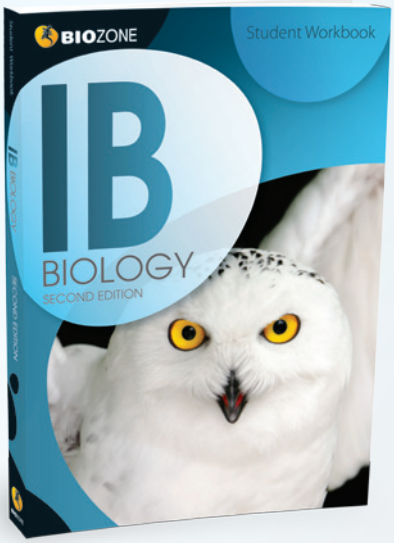
BIOZONE

CLASSROOM GUIDE

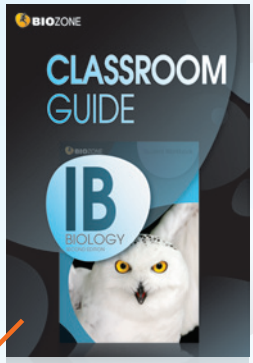
IB BIOLOGY SERIES

www.thebiozone.com/ib

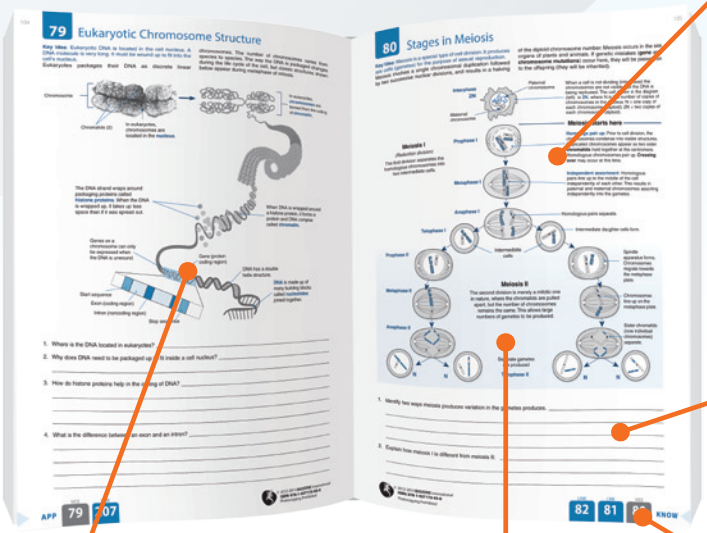


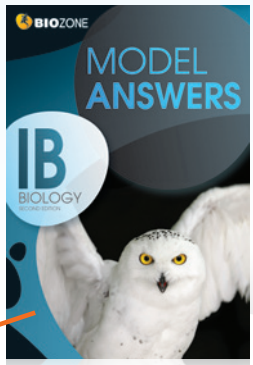
Engage students with write-on activities directly in the Workbook

Options
Workbooks for each of the four IB Options (available 2015)



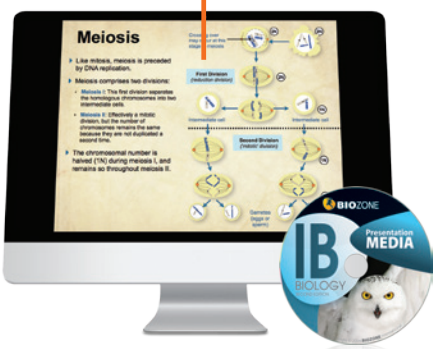
Explain
Classroom Guide provides teaching strategies



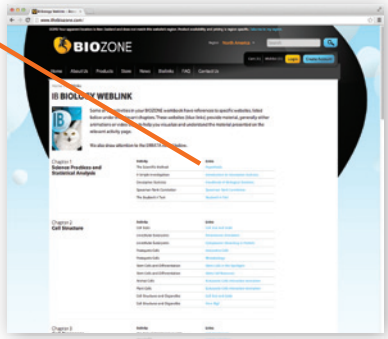


Evaluate student performance with Model Answers

Elaborate on and review ideas using the Teacher's Digital Edition with "reveal answers" feature



Enhance workbook activities with Presentation Media - editable PowerPoint slides (coming soon)



Explore extra content with comprehensive weblinks

BIOZONE - Resources for Lifelong Learners

This Classroom Guide complements **BIOZONE**'s IB BIOLOGY Student Workbook. Our resources have always emphasized critical thinking and conceptual understanding. The new student workbook series for IB BIOLOGY continues this successful formula, providing engaging and relevant material fully revised to meet the teaching and learning requirements of the **new IB Biology Programme.** We welcome feedback on this workbook and its accompanying products.

www.**theBIOZONE**.com/**IB**

Contents

Making the most of *IB Biology*

FAQs ABOUT OUR IB BIOLOGY STUDENT WORKBOOK

Creating Lifelong Learners

We want today's biology students to be self-motivated, lifelong learners, to develop a sound grasp or biological knowledge, to plan and evaluate their work, and to think critically and independently. In developing IB Biology, we have utilized the 5Es instructional model as a basis for developing materials to specifically address the IB Biology syllabus. By successfully completing the activities, which make up the bulk of the student workbook, students can demonstrate competence in skills and ideas. This is central to meeting the understandings, applications and skills of the IB Biology Diploma Programme. BIOZONE's suite of resources for the SL and HL component of IB Biology can help your students achieve key competencies in all areas of biology.

BIOZONE encourages the development of the IB learner profile using the 5 Es model

The Five Es

Engage:	make connections between past and present learning experiences.
Explore:	become actively involved in the activity.
Explain:	communicate the learning experience.
Elaborate:	expand on the concepts learned.
Evaluate:	assess understanding of the concepts.

ENGAGE: **Highly visual activities**	Use activities in class to engage a student when introducing a topic, or to consolidate student understanding and summarize the material covered by other methods. Using activities in class provides valuable opportunities for peer-to-peer learning.
ENGAGE: **A connected plan of study**	The check-box format of the contents pages and the chapter introductions provides a focus for planning achievement.
EXPLORE: **Independent, self directed study**	Activities are self-contained so students are encouraged to be independent learners and seek the answers to questions posed by the activity. Capable students can work quickly and independently through the core material and can use the time for extension. Less able students can review or finish activities at home. Most activities are supported by web-based resources in the form of animations and video clips.
EXPLAIN: **Communicating is the key to consolidation**	All activities first engage the student with a key idea and a visually inviting delivery of content. Student engagement with this material leads them to the questions in which they must communicate their understanding of the content. Students are encouraged to use appropriate biological terms as referenced in the chapter introduction (key terms).
ELABORATE: **Building up**	Most introductory activities are supported by activities in which students apply their understanding of ideas to a new situation. These 'follow-on' activities often involve data analysis, and support scientific practices.
EVALUATE: **Easy assessment**	Encourage self assessment with chapter reviews (these can be graded if desired) or use specific activities to evaluate a student's skills and understanding or scientific ideas.
WHAT ABOUT HOMEWORK?	Assign activities as homework to review a completed topic, explore a related concept, or introduce a topic prior to in-class practical work or extension.

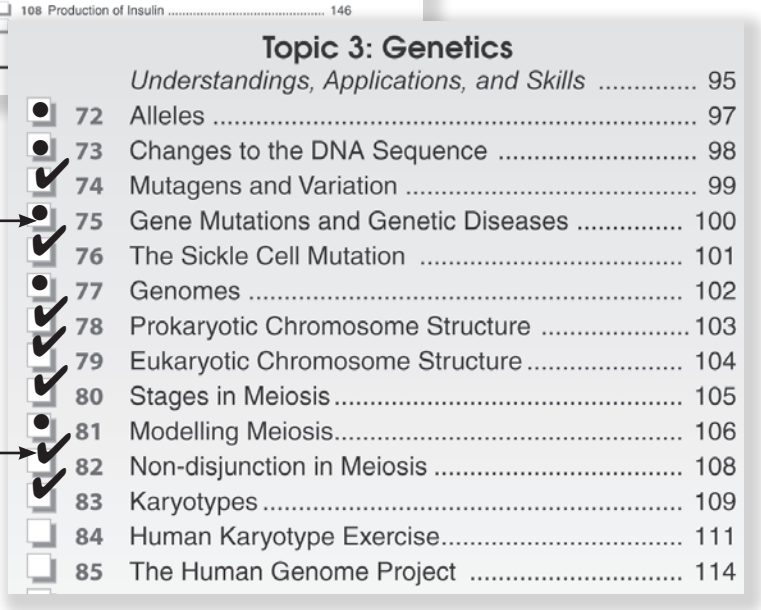
The Contents: A Plan of Action

The contents pages are not merely a list of the activities in the workbook. Encourage your students to use them as a planning tool for their program of work. Students can identify the activities they are to complete and then tick them off when completed. The teacher can also see at a glance how quickly the student is progressing through the assigned material. In future editions, the contents will also be annotated to provide information at a glance about new and revised activities so that teachers can easily review and note any revisions since the last edition.

Contents

Activity is marked: ☐ to be done; ☑ when completed

The teacher can see at a glance how this student is progressing through this unit of work. Any concerns with progress can be addressed early.



Topic 3: Genetics

Understandings, Applications, and Skills 95
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Students can mark the check boxes to indicate the activities they should complete. This helps them to quantify the work to be done and plan their work.

Ticking off the activities as they are completed gives students a sense of progression and helps them to be more personally organized in their work.

Introducing the IB Biology Content

Each chapter is prefaced with list of learning objectives pertaining to the **understandings, applications, and skills** for the chapter. These represent the knowledge requirement for the topic and are supported by a key terms list from which students can compile their own glossary. The learning objectives aim to improve the accessibility of information and encourage students to approach each topic confidently. Familiarity with the scientific terms used in each topic is implicit in this.

This identifies the IB Biology topic to which this chapter applies.

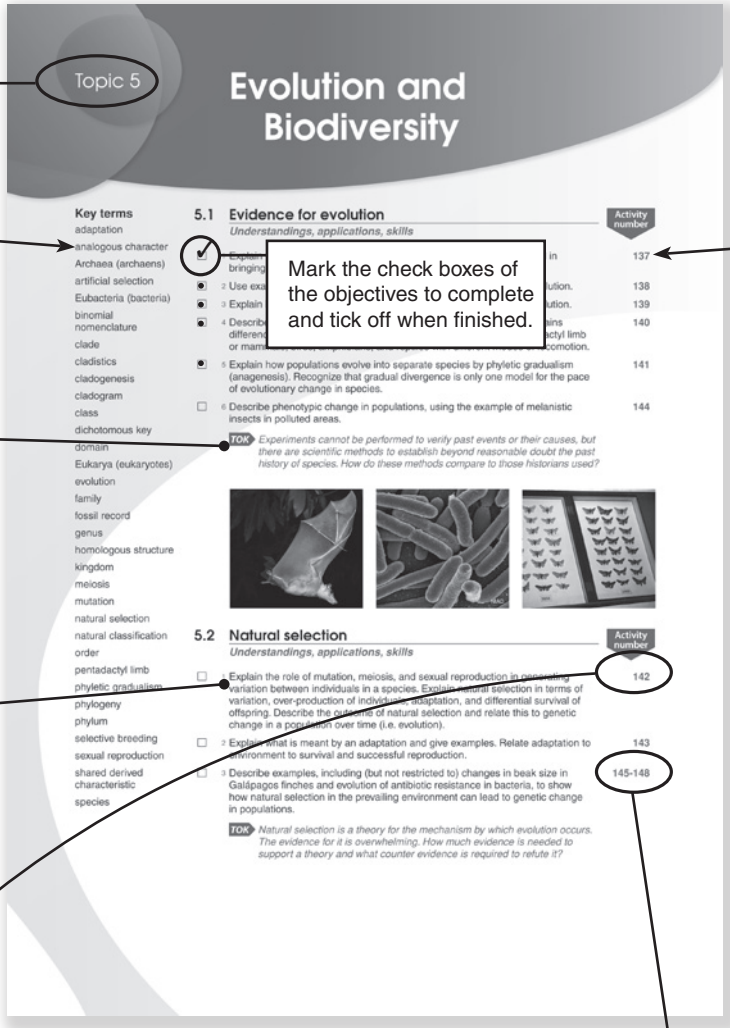
The list of **key terms** can be used to create a glossary for revision and encourages appropriate use of the correct terms when answering questions.

Theory of Knowledge:

TOKs are identified in association with their relevant activity.

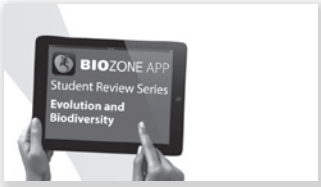
For students:

The understandings, applications, and skills are purposefully brief, with enough information to provide a framework, but not so much that students are overwhelmed.



The activities pertaining to the corresponding understandings, applications, and skills.

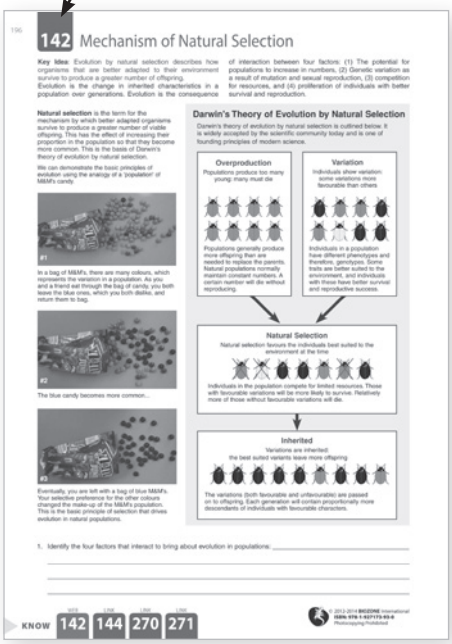
Page two of chapter introduction

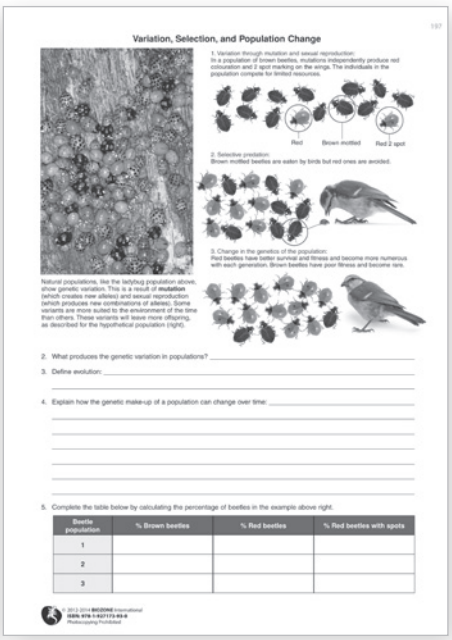


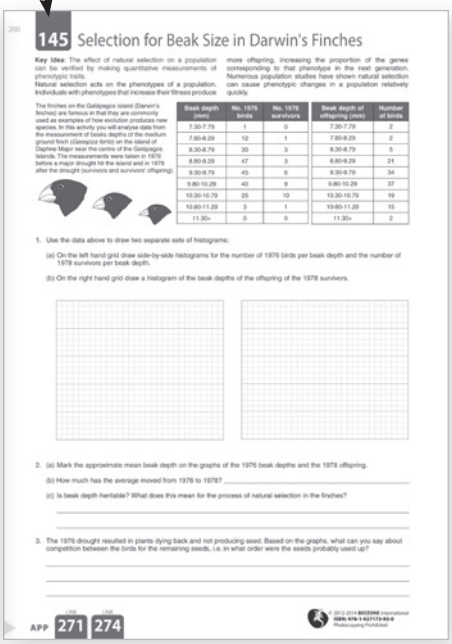
Student Review Series provide colour review slides for purchase. Download via the free BIOZONE App, available on the App Store.

Introduce the understanding with a grounding activity

Follow with an activity supporting an application of that understanding

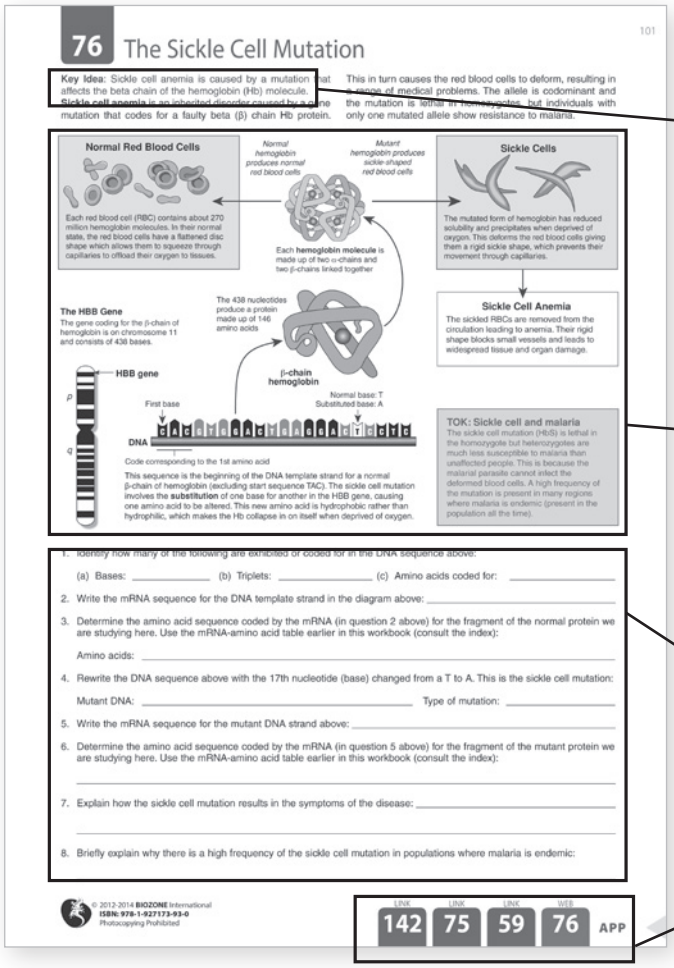


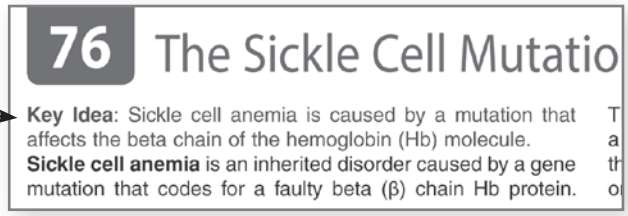




Finding Your Way Around

The content of the IB Biology Student Workbook is organized into 12 chapters, each one beginning with an introduction and concluding with a student's self-test of understanding and vocabulary. Inviting, concept-based activities make up the bulk of each chapter, with each activity focussing on an understanding, application, and/or skill. An important feature of each activity is the key idea, which encapsulates the main focus of the content provided. Clear annotated diagrams and photographs are a major part of almost all activities and the student's understanding of the information is tested through a series of questions and/or data handling and interpretation tasks. The tabs for each activity identify the nature of the activity, and identify related material and external weblinks, which provide support for the activity.



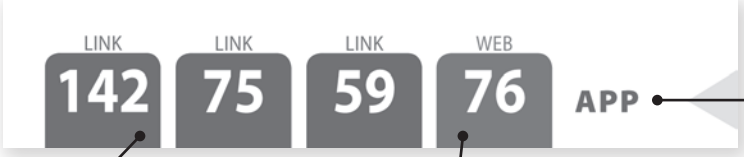


The **key idea** provides a focus for each activity. It summarizes the focus of the activity and provides a clear take-home message for the student.

Annotated diagrams, sometimes including photo panels, explain the content of the page, providing the information necessary to complete the activity. In this activity, a **Theory of Knowledge** box explains heterozygote advantage.

Understanding of content is tested through questions,data handling, analysis, prediction, or summary. Students are often required to apply their understanding to a new scenario or make connections to related content. Students must interact with the information on the page in order to complete the activity. It is this interaction that provides the valuable learning experience and reinforcement and explanation of the key idea.

Related content is identified through the tab system. This activity also has a weblink assigned to it (see below).



Links

This tab indicates activities that provide content which is related to or builds on the content on the page.

Weblinks

Bookmark the weblinks page:
www.thebiozone.com/weblink/IB-3930/

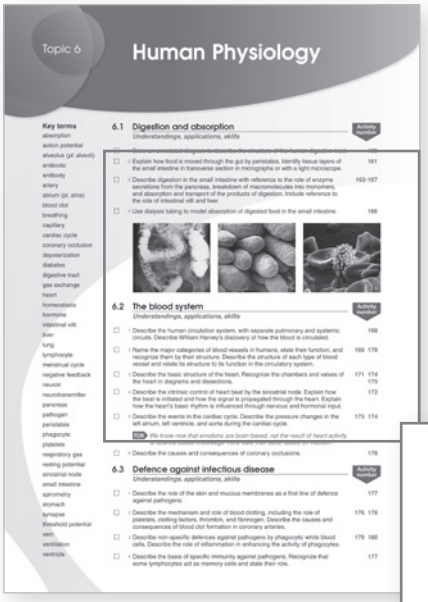
Access the external URL for the activity by clicking the link.
See page 12 for more details.

Activities are coded

KNOW	=	understanding: content you need to know.
APP	=	applying your understanding of content to new scenarios.
SKILL	=	demonstrate your knowledge through doing or constructing.
REFER	=	reference - use this for information
REVISE	=	review the material in the section
TEST	=	test your understanding

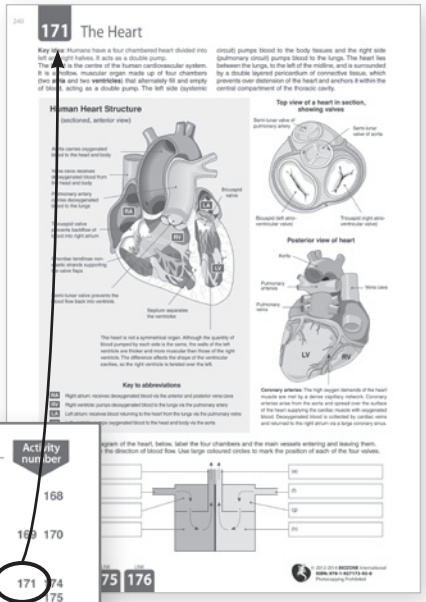
Understandings, Applications, and Skills

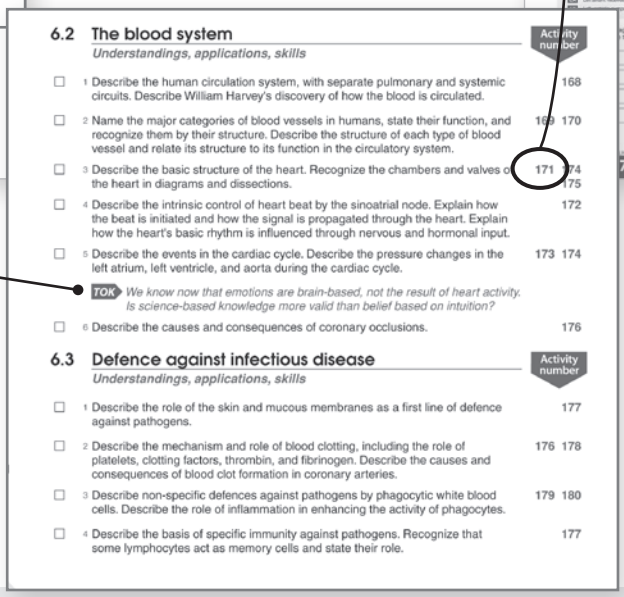
In developing *IB Biology*, we have focussed on the understandings, applications, and skills identified in the IB Biology guide, while also integrating the theory of knowledge, international mindedness, and nature of science where appropriate throughout the workbook. The activities in IB *Biology* have been specifically written to address the content of the IB Biology programme**.** Our focus is student engagement though the use of a concept-based, highly visual design and opportunity to demonstrate understanding.



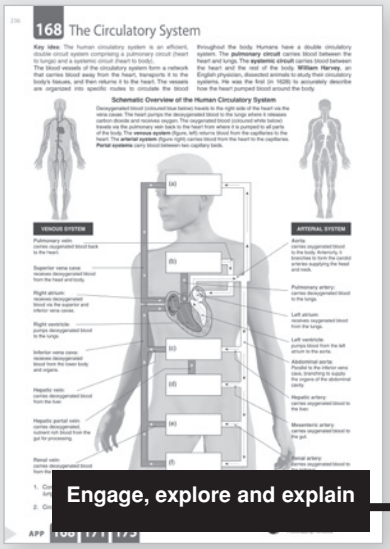
The introduction to each chapter provides a summary of the **understandings, applications, and skills,** presented as a series of short student learning aims. The students achieve understanding of each statement by completing its corresponding activity.

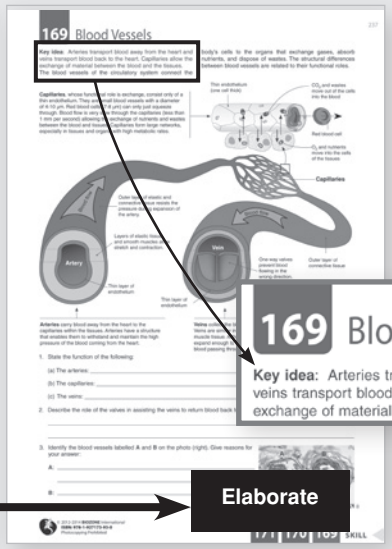
Activities are written and presented so that students progressively extend and deepen their understanding, using what they have learned in earlier activities to complete later related activities and to solve new problems.

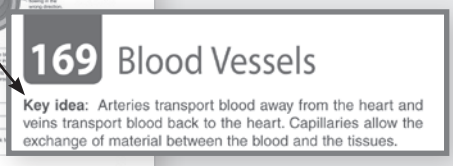




Activities integrate the **Nature of Science**, **Theory of Knowledge**, and **International-Mindedness** where appropriate. Specific TOKs are noted underneath the corresponding activity statement.





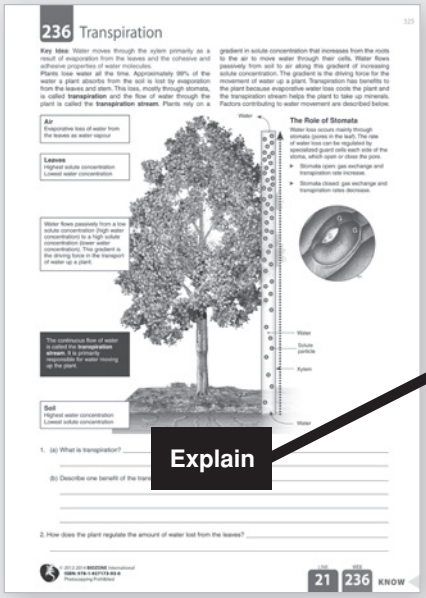


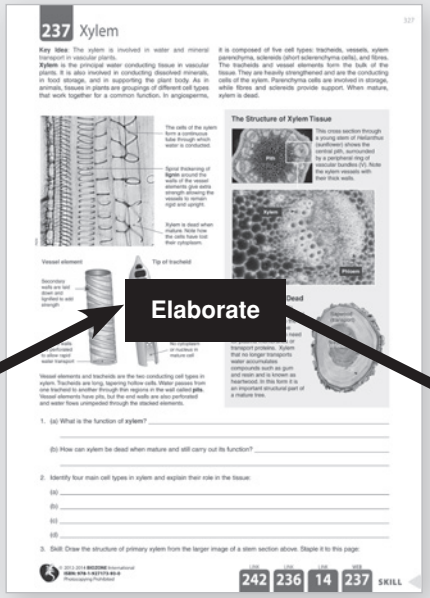
Engage, explore and explain → Elaborate

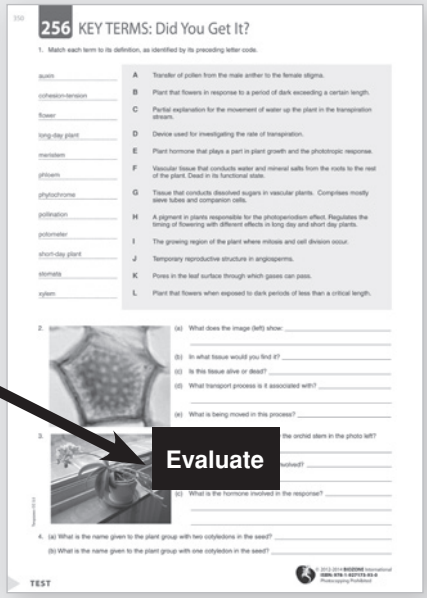
The KEY IDEA provides a focus for each activity. The key ideas through a chapter provide a concise summary of the chapter content.

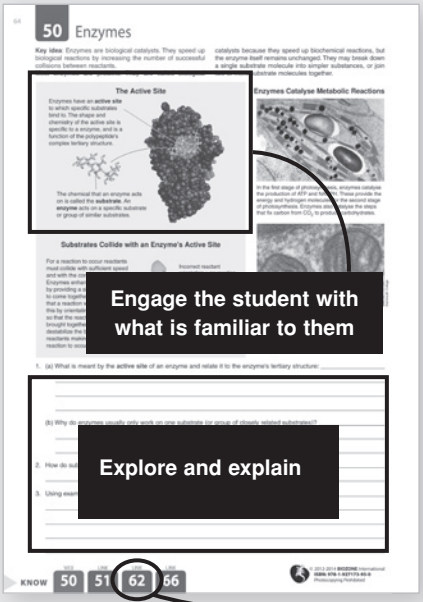
Students become actively involved in the learning activity by interacting with the material, answering the question and completing the set tasks. Many activities are suitable as assessment tasks.

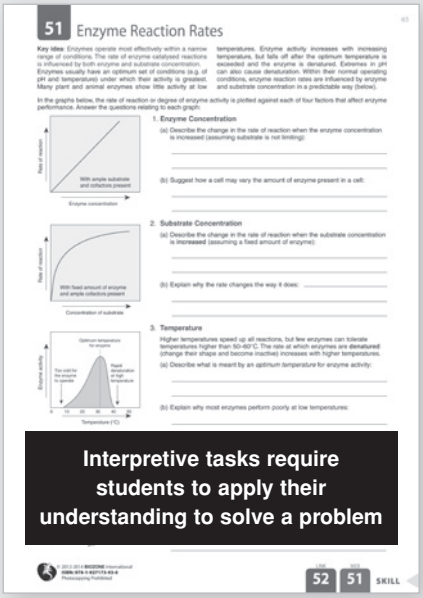
Engage, explore, explain, elaborate, evaluate: Activities are nested. An introductory activity introduces and builds understanding of a specific core idea, and a subsequent activity involves applying that understanding to a new situation, e.g. analyzing data, finding a solution, or interpreting new information.

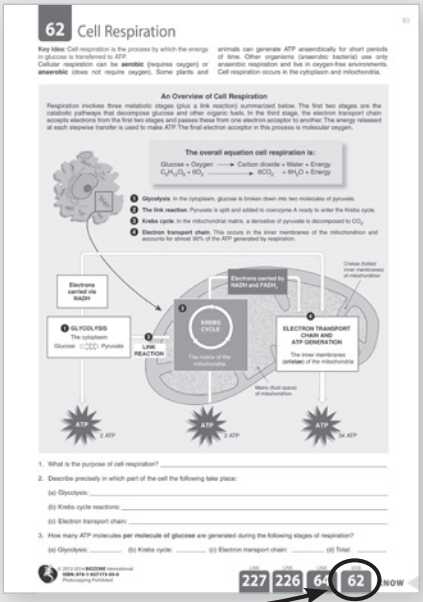












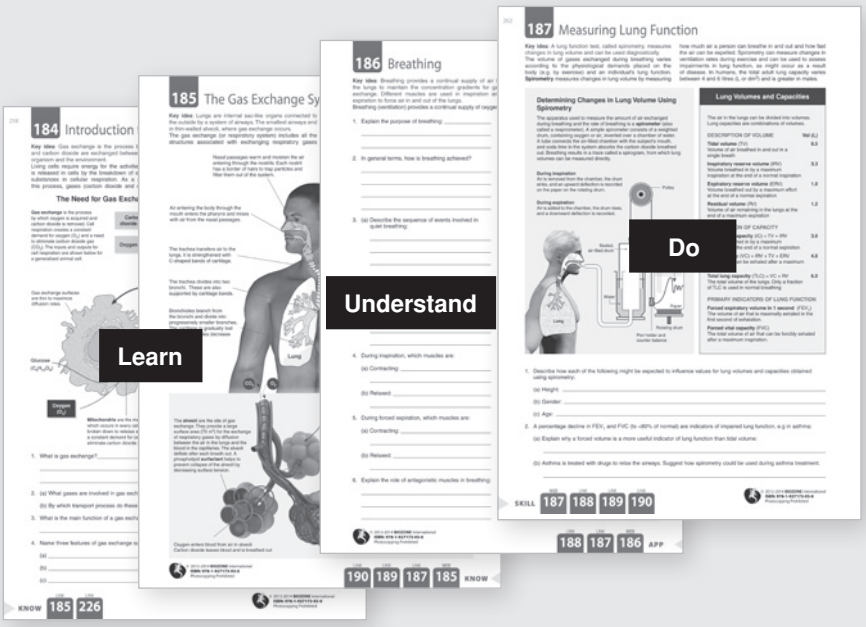
This activity begins by engaging the student with something familiar (enzymes) and goes on to introduce the concept that the specific structure of enzymes enables them to catalyse biochemical reactions in cells.

In the activity that follows, students can demonstrate their deeper understanding of the content by interpreting graphs of enzyme reaction rates.

A connection is made to cellular respiration. Other activities build on the understanding of this metabolic pathway.

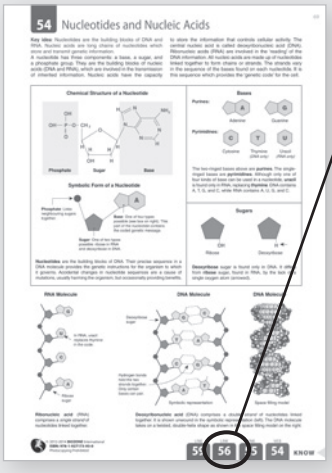
Groups of activities incorporate the understandings, applications, and skills.

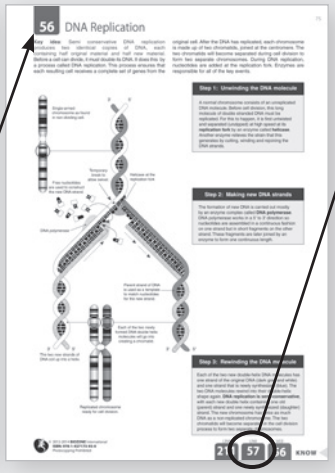
KNOW	*The need for and structure of the gas exchange system*
APP	*How breathing is brought about by antagonistic muscles*
SKILL	*Use data to explore lung function and ventilation*

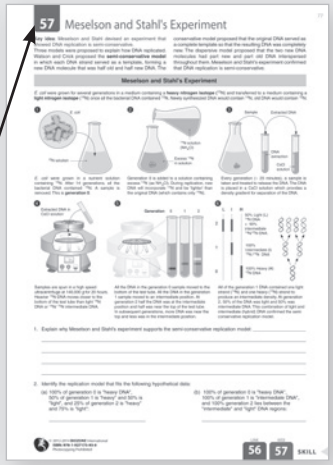


LINKS - Making Connections

The Link tabs help students to connect ideas between different topics in the IB Biology programme. Connections may be made to activities that build on or develop an idea, utilize the same core principles in another biological context, or examine the evidence for a biological process such as DNA replication or ATP synthesis. The connections help students to appreciate that the same core principles underlie many biological phenomena and there is evidence to support them. Understanding these core principles brings understanding to a wide range of contexts and situations, even if they are unfamiliar.



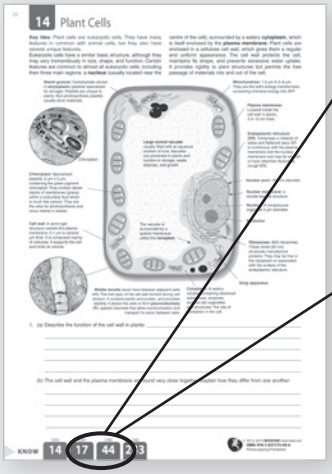


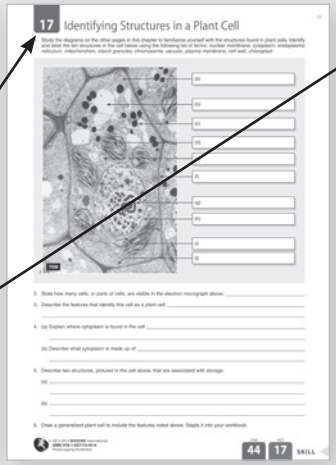


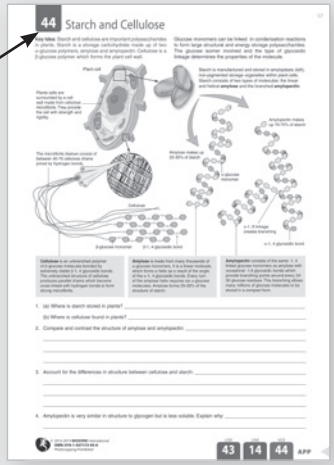
EXAMPLE ❶

DNA replication

Connect the details of DNA structure to the replication of DNA. Understand how the semi-conservative model was confirmed.



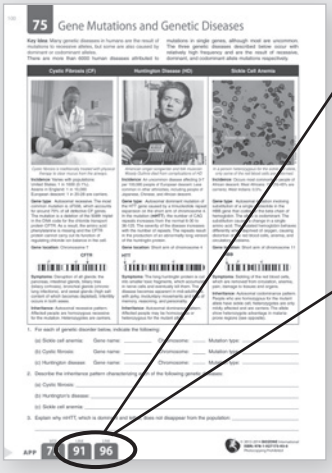


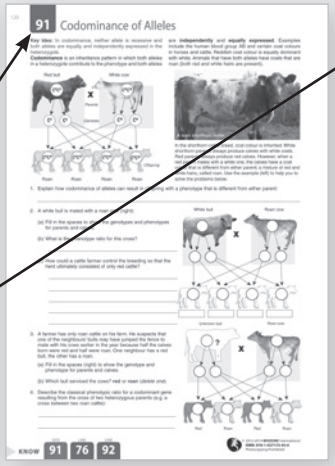


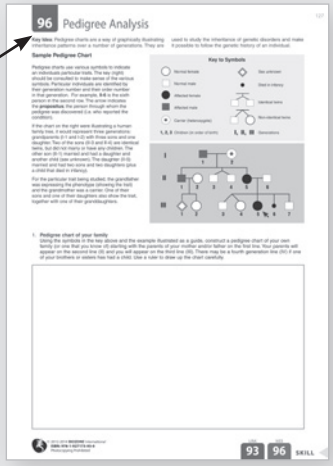
EXAMPLE ❷

The plant cell and the cell wall

Apply the understanding of the structure of the plant cell to label an electron micrograph. Relate the function of the cell wall to the structure of cellulose.



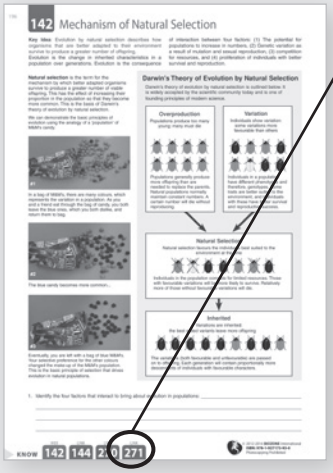


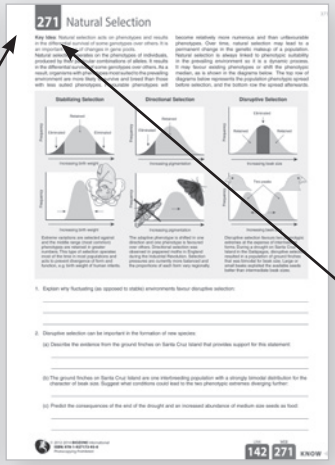


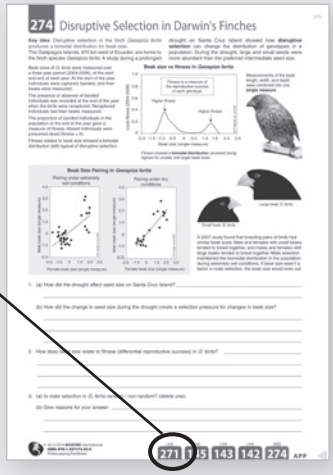
EXAMPLE ❸

Disease, codominance, and pedigrees

Learn about genetic diseases caused by codominant alleles, understand the relationship between codominance and phenotype, and examine the inheritance patterns of codominant alleles through pedigree analysis.



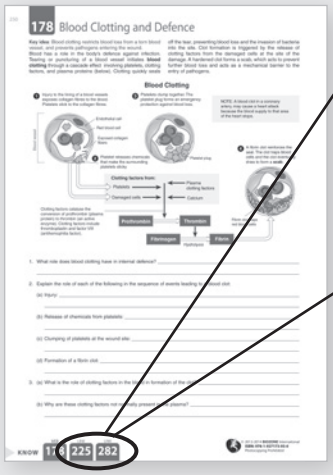


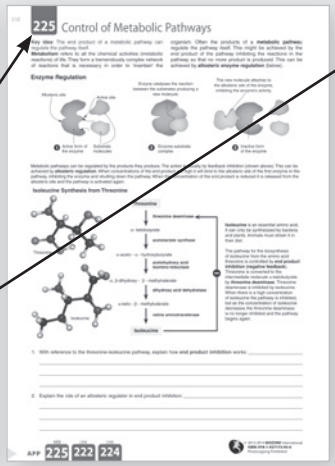


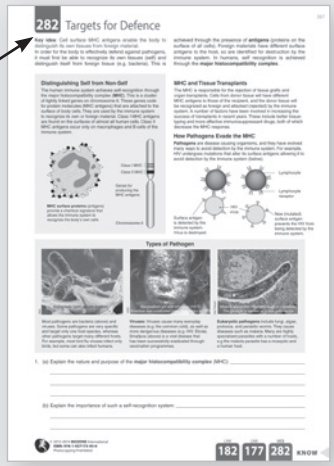
EXAMPLE ❹

Natural selection

Make connections between the mechanism of natural selection and the effect of types of natural selection on phenotypic spread in populations. Real world examples of natural selection support the explanation of core principles.



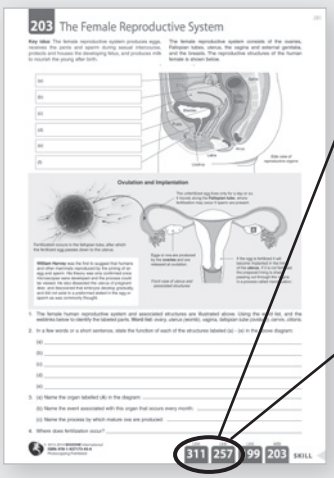


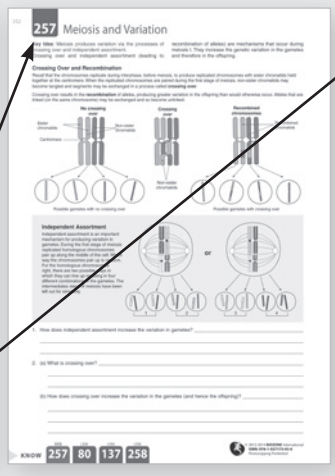


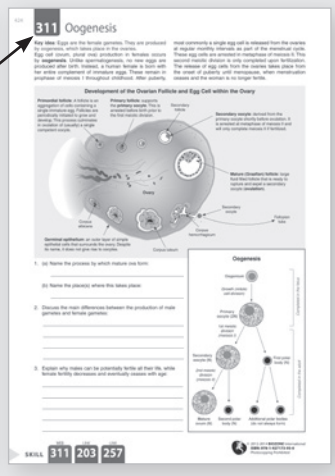
EXAMPLE ❺

Defence and metabolism

Understand that blood clotting involves a cascade of enzyme-catalysed metabolic reactions. Link blood clotting with the immune system and the need to prevent invasion by pathogens.



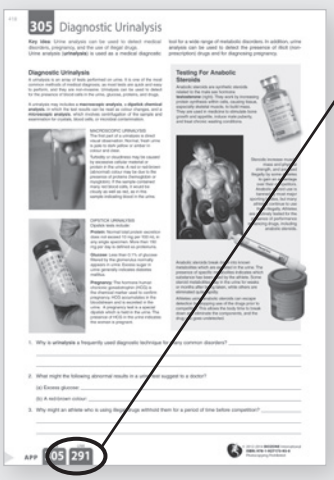


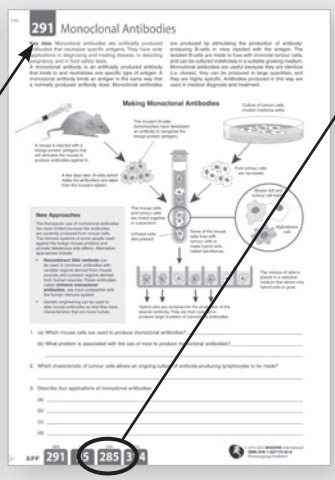


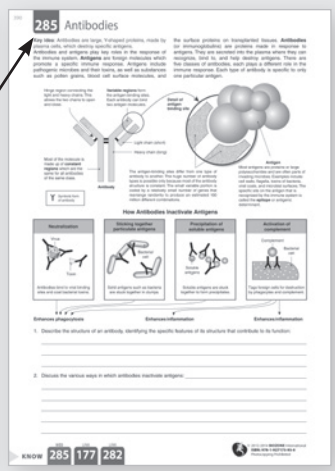
EXAMPLE ❻

Reproduction and variation

Link the reproductive system with the production of gametes and the recombination of alleles during meiosis.







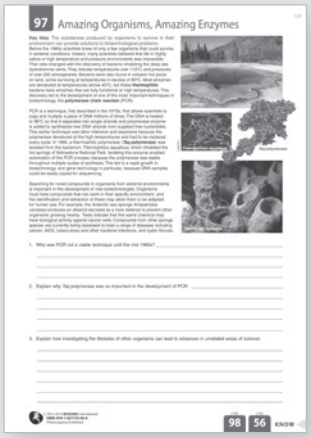
EXAMPLE ❼

Antibodies and applications

Link the basic understanding of antibody structure and mode of action with production of monoclonal antibodies and their diagnostic uses.

Group 4 Project

Laboratory work and other practical components are an important part of the IB Biology course. Practical sessions challenge students to be self-organized, to work cooperatively, to plan ahead, and to think critically about the design, implementation, and evaluation of their experimental work. The IB course has a strong practical component, aimed at providing a framework for laboratory experience. BIOZONE has integrated the Group 4 aims into the IB Biology workbook. Students will encounter activities that will help them build both practical and analytical skills.

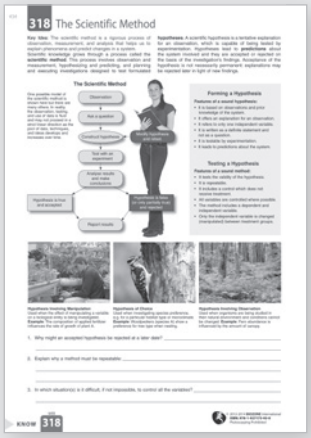


1. Appreciate scientific study and creativity

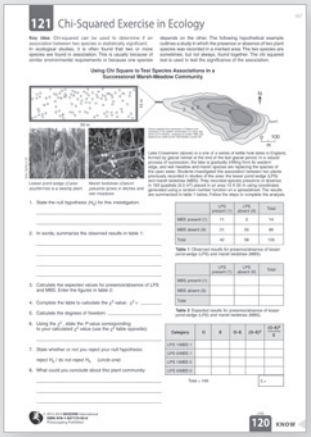
Aims of the Group 4 Project

The aims of the Group 4 project are integrated throughout the workbook. A wide range of activities aim to help students develop a critical awareness of science in the modern world, how it can be used to build knowledge, and its implications and applications.

Throughout the workbook, students have the opportunity to demonstrate understanding and apply their knowledge. They can practise their skills in formulating hypotheses, designing experiments, evaluating methodologies, and analysing and evaluating data.

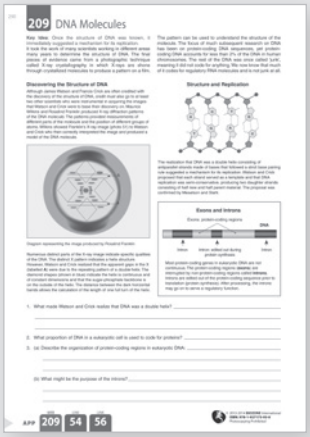


2. Knowledge, methods and, techniques

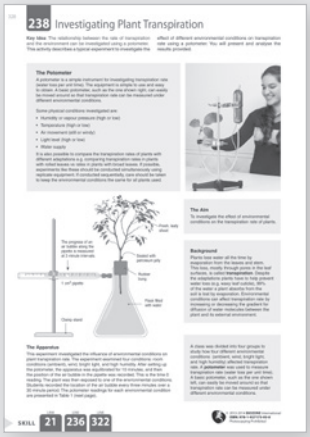


3. Apply knowledge, methods, and techniques

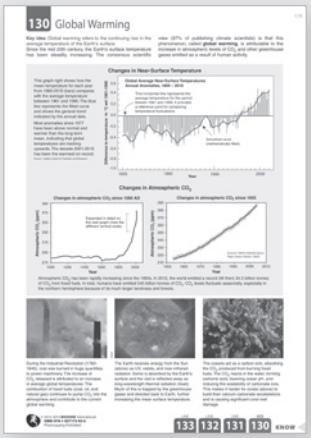
4. Analyse, evaluate, and synthesize



5. Critical awareness of communication and collaboration

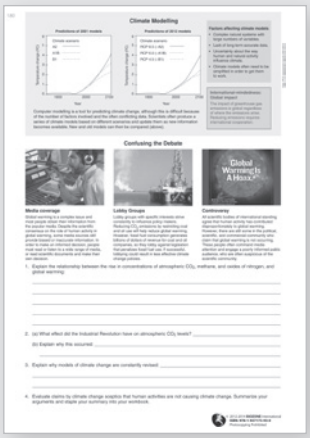


6. Develop experimental and investigative skills

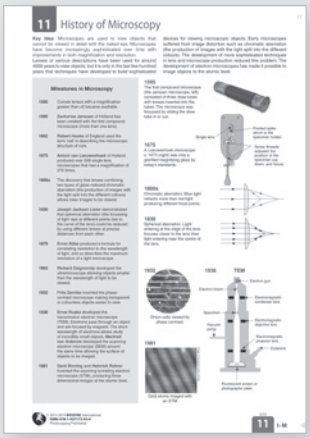


7. Develop communication skills

8. Ethical implications of science and technology



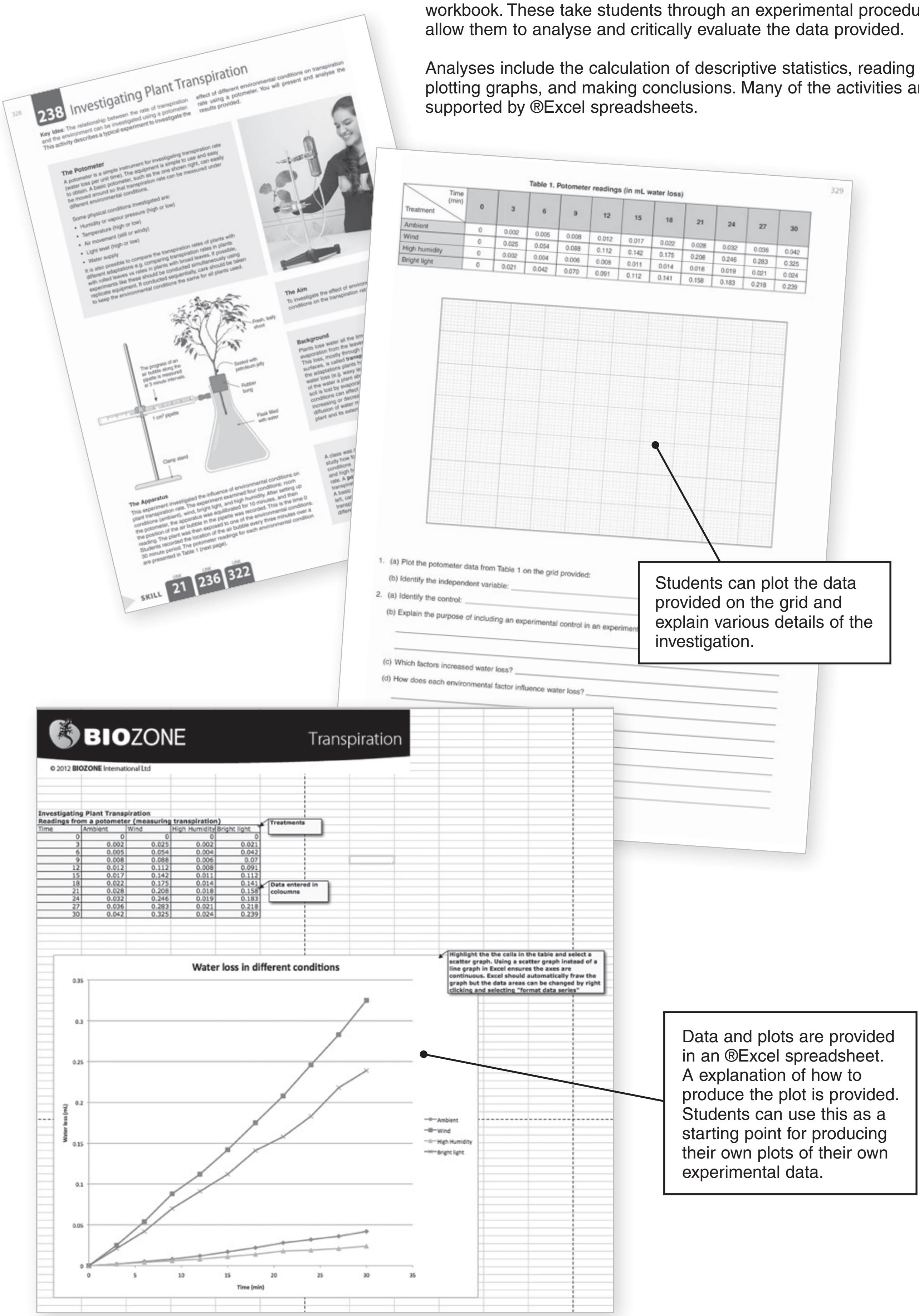
9. Appreciate scientific possibilities and limitations



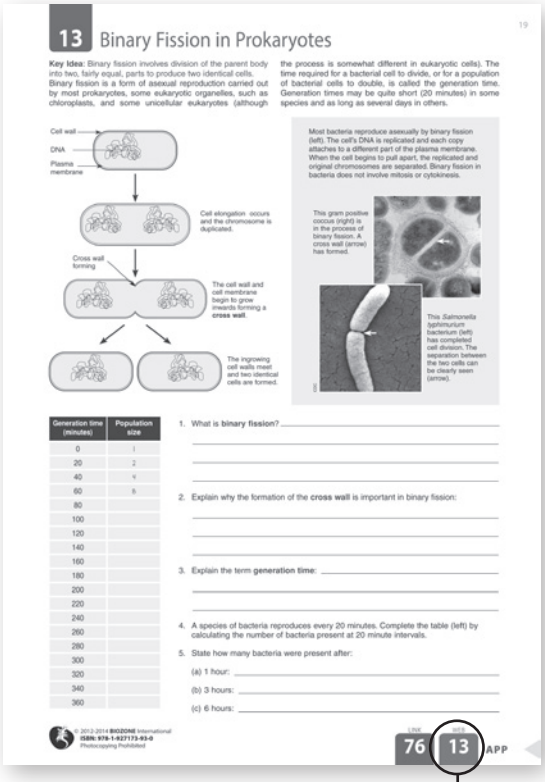
10. Relationships between scientific disciplines

BIOZONE has incorporated many experimental activities throughout this workbook. These take students through an experimental procedure and allow them to analyse and critically evaluate the data provided.

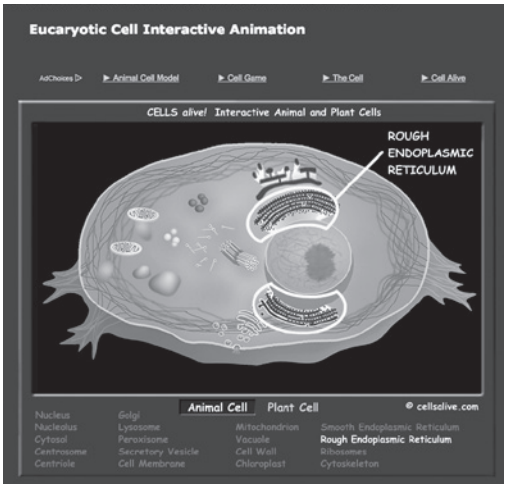
Analyses include the calculation of descriptive statistics, reading or plotting graphs, and making conclusions. Many of the activities are supported by ®Excel spreadsheets.



Making Use of Weblinks



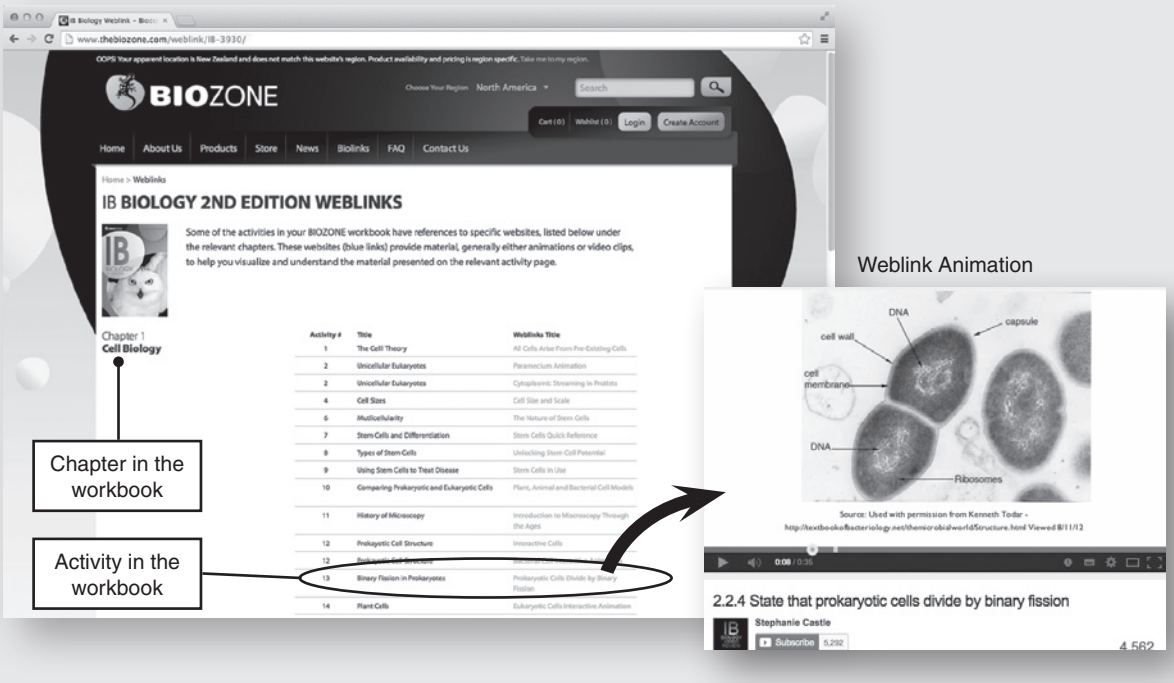
The tab system at the base of each activity identifies if there is a weblink available to support the activity's content. The weblinks are distinct from the general Biolinks site on BIOZONE's website. They are coded with the activity number and are only accessible through a specific url (below), so bookmark the address at the beginning of your teaching year and always have them on hand. The weblinks comprise short video clips or animations aimed specifically at the activity content. These are external sites from a wide range of reputable sources and are invaluable as support to explain content or view an animation of a complex process such as DNA packing or translation. It's easy and we've done the hard work for you. Just click and view.



Weblinks exist for most of the activities in the workbook, from cells to evolution.

www.thebiozone.com/weblink/IB-3930/

This WEBLINKS page provides links to **external web sites** with supporting information for the activities. Almost exclusively, they are narrowly focussed animations and video clips relevant to the activity on which they are cited. They offer great support to aid student understanding of basic concepts, especially for visual learners.



Bookmark weblinks by typing in the address: it is not accessible directly from BIOZONE's website

Corrections and clarifications to current editions are always posted on the weblinks page

Teaching Strategies for Classroom Use

Achieving effective differential instruction in classes is a teaching challenge. Students naturally have mixed abilities, varying backgrounds in the subject, and different language skills. Used effectively, BIOZONE's workbooks and supporting products can make teaching a mixed ability class easier. Here, we offer three approaches for differential instruction.

MAKING A START

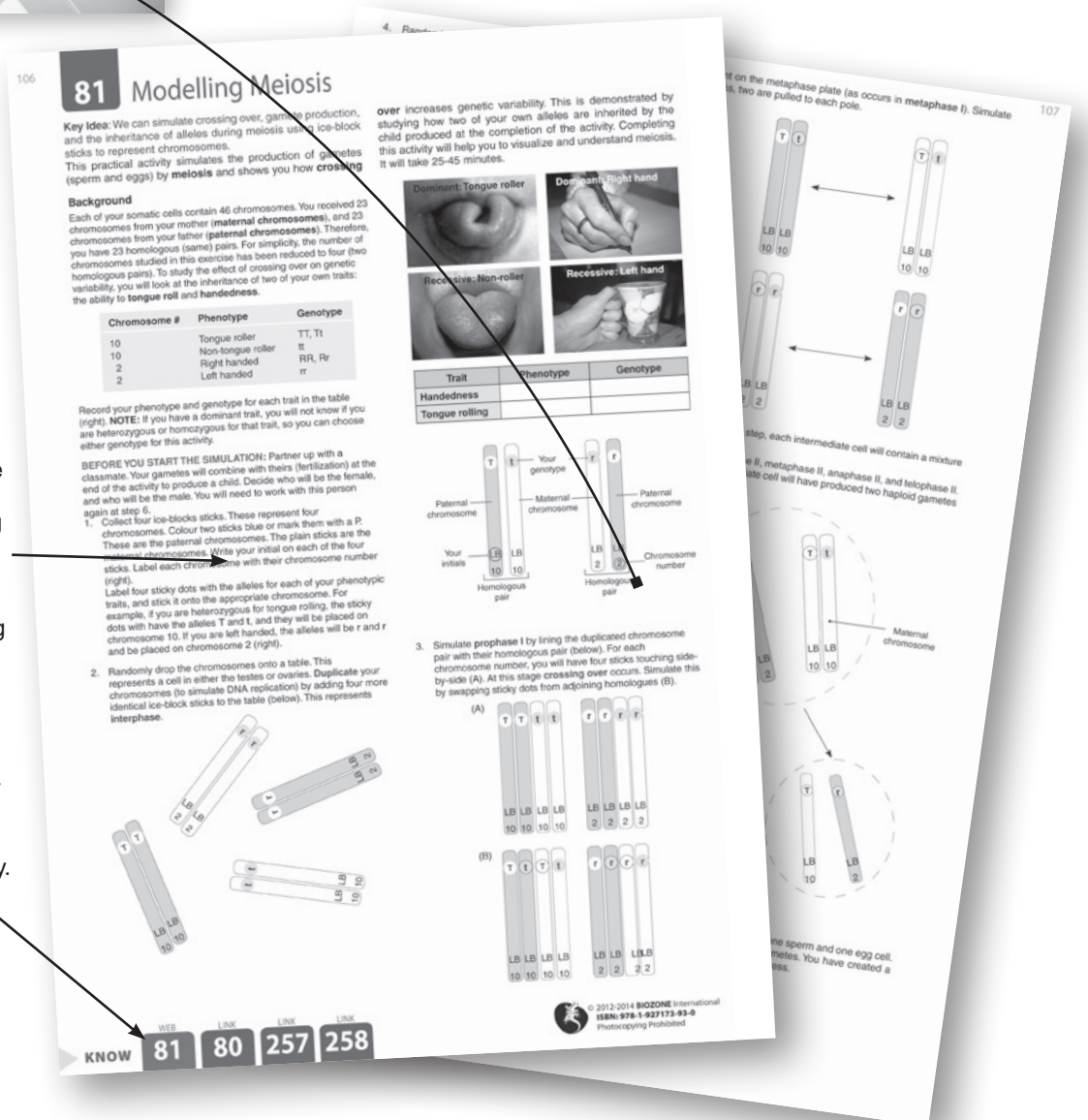
Regardless of which activity you might be attempting in class, a 5-10 minute introduction to the task by the teacher is useful orientation for all students. For collaborative work, the teacher can then divide the class into appropriate groups, each with a balance of able and less able students. Depending on the activity, the class may regroup at the end of the lesson for collaborative discussion.

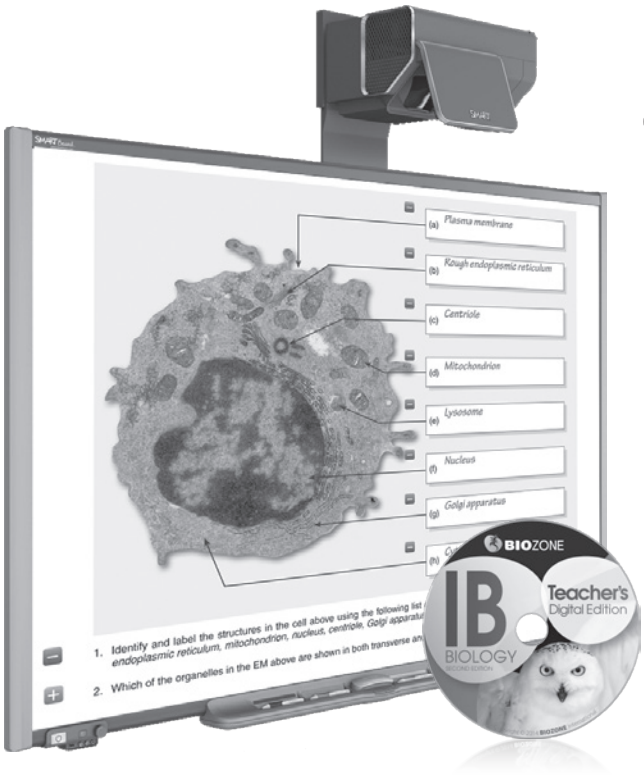
1 Peer to peer support

- Use **peer-to-peer learning** for more challenging activities where the content may be more complex and the questions require students to draw on several areas of their knowledge to synthesize an answer. Examples of such activities include those with a graphing component followed by an evaluation task.
- Stronger peers can assist weaker students and both groups benefit from verbalizing their thoughts and presenting them to a group. ESL students can ask their peers to explain unfamiliar terms (both scientific and English) and this benefits both parties. **Paper practicals** (e.g. *Modelling Meiosis, Creating A DNA Molecule*) are another ideal vehicle for this kind of peer-to-peer learning.

In Modelling Meiosis, students can collaborate in pairs to determine the outcome of a mating between two individuals with different traits. This tests and creates understanding by putting theory into practice.

Encourage able students to extend their knowledge by visiting the **recommended weblinks** for the activity.





2 Interactive revision of tasks in class

- Use the workbook PDFs with HIDE/SHOW answers on the **Teacher's Digital Edition** to review activities in class using a data projector or interactive whiteboard.
- Students benefit from the feedback in class, where questions can be addressed, and teachers benefit by having students self-mark their work and receive helpful feedback on their responses.
- This approach is particularly suited to activities with questions requiring a discussion, as students will be able to clarify some aspects of their responses. Stronger students can benefit by contributing to the explanatory feedback and class discussion.

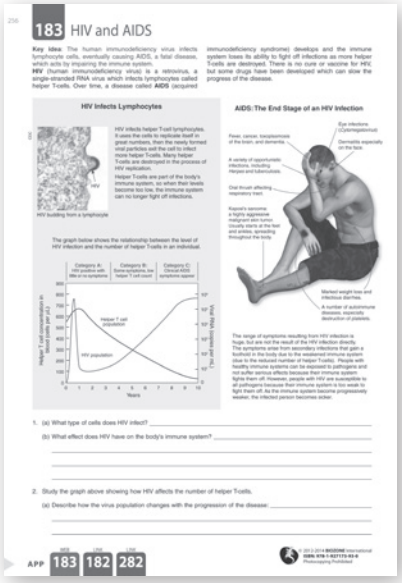
3 Gaining confidence

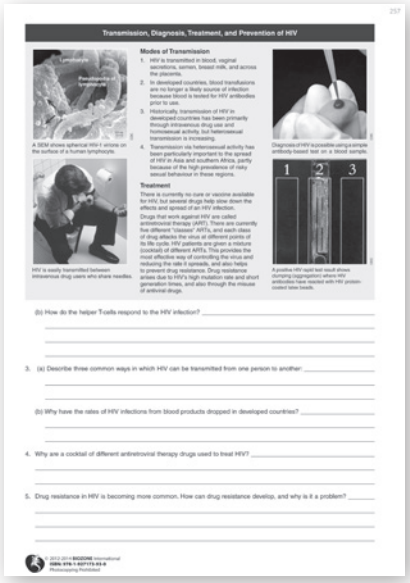
- The questions in BIOZONE's workbook activities have generally been written in a direct questioning style, e.g. "What are the differences between A and B", or "Why are A and B different?". This makes it easier for the students to understand what is required to answer the question.
- Questions are also arranged so that simpler questions (describe, what, identify, name) are generally asked first, followed by questions demanding an explanation (explain, how, why, account for). This allows students to gain confidence from answering the simpler questions first before attempting the questions that require more comprehensive answers.
- This arrangement also allows teachers to direct students appropriately so that some may attempt only the simpler questions themselves and work with peers to attempt the more challenging questions.

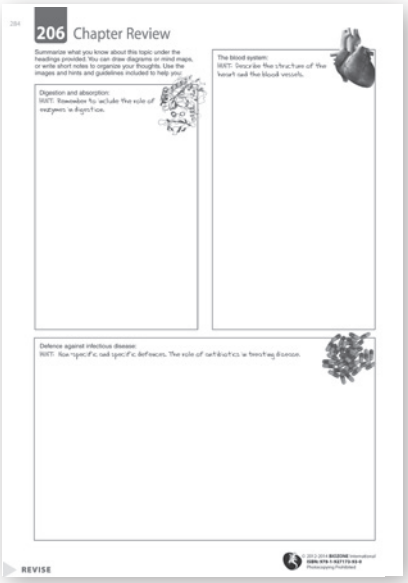
Students A and B will work through simpler questions themselves but may require assistance with the more challenging questions in an activity.

Student C is capable. She completes all of an activity including the more challenging questions.

Student D (above) is capable and completes the set work quickly. She can assist her peers and demonstrate her understanding in the relevant section of the review sheets.

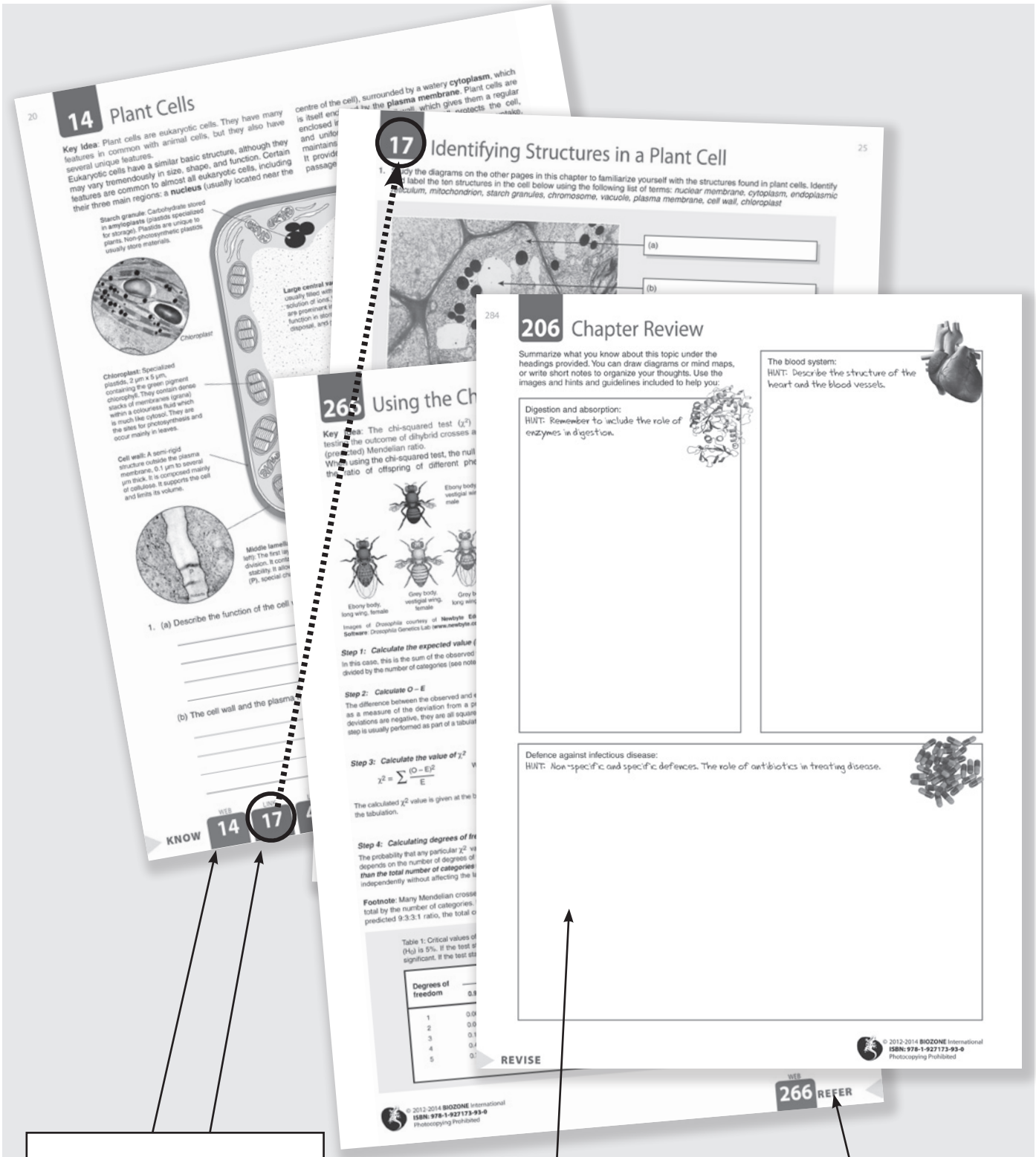






Choosing Activities for Home Study

Many of the workbook activities are ideal for homework or as vehicles for a quick synoptic assessment. Chapter reviews, literacy activities, and follow-on activities are ideal as homework. They provide a way in which to review and consolidate material that has recently been completed, helping learners by presenting the material in a slightly different way. The information for review activities can be found in the content of the chapter, although stronger students may not need to refer back to source material to complete the set work.



Most students will have internet access. Encourage them to visit the assigned **weblinks** if they are having trouble understanding a subject or visualizing a process. They should also check activities indicated as **links**.

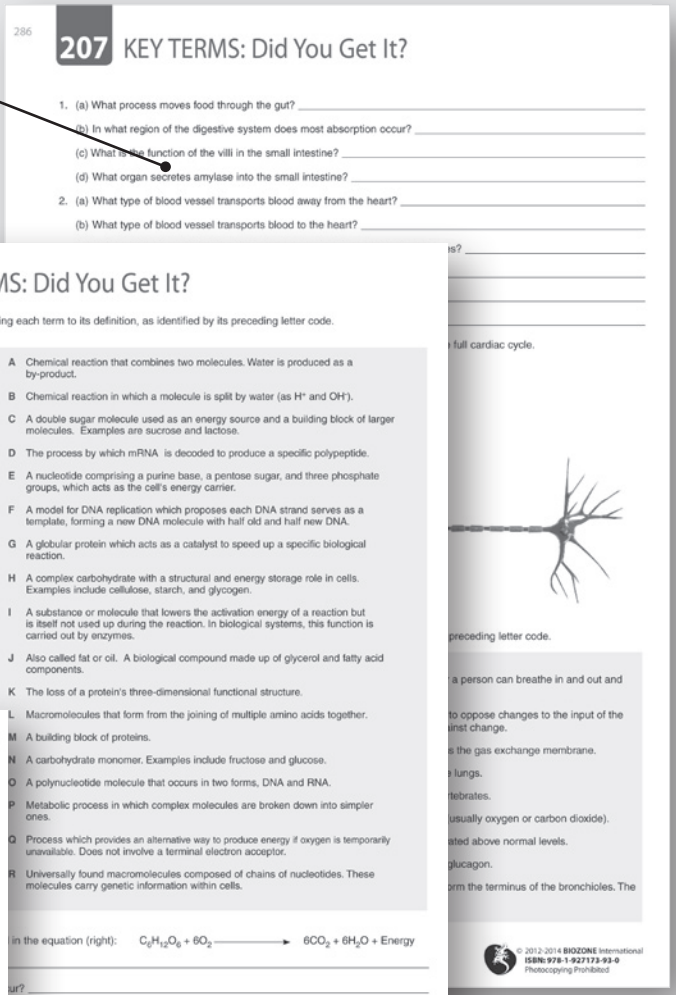
Review activities are ideal as homework. Students can produce their own review and then have it checked by the teacher or compare and discuss it with peers if they want to check their thinking.

Set simpler activities or preparatory reading (REFER activities) for homework. This encourages less able students to achieve and to be properly prepared for in-class lessons.

Focus on Scientific Literacy

Within all areas of science, scientific literacy is an important area of focus. With it, communication in the topic is more effective, more concise, and less cumbersome. BIOZONE's aim is to provide a method by which students would encounter and become familiar with scientific terms in various contexts. Beginning with the list of KEY TERMS at the beginning of each chapter, students can create their own glossary of commonly used terms. They can learn to use these key terms appropriately by encountering them in context within the activities, and reinforce their understanding of the term by completing the literacy activities throughout the workbook. These take several forms:

Literacy activities use a range of question types to test vocabulary and understanding of basic principles. Questions include analysis or completion of flow charts, drawings or photographs, mix and match definitions, cloze questions and other vocab builders, and multiple choice.



286

207 KEY TERMS: Did You Get It?

1. (a) What process moves food through the gut? _____
   (b) In what region of the digestive system does most absorption occur? _____
   (c) What is the function of the villi in the small intestine? _____
   (d) What organ secretes amylase into the small intestine? _____
2. (a) What type of blood vessel transports blood away from the heart? _____
   (b) What type of blood vessel transports blood to the heart? _____

Mix and match activities ask students to match each key term to its best definition. Finding the correct definition increases retention of the terms and their meanings.

94

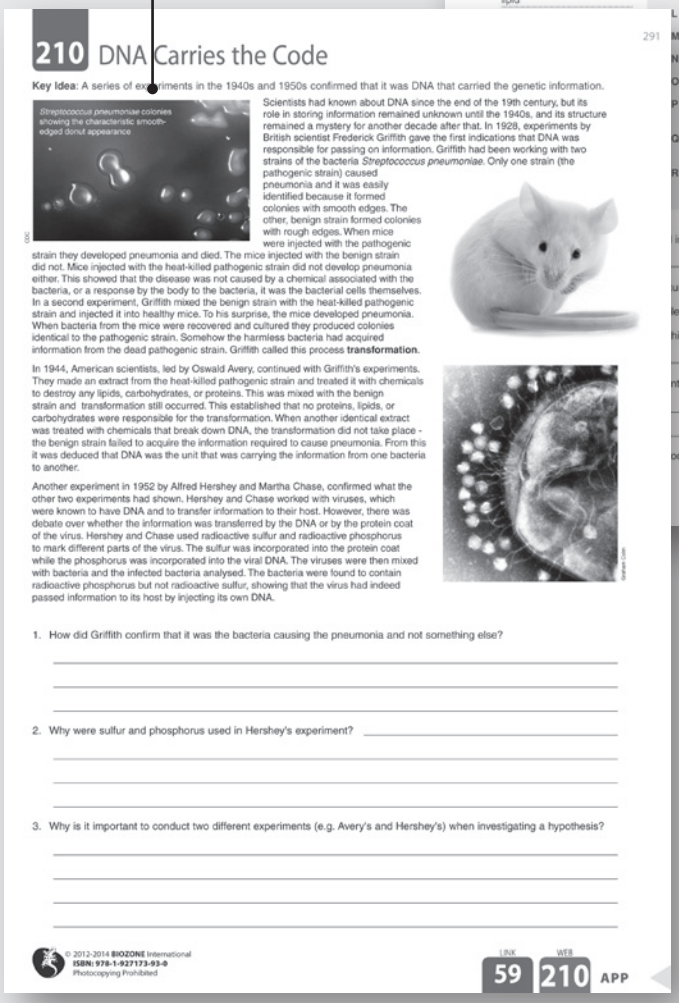
71 KEY TERMS: Did You Get It?

1. Test your vocabulary by matching each term to its definition, as identified by its preceding letter code.

amino acid _____
ATP _____
catabolism _____
catalyst _____
condensation _____
denaturation _____
disaccharide _____
DNA _____
enzyme _____
fermentation _____
hydrolysis _____
lipid _____

A Chemical reaction that combines two molecules. Water is produced as a by-product.
B Chemical reaction in which a molecule is split by water (as H^+ and OH^-).
C A double sugar molecule used as an energy source and a building block of larger molecules. Examples are sucrose and lactose.
D The process by which mRNA is decoded to produce a specific polypeptide.
E A nucleotide comprising a purine base, a pentose sugar, and three phosphate groups, which acts as the cell's energy carrier.
F A model for DNA replication which proposes each DNA strand serves as a template, forming a new DNA molecule with half old and half new DNA.
G A globular protein which acts as a catalyst to speed up a specific biological reaction.
H A complex carbohydrate with a structural and energy storage role in cells. Examples include cellulose, starch, and glycogen.
I A substance or molecule that lowers the activation energy of a reaction but is itself not used up during the reaction. In biological systems, this function is carried out by enzymes.
J Also called fat or oil. A biological compound made up of glycerol and fatty acid components.
K The loss of a protein's three-dimensional functional structure.
L Macromolecules that form from the joining of multiple amino acids together.
M A building block of proteins.
N A carbohydrate monomer. Examples include fructose and glucose.
O A polynucleotide molecule that occurs in two forms, DNA and RNA.
P Metabolic process in which complex molecules are broken down into simpler ones.
Q Process which provides an alternative way to produce energy if oxygen is temporarily unavailable. Does not involve a terminal electron acceptor.
R Universally found macromolecules composed of chains of nucleotides. These molecules carry genetic information within cells.

Comprehension activities require the students to read a short section of text, e.g. a mock article, and then answer some questions based on understanding and correctly interpreting the information provided. The aim is to provide high-interest material in a way that encourages engagement and focus.



291

210 DNA Carries the Code

Key Idea: A series of experiments in the 1940s and 1950s confirmed that it was DNA that carried the genetic information.

Streptococcus pneumoniae colonies showing the characteristic smooth-edged donut appearance

Scientists had known about DNA since the end of the 19th century, but its role in storing information remained unknown until the 1940s, and its structure remained a mystery for another decade after that. In 1928, experiments by British scientist Frederick Griffith gave the first indications that DNA was responsible for passing on information. Griffith had been working with two strains of the bacteria *Streptococcus pneumoniae*. Only one strain (the pathogenic strain) caused pneumonia and it was easily identified because it formed colonies with smooth edges. The other, benign strain formed colonies with rough edges. When mice were injected with the pathogenic strain they developed pneumonia and died. The mice injected with the benign strain did not. Mice injected with the heat-killed pathogenic strain did not develop pneumonia either. This showed that the disease was not caused by a chemical associated with the bacteria, or a response by the body to the bacteria, it was the bacterial cells themselves. In a second experiment, Griffith mixed the benign strain with the heat-killed pathogenic strain and injected it into healthy mice. To his surprise, the mice developed pneumonia. When bacteria from the mice were recovered and cultured they produced colonies identical to the pathogenic strain. Somehow the harmless bacteria had acquired information from the dead pathogenic strain. Griffith called this process **transformation**.

In 1944, American scientists, led by Oswald Avery, continued with Griffith's experiments. They made an extract from the heat-killed pathogenic strain and treated it with chemicals to destroy any lipids, carbohydrates, or proteins. This was mixed with the benign strain and transformation still occurred. This established that no proteins, lipids, or carbohydrates were responsible for the transformation. When another identical extract was treated with chemicals that break down DNA, the transformation did not take place - the benign strain failed to acquire the information required to cause pneumonia. From this it was deduced that DNA was the unit that was carrying the information from one bacteria to another.

Another experiment in 1952 by Alfred Hershey and Martha Chase, confirmed what the other two experiments had shown. Hershey and Chase worked with viruses, which were known to have DNA and to transfer information to their host. However, there was debate over whether the information was transferred by the DNA or by the protein coat of the virus. Hershey and Chase used radioactive sulfur and radioactive phosphorus to mark different parts of the virus. The sulfur was incorporated into the protein coat while the phosphorus was incorporated into the viral DNA. The viruses were then mixed with bacteria and the infected bacteria analysed. The bacteria were found to contain radioactive phosphorus but not radioactive sulfur, showing that the virus had indeed passed information to its host by injecting its own DNA.

1. How did Griffith confirm that it was the bacteria causing the pneumonia and not something else?
2. Why were sulfur and phosphorus used in Hershey's experiment?
3. Why is it important to conduct two different experiments (e.g. Avery's and Hershey's) when investigating a hypothesis?

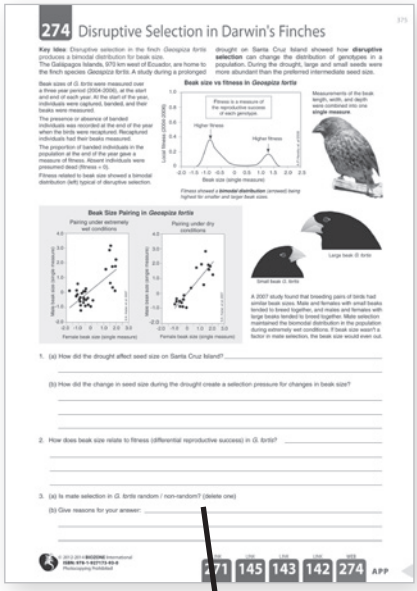
The Vocabulary and Comprehension activities frequently require students to apply the knowledge they have gained in the chapter to solving a new problem. This tests their deeper understanding of basic principles.

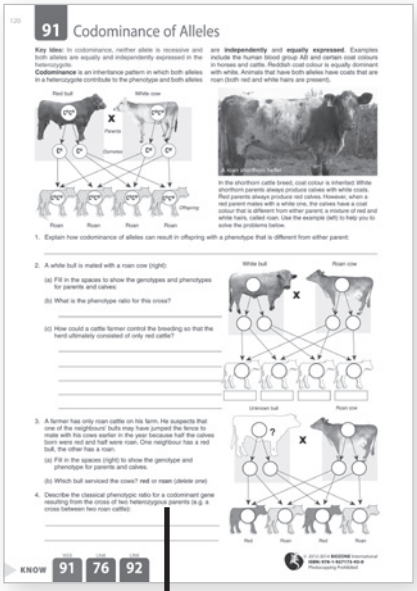
IB Biology Presentation Media

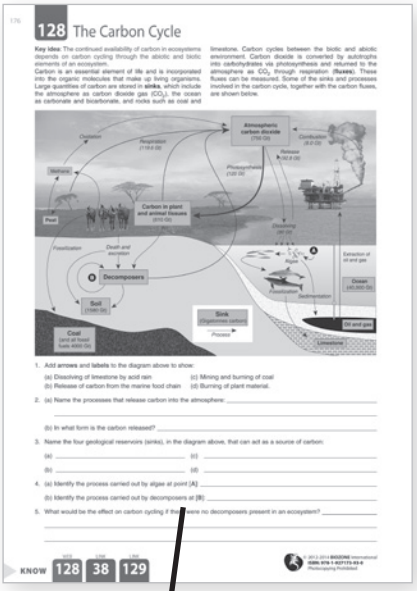
Support your teaching of the IB biology program with ***IB Biology*** **Presentation Media**. This title provides 12 sets of full colour slides corresponding to the 12 (11 topics + Data Handling and Analysis) chapters of the IB Biology Student workbook. The extent of each set broadly reflects the coverage in the workbook, and may include additional detail and illustrations. The slide sets are in **full colour**, **fully editable**, and **site licenced**.

BIOZONE APP
Student Review Series
Science Practices

Equivalent titles, as non-editable screens, are available as **Student Review Series** through the BIOZONE app.


274 Disruptive Selection in Darwin's Finches


91 Codominance of Alleles


128 The Carbon Cycle

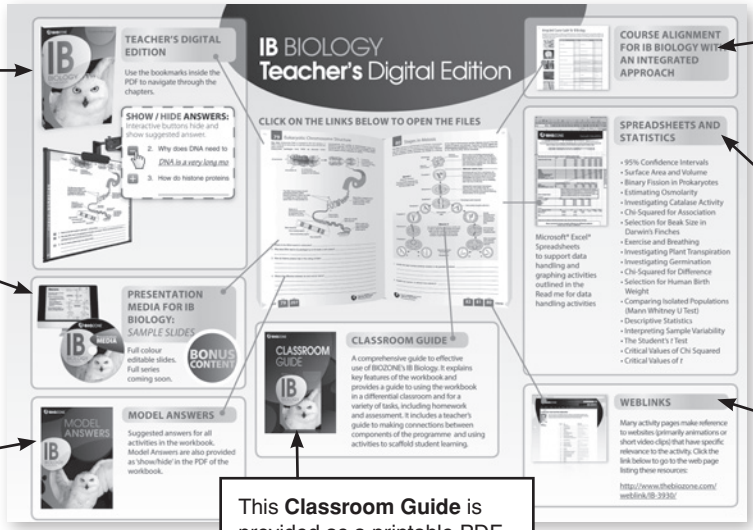
The Teacher's Digital Edition

The *Teacher's Digital Edition* is aimed primarily at extending the pedagogical tools at a teacher's disposal. Many of the features of this resource have been developed in response to requests from teachers themselves.

A digital (PDF) version of the workbook (non-printable). Use the interactive buttons to HIDE or SHOW the answers.

A **BONUS** sample of the IB Biology Presentation Media set 'Cell Biology' (fully editable).

Digital copy of the Model Answers (non-printable). Suggested answers are provided to all activities. Some include explanatory detail.

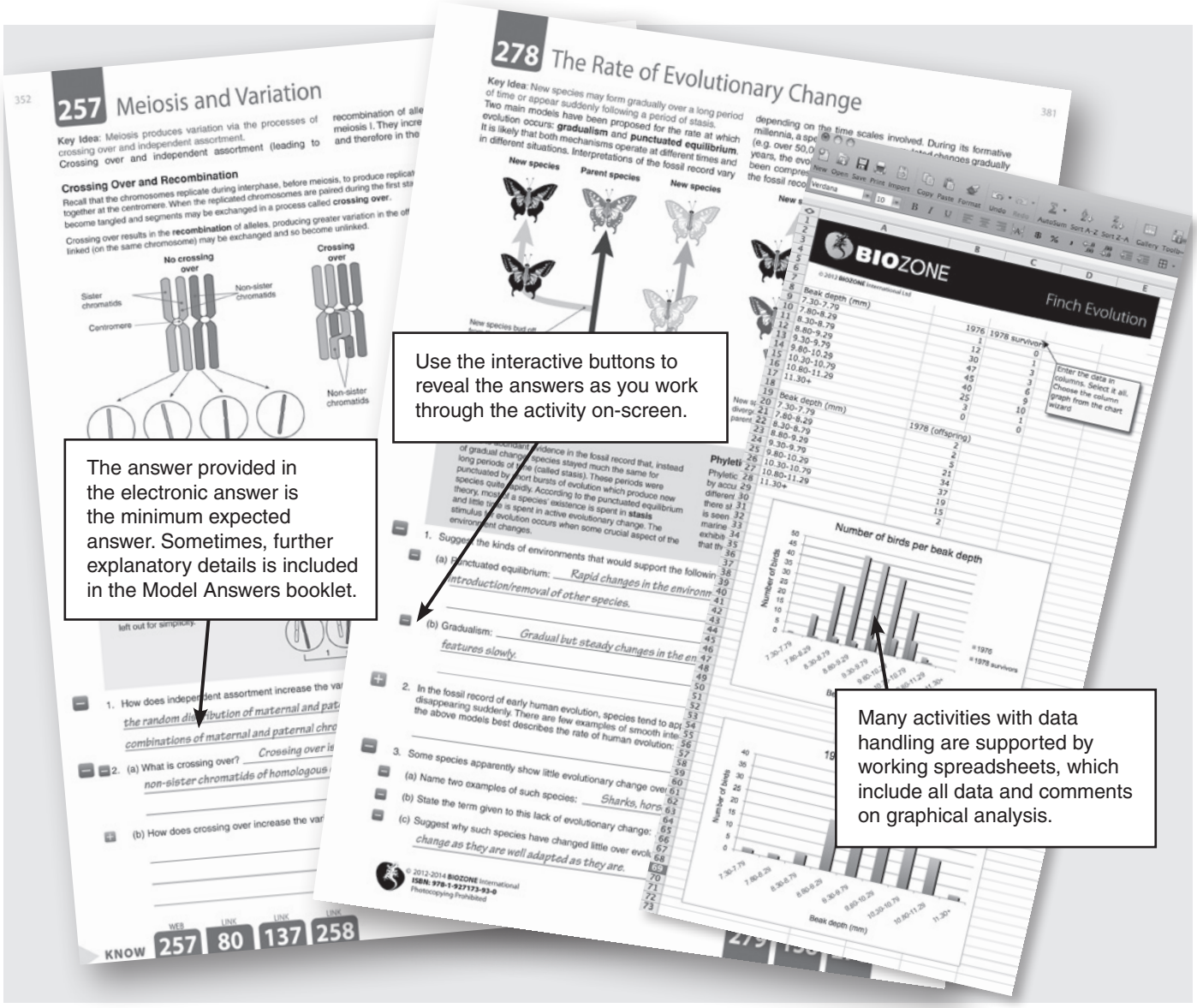


This **Classroom Guide** is provided as a printable PDF.

Guide to using this workbook for teaching IB Biology using an integrated approach.

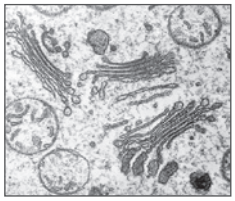
Link to ***Excel®* spreadsheets** for all activities with a graphing or data analysis component.

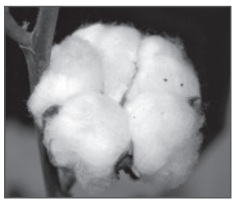
Access the *Weblinks* directly from this link for a range of animations and video clips to support the activities.

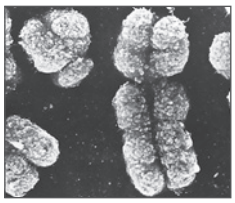


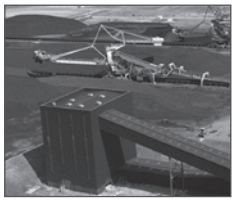
Integrated Course Guide for IB Biology

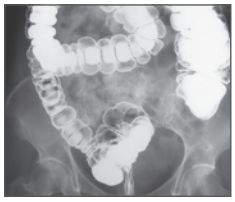
Although the IB Biology syllabus is divided into Standard Level (SL) and Higher Level (HL) sections, it can easily be taught as an integrated course, with the HL components taught in the same block as the SL components. For teachers choosing to take an integrated approach, the guide below will help you to quickly locate the activities in the IB Biology workbook that pertain to the general subject areas listed.







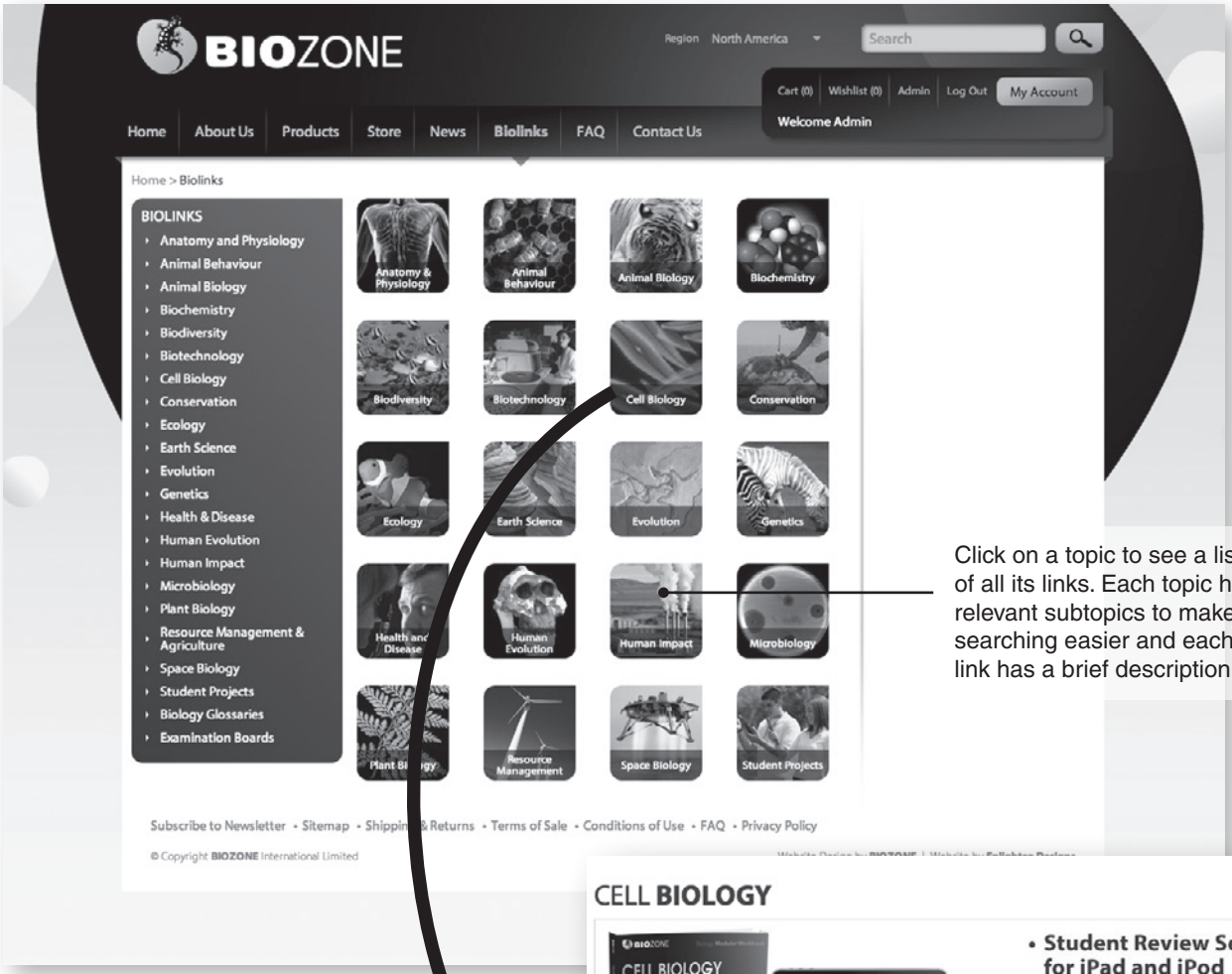




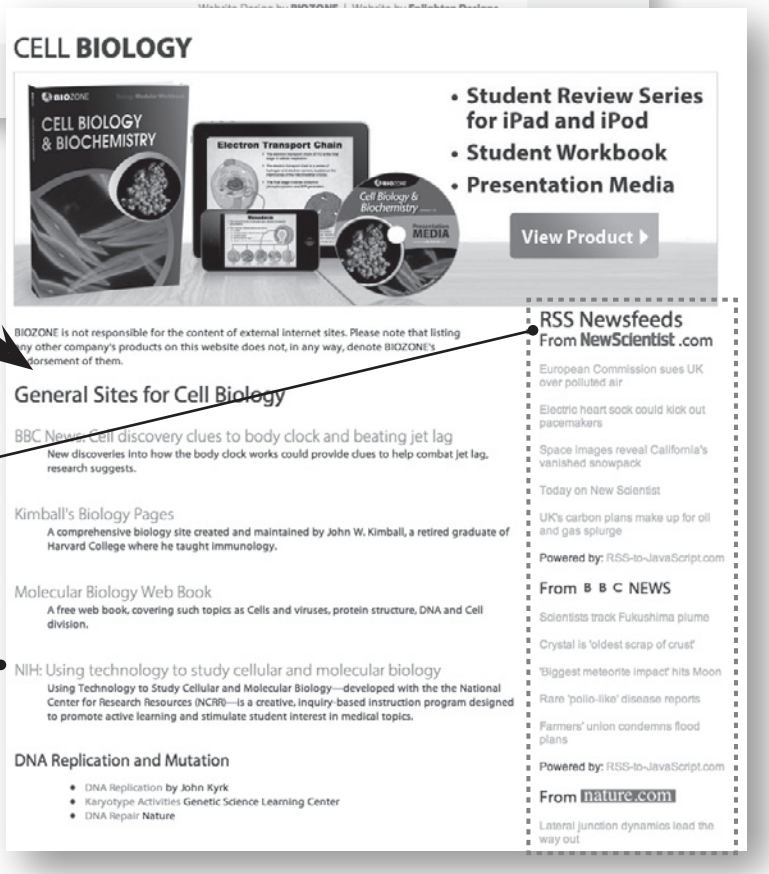
Subject area	IB topic	Workbook chapter	Activity number
Cell biology	1.1	Cell Biology	1-9
	1.2		10-17
	1.3		18- 19
	1.4		20- 26
	1.6		31-35
Molecular biology	2.1	Molecular Biology	38, 46
	2.2		39-40
	2.3		42-45
	2.4		47-49
	7.3	Nucleic Acids (HL)	219
Cellular metabolism	2.5	Molecular Biology	50-53
	2.8		61-65
	2.9		66-69
	8.1	Cellular Metabolism (HL)	222-225
	8.2		226-227
	8.3		228-231
Structure and function of DNA	2.6	Molecular Biology	54
	2.7		55-60
	7.1	Nucleic Acids (HL)	208-211
	7.2		212-216
	7.3		217-218
Chromosomes and meiosis	3.1	Genetics	72-73, 76-77
	3.4		74-75
	3.2		78-79, 83-84
	3.3		80-82
	10.1	Genetics and Evolution (HL)	257-259
Heredity	3.4	Genetics	86-96
	10.2	Genetics and Evolution (HL)	261-268
Genetic engineering	3.2	Genetics	85
	3.5		97-113
Ecology	4.1	Ecology	116-121, 127, 129
	4.2		122-126
	4.3		128
	4.4		130-135
Classification	5.3	Evolution and Biodiversity	149-155
	5.4		156-157
Evolution	1.5	Cell Biology	27-30
	5.1	Evolution and Biodiversity	137-141
	5.2		142-148
	10.3	Genetics and Evolution (HL)	269-279
Digestion	6.1	Human Physiology	160-167
Transport	6.2	Human Physiology	168-176
Gas exchange	6.3	Human Physiology	184-190
Defence and immune system	6.4	Human Physiology	177-183
	11.1	Animal Physiology (HL)	282-291
Homeostasis and osmoregulation	6.6	Human Physiology	197-201
	11.3	Animal Physiology (HL)	297-307
The nervous system	6.5	Human Physiology	191-196
Muscles and movement	11.2	Animal Physiology (HL)	292-296
Reproduction	6.6	Human Physiology	202-205
	11.4	Animal Physiology (HL)	308-315
Plant biology	9.1	Plant Biology (HL)	234-239
	9.2		240-242
	9.3		243-245
	9.4		246-254

Resources on BIOZONE's Website

BIOZONE's web site should be the first stop for biologists. As well as providing all our product information (including shipping dates) and updates, *www.thebiozone.com* provides quick access to the latest RSS newsfeeds and podcasts from around the world. The Resource hub also provides quick links to access the websites of publishers of references cited in the workbooks. Perhaps of greatest value to students and teachers is the BIOLINKS area of Biozone's website. The BIOLINKS pages are distinct from *Weblinks* (which are specific to each workbook edition) and provide a database of well organized hyperlinks pertaining to topics of interest in biology. The database is updated regularly, so that outdated, not operational, or no longer relevant sites are removed and new sites are added as they appear.



Click on a topic to see a list of all its links. Each topic has relevant subtopics to make searching easier and each link has a brief description.



RSS Newsfeeds and Podcasts in the right hand column provide the latest news and information from the world of science.

Click on the link to access the named site. The brief description tells you how the site may be of interest, as well as any country specific bias, if this is relevant.

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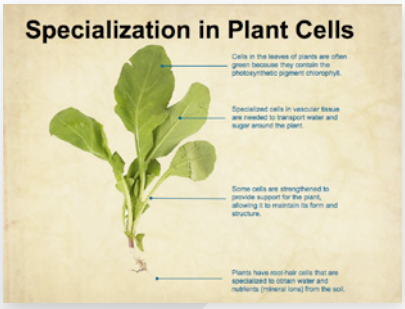

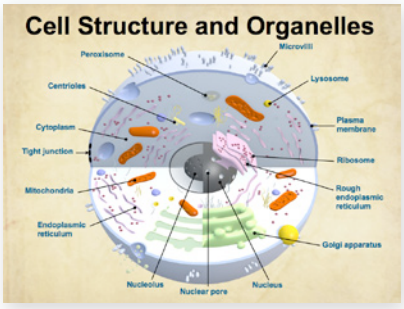

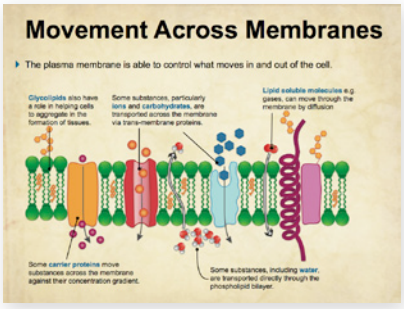

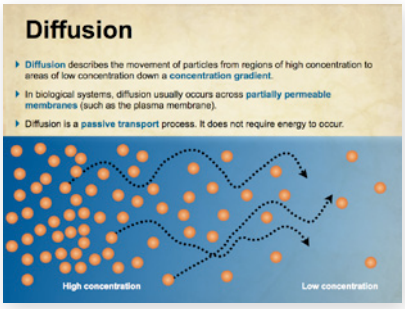

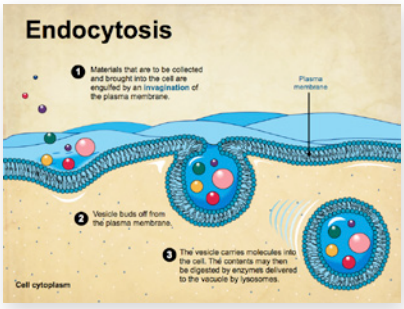

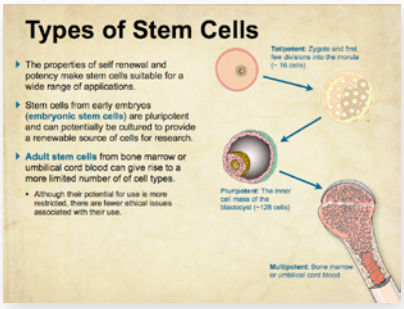

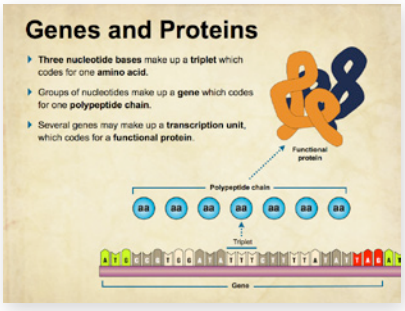

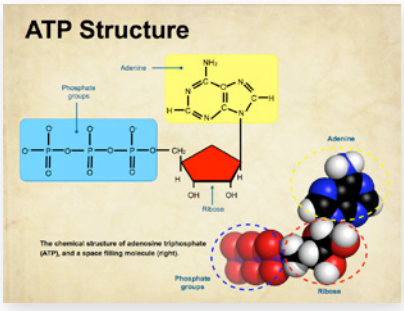

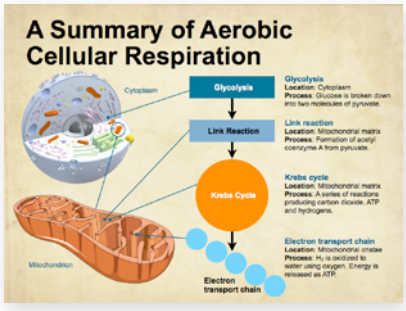

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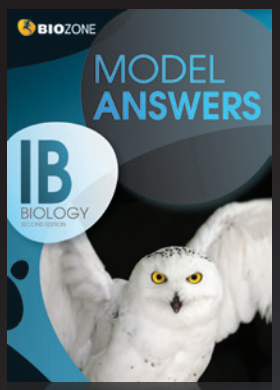
The IB BIOLOGY Series

BIOZONE's **IB** BIOLOGY Student Workbook has been completely redesigned and revised to address the new IB Diploma Programme for Biology. It incorporates both SL and HL content in a single, easily navigated volume, with clear indicators to specific components of the IB Biology Programme.

Targeted learning objectives summarize the required understandings, applications, and skills, prefacing each of the 11 comprehensive chapters and providing the necessary framework for delivering the programme content.



Understandings, Applications, and Skills

The understandings, applications, and skills required for each topic are summarized in clear learning objectives that provide the IB learner with specific performance expectations.

TOK and International-Mindedness

Specific indicators to these components of the IB programme are made in the introduction to each chapter and throughout the workbook. Students are encouraged through questions and visual material to address them in context as appropriate.

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A literacy and comprehension activity concludes each chapter, testing knowledge of important terms, synthesis of information, and understanding of basic concepts. A perfect synoptic self-test for students.

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BIOZONE's unique tab system identifies specific utilizations and makes connections to related concepts across the entire IB Biology syllabus.

Group 4 Experimental Skills and Mathematical Requirements

These components of the syllabus are addressed in two complementary ways. Activities including data handling and interpretation are integrated throughout the workbook, providing real-world scenarios in context. A comprehensive concluding chapter supports this, developing skills in basic planning, computation, graphing, and data analysis.

Weblinks

These support activities where relevant and appropriate, to extend learning beyond the workbook and to assist students in visualizing complex processes.

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