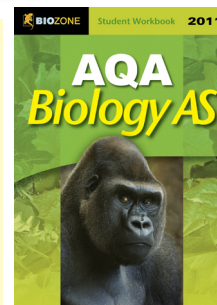


2011: What's New in AQA Biology AS

Thank you for purchasing the **AQA Biology AS Student Workbook**. BIOZONE is committed to providing an up-to-date resource catering for AQA Biology students and teachers. This workbook and its companion volume, AQA Biology A2 Student Workbook, are currently reviewed on alternate years. This year's revision of Biology AS introduces several innovations, focussing on context in learning and competency in scientific literacy. These changes will improve value and usability for both students and educators. A guide to using BIOZONE's workbooks and ancillary products is provided in the Teacher's Guide, which is provided free with every order of workbooks. It provides suggested teaching strategies and the rationale for changes in the this year's edition. We are keen for any constructive criticism and feedback from our users regarding content revisions. Please let us know so that we can improve our products to better meet your needs. Email: tracey@biozone.co.nz



Organisational and general changes

AQA Biology AS 2011 builds on the successful features of the previous edition, while focusing on scientific literacy and learning within relevant contexts. Much of the content has been substantially revised to improve its relevance, accessibility, and usability by students and educators. These changes include:

- ▶ A contextual approach. We encourage students to become thinkers by applying their knowledge within appropriate contexts. Some chapters include an account examining a 'biological story' related to the theme of the chapter. This approach provides a context for the material and an opportunity to focus on comprehension and the synthesis of ideas.
- ▶ An easy-to-use chapter introduction comprising succinct learning objectives, a list of key terms, and a short summary of key concepts. The learning objectives are based on the learning outcomes of the AQA scheme, but in some cases include additional detail to assist with comprehension.
- ▶ There is an emphasis on acquiring skills in scientific literacy. Each chapter includes a comprehension and/or literacy activity, and the appendix (a new feature) includes references for articles of interest cited throughout the text.
- ▶ Web links and Related Activities support the material provided on each activity page. We have provided an enhanced list of **web links** for activities (videos and animations) accessed through www.biozone.co.uk/weblink/AQA-AS-2658.html. Each link provides a video clip or animation of relevance to the activity page on which it indicated. Note that this resource is distinct from the Biolinks, which have long been a feature of BIOZONE's website.
- ▶ This workbook will be regularly updated to keep abreast of new developments in biology and to reflect changes to the AQA curriculum. BIOZONE continues to be committed to providing up-to-date, relevant, interesting, and accurate information.
- ▶ Model Answers: In response to popular request, the model answers are now also provided as a show-hide feature on the non-printable PDF version of the workbook on the Teacher Resource CD-ROM.
- ▶ Removed activities: Some activities have been removed. An activity is generally removed because (1) it was not relevant to the AQA curriculum at the AS level or (2) it has been incorporated into a new activity. Some activities peripheral to the curriculum but suitable as topic extension have been removed but are available on the Teacher's Resource CD-ROM as part of the collection of resources for support and extension.

☆ New activities in this edition

Literacy activities:

Key Terms: Word Find

A little different from traditional word finds, students must first solve the clue before they can find the word!

Key Terms: Crossword

Crosswords help student literacy in the selected topic.

Students will need to know their key terms to solve it.

Key Terms: Mix and Match

Match each key term from the topic with its definition.

Concept maps:

Although these are not activities, students can refer to them often to map the connections between topics and to place their material into a wider context. An introductory activity providing an overview of the unit's work follows each of the two concept maps.

Page Activity and description

- 12 A Qualitative Practical Task**
Introducing a qualitative task; using colour changes in the iodine/KI test and the Benedict's test to assess the conversion of starch to simple sugars during ripening in bananas. Students are asked to evaluate the methodology and explain what is happening during the ripening process.
- 13 A Quantitative Practical Task**
This activity introduces students to the procedure for a basic quantitative task, in this case, a study of catalase activity. The focus of the activity is in identifying and describing the variables, and aspects of the experimental design.
- 17 Manipulating Raw Data**
A new activity designed to introduce and familiarise students with common techniques for data manipulation (tally charts, percentages, and rates).
- 18 Constructing Tables**
This new activity provides an introduction about how to present data in a tabulated form. It provides clear guidelines about how to construct and present a table to get the most benefit from using this format.
- 19 Constructing Graphs**
This activity introduces students to the basic principles of constructing graphs. It provides an introduction to the specific graphing activities which follow.
- 35 Evaluating Your Results**
This activity is based on the evaluation of a quantitative task for which data are provided. The data relate to the metabolic activity of respiring seeds at varying stages of germination, as measured by decomposition of H_2O_2 by catalase. Students must calculate the mean volume of oxygen produced, the standard deviation, and the mean rate of oxygen production. They are then asked to make decisions regarding the handling of data and to evaluate the experiment in terms of sources of error and design.
- 42 Monosaccharides and Disaccharides**
The material previously covering carbohydrate structure and function has been substantially revised. This activity focuses on the structure, role, and properties of monosaccharides and disaccharides.
- 43 Carbohydrate Chemistry**
This activity focuses solely the basic biochemistry of simple sugars: isomerism and the role of condensation



and hydrolysis in forming and breaking down disaccharides respectively.

- 44 Polysaccharides**
The structure and function of four biologically important polysaccharides: cellulose, starch, glycogen, and chitin.
- 50 How Enzymes Work**
A separation and revision of material previously covered in enzymes. The focus is on the models for enzyme action and how enzymes work by lowering E_a .
- 52 Enzyme Cofactors**
The focus of this activity is on the structure and function of various types of enzyme cofactors. Some examples are provided and questions focus on student understanding of how cofactors work.
- 53 Enzyme Inhibitors**
This material has been substantially revised as a separate activity and now examines in more detail the role of allostery in the regulation of metabolic pathways, the differences between competitive and non-competitive inhibition and how these can be tested empirically, and the action of irreversible inhibitors as poisons and antimicrobial drugs.
- 55 The Mouth and Pharynx**
The first of a series of pages focusing on human digestion. This describes the structure and role of the mouth, pharynx, and teeth in humans.
- 56 The Human Digestive System**
This activity has been coded as new because, although it has the same name as an activity in 2009's edition, it is essentially a new activity incorporating the human digestive tract, the stomach and small intestine, and the large intestine. The artwork and information has been revised and presented in a more succinct and accessible manner the focus is on the relationship of gut structure to function.
- 59 Digestion, Absorption, and Transport**
This activity extends the material introduced in the previous activity "*The Human Digestive Tract*". Specifically, it covers carbohydrate digestion in the mouth and small intestine and discusses lactose intolerance in humans. The second page of the activity looks at nutrient absorption by the intestinal villi, examining which breakdown products are absorbed by passive and which by active transport.
- 68 The Cell's Cytoskeleton**
An introduction to the components of the cytoskeleton: microfilaments, intermediate filaments, and microtubules. The structure and function of each of these components is discussed.
- 78 Identifying Structures in an Animal Cell**
A complementary activity to that covering identification of plant structures. This activity asks the students to identify the organelles of an animal cell from an electron micrograph. Questions focus on understanding the structure with respect to functional role.
- 81 How Do We Know? Membrane Structure**
A essay-type comprehension activity examining the evidence for our current fluid mosaic model of membrane structure.
- 91 Packaging Proteins**
This material, which was previously included in *The Role of Membranes in Cells* has been present as a stand-alone activity looking only at the role of the rER and the Golgi in protein export.
- 92 Passive Transport Processes**
A revision of the material previously covered in several activities. It covers types of diffusion as well as osmosis.
- 113 Living with Chronic Lung Disease**
A contextual example for exploring the impact of chronic lung disease. It is introduced with some data and

background and follows with the personal story of a sufferer with chronic obstructive pulmonary disease.

- 126 Atherosclerosis**
The step-wise progression of atherosclerosis. Questions focus on the the causes and consequences of the physiological changes associated with the disease.
- 127 Risk Factors for CVD**
An examination of the risk factors for cardiovascular diseases and, particularly, the impact of multiple risk factors on the development of disease. Second hand data are presented for evaluation and questions focus on the interpretation of these data.
- 129 Reducing the Risk**
This activity presents data relating to the reduction in CVD risk associated with certain behaviours: exercising more, smoking less, and eating more fruit. Students are asked to critically evaluate the evidence for risk reduction in certain groups.
- 133 The First Line of Defence**
This activity replaces *Targets for Defence*, concentrating on the body's natural microbiota and the role of the skin and its secretions in preventing pathogen entry.
- 147 Vaccines and Vaccination**
This revision of two activities (under a new name) now focuses less on schedules of vaccination and vaccines themselves and more on the features of vaccination programmes that are associated with control or eradication of disease. Whooping cough and smallpox are the case studies described.
- 172 Changes to the DNA Sequence**
This activity provides a brief overview of the role of mutations as a source of variation. The main example is the mutation causing one form of genetic hearing loss.
- 187 Darwin: Pigeon Fancier?**
An context for examining the changes possible to a species through selective breeding. Darwin's documentation of the considerable phenotypic changes that occur in pigeon breeds provides the stimulus material for students to look at how species can change over time.
- 191 Starch, Cellulose, and Cell Walls**
This activity covers the structure and chemistry of cellulose and starch. It focuses on the structural source of high tensile strength in cellulose, and looks more closely at the components of starch, amylose and amylopectin. Some of the questions require interpretation of graphical data provided.
- 193 Chloroplasts**
A detailed examination of chloroplast structure using diagrams, TEMs, and light micrographs. The structure of a basic palisade mesophyll cell is describe and students are asked to relate structural features to function.
- 194 DNA Replication is Semi-Conservative**
An account of the Meselson-Stahl experiment that proved the semi-conservative nature of DNA replication.
- 197 Does DNA Really Carry the Code?**
A reading and comprehension activity describing the methods used to confirm DNA as an information storage molecule and the unit of inheritance. Students are asked to explain why certain methods were used and what the outcome of those methods were.
- 199 Understanding Mitosis**
A revision of *Mitosis and the Cell Cycle* under a new name to expand the material and provide more room for questions. The overview of the cell cycle is now covered in a separate activity.
- 204 Differentiation of Plant Cells**
This activity examines the origins of the primary tissues from meristematic tissues in dicots. Questions focus on the totipotent nature of meristematic tissues in plants



and the differentiation of meristems to produce vascular tissue, ground tissue, and epidermis.

- 229 Capillary Networks**
This activity looks at the structure and function of capillary networks in mammals. Students are asked to recognise different functional states in a capillary bed. The structure and role of portal systems are also discussed.
- 230 Formation of Tissue Fluid**
The role of tissue fluid and the mechanisms by which it is formed and returned to circulation are discussed in this activity. This material was previously covered with capillaries and the clarity of the explanatory artwork has been improved.
- 239 Protein Homologies**
A revision of some older material to update information regarding both the technique and application of protein homologies to phylogenetic systematics. Molecular clocks are covered in more detail than previously, using cytochrome *c* as the example.
- 241 DNA Homologies**
A revision of the material on DNA hybridisation to acknowledge the use of newer sequencing technology in making DNA comparisons. The continued use of DNA hybridisation for identifying bacteria is acknowledged.
- 243 Phylogenetic Systematics**
A new activity examining the basis of cladistic analysis. Students examine and interpret data associated with different constructions of phylogenetic trees.
- 249 Antibiotics and Resistance**
This activity includes some of the material previously in the activity *Antibiotics*, but also covers the nature of bactericidal and bacteriostatic drugs and provides more questions, including an interpretation of antibiotic efficacy as deduced from the presented results of a plate agar experiment.
- 260 Hedgerows: An Ancient Tradition**
The activity focuses solely on the role of hedgerows in the UK and arguments for their conservation in an increasingly intensified landscape.

△ Existing material revised this edition

Existing activities that have been revised in order to clarify ideas and improve the questions, format, or general content:

Activity and account of change

- 11 Terms and Notation**
The definitions for accuracy and precision have been revised to provide clarification. Alternative notations for expression of units have been removed, leaving only the IOB recommended notation.
- 15 Recording Results**
In the example table, the range of the independent variable has been reduced and the introduction has been revised.
- 49 Enzymes**
This activity has been revised, with much of the material now covered in separate activities. This activity focuses only on the role of enzymes as biological catalysts in endergonic and exergonic metabolic reactions.
- 60 Biochemical Tests**
This activity no longer covers chromatography, but provides an example of colorimetric analysis to produce a calibration curve for glucose from a series of standards. The questions have been revised accordingly.
- 65 Animal Cells**
The artwork for this activity has been revised to provide a clearer explanation of cellular organelles. The questions are unchanged.
- 71 Prokaryotic Cells**
Minor change with the use of photographs of organisms to describe bacterial forms.
- 80 Interpreting Electron Micrographs**
Now a one page activity; the chloroplast has been replaced with lysosomes.
- 85 Lipids**
The diagram work in this activity has been revised to improve clarity and accuracy in representation. More focus has been placed in the structure of phospholipids in relation to function and the role of cholesterol (especially in cellular membranes). The questions have been revised accordingly.
- 87 The Structure of Membranes**
A revision the diagrammatic work to more clearly show the key structural features of the plasma membrane. Photographic examples of membranes provide illustrative clarification on some points. The questions have been revised.
- 89 The Role of Membranes in Cells**
Revised with illustrative examples of the functional role of membranes in cells. The material on protein packaging has been removed to a separate activity. The questions have been revised accordingly.
- 94 Ion Pumps**
The sodium-glucose symport replaces the coupled transport of sucrose in the phloem (which is less relevant than glucose transport in the intestinal epithelium for AQA students).
- 95 Exocytosis and Endocytosis**
A revision to include more explanatory detail, including a brief description of receptor mediated phagocytosis.
- 97 Cholera**
An extensive revision to include not only details of the disease and the role of ORS but a diagrammatic explanation of how the cholera toxin creates diarrhoea and how ORS rehydrate in the event of infection. The questions have been revised accordingly.
- 103 The Human Gas Exchange System**
Minor revision of terminology (gas exchange system replaces respiratory system and alveolar-capillary membrane replaces respiratory membrane) to avoid any confusion with cellular respiration.
- 105 Measuring Lung Function**
The explanation of how the spirometer works has been revised to provide more detail. The questions are unchanged.
- 111 Smoking and the Lungs**
This activity was called *Diseases caused by Smoking*, but it is essentially a relatively minor revision to focus only on the effects of smoking on the gas exchange system. Smoking as a risk factor in the development of cardiovascular disease is now covered elsewhere. Question 4 has been revised accordingly.
- 120 Control of Heart Activity**
The material on the extrinsic control of heart rate has been removed from this activity and it now focuses only on the intrinsic control of heart rate, as required by the AQA scheme.
- 125 Cardiovascular Disease**
This activity has been reframed as an introduction to CVD without examining the related issues of atherosclerosis and blood lipids. These are now covered separately. The questions focus on discussing general aspects of CVD.
- 130 Review of the Human Heart**
In this review, material on the extrinsic control of heart rate has been removed and the activity focuses on heart structure, intrinsic control of heart rate, and ECG.



- 134 The Body's Defences**
This activity has been reduced to one page, with some of the material on the first line of defence covered in a new activity. The questions have been revised accordingly.
- 141 Acquired Immunity**
This activity has been substantially revised to two pages and now includes coverage of the primary and secondary responses to pathogens, the role of vaccination programmes in public health, and the principle of herd immunity. The questions have been revised accordingly.
- 151 Immunology and Public Health**
Although previously called *Disease and Public Health*, this activity is essentially a revision, with one of the sets of second hand data now pertaining to TB (rather than whooping cough). The whooping cough data are presented elsewhere. The questions have been revised accordingly.
- 170 The Genetic Code**
A simplified version of the activity by the same name in the 2009 edition. This activity emphasises the steps between DNA and polypeptide chain, and not the finer details of translating the three base code.
- 179 Genetic Diversity**
The questions have been revised so that they explore how selective breeding produces phenotypic variation and more appropriately reflect the focus of the activity.
- 198 Mitosis and the Cell Cycle**
This revision now focuses on the cell cycle and provides an overview of the outcomes of mitotic cell division. the role of mitosis and detail of the stages is now covered in a separate activity. the questions have been revised accordingly.
- 202 Differentiation of Human Cells**
This activity now includes information of the role of cellular differentiation in development and the questions have been revised to avoid overlap in responses with "*Human Cell Specialisation*".
- 203 Human Cell Specialisation**
A minor change in which a goblet cell replaces an intestinal epithelial cell. The intent of the activity is unchanged.
- 207 Levels of Organisation**
A change to the order in which material is presented.
- 228 Capillaries**
This activity now includes only the first part of "*Capillaries and Tissue Fluid*" and focuses on capillary structure and function. The formation of tissue fluid and the structure and role of capillary networks are covered in separate activities.
- 238 The Species Concept**
This activity has been revised to update the information on interbreeding and distribution of canids. The introduction now more clearly identifies the focus of the page. The questions are unchanged.
- 261 Agriculture and Diversity**
This revision focuses on the impact of monocultures and high input agriculture on the biodiversity of ecosystems in the UK, particularly its natural grasslands. Data documenting the decline in the diversity woodland bird populations is also presented. The material on hedgerows is now presented in a separate activity. The questions have been revised accordingly.

*We hope that you enjoy using AQA Biology AS.
We always welcome comments and constructive criticism, and
will endeavor to implement suggestions where possible.*

The staff at BIOZONE

