

Edexcel Science (Double Award) (9-1)

Questions and Answers

Biology Content	2
Topic 1: The nature and variety of living organisms	2
Characteristics of living organisms	2
Variety of living organisms	4
Topic 2: Structure and functions in living organisms	6
Level of organisation	6
Cell structure	7
Biological molecules	8
Movement of substances into and out of cells	11
Nutrition	13
Respiration	17
Gas Exchange	18
Transport	20
Excretion	22
Co-ordination and response	23
Topic 3: Reproduction and inheritance	26
Reproduction	26
Inheritance	28
Topic 4: Ecology and the environment	32
Cycles within ecosystems	35
Human influences on the environment	37
Topic 5: Use of biological resources	38
Food production	38
Selective breeding	40
Genetic modification (genetic engineering)	41
Chemistry Content	42
Topic 1 Principles of Chemistry	43
States of Matter	43
Elements, compounds and mixtures	45
Atomic Structure	47
The Periodic Table	48
Chemical formulae, equations and calculations	50
Ionic Bonding	55
Covalent Bonding	57

Topic 2: Inorganic Chemistry	59
Group 1 (alkali metals) – lithium, sodium and potassium	59
Group 7 (halogens) – chlorine, bromine and iodine	61
Gases in the atmosphere	62
Reactivity series	64
Acids, alkalis and titrations	67
Acids, bases and salt preparations	68
Chemical tests	72
Topic 3: Physical Chemistry	76
Energetics	76
Rates of Reaction	79
Reversible reactions and equilibria	82
Topic 4: Organic Chemistry	83
Introduction	83
Crude oil	86
Alkanes	88
Alkenes	89
Alcohols	90
Carboxylic acids	92
Esters	93
Synthetic polymers	95
Physics Content	96
Topic 1: Forces and Motion	96
Topic 2: Electricity	99
Topic 3: Waves	104
Topic 4: Energy resources and energy transfers	110
Topic 5: Solids, liquids and Gases	113
Topic 6: Magnetism and electromagnetism	116
Topic 7: Radioactivity and Particles	120
Topic 8: Astrophysics	126

Biology Content

Topic 1: The nature and variety of living organisms

Characteristics of living organisms

Why do living organisms require nutrition?

Living organisms require nutrition because it provides them with the energy they need to carry out their metabolic processes. Nutrition also provides the necessary raw materials for growth and repair.

What is respiration in living organisms?

Respiration is the process by which living organisms convert oxygen and glucose into energy in the form of ATP. This process is essential for the survival of the organism as it provides the energy required for all metabolic processes.

What is the function of excretion in living organisms?

Excretion is the process by which living organisms eliminate waste products from their bodies. It is important because the accumulation of waste products can be toxic and can interfere with normal metabolic processes.

How do living organisms respond to their surroundings?

Living organisms have the ability to respond to changes in their environment through a variety of mechanisms, such as movement, sensing changes in temperature, light, and other environmental factors. This helps them to adapt to their surroundings and survive.

How do living organisms move?

Living organisms move in a variety of ways, depending on their structure and environment. Some organisms, like humans, have complex muscular and skeletal systems that allow for movement. Others, like plants, may move in response to environmental cues or growth.

What is homeostasis in living organisms?

Homeostasis is the ability of living organisms to maintain a stable internal environment despite changes in the external environment. This is important because the internal environment must be kept within certain limits in order for metabolic processes to function properly.

What is the importance of reproduction in living organisms?

Reproduction is important for the survival of a species. It allows for the continuation of genetic information from one generation to the next and ensures that the population of a species does not decline to extinction.

How do living organisms grow and develop?

Living organisms grow and develop by increasing the number and size of cells through the process of cell division and differentiation. This process is regulated by genetic and environmental factors and is essential for the survival and adaptation of the organism.

Variety of living organisms

What are the common features of plants?

Plants are multicellular organisms that contain chloroplasts and are able to carry out photosynthesis. They have cellulose cell walls and store carbohydrates as starch or sucrose.

What are the common features of animals?

Animals are multicellular organisms that do not contain chloroplasts and are not able to carry out photosynthesis. They have no cell walls and are able to move from one place to another. They often store carbohydrates as glycogen.

What are the common features of fungi?

Fungi are organisms that are not able to carry out photosynthesis. They have a body usually organized into a mycelium made from thread-like structures called hyphae, which contain many nuclei. They have walls made of chitin and feed by extracellular secretion of digestive enzymes onto food material and absorption of the organic products. They may store carbohydrate as glycogen.

What are the common features of protoctists?

Protoctists are microscopic single-celled organisms. Some, like Amoeba, that live in pond water, have features like an animal cell, while others, like Chlorella, have chloroplasts and are more like plants. A pathogenic example is Plasmodium, responsible for causing malaria.

What are the common features of bacteria?

Bacteria are microscopic single-celled organisms that have a cell wall, cell membrane, cytoplasm, and plasmids. They lack a nucleus but contain a circular chromosome of DNA. Some bacteria can carry out photosynthesis, but most feed off other living or dead organisms.

What is a pathogen?

A pathogen is a microorganism that causes disease in a host organism. Pathogens may include fungi, bacteria, protoctists, and viruses.

What are viruses?

Viruses are not living organisms but are small particles that are parasitic and can reproduce only inside living cells. They have no cellular structure but have a protein coat and contain one type of nucleic acid, either DNA or RNA. Examples include the tobacco mosaic virus that causes discoloring of the leaves of tobacco plants by preventing the formation of chloroplasts, the influenza virus that causes flu, and the HIV virus that causes AIDS. They are used in genetic engineering to create fragments of DNA with specific sequences.

What are ligase enzymes, and how are they used to join pieces of DNA together?

Ligase enzymes are enzymes that can join pieces of DNA together by catalyzing the formation of covalent bonds between the sugar-phosphate backbones of the DNA strands. They are used in genetic engineering to create recombinant DNA molecules.

What are plasmids and viruses, and how can they act as vectors in genetic engineering?

Plasmids and viruses are small, circular pieces of DNA that can replicate independently within cells. They can act as vectors by taking up pieces of foreign DNA and delivering them into other cells, where the foreign DNA can be incorporated into the host genome.

How can genetically modified bacteria be used to produce large amounts of human insulin in a fermenter?

Genetically modified bacteria can be engineered to produce human insulin by inserting the gene for insulin production into the bacteria's genome. The bacteria can then be grown in a fermenter, where they produce large amounts of insulin which can be harvested and purified for medical use.

Topic 3: Waves

What is the difference between longitudinal and transverse waves?

Longitudinal waves are waves that travel parallel to the direction of the wave and involve the compression and rarefaction of the medium through which they are traveling. On the other hand, transverse waves are waves that travel perpendicular to the direction of the wave and involve the movement of the medium in a perpendicular direction.

What is amplitude in waves?

Amplitude refers to the maximum height or depth of a wave from its midpoint, also known as the "peak to trough" measurement. In other words, it refers to the maximum displacement of the wave from its rest position.

What is a wavefront in waves?

A wavefront is a line or surface that separates regions of opposite phase in a wave. It is the leading edge of a wave, where the disturbance or change in the medium is taking place.

What is frequency in waves?

Frequency refers to the number of complete cycles of a wave that occur in a specific period of time. It is measured in Hertz (Hz), which represents the number of cycles per second.

What is wavelength in waves?

Wavelength is the distance between two consecutive points on a wave that are in phase. It is the distance that the wave travels during one complete cycle.

What is the period of a wave?

The period of a wave refers to the amount of time it takes for a complete cycle of the wave to occur. It is the inverse of the frequency, and is measured in seconds.

Sample Copy