

2.1.1

Outline the cell theory.

Outline: *To give a brief account or summary*

- All living things are made of cells.
- Cells are the smallest unit of life.
- Existing cells have come from other cells.

2.1.2

Discuss the evidence for the cell theory.

Discuss: *Give an account including, where possible, a range of arguments for and against the relative importance of various factors, or comparisons of alternative hypotheses.*

- All living things are made of cells; when living things are observed under the microscope they consistently appear to be composed of cells.
- Cells are the smallest unit of life; the cell is the smallest unit of organization that can show all the characteristics of living processes.
- Existing cells have come from other cells; cells carry out a form of cell division to form new cells (mitosis or binary fission).

2.1.3

State that unicellular organisms carry out all the functions of life.

State: to give a specific name, value or other brief answer without explanation or calculation.

Functions of Life

- Metabolism: chemical reactions inside the cell, including cell respiration
- Response: perceiving and responding to changes in the environment
- Homeostasis: keeping conditions inside the organism within tolerable limits (i.e. pH, temp)
- Growth: an irreversible increase in size or volume
- Reproduction: producing offspring
- Nutrition: either autotrophic or heterotrophic modes of obtaining energy

Examples of unicellular organisms:

- Prokaryotic: *E. coli*
- Eukaryotic: amoeba, euglena

2.1.7

State that multicellular organisms show emergent properties.

State: to give a specific name, value or other brief answer without explanation or calculation.

Emergence is the occurrence of unexpected characteristics or properties in a complex system. The properties emerge from the interaction of the 'parts' of the system; the 'parts' do not show the property themselves.

For example: human consciousness. A neuron doesn't display the property of consciousness, but the multicellular brain does.

2.1.8

Explain that cells in multicellular organisms differentiate to carry out specialized functions by expressing some of their genes but not others.

Explain: *to give a detailed account of causes, reasons or mechanisms.*

Rather than all cells carrying out all functions, cells undergo **differentiation** (meaning, specialize to particular functions).

Differentiated cells have switched on (expressed) particular genes that correlate to these specialist functions. These cells are then organized into tissues and organs.

5.1.1

Define species, habitat, population, community, ecosystem and ecology.

Define: *to give the precise meaning of a word, phrase or physical quantity.*

Species: a group of organisms capable of interbreeding and producing fertile offspring

Habitat: the natural environment in which an organism lives; the physical environment that surrounds (influences and is utilized by) a species

Population: all the organisms that belong to the same species and live in the same geographical area at the same time

Community: a community is a group of interacting organisms sharing a habitat

Ecosystem: all the organisms living in a particular area, as well as all the nonliving (abiotic), physical components of the environment with which the organisms interact, such as air, soil, water and sunlight

Ecology: the scientific study of organisms and their natural environment

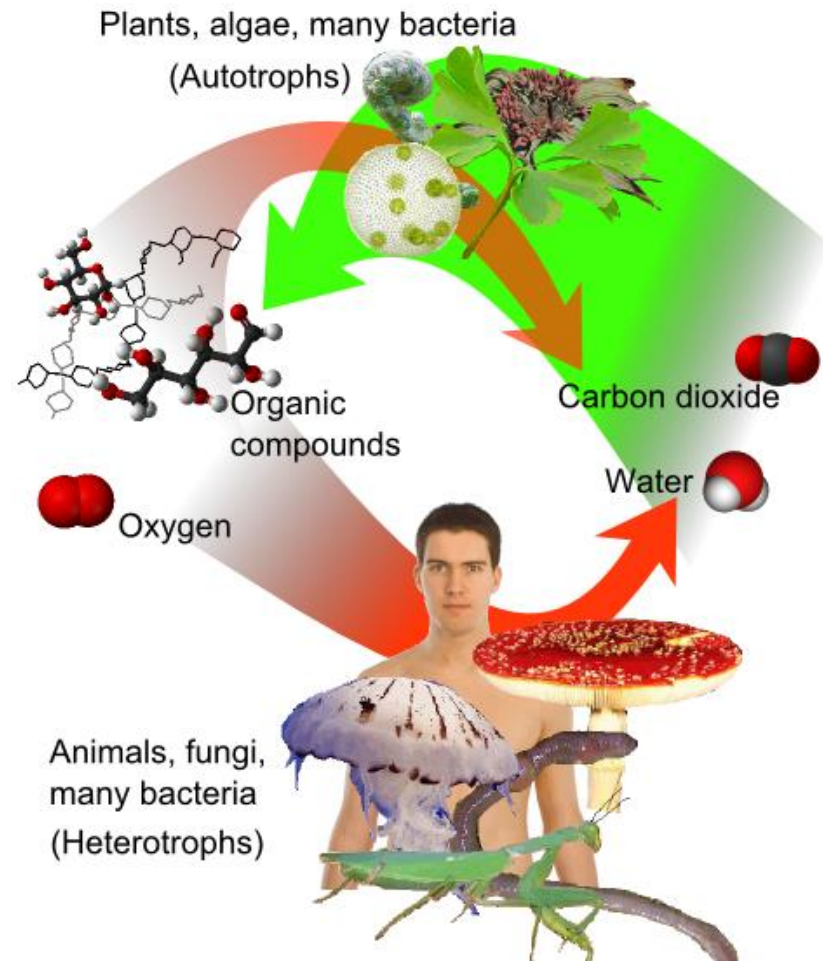
5.1.2

Distinguish between autotroph and heterotroph.

Distinguish: *to give the differences between two or more different items*

An **autotroph**, or producer, is an organism that produces complex organic compounds (such as carbohydrates, fats, and proteins) from simple inorganic molecules *usually* using energy from light (by photosynthesis). They are the producers in a food chain. Examples are plants on land or algae in water.

A **heterotroph** is an organism that cannot produce organic compounds on its own. Heterotrophs must consume the organic compounds made by autotrophs for energy. Heterotrophs are consumers in a food chain.



5.1.3

Distinguish between consumers, detritivores and saprotrophs.

Distinguish: *to give the differences between two or more different items*

Consumers: an organism that obtains energy by feeding on other organisms; a heterotroph.

Detritivores: heterotrophs that obtain nutrients by consuming decomposing organic matter. Examples include millipedes, slugs, sea stars, and crabs.

Saprotrophs: heterotrophs that use extra-cellular digestion to break down dead or decayed organic matter. Most often associated with fungi.

