

Biology and Geology ESO 4 - Chapter 1

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Origins of the solar system	To have a general understanding of how the solar system formed	Demonstrate a general understanding of how the solar system formed
Earth's internal structure	To be familiar with the chemical and mechanical models of the Earth's internal structure	Explain the Earth's internal structure using the chemical and mechanical models
	To understand how scientists have used observations and experiments to construct models of the Earth's internal structure	Show understanding of how scientists have used observations and experiments to construct models of the Earth's internal structure
	To understand how seismic waves provide evidence of the Earth's different layers	Explain how seismic waves provide evidence of the Earth's different layers
Continental drift and plate tectonics	To know the main evidence supporting the theories of continental drift and plate tectonics	State the main evidence supporting the theories of continental drift and plate tectonics
	To understand the difference between plate tectonics and continental drift, and to know that plate tectonics represents the current scientific explanation for the movements of the Earth's surface	Distinguish between plate tectonics and continental drift and know that plate tectonics represents the current scientific explanation for the movements of the Earth's surface
	To understand the mechanisms involved in plate tectonics	Explain the mechanisms involved in plate tectonics
Deformation	To understand the mechanisms that produce faults and folds in rock	Explain the mechanisms that produce faults and folds in rock
Plate margins	To understand the movements of tectonic plates at three types of plate margins and the phenomena these produce on the Earth's surface	Explain the phenomena at three types of plate margins
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To be able to carry out practical demonstrations of plate tectonics and the formation of faults and folds	Carry out practicals to demonstrate plate tectonics and the formation of faults and folds
	To know how to construct a topographic profile	Draw a topographic profile

Biology and Geology ESO 4 - Chapter 2

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Age of the Earth	To have a general overview of historical ideas about the age of the Earth	Demonstrate an awareness of historical ideas about the age of the Earth
The first geologists	To understand how Hutton and Lyell's ideas led to the development of modern geology	Show an understanding of how Hutton and Lyell's ideas led to the development of modern geology
Geologic Time Scale	To know the main divisions of time in the Geologic Time Scale and how they relate to the Earth's geological and natural history	Place important events in the Earth's geological and natural history in the Geologic Time Scale
Dating	To understand the difference between absolute and relative dating	Distinguish between absolute and relative dating
	To understand how geological cross sections and index fossils can be used for relative dating	Explain how geological cross sections and index fossils can be used for relative dating
Precambrian Superaeon	To know the most important events in the Earth's geological, climatic and natural history during the Precambrian Superaeon	Demonstrate an awareness of the most important events in the Earth's geological, climatic and natural history during the Precambrian Superaeon
Phanerozoic Aeon	To know the most important events in the Earth's geological, climatic and natural history during the Phanerozoic Aeon	Place important events in the Earth's geological, climatic and natural history in the correct geological time period
Spain's geological history	To gain a general overview of the geological history of Spain and its fossil record	Show an appreciation of the geological history of Spain and its fossil record
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To be able to analyse geological cross sections and photographs of rock layers to determine the order of geological events	Analyse geological cross sections and photographs of rock layers to determine the order of geological event

Biology and Geology ESO 4 - Chapter 3

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Cells	To know the main features and functions of all cells	State the main features and functions of all cells
Cell theory	To have an overview of the historical development of cell theory	Show an awareness of the historical development of cell theory
	To know the main points of modern cell theory	List the main points of modern cell theory
Prokaryotic cells	To know the main features of prokaryotic cells	List the main structures and organelles in a prokaryotic cell and explain their functions
Eukaryotic cells	To know the main features of eukaryotic cells	List the main structures and organelles in a eukaryotic cell and explain their functions
	To understand the difference between plant and animal cells	Explain the main differences between plant and animal cells
	To have an overview of the main steps in the evolution of eukaryotes	Show an awareness of the main steps in the evolution of eukaryotes, as well as the evidence for this
Cell nucleus and DNA	To know the structures within the cell nucleus, including the forms of DNA	Explain the structures within the cell nucleus, including the two forms of DNA
Cell cycle and mitosis	To understand the main stages in the cell cycle	Explain the main stages in the cell cycle
	To understand the processes involved when a cell divides by mitosis and cytokinesis	Explain the processes involved in the division of a cell by mitosis and cytokinesis
Haploid and diploid cells	To understand the differences between haploid and diploid cells	Explain the differences between haploid and diploid cells
Meiosis	To understand the processes involved when a cell divides by meiosis	Explain the processes involved in the division of a cell by meiosis
	To understand the differences between meiosis and mitosis	Explain the differences between meiosis and mitosis
	To understand how meiosis creates genetic variation	Explain how meiosis creates genetic variation
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To gain experience of using a microscope	Examine various types of cells under a microscope
	To analyse cell structures	Analyse photographs of cells under a microscope

Biology and Geology ESO 4 - Chapter 4

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Variation	To be aware that individuals of the same species show variation	Show an awareness that individuals of the same species show variation
	To understand the difference between discrete and continuous variation and between genetic and acquired characteristics	Distinguish between discrete and continuous variation and between genetic and acquired characteristics
Mendel's experiments	To know what experiments Mendel carried out and what the results showed	Describe the experiments Mendel carried out and what the results showed
	To understand how Mendel's three laws explain the results of his experiments	Explain Mendel's results using his three laws
Gregor Mendel	To appreciate why Mendel's work was so important and why this wasn't recognised until much later	Show an appreciation of why Mendel's work was so important and why this wasn't recognised until much later
Genetic theory	To understand how homologous pairs of chromosomes are inherited and how these determine physical characteristics	Explain how homologous pairs of chromosomes are inherited and how these determine physical characteristics
	To understand what is meant by genotype and phenotype	Identify the genotype and phenotype
	To understand the difference between homozygous and heterozygous individuals and dominant and recessive alleles	Explain the difference between homozygous and heterozygous individuals and dominant and recessive alleles
	To understand how pairs of characteristics are inherited if they are located on the same chromosome or on different chromosomes	Be able to determine how pairs of characteristics are inherited if they are located on the same chromosome or on different chromosomes
	To be aware of how inheritance doesn't always follow Mendel's laws	Show awareness of how inheritance doesn't always follow Mendel's laws
Gender and sex-linked genes	To understand how gender is inherited through sex chromosomes	Demonstrate understanding of how gender is inherited through sex chromosomes
	To understand why sex-linked genes are inherited differently by males and females and the consequences of this	Analyse patterns of inheritance for sex-linked genes and explain their consequences
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To analyse inheritance of characteristics using punnet squares and pedigree charts	Analyse inheritance of characteristics using punnet squares and pedigree charts

Biology and Geology ESO 4 - Chapter 5

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
DNA structure	To know the structure of DNA molecules	Label the parts of a DNA molecule and explain how the antiparallel strands twist to create a double helix
	To understand complementary base pairing	Understand what base pairs are and correctly match them up
	To have an overview of how scientists gradually improved their understanding of DNA structure	Show awareness of how scientists gradually improved their understanding of DNA structure
	To understand how DNA is packaged in chromosomes	Explain how DNA is packaged in chromosomes
DNA replication	To understand the process of DNA replication	Explain the steps in DNA replication
RNA structure and function	To understand the differences in structure and function between DNA and RNA	Explain the differences in structure and function between DNA and RNA
	To know the three types of RNA and their functions	List the three types of RNA and their functions
	To understand how the genetic code contains the instructions to make a protein	Explain how the genetic code contains the instructions to make a protein
Gene expression	To understand the processes involved in gene expression	Explain the processes involved in gene expression; convert an mRNA sequence into the corresponding amino acids
	To understand the different types of mutations and how these lead to genetic diseases	Explain the different types of mutations and how these lead to genetic diseases
Genetic engineering	To understand what recombinant DNA and genetically modified organisms are	Explain what recombinant DNA and genetically modified organisms are
	To have an overview of the most important techniques used in genetic engineering and how they are used	Demonstrate knowledge of the most important techniques used in genetic engineering and how they are used
	To be aware of ethical considerations related to genetic engineering	Discuss ethical considerations related to genetic engineering
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To carry out a practical to extract DNA	Extract DNA from strawberries
	To use models to illustrate the structure of DNA and the process of gene expression	Use models to illustrate the structure of DNA and the process of gene expression

Biology and Geology ESO 4 - Chapter 6

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Early theories about the development of species	To be aware of early theories about the development of species, including creationism and Lamarckism	Explain the main ideas of creationism and Lamarckism
Darwinism	To understand the basic principles of Darwin's theory of evolution	Explain the basic principles of Darwin's theory of evolution
	To understand what is meant by adaptation	Explain how organisms are adapted to their environment
	To be aware of how the observations Darwin made during his voyage on the Beagle contributed to his theory	Show awareness of how the observations Darwin made during his voyage on the Beagle contributed to his theory
Neo-Darwinism	To know that Neo-Darwinism combines Darwin's ideas with modern genetics	Demonstrate knowledge that Neo-Darwinism combines Darwin's ideas with modern genetics
	To understand the basic mechanism of Neo-Darwinism	Explain the basic mechanism of Neo-Darwinism
	To understand why new species are more likely to develop in isolated populations	Explain why new species are more likely to develop in isolated populations
Gene flow and neutral theory	To understand the concept of gene flow and the neutral theory of molecular evolution	Explain the mechanism of gene flow and what is meant by the neutral theory of molecular evolution
Gradualism and punctuated equilibrium	To understand the concepts of gradualism and punctuated equilibrium	Explain the difference between gradualism and punctuated equilibrium
Evidence for evolution	To be familiar with the evidence that indicates that all life on Earth has evolved from a common ancestor	Describe several different types of evidence that indicates that all life on Earth has evolved from a common ancestor
Human evolution	To know the main stages in the evolution of <i>Homo sapiens</i>	Describe the main stages in the evolution of <i>Homo sapiens</i>
	To appreciate that our understanding of the relationships between hominids is constantly being refined as we find more evidence	Demonstrate an awareness that our understanding of the relationships between hominids is constantly being refined as we find more evidence
Evolutionary trees	To understand how evolutionary trees show the relationships between species	Explain how evolutionary trees show the relationships between species
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To analyse relationships between species using an evolutionary tree	Analyse relationships between species using an evolutionary tree
	Using a practical activity to help understand how species are adapted to specific conditions	Carry out a practical demonstration of adaptations to the type of food available

Biology and Geology ESO 4 - Chapter 7

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Ecosystems	To know the basic definition of an ecosystem and classify its parts as biotic and abiotic factors	Classify biotic and abiotic factors in an ecosystem
Habitats and ecological niches	To distinguish between a habitat and an ecological niche and understand why several species cannot share the same ecological niche	Describe the ecological niche of an organism in an ecosystem; explain why several species cannot share the same ecological niche
Tolerance	To understand what is meant by a tolerance range and interpret graphs of tolerance ranges	Explain what is meant by a tolerance range and interpret graphs of tolerance ranges
Food chains and food webs	To understand how food chains and food webs show the relationships between organisms in a community	Interpret food chains and food webs
	To understand the flow of matter and energy through a food chain, including why energy is lost at each trophic level	Explain how matter and energy flow through food chains, including why energy is lost at each trophic level
Productivity	To understand the concept of productivity	State the definition of net primary productivity
Competition	To understand the different ways in which organisms compete for resources and mates, including predator-prey relationships	Explain how organisms compete for resources and mates, including predator-prey relationships
Cooperation and symbiosis	To know the different types of intraspecies and interspecies relationships	Describe intraspecies and interspecies relationships and explain the differences between them
Terrestrial ecosystems	To know the most important abiotic factors in terrestrial ecosystems and how they impact productivity	Describe the abiotic factors in a terrestrial ecosystem and explain how they impact productivity
Aquatic ecosystems	To know the most important abiotic factors in aquatic ecosystems and how they impact productivity	Describe the abiotic factors in an aquatic ecosystem and explain how they impact productivity
Limiting factors	To understand the concept of a limiting factor	Explain how biotic and abiotic factors can become a limiting factor
Ecotones	To understand the special characteristics of ecotones	Explain the special characteristics of ecotones
Equilibrium and disturbance	To understand the concepts of ecosystem equilibrium and resilience	Explain the concepts of ecosystem equilibrium and resilience
	To understand how disturbances upset ecosystem equilibrium	Explain how disturbances upset ecosystem equilibrium
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To draw and analyse ecological pyramids	Draw and analyse ecological pyramids
	To perform an analysis of biodiversity data	Tabulate and interpret biodiversity data

Biology and Geology ESO 4 - Chapter 8

CONTENTS, OBJECTIVES AND EVALUATION CRITERIA



CONTENTS	OBJECTIVES	EVALUATION CRITERIA
Natural resources	To know the main types of natural resources and classify them as renewable or non-renewable	Indicate what the main types of natural resources are used for and classify them as renewable or non-renewable
	To know the most important natural resources in Spain and in the local region of the school	Describe the the most important natural resources in Spain and in the local region of the school
Biogeochemical cycles	To understand how nutrients cycle through the geosphere, hydrosphere, atmosphere and biosphere in biogeochemical cycles	Explain how nutrients cycle through the geosphere, hydrosphere, atmosphere and biosphere in biogeochemical cycles
	To understand how humans intervene in the biogeochemical cycles and the environmental problems this causes	Explain how humans intervene in the biogeochemical cycles and the environmental problems this causes
Pollution and waste	To understand the problems caused by pollution and waste	Explain the problems caused by pollution and waste
	To understand the waste management system and how waste can be reduced, reused and recycled	Demonstrate an understanding of the waste management system and how waste can be reduced, reused and recycled
Overexploitation	To understand problems caused by overexploitation	Describe the problems caused by overexploitation
Alternative energy sources	To understand the problems caused by fossil fuels and realise why we need a transition to alternative energy sources	Explain the problems caused by fossil fuels and describe why we need a transition to alternative energy sources
	To understand the importance of saving energy	Demonstrate an understanding of the importance of saving energy
	To be aware of current progress in the transition to renewable sources of energy and understand what more needs to be done	Describe current progress in the transition to renewable sources of energy and explain what more needs to be done
Technical vocabulary	To learn the keywords for the chapter in English	Demonstrate knowledge of the keywords
Scientific skills	To collect air pollution data	Collect and analyse data on air pollution