences between the two?



(BBC.co.uk, 2015)

Extension: Write a summary of the differences under the diagram.

[Don't forget to include the complete reference your NSD.]



Check your Learning

Make sure you can correctly label a cell diagram in an exam. You can practice by following [this link](#).

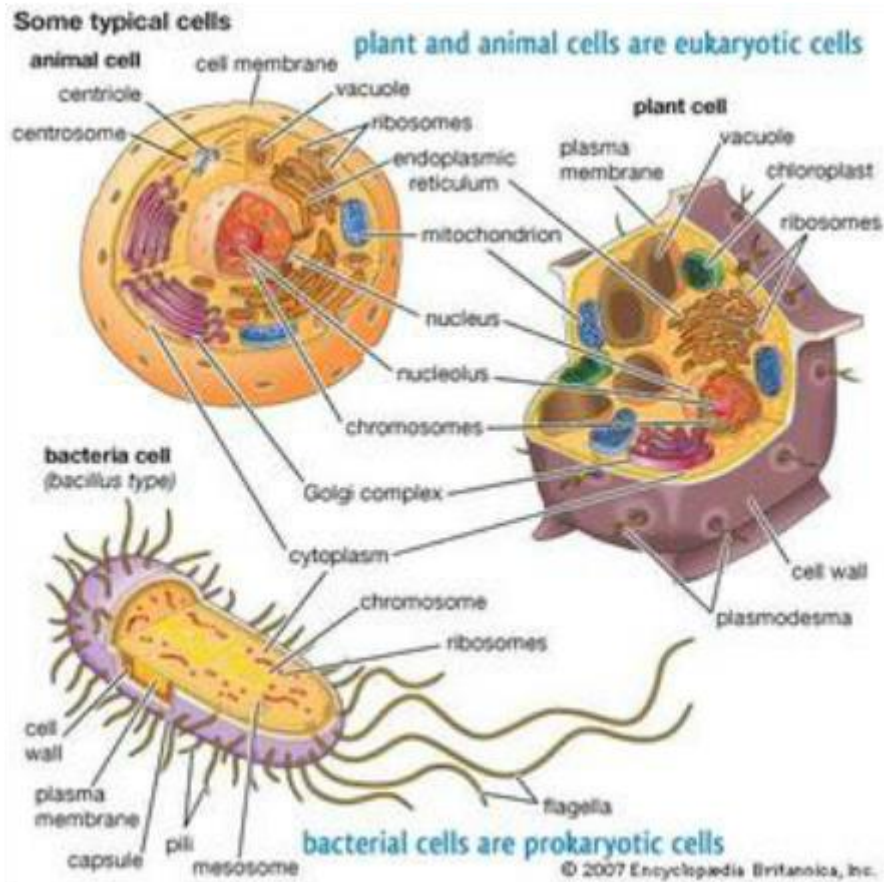
Types of Cells

Cells can be divided into two other groups that have different organelles and structures:

Prokaryotes - have **no nucleus** and are more basic, eg. bacteria.

Eukaryotes - **Have a nucleus** surrounded by a *membrane*.

This group includes all other living things, including plants and animals.



Explore!

Use the following websites to explore the different types of cells:

1. [Cell structure](#)
2. [What makes a prokaryote?](#) (Click "Next")
3. [Cells Alive!](#)
4. [Read and practice tests](#)
5. [Eukaryotic organelles animation](#)

Task 3g:

1. In your NSD under a suitable heading, find, insert and reference two pictures of a prokaryotic cell and two of a eukaryotic cell. Can you find one diagram and one as seen through a microscope for each?

2. Complete the following sentences by copying the text by using Ctrl+C, and pasting it into your

NSD with Ctrl+V. Then delete the incorrect words.

- a) Prokaryotic cells have / do not have a true nucleus.
- b) Prokaryotic cells are more / less primitive than eukaryotic cells.
- c) Eukaryotic cells have / do not have a true nucleus.
- d) Eukaryotic cells can / cannot be a plant or animal cell.

3. Copy and paste the following tables by selecting everything in the box below with Ctrl+A and then using the other shortcuts for copy and paste you learnt above.

Complete the tables to compare the different types of cells.

Compare and contrast the different types of cells.

Plant	Animal
Has a nucleus Has a cell wall	Has a nucleus No cell wall
Prokaryote	Eukaryote
No nucleus	Membrane-bound nucleus

References

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