A Level Biology Year 1

Autumn Term	Spring Term	Summer Term
Term 1 **Unit/ Topic title: Biological molecules** **Learning weeks:** 14 weeks **Skills** • *Convert between units such as mm^3 and cm^3* • *Understand that significant figures need retaining when making conversions between standard and ordinary form* • *Estimate results to check that calculated values are appropriate* • *Calculate standard deviation* • *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams* • *Evaluate information* • *Suggest practical methods* • *Construct arguments* • *Make predictions* • *Apply knowledge to unknown circumstances* • • **Key learning (knowledge and skills):** 3.1 All life on Earth shares a common chemistry. This provides indirect evidence for evolution. Despite their great variety, the cells of all living organisms contain only a few groups of carbon-based compounds that interact in similar ways. • Carbohydrates are commonly used by cells as respiratory substrates. They also form structural components in plasma membranes and cell walls. □ Lipids have many uses, including the bilayer of plasma membranes, certain hormones and as respiratory substrates.	**Term 1** **Unit/ Topic title: Organisms and exchange between the environment** **Learning weeks:** 14 weeks **Skills** • *Convert between units such as mm^3 and cm^3* • *Understand that significant figures need retaining when making conversions between standard and ordinary form* • *Estimate results to check that calculated values are appropriate* • *Calculate standard deviation* • *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams* • *Evaluate information* • *Suggest practical methods* • *Construct arguments* • *Make predictions* • *Apply knowledge to unknown circumstances* • **Key learning (knowledge and skills):** • **3.2** All life on Earth exists as cells. These have basic features in common. Differences between cells are due to the addition of extra features. This provides indirect evidence for evolution. • All cells arise from other cells, by binary fission in prokaryotic cells and by mitosis and meiosis in eukaryotic cells.	**Term 1** **Unit/ Topic title: Biodiversity** **Learning weeks:** 14 weeks **Skills** • *Convert between units such as mm^3 and cm^3* • *Understand that significant figures need retaining when making conversions between standard and ordinary form* • *Estimate results to check that calculated values are appropriate* • *Calculate standard deviation* • *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams* • *Evaluate information* • *Suggest practical methods* • *Construct arguments* • *Make predictions* • *Apply knowledge to unknown circumstances* • **Key learning (knowledge and skills):** 3.4 Biological diversity – biodiversity – is reflected in the vast number of species of organisms, in the variation of individual characteristics within a single species and in the variation of cell types within a single multicellular organism. • Differences between species reflect genetic differences. Differences between

- Proteins form many cell structures. They are also important as enzymes, chemical messengers and components of the blood.
- Nucleic acids carry the genetic code for the production of proteins. The genetic code is common to viruses and to all living organisms, providing evidence for evolution.
- The most common component of cells is water; hence our search for life elsewhere in the universe involves a search for liquid water.

Assessments
- Carbohydrates end of topic test
- Proteins end of topic test
- Water end of topic test
- End of module test

3.2-Cells
- All life on Earth exists as cells. These have basic features in common. Differences between cells are due to the addition of extra features. This provides indirect evidence for evolution.
- All cells arise from other cells, by binary fission in prokaryotic cells and by mitosis and meiosis in eukaryotic cells.
- All cells have a cell-surface membrane and, in addition, eukaryotic cells have internal membranes. The basic structure of these plasma membranes is the same and enables control of the passage of substances across exchange surfaces by passive or active transport.
- Cell-surface membranes contain embedded proteins. Some of these are involved in cell

- All cells have a cell-surface membrane and, in addition, eukaryotic cells have internal membranes. The basic structure of these plasma membranes is the same and enables control of the passage of substances across exchange surfaces by passive or active transport.
- Cell-surface membranes contain embedded proteins. Some of these are involved in cell signalling – communication between cells. Others act as antigens, allowing recognition of 'self' and 'foreign' cells by the immune system. Interactions between different types of cell are involved in disease, recovery from disease and prevention of symptoms occurring at a later date if exposed to the same antigen, or antigen-bearing pathogen

Assessments
- Cells end of topic test
- Pathogens end of topic test
- End of module test
- 3.3 The internal environment of a cell or organism is different from its external environment. The exchange of substances between the internal and external environments takes place at exchange surfaces. To truly enter or leave an organism, most substances must cross cell plasma membranes
- In large multicellular organisms, the immediate environment of cells is some form of tissue fluid. Most cells are too far away from exchange surfaces, and from each other, for simple diffusion alone to maintain the composition of tissue fluid within a suitable metabolic range.

individuals within a species could be the result of genetic factors, of environmental factors, or a combination of both.
- A gene is a section of DNA located at a particular site on a DNA molecule, called its locus. The base sequence of each gene carries the coded genetic information that determines the sequence of amino acids during protein synthesis. The genetic code used is the same in all organisms, providing indirect evidence for evolution.
- Genetic diversity within a species can be caused by gene mutation, chromosome mutation or random factors associated with meiosis and fertilisation. This genetic diversity is acted upon by natural selection, resulting in species becoming better adapted to their environment. Variation within a species can be measured using differences in the base sequence of DNA or in the amino acid sequence of proteins.
- Biodiversity within a community can be measured using species richness and an index of diversity.

Assessments
- Biodiversity end of topic test
- Genes end of topic test
- End of module test
- 3.5 Life depends on continuous transfers of energy.
- In photosynthesis, light is absorbed by chlorophyll and this is linked to the production of ATP.
- In respiration, various substances are used as respiratory substrates. The hydrolysis of these respiratory substrates is linked to the production of ATP.

signalling – communication between cells. Others act as antigens, allowing recognition of 'self' and 'foreign' cells by the immune system. Interactions between different types of cell are involved in disease, recovery from disease and prevention of symptoms occurring at a later date if exposed to the same antigen, or antigen-bearing pathogen Assessments • Cells end of topic test • Pathogens end of topic test • End of module test **Assessment:** see above **Key websites and media to support learning:** Kerboodle Online podcasts Snap revise You tube CGP alevel revision guide AQA Biology textbook	• In large organisms, exchange surfaces are associated with mass transport systems that carry substances between the exchange surfaces and the rest of the body and between parts of the body. Mass transport maintains the final diffusion gradients that bring substances to and from the cell membranes of individual cells. It also helps to maintain the relatively stable environment that is tissue fluid. Assessments • Transport end of topic test **Assessment:** see above **Key websites and media to support learning:** Kerboodle Online podcasts Snap revise You tube CGP alevel revision guide AQA Biology textbook	• In both respiration and photosynthesis, ATP production occurs when protons diffuse down an electrochemical gradient through molecules of the enzyme ATP synthase, embedded in the membranes of cellular organelles. • The process of photosynthesis is common in all photoautotrophic organisms and the process of respiration is common in all organisms, providing indirect evidence for evolution. • In communities, the biological molecules produced by photosynthesis are consumed by other organisms, including animals, bacteria and fungi. Some of these are used as respiratory substrates by these consumers. □ • Photosynthesis and respiration are not 100% efficient. The transfer of biomass and its stored chemical energy in a community from one organism to a consumer is also not 100% efficient. Assessments • Respiration end of topic test • Photosynthesis end of topic test • End of module test **Assessment:** see above **Key websites and media to support learning:** Kerboodle Online podcasts Snap revise You tube CGP alevel revision guide

		AQA Biology textbook

A Level Biology Year 2

Autumn Term

Term 1

Unit/ Topic title: Energy transfer in and between organisms

Learning weeks: 14 weeks

Skills

- *Convert between units such as mm^3 and cm^3*
- *Understand that significant figures need retaining when making conversions between standard and ordinary form*
- *Estimate results to check that calculated values are appropriate*
- *Calculate standard deviation*
- *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams*
- *Evaluate information*
- *Suggest practical methods*
- *Construct arguments*
- *Make predictions*
- *Apply knowledge to unknown circumstances*

- **Key learning (knowledge and skills):** 3.6 A stimulus is a change in the internal or external environment. A receptor detects a stimulus. A coordinator formulates a suitable response to a stimulus. An effector produces a response
- Receptors are specific to one type of stimulus.
- Nerve cells pass electrical impulses along their length. A nerve impulse is specific to a target cell only because it releases a chemical messenger directly onto it, producing a response that is usually rapid, short-lived and localised.

Spring Term

Term 1

Unit/ Topic title: Organisms to respond to internal and external environments

Learning weeks: 14 weeks

Skills

- *Convert between units such as mm^3 and cm^3*
- *Understand that significant figures need retaining when making conversions between standard and ordinary form*
- *Estimate results to check that calculated values are appropriate*
- *Calculate standard deviation*
- *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams*
- *Evaluate information*
- *Suggest practical methods*
- *Construct arguments*
- *Make predictions*
- *Apply knowledge to unknown circumstances*

- **Key learning (knowledge and skills):**
- 3.6 A species exists as one or more populations. There is variation in the phenotypes of organisms in a population, due to genetic and environmental factors. Two forces affect genetic variation in populations: genetic drift and natural selection. Genetic drift can cause changes in allele frequency in small populations. Natural selection occurs when alleles that enhance the fitness of the

Summer Term

Term 1

Unit/ Topic title: the control of gene expression

Learning weeks: 14 weeks

Skills

- *Convert between units such as mm^3 and cm^3*
- *Understand that significant figures need retaining when making conversions between standard and ordinary form*
- *Estimate results to check that calculated values are appropriate*
- *Calculate standard deviation*
- *Select an appropriate format for presenting data, bar charts, histograms, graphs and scattergrams*
- *Evaluate information*
- *Suggest practical methods*
- *Construct arguments*
- *Make predictions*
- *Apply knowledge to unknown circumstances*

Key learning (knowledge and skills): Recap, revision and walking talking mock examinations
Assessment: Walking talking mocks

- 3.8 Cells are able to control their metabolic activities by regulating the transcription and translation of their genome. Although the cells within an organism carry the same coded genetic information, they translate only part of it. In multicellular organisms, this control of

- In contrast, mammalian hormones stimulate their target cells via the blood system. They are specific to the tertiary structure of receptors on their target cells and produce responses that are usually slow, longlasting and widespread.
- Plants control their response using hormone-like growth substances.

Assessments

- Survival and response end of topic test
- Heart end of topic test
- Nervous co-ordination end of topic test
- End of module test
- 3.7 The theory of evolution underpins modern Biology. All new species arise from an existing species. This results in different species sharing a common ancestry, as represented in phylogenetic classification. Common ancestry can explain the similarities between all living organisms, such as common chemistry (eg all proteins made from the same 20 or so amino acids), physiological pathways (eg anaerobic respiration), cell structure, DNA as the genetic material and a 'universal' genetic code.
- The individuals of a species share the same genes but (usually) different combinations of alleles of these genes. An individual inherits alleles from their parent or parents.

Assessments

- inheritance end of topic test
- populations end of topic test
- Evolution end of topic test
- End of module test

Assessment: see above

individuals that carry them rise in frequency. A change in the allele frequency of a population is evolution

- If a population becomes isolated from other populations of the same species, there will be no gene flow between the isolated population and the others. This may lead to the accumulation of genetic differences in the isolated population, compared with the other populations. These differences may ultimately lead to organisms in the isolated population becoming unable to breed and produce fertile offspring with organisms from the other populations. This reproductive isolation means that a new species has evolved.
- Populations of different species live in communities. Competition occurs within and between these populations for the means of survival. Within a single community, one population is affected by other populations, the biotic factors, in its environment. Populations within communities are also affected by, and in turn affect, the abiotic (physicochemical) factors in an ecosystem.
- 3.7- Genetics The theory of evolution underpins modern Biology. All new species arise from an existing species. This results in different species sharing a common ancestry, as represented in phylogenetic classification. Common ancestry can explain the similarities between all living organisms, such as common chemistry (eg all proteins made from the same 20 or so amino acids), physiological pathways (eg anaerobic respiration), cell structure, DNA

translation enables cells to have specialised functions, forming tissues and organs.

- There are many factors that control the expression of genes and, thus, the phenotype of organisms. Some are external, environmental factors, others are internal factors. The expression of genes is not as simple as once thought, with epigenetic regulation of transcription being increasingly recognised as important.
- Humans are learning how to control the expression of genes by altering the epigenome, and how to alter genomes and proteomes of organisms. This has many medical and technological applications.
- Consideration of cellular control mechanisms underpins the content of this section. Students who have studied it should develop an understanding of the ways in which organisms and cells control their activities. This should lead to an appreciation of common ailments resulting from a breakdown of these control mechanisms and the use of DNA technology in the diagnosis and treatment of human diseases.

Key websites and media to support learning:

Kerboodle
Online podcasts
Snap revise
You tube
CGP alevel revision guide
AQA Biology textbook

Key websites and media to support learning: Kerboodle Online podcasts Snap revise You tube CGP alevel revision guide AQA Biology textbook	as the genetic material and a 'universal' genetic code. • The individuals of a species share the same genes but (usually) different combinations of alleles of these genes. An individual inherits alleles from their parent or parents. • A species exists as one or more populations. There is variation in the phenotypes of organisms in a population, due to genetic and environmental factors. Two forces affect genetic variation in populations: genetic drift and natural selection. Genetic drift can cause changes in allele frequency in small populations. Natural selection occurs when alleles that enhance the fitness of the individuals that carry them rise in frequency. A change in the allele frequency of a population is evolution • If a population becomes isolated from other populations of the same species, there will be no gene flow between the isolated population and the others. This may lead to the accumulation of genetic differences in the isolated population, compared with the other populations. These differences may ultimately lead to organisms in the isolated population becoming unable to breed and produce fertile offspring with organisms from the other populations. This reproductive isolation means that a new species has evolved. • Populations of different species live in communities. Competition occurs within and between these populations for the means of survival. Within a single community, one population is affected by other populations, the	

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