A Level Biology

AQA Specification

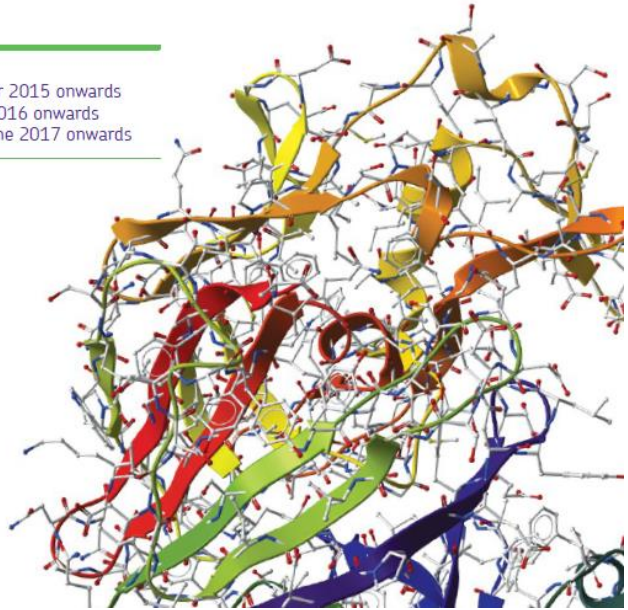
AQA
Realising potential

AS AND A-LEVEL BIOLOGY

AS (7401)
A-level (7402)

Specifications
For teaching from September 2015 onwards
For AS exams in May/June 2016 onwards
For A-level exams in May/June 2017 onwards

Version 1.4 April 2017



Subject Content

Year 12 (AS Level)

- Biological Molecules
- Cells
- Organisms exchange substances with their environment
- Genetic information, variation and relationships between organisms

Year 13 (A Level)

- Energy transfers in and between organisms
- Organisms respond to changes in the environment
- Genetics, populations, evolution and ecosystems
- The control of gene expression

How will I be taught?

- Introduction to new topics similar to GCSE
- Some lecture style topics
- Past paper questions (including modelling)
- Independent learning
- Practical work
- One to one discussions and feedback

Assessment

100% Exam

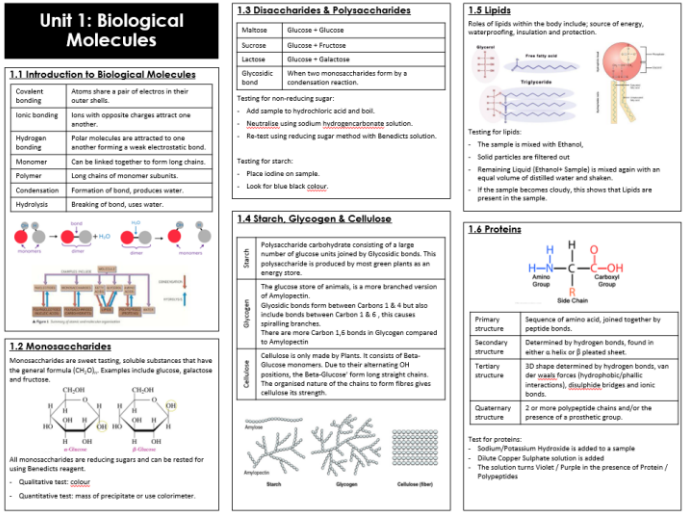
Paper 1	Paper 2	Paper 3
What's assessed • Any content from topics 1–4, including relevant practical skills	**What's assessed** • Any content from topics 5–8, including relevant practical skills	**What's assessed** • Any content from topics 1–8, including relevant practical skills
Assessed • written exam: 2 hours • 91 marks • 35% of A-level	**Assessed** • written exam: 2 hours • 91 marks • 35% of A-level	**Assessed** • written exam: 2 hours • 78 marks • 30% of A-level
Questions • 76 marks: a mixture of short and long answer questions • 15 marks: extended response questions	**Questions** • 76 marks: a mixture of short and long answer questions • 15 marks: comprehension question	**Questions** • 38 marks: structured questions, including practical techniques • 15 marks: critical analysis of given experimental data • 25 marks: one essay from a choice of two titles

Practical Endorsement

Required activity	Apparatus and technique reference
1. Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction	a, b, c, f, l
2. Preparation of stained squashes of cells from plant root tips; set-up and use of an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index	d, e, f
3. Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue	c, h, j, l
4. Investigation into the effect of a named variable on the permeability of cell-surface membranes	a, b, c, j, l
5. Dissection of animal or plant gas exchange or mass transport system or of organ within such a system	e, h, j
6. Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth	c, i
7. Use of chromatography to investigate the pigments isolated from leaves of different plants, eg leaves from shade-tolerant and shade-intolerant plants or leaves of different colours	b, c, g
8. Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts	a, b, c
9. Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms	a, b, c, i
10. Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a maze	h
11. Production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample	b, c, f
12. Investigation into the effect of a named environmental factor on the distribution of a given species	a, b, h, k, l

Resources

- Knowledge Organisers
- SENECA
- Textbook
- Lab Book



Unit 1: Biological Molecules

1.1 Introduction to Biological Molecules

Covalent bonding	Atoms share a pair of electrons in their outer shells.
Ionic bonding	Ions with opposite charges attract one another.
Hydrogen bonding	Polar molecules are attracted to one another forming a weak electrostatic bond.
Monomer	Can be linked together to form long chains.
Polymer	Long chains of monomer subunits.
Condensation	Formation of bond, produces water.
Hydrolysis	Breaking of bond, uses water.

1.2 Monosaccharides

Monosaccharides are sweet tasting, soluble substances that have the general formula $(CH_2O)_n$. Examples include glucose, galactose and fructose.

All monosaccharides are reducing sugars and can be tested for using Benedicts reagent.

- Qualitative test: colour
- Quantitative test: mass of precipitate or use colorimeter.

1.3 Disaccharides & Polysaccharides

Maltose	Glucose + Glucose
Sucrose	Glucose + Fructose
Lactose	Glucose + Galactose
Glycosidic bond	When two monosaccharides form by a condensation reaction.

Testing for non-reducing sugar:

- Add sample to hydrochloric acid and boil.
- Neutralise using sodium hydrogencarbonate solution.
- Re-test using reducing sugar method with Benedicts solution.

Testing for starch:

- Place iodine on sample.
- Look for blue black colour.

1.4 Starch, Glycogen & Cellulose

Starch	Polysaccharide carbohydrate consisting of a large number of glucose units joined by Glycosidic bonds. This polysaccharide is produced by most green plants as an energy store.
Glycogen	The glucose store of animals, is a more branched version of Amylopectin. Glycosidic bonds form between Carbons 1 & 4 but also include bonds between Carbon 1 & 6 , this causes spiralling branches. There are more Carbon 1,6 bonds in Glycogen compared to Amylopectin
Cellulose	Cellulose is only made by Plants. It consists of Beta-Glucose monomers. Due to their alternating OH positions, the Beta-Glucose' form long straight chains. The organised nature of the chains to form fibres gives cellulose its strength.

1.5 Lipids

Roles of lipids within the body include; source of energy, waterproofing, insulation and protection.

Testing for lipids:

- The sample is mixed with Ethanol,
- Solid particles are filtered out
- Remaining Liquid (Ethanol+ Sample) is mixed again with an equal volume of distilled water and shaken.
- If the sample becomes cloudy, this shows that Lipids are present in the sample.

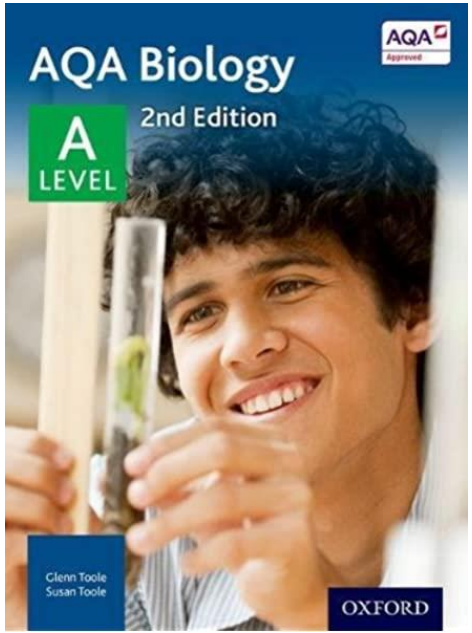
1.6 Proteins

Primary structure	Sequence of amino acid, joined together by peptide bonds.
Secondary structure	Determined by hydrogen bonds, found in either α helix or β pleated sheet.
Tertiary structure	3D shape determined by hydrogen bonds, van der waals forces (hydrophobic/phallic interactions), disulphide bridges and ionic bonds.
Quaternary structure	2 or more polypeptide chains and/or the presence of a prosthetic group.

Test for proteins:

- Sodium/Potassium Hydroxide is added to a sample
- Dilute Copper Sulphate solution is added
- The solution turns Violet / Purple in the presence of Protein / Polypeptides

SENECA



Links to other subjects

- Chemistry
- Maths
- Psychology
- Sports Science
- Health & Social Care

Any questions?