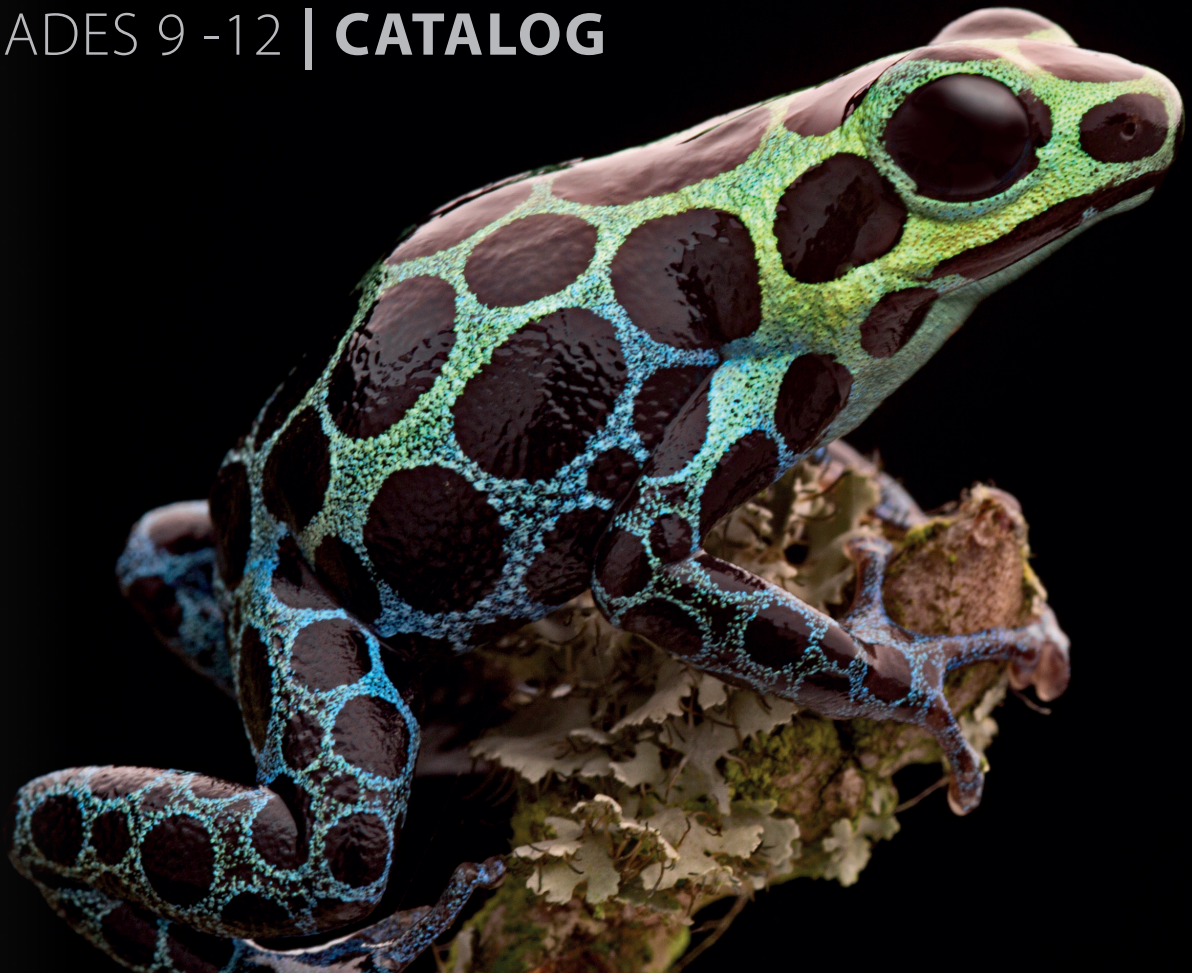
BIOZONE

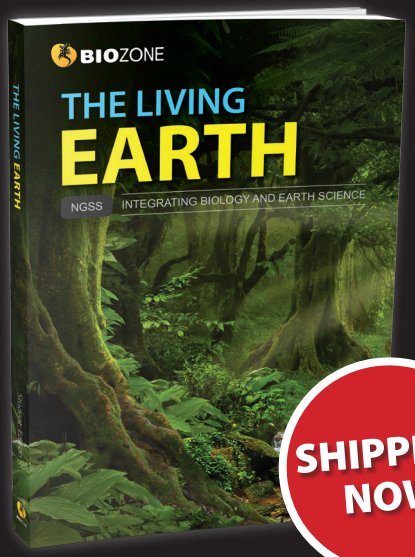
2019

Science Resources

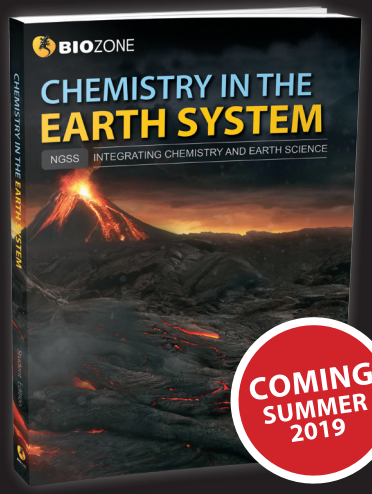
GRADES 9 -12 | **CATALOG**



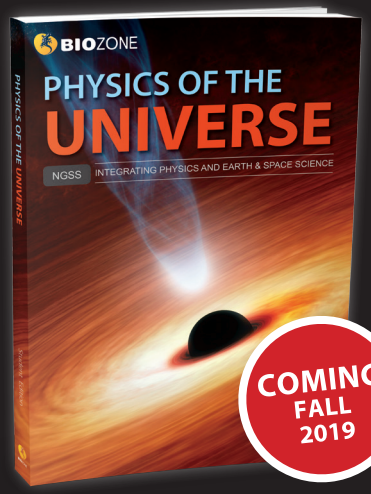
NEW EDITIONS
INTEGRATED NGSS SERIES



SHIPPING NOW



COMING SUMMER 2019



COMING FALL 2019

For more info on pages 10-13

eBOOKs for all BIOZONE student books

We are excited to announce the launch of eBOOKs for ALL of BIOZONE's critically acclaimed student books.

More information on pages 2-3

www.theBIOZONE.com/ebooks

Course **Books**

Modular **Books**

Presentation **Media**

Dear Science Educator,

These are exciting times for BIOZONE. Not only have we been very busy creating whole new programs of instructional materials for the many NGSS rollouts across the US, we have also been busy developing digital versions of many of our print book titles.

eBOOKs

We are delighted to launch eBOOK versions of our printed books. These provide a replica of the printed pages, with numerous enhancements, including: weblinks, 3D models, and embedded questions. The eBOOKs are also available at half price if you combine them with an order for the print books. They are designed for a class enrolment, so single purchases are not possible (however do ask for a free trial).

Integrated NGSS Series

We have successfully launched our new NGSS series for the California market. The Living Earth os receiving high praise from early adopters of the inspired new style of instructional resource. In full color, it integrates earth and space sciences with each of the three traditional sciences.

AS always, please get in touch if you have any queries.

Warmest regards,

The Sales Team
BIOZONE Corporation

P.S. Don't forget you can sign up to our newsletter and receive exclusive discounts, full product previews, free samples and new product releases. Sign up on our home page: thebiozone.com

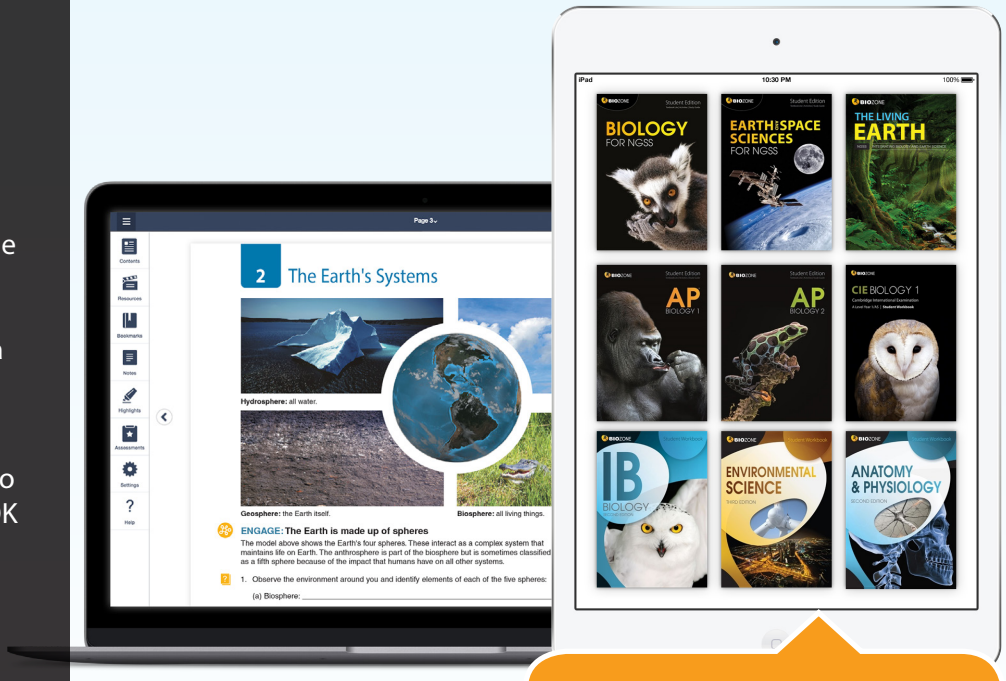
Introducing eBOOKs

BIOZONE's new eBOOKs are viewable through any web browser or via the **BIOZONE Reader App** on iOS (for iPAD). The licences are provided for a period of one year.

They can be purch ased as a stand alone eBOOK, or you can add them to a print book order and get the eBOOK at half price.

Minimum quantities apply

Launch Date: **September 2018**



Free 14 day Trial
Request your Teacher trial at:
theBIOZONE.com/ebooks

eBOOK Title List

Biology for NGSS	$19.95 *
Earth & Space Sciences for NGSS	$19.95 *
The Living Earth	$19.95 *
AP Biology 1	$24.95 *
AP Biology 2	$24.95 *
CIE Biology 1	$19.95 *
CIE Biology 2	$19.95 *
IB Biology	$29.95 *
Environmental Science	$19.95 *
Anatomy & Physiology	$19.95 *

Cell Biology & Biochemistry	$9.95
Human Evolution	$9.95
Microbiology & Biotechnology	$9.95
Genes & Inheritance	$9.95
Evolution	$9.95
Health & Disease	$9.95
Ecology	$9.95
Skills in Biology	$9.95

*Also available as a Print book/eBOOK bundle at half price when purchased together with the corresponding print title (minimum quantities apply).

Technical Notes:

Web browser requires a live internet connection. iPAD app stores the book offline and synchronizes when an internet connection is available.

***NOTE:** These eBOOKs are not suitable for small mobile devices, such as smartphones.*

Browser Support:

Recent browser versions:

Windows 8/10	*(IE, Chrome, Firefox)*
Mac OS 10.10+	*(Safari, Chrome)*
Chromebook	*(Chrome)*

iPad App : *iOS 9.0 or above*

How it works

ENRICHMENTS:

A variety of enrichment resources are available for many activities:

- Display annotated 3D models
- Website links (3rd party)
- Video clips

RESOURCES:

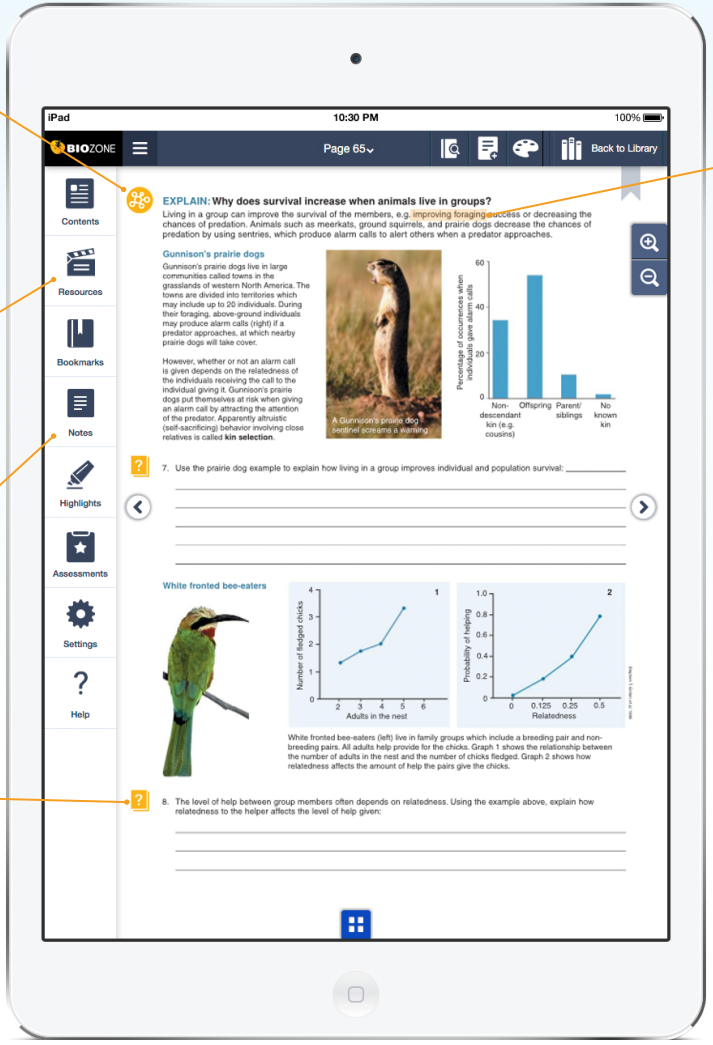
Students and teachers can see all the additional resources and enhancements available throughout the book

ADD NOTES:

Students can access previously added notes to highlighted text or to any other part of the page.

EMBEDDED QUESTIONS:

Students can answer questions on each page of the ebook that are identical to those in the printed book.



SELECTED TEXT:

A comprehensive collection of MARKUP tools allow students to interact with text:

- Color highlight
- Dictionary definition
- Access Google search
- Access Wikipedia lookup

TEACHER QUIZZES:

Teachers can create their own quizzes for student assessment from a selection of question types, including:

- Multichoice
- Matching
- Fill in the blanks
- Free response

SIMPLE DRAWING TOOLS:

A simple collection (above) of drawing tools allow students to interact with images:

- Draw over a diagram
- Choose pen type and color
- Eraser removes unwanted user drawing

BIOZONE ACADEMY

The BIOZONE Academy transforms our highly engaging student books from print media into an online course.

The added enhancements of 3D models, animations, videos, weblinks and simulations provide an exciting interactive experience for students.

Early access to the Beta version is available now.

Free 14 day Trial
Test the platform yourself by requesting early access at **theBIOZONE.com/academy**

Teacher

- Easily create and manage virtual classrooms
- Assign homework to a class with the push of a button
- Save time with speed-grading
- Personalize your course with your own teacher-curated resources

Students

- Personalize their learning experience by adding their own notes
- Understand the focus of the page through the clearly identified key idea
- Build deeper understanding with scaffolded content

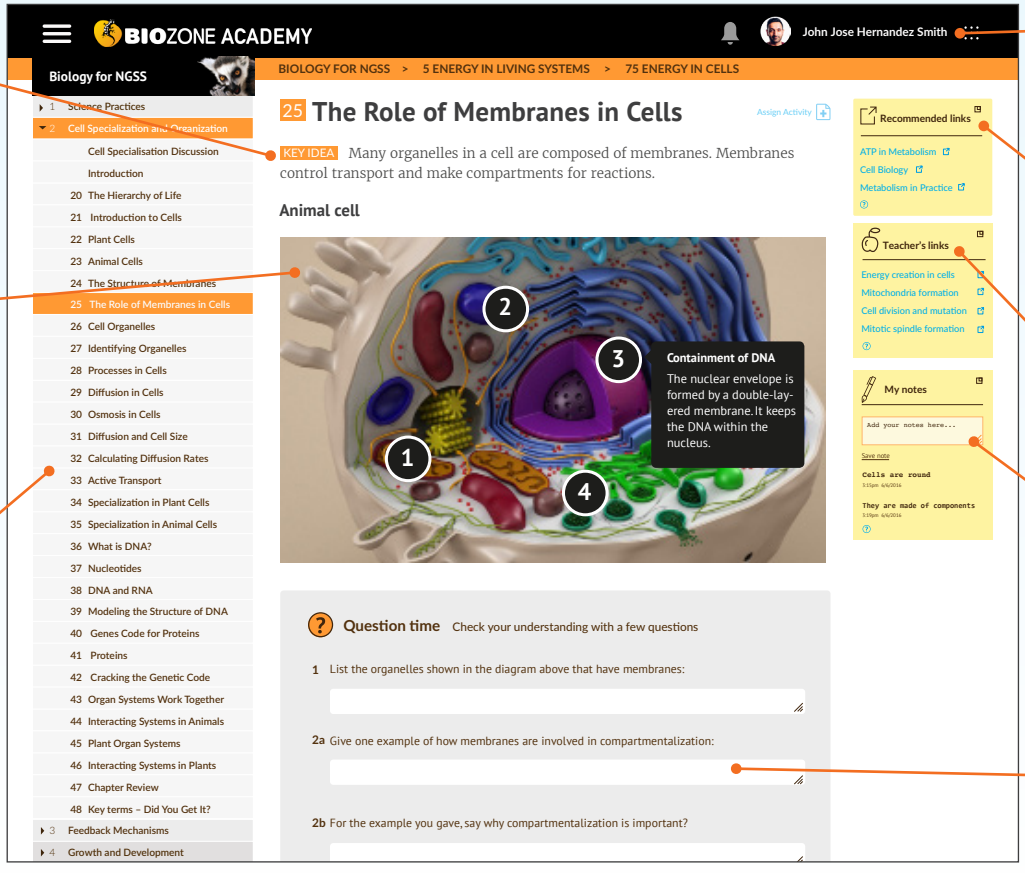
Pricing

- BIOZONE ACADEMY: $19.95 annual subscription per student (teachers access is free of charge)

Key idea
Each activity has a key idea summarizing its primary focus

Illustrations
Full color diagrams, animations, and 3D models

Intuitive navigation
Easy to find activities



Log-in
User-specific features for teacher, student and admin

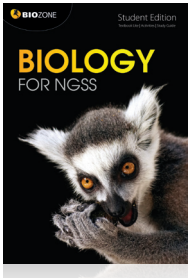
Recommended links
Links to publisher's curated weblinks

Teacher's links
Space for teachers to supply additional links for students

My notes
Space for students to take notes

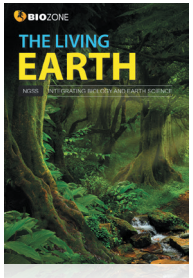
Question time
Students can answer questions directly within the activity. This forms their record of work

Online Courses

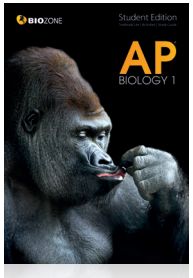


AVAILABLE NOW

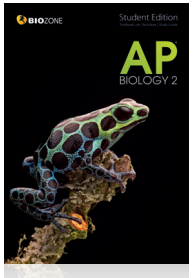
AVAILABLE NOW



COMING SOON



COMING SOON



COMING SOON

NON-INTEGRATED NGSS Series

BIOZONE's new resources for NGSS have been specifically written to meet the requirements of the NGSS for High School (grades 9-12). They integrate the three dimensions of the standards: **Science and Engineering Practices** (SEPs), **Crosscutting Concepts** (CCCs), and **Disciplinary Core Ideas** (DCIs), addressing the program content through a wide range of engaging student-focused activities.

By completing the activities, students develop competence in science practices, recognize and understand the concepts that link all domains of science, and build the knowledge base required to integrate the three dimensions of the standards to meet performance expectations.

The **Engineering Design** component of NGSS (ETS) has been incorporated as appropriate through activities that engage students in the solution of real world problems. ETS DCIs are integrated with science DCIs sharing the same performance expectations. Throughout, students develop an understanding of the **Nature of Science** through incorporation of its basic principles into activities.

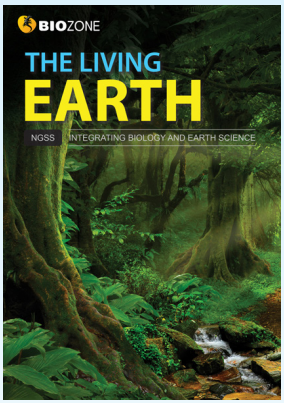
2015 WINNER REVERE awards AAP

BIOZONE: meeting the key requirements

- ✓ Elements of SEPs, DCIs, and CCCs are integrated to support three-dimensional learning.
- ✓ Provides coherent instructional sequences to help students demonstrate competence in targeted performance expectations.
- ✓ Provides opportunities for students to demonstrate performance of SEPs connected with their understanding of DCIs and CCCs.
- ✓ Develops connections between different science disciplines using CCCs.
- ✓ Provides grade appropriate connections to core standards in English and mathematics.
- ✓ Engages students in real-world, meaningful scenarios that reflect science practice.
- ✓ Develops deeper understanding of the SEPs, CCCs, and DCIs by building on prior knowledge.
- ✓ Uses scientifically accurate, grade-appropriate information and representations to support three-dimensional learning.
- ✓ Supports differentiated instruction through suggested teaching strategies.
- ✓ Provides multiple opportunities for formative, summative, and self-assessment.
- ✓ Provides multiple opportunities for students to demonstrate proficiency in all three dimensions of the standards.
- ✓ Components of Nature of Science and Engineering Design are evident in the SEPs and CCCs of activities.

See details at: theBIOZONE.com/the-ngss-solution

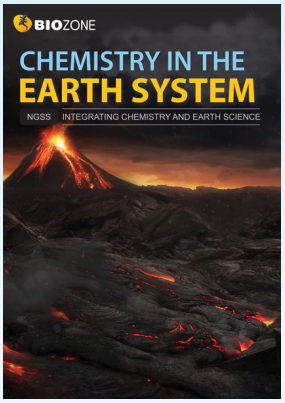
Integrating **Earth & Space Sciences** with each of the three traditional sciences



THE LIVING EARTH

1. Ecosystem Interactions and Energy
2. History of Earth's Atmosphere: Photosynthesis and Respiration
3. Evidence of Evolution
4. Inheritance of Traits
5. Structure, Function, and Growth
6. Ecosystem Stability and the Response to Climate Change

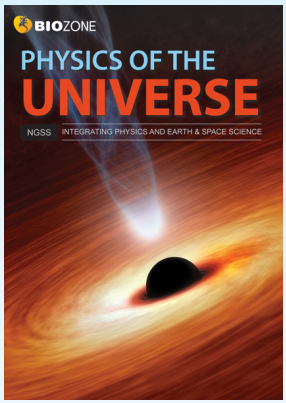
Available: **NOW**



CHEMISTRY IN THE EARTH SYSTEM

1. Combustion
2. Heat and Energy in the Earth System
3. Atoms, Elements, and Molecules
4. Chemical Reactions
5. Chemistry of Climate Change
6. The Dynamics of Chemical Reactions & Ocean Acidification

Publication date: **Summer-2019**



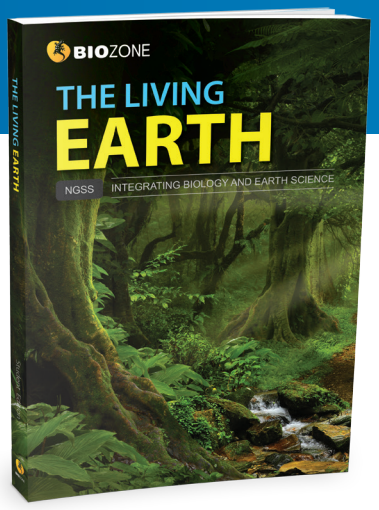
PHYSICS OF THE UNIVERSE

1. Forces and Motion
2. Forces at a Distance
3. Energy Conversion and Renewable Energy
4. Nuclear Processes and Earth History
5. Waves and Electromagnetic Radiation
6. Stars and the Origins of the Universe

Publication date: **Fall-2019**

www.theBIOZONE.com/ngss-integrated

THE LIVING EARTH



The Living Earth has been designed and written following the High School Three-Course Model for California. It will also suit NGSS-aligned states integrating Earth Science with Life Science.

This phenomena-based title takes a three-dimensional approach to provide an engaging, relevant, and rigorous program of instruction.

Departing from the more traditional approach of **BIOZONE's** Non-Integrated Series, the Integrated Series offers a learning experience based on the 5 Es and anchored in student-relevant phenomena and problems.

Print Version:

This WORKTEXT is designed to form the student's "record of work" – achieved by providing a write-on format allowing students to write their answers to questions right on the page.

eBOOK Version:

The eBOOK format renders a replica of the printed book. Enrichment features include weblinks, annotated 3D models, and publisher's questions. Teachers can set assignments. Student responses to set questions can be viewed by the teacher.

Online Course Version:

The book will also be available as an online course. Students will be able to answer the questions in an online format. Teachers can set assignments, and student responses to questions can be viewed by the teacher and graded if desired. *(See pages 4-5)*

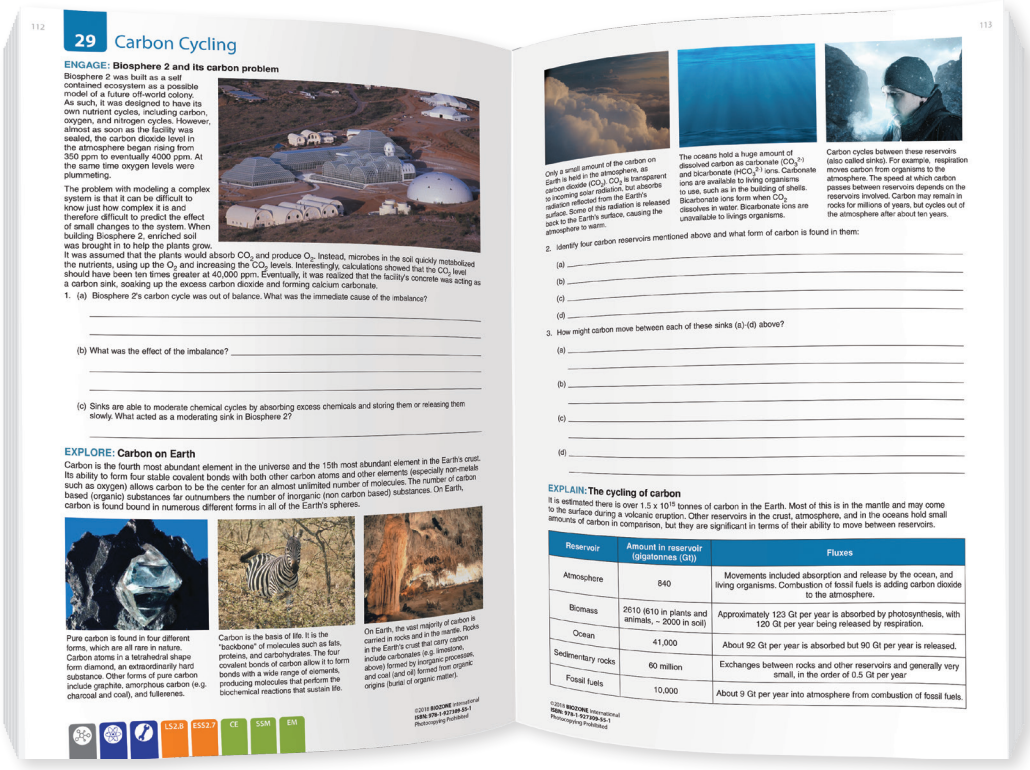
THE LIVING EARTH PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
The Living Earth - Student Edititon	978-1-927309-55-1	A4 paperback	$29.95	$19.95*
The Living Earth - Teacher's Edition	978-1-927309-70-4	A4 paperback	$85.95	N/A
The Living Earth - Model Answers	978-1-927309-68-1	A4 paperback *(B&W)*	$8.95	$5.95*
The Living Earth - Teacher's Digital Edition Δ	978-1-927309-69-8	CD-ROM *(1 year license)*	$499.95	$59.99++
The Living Earth - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
The Living Earth - eBOOK	978-1-98-856623-8	Web Browser / iPad App	$19.95	$29.95❍
The Living Earth - BIOZONE Academy	N/A	Online Course	$19.95	N/A

Pricing represents "introductory pricing" and will change to full pricing on **1 September 2019**.
Customers may secure guaranteed continuation of "introductory pricing" for multiple-year purchases.

* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from BIOZONE. Please contact our Sales Team: sales@thebiozone.com
Δ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
❍ eBOOKs are not for individual sale. (Minimum purchase of 30 + copies of the same title required).



29 Carbon Cycling

ENGAGE: Biosphere 2 and its carbon problem

Biosphere 2 was built as a self contained ecosystem as a possible model of a future off-world colony. As such, it was designed to have its own nutrient cycles, including carbon, oxygen, and nitrogen cycles. However, almost as soon as the facility was sealed, the carbon dioxide level in the atmosphere began rising from 350 ppm to eventually 4000 ppm. At the same time oxygen levels were plummeting.

The problem with modeling a complex system is that it can be difficult to know just how complex it is and therefore difficult to predict the effect of small changes to the system. When building Biosphere 2, enriched soil was brought in to help the plants grow. It was assumed that the plants would absorb CO_2 and produce O_2. Instead, microbes in the soil quickly metabolized the nutrients, using up the O_2 and increasing the CO_2 levels. Interestingly, calculations showed that the CO_2 level should have been ten times greater at 40,000 ppm. Eventually, it was realized that the facility's concrete was acting as a carbon sink, soaking up the excess carbon dioxide and forming calcium carbonate.

1. (a) Biosphere 2's carbon cycle was out of balance. What was the immediate cause of the imbalance?

(b) What was the effect of the imbalance?

(c) Sinks are able to moderate chemical cycles by absorbing excess chemicals and storing them or releasing them slowly. What acted as a moderating sink in Biosphere 2?

EXPLORE: Carbon on Earth

Carbon is the fourth most abundant element in the universe and the 15th most abundant element in the Earth's crust. Its ability to form four stable covalent bonds with both other carbon atoms and other elements (especially non-metals such as oxygen) allows carbon to be the center for an almost unlimited number of molecules. The number of carbon based (organic) substances far outnumbers the number of inorganic (non carbon based) substances. On Earth, carbon is found bound in numerous different forms in all of the Earth's spheres.

Pure carbon is found in four different forms, which are all rare in nature. Carbon atoms in a tetrahedral shape form diamond, an extraordinarily hard substance. Other forms of pure carbon include graphite, amorphous carbon (e.g. charcoal and coal), and fullerenes.

Carbon is the basis of life. It is the "backbone" of molecules such as fats, proteins, and carbohydrates. The four covalent bonds of carbon allow it to form bonds with a wide range of elements, producing molecules that perform the biochemical reactions that sustain life.

On Earth, the vast majority of carbon is carried in rocks and in the mantle. Rocks in the Earth's crust that carry carbon include carbonates (e.g. limestone, above) formed by inorganic processes, and coal (and oil) formed from organic origins (burial of organic matter).

LS2.B ESS2.7 CE SSM EM

Only a small amount of the carbon on Earth is held in the atmosphere, as carbon dioxide (CO_2). CO_2 is transparent to incoming solar radiation, but absorbs radiation reflected from the Earth's surface. Some of this radiation is released back to the Earth's surface, causing the atmosphere to warm.

The oceans hold a huge amount of dissolved carbon as carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-) ions. Carbonate ions are available to living organisms to use, such as in the building of shells. Bicarbonate ions form when CO_2 dissolves in water. Bicarbonate ions are unavailable to livings organisms.

Carbon cycles between these reservoirs (also called sinks). For example, respiration moves carbon from organisms to the atmosphere. The speed at which carbon passes between reservoirs depends on the reservoirs involved. Carbon may remain in rocks for millions of years, but cycles out of the atmosphere after about ten years.

2. Identify four carbon reservoirs mentioned above and what form of carbon is found in them:

(a)

(b)

(c)

(d)

3. How might carbon move between each of these sinks (a)-(d) above?

(a)

(b)

(c)

(d)

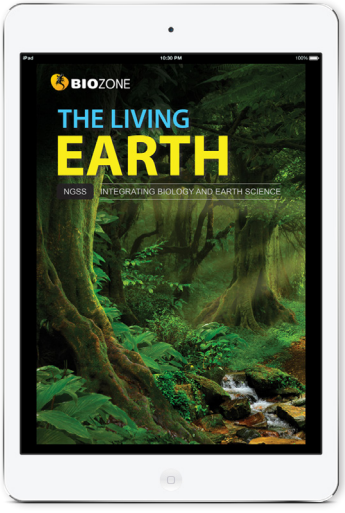
EXPLAIN: The cycling of carbon

It is estimated there is over 1.5 x 10^{19} tonnes of carbon in the Earth. Most of this is in the mantle and may come to the surface during a volcanic eruption. Other reservoirs in the crust, atmosphere, and in the oceans hold small amounts of carbon in comparison, but they are significant in terms of their ability to move between reservoirs.

Reservoir	Amount in reservoir (gigatonnes (Gt))	Fluxes
Atmosphere	840	Movements included absorption and release by the ocean, and living organisms. Combustion of fossil fuels is adding carbon dioxide to the atmosphere.
Biomass	2610 (610 in plants and animals, ~ 2000 in soil)	Approximately 123 Gt per year is absorbed by photosynthesis, with 120 Gt per year being released by respiration.
Ocean	41,000	About 92 Gt per year is absorbed but 90 Gt per year is released.
Sedimentary rocks	60 million	Exchanges between rocks and other reservoirs and generally very small, in the order of 0.5 Gt per year
Fossil fuels	10,000	About 9 Gt per year into atmosphere from combustion of fossil fuels.

Student Edition

Engage students with write-on activities that forms a premanent "Record of Work"

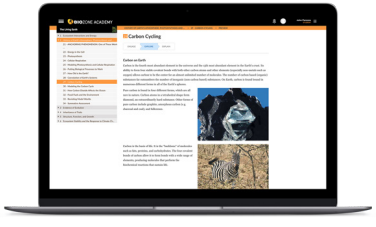


eBOOKs *(laptop & iPad)*

eBOOK format renders a replica of the printed book with students answering questions online

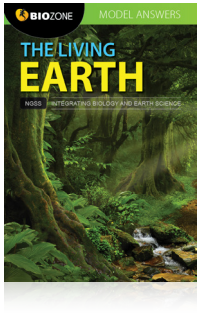
Teacher's Digital Edition

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



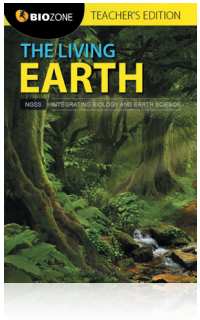
Online Course

Available as an online course with BIOZONE Academy



Model Answers

Provides suggested answers to all activities



Teacher's Edition

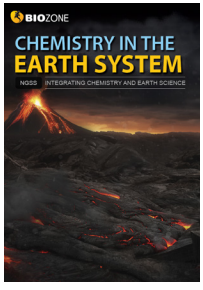
Provides teaching strategies, plus all suggested answers in a replica of the student book.

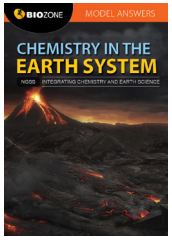
CHEMISTRY IN THE EARTH SYSTEM

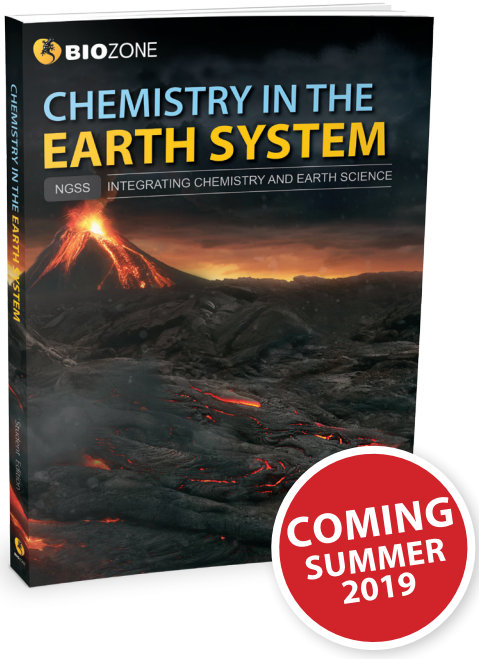
Chemistry in the Earth System has been designed and written following the High School Three-Course Model for California. It will also suit NGSS-aligned states integrating Earth Science with Chemistry.

This phenomena-based title takes a three-dimensional approach to provide an engaging, relevant, and rigorous program of instruction.

Departing from the more traditional approach of **BIOZONE's** Non-Integrated Series, the Integrated Series offers a learning experience based on the 5 Es and anchored in student-relevant phenomena and problems.







CHEMISTRY IN THE EARTH SYSTEM PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
Chemistry in the Earth System - Student Edititon	978-1-927309-71-1	A4 paperback	$29.95	$19.95*
Chemistry in the Earth System - Teacher's Edition	978-1-927309-74-2	A4 paperback	$85.95	N/A
Chemistry in the Earth System - Model Answers	978-1-927309-72-8	A4 paperback *(B&W)*	$8.95	$5.95*
Chemistry in the Earth System - Teacher's Digital Edition△	978-1-927309-73-5	CD-ROM *(1 year license)*	$499.95	$59.99++
Chemistry in the Earth System - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Chemistry in the Earth System - eBOOK	978-1-927309-94-0	Web Browser / iPad App	$19.95❍	$29.95❍

Pricing represents "introductory pricing" and will change to full pricing on **1 September 2019**.
Customers may secure guaranteed continuation of "introductory pricing" for multiple-year purchases.

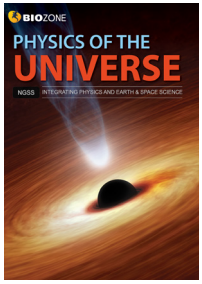
* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from BIOZONE. Please contact our Sales Team: sales@thebiozone.com
△ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
❍ eBOOKs are not for individual sale. (Minimum purchase of 30 + copies of the same title required).

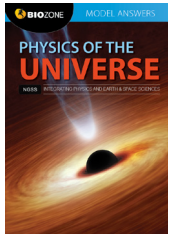
PHYSICS OF THE UNIVERSE

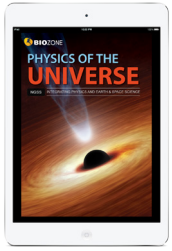
Physics of the Universe has been designed and written following the High School Three-Course Model for California. It will also suit NGSS-aligned states integrating Space Science with Physics.

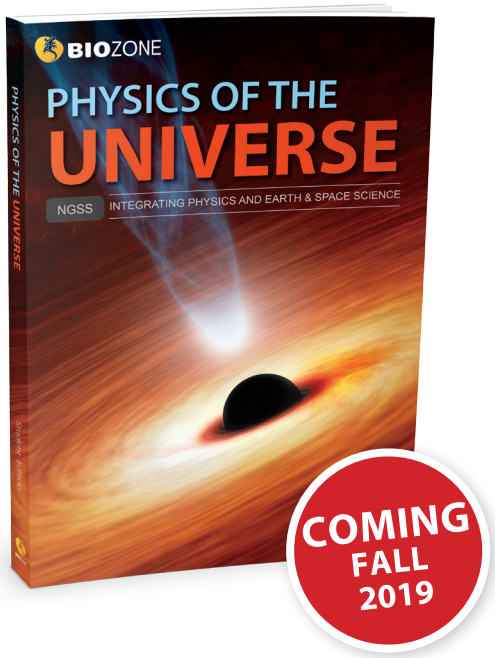
This phenomena-based title takes a three-dimensional approach to provide an engaging, relevant, and rigorous program of instruction.

Departing from the more traditional approach of **BIOZONE's** Non-Integrated Series, the Integrated Series offers a learning experience based on the 5 Es and anchored in student-relevant phenomena and problems.









PHYSICS OF THE UNIVERSE PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
Physics of the Universe - Student Edititon	978-1-927309-75-9	A4 paperback	$29.95	$19.95*
Physics of the Universe - Teacher's Edition	978-1-927309-78-0	A4 paperback	$85.95	N/A
Physics of the Universe - Model Answers	978-1-927309-76-6	A4 paperback *(B&W)*	$8.95	$5.95*
Physics of the Universe - Teacher's Digital Edition$^{\Delta}$	978-1-927309-77-3	CD-ROM *(1 year license)*	$499.95	$59.99++
Physics of the Universe - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Physics of the Universe - eBOOK	978-1-98-856618-4	Web Browser / iPad App	$19.95	29.95^{\circlearrowright}$

Pricing represents "introductory pricing" and will change to full pricing on **1 September 2019**.
Customers may secure guaranteed continuation of "introductory pricing" for multiple-year purchases.

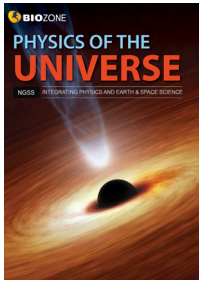
* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from BIOZONE. Please contact our Sales Team: sales@thebiozone.com
$^{\Delta}$ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
$^{\circlearrowright}$ eBOOKs are not for individual sale. (Minimum purchase of 30 + copies of the same title required).

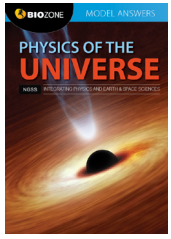
PHYSICS OF THE UNIVERSE

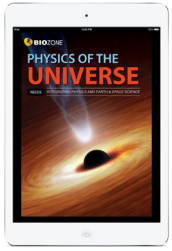
Physics of the Universe has been designed and written following the High School Three-Course Model for California. It will also suit NGSS-aligned states integrating Space Science with Physics.

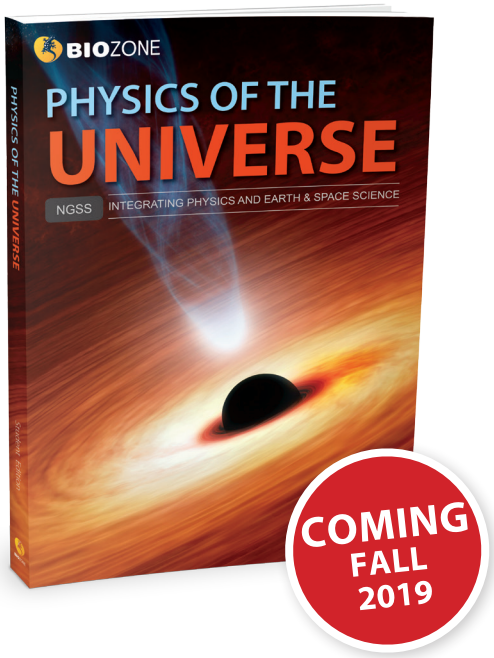
This phenomena-based title takes a three-dimensional approach to provide an engaging, relevant, and rigorous program of instruction.

Departing from the more traditional approach of **BIOZONE's** Non-Integrated Series, the Integrated Series offers a learning experience based on the 5 Es and anchored in student-relevant phenomena and problems.









PHYSICS IN THE UNIVERSE PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
Physics of the Universe - Student Edititon	978-1-927309-75-9	A4 paperback	$29.95	$19.95*
Physics of the Universe - Teacher's Edition	978-1-927309-78-0	A4 paperback	$85.95	N/A
Physics of the Universe - Model Answers	978-1-927309-76-6	A4 paperback *(B&W)*	$8.95	$5.95*
Physics of the Universe - Teacher's Digital Edition$^{\Delta}$	978-1-927309-77-3	CD-ROM *(1 year license)*	$499.95	$59.99++
Physics of the Universe - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Physics of the Universe - eBOOK	978-1-98-856618-4	Web Browser / iPad App	$19.95	29.95^{\circlearrowright}$

Pricing represents "introductory pricing" and will change to full pricing on **1 September 2019**.
Customers may secure guaranteed continuation of "introductory pricing" for multiple-year purchases.

* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from BIOZONE. Please contact our Sales Team: sales@thebiozone.com
$^{\Delta}$ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
$^{\circlearrowright}$ eBOOKs are not for individual sale. (Minimum purchase of 30 + copies of the same title required).

What does **Non-Integrated NGSS** look like?

Chapter Introduction page

LS1.A

Cell Specialization and Organization

Key terms
base-pairing rule
cell
DNA
eukaryotic cell
gene
multicellular
nucleotide
organelle
organ system
polynucleotide
prokaryotic cell
protein
specialized cell

Disciplinary core ideas — Activity number

Show understanding of these core ideas

Specialized cells provide essential life functions

1 There are two types of cells: prokaryotic and eukaryotic. Plant and animal cells are eukaryotic cells. — 21 22 23
2 Cells contain specialized components called organelles. Each organelle carries out a specialized role in the cell. — 24-33
3 Many cells are specialized to carry out specific roles. The size, shape, and number of organelles in a cell depends on the cell's role. — 34 35

Genes on DNA code for proteins

4 A cell's genetic information is carried in a molecule called DNA. DNA is a polynucleotide; it is made up of many smaller components, called nucleotides, joined together. DNA has a double-helix structure. — 36 37 38 39
5 Nucleotides pair together according to the base-pairing rule. Adenine always pairs with thymine and cytosine always pairs with guanine. — 38 39
6 A gene is a region of DNA that codes for a specific protein. Proteins carry out most of the work in a cell. The shape of a protein helps it to carry out its job. — 40 41

Multicellular organisms are organized in a hierarchical way

7 Multicellular organisms exhibit a hierarchical structure of organization. Components at each level of organization are part of the next level. — 20
8 Multicellular organisms have complex organ systems, made up of many components. Each system has a specific role, but different organ systems interact and work together so that the organism can carry out essential life functions. — 42 43 44 46

Crosscutting concepts — Activity number

Understand how these fundamental concepts link different topics

1 SF The determination of DNA's structure required a detailed examination of its components and enabled its function to be understood. — 37 38 40 41 42
2 SF The functions and properties of cells can be inferred from their components and their overall structure. — 22 23 34 35

Science and engineering practices — Activity number

Demonstrate competence in these science and engineering practices

1 Use a model to show that multicellular organisms have a hierarchical structure and that components from one level contribute to the next. — 20 22 23
2 Use a model to show that parts of a system interact to fulfil life functions. — 41-43 46
3 Construct and use a model to illustrate the structure of DNA. — 39
4 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins. — 42

BIOZONE APP
Student Review Series
Cell Specialization & Organization

Disciplinary Core Ideas
Each chapter carries a program code identifying the DCI to which it applies.

Key terms
An essential vocabulary list encourages appropriate use of the correct terms when answering questions. Students can use the list to create a glossary for revision.

Check boxes
Students can use the check boxes to indicate the objectives they should complete and tick them off when finished.

Disciplinary Core Ideas
DCIs are summarised as a series of short learning outcomes. The activities to which they relate enable the student to meet performance expectations.

Crosscutting Concepts
The activities relating to each crosscutting statement are identified by their number.

Science and Engineering Practices
The activities relating to each of the science and engineering practices described are identified by their number.

SIGNIFICANT BENEFITS

Streamline
the coverage of extensive curricula.

Concept-based
content allows complex ideas to be broken down into manageable parts.

Student engagement
is maximized, with information, questions and student-required answers all on the same page.

Critical-thinking
questions build deeper understanding of concepts and practices.

See full previews:
www.theBIOZONE.com/NBI2

Activity page

Activity number
Activities are numbered to make navigation through the book easier.

Content organization
Logically organized content makes it easier for students to access and engage with the information.

Key idea
Each activity has a key idea summarizing its primary focus. The key idea is designed to help facilitate the student's understanding of the message on the page.

Comprehensive diagrams provide an engaging, highly visual delivery of the important information.

Critical thinking questions
A direct questioning style helps students to easily identify what is being asked. A wide range of tasks, including free response, data analysis and presentation, and interpretation and evaluation of evidence, scaffold student learning to build confidence and competence.

Write-on answers
Students write their answers directly onto the page. This becomes their record of work and helps them when it is time to review for tests and exams.

Activities meeting aspects of the **science and engineering practices** are integrated with DCIs and identified through picture codes. These activities provide opportunities for students to develop competence in the practices identified in the standards.

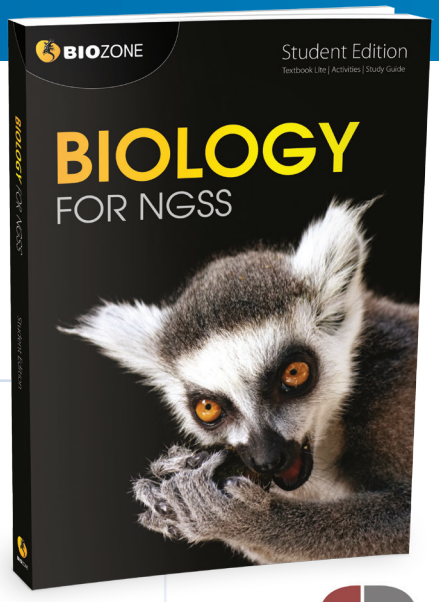
Activity coding system
A task code indicates the type of activity, enabling activities to be assigned appropriately.

Weblinks provide direct links to useful animations, video clips and illustrative material. Access our dedicated webpage to view the list of weblinks.

Letter codes identify each of the **crosscutting concepts** as they apply, linking related concepts in different topic areas and different domains of science.

Visually rich
content, including clear explanatory diagrams, appeals to today's learning styles.

BIOLOGY FOR NGSS



Biology for NGSS has been specifically written to meet the high school life sciences requirements of the **Next Generation Science Standards** (NGSS). The three dimensions of the standards: **science and engineering practices** (SEPs), **crosscutting concepts** (CCCs), and **disciplinary core ideas** (DCIs) are integrated throughout. Refer to pages 4-5 of this catalog for a detailed overview of how **BIOZONE** addresses these dimensions.

Student Edition:

- The introduction to each chapter provides the student with clear, achievable learning outcomes, mapping the integration of DCIs, CCCs, and SEPs across a wide range of activities.
- Different aspects of the Nature of Science are addressed throughout the book, drawing the student's attention to key principles in context.
- Specifically designed activities connect the engineering design component of NGSS to DCIs sharing the same performance expectations.

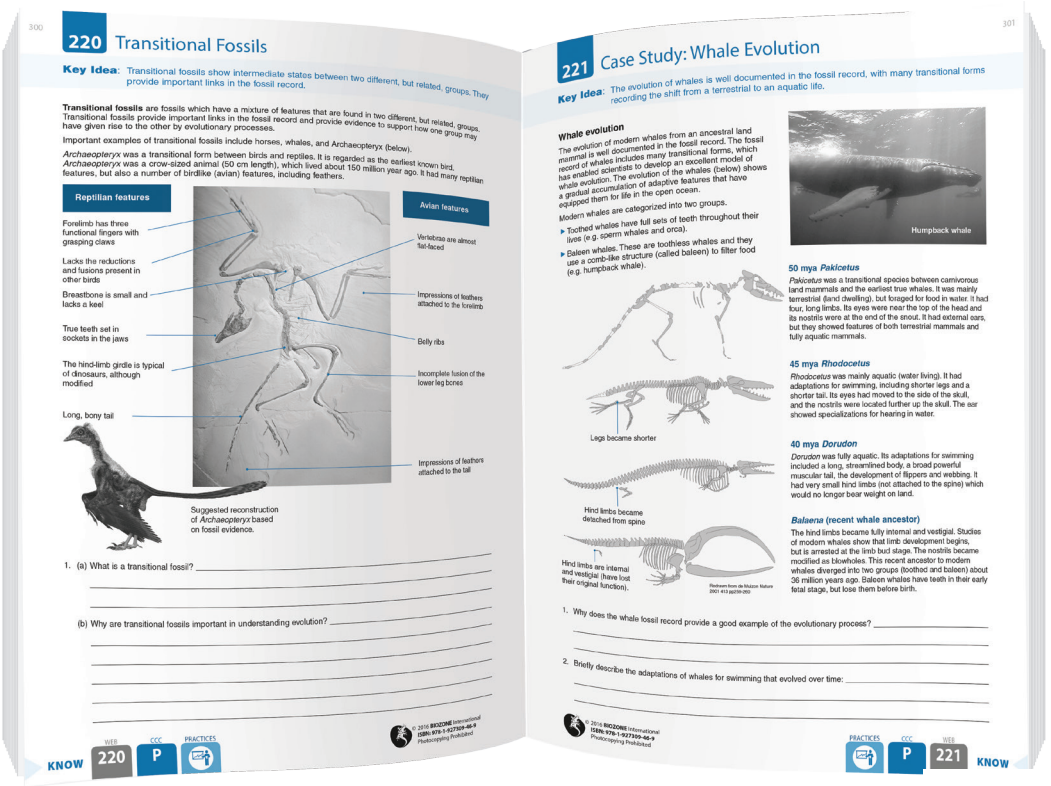
2015 WINNER REVERE awards AAP PRE K-12 LEARNING

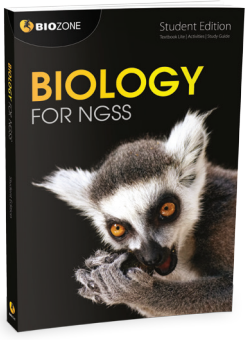
BIOLOGY FOR NGSS SERIES PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
Biology for NGSS - Student Edititon	978-1-927309-46-9	A4 paperback *(2 colour)*	$29.95	$19.95*
Biology for NGSS - Teacher's Edition	978-1-927309-49-0	A4 paperback *(2 colour)*	$85.95	N/A
Biology for NGSS - Model Answers	978-1-927309-47-6	A4 paperback *(B&W)*	$8.95	$5.95*
Biology for NGSS - Teacher's Digital Edition$^{\Delta}$	978-1-927309-48-3	CD-ROM *(1 year license)*	$499.95	$59.99++
Biology for NGSS - Presentation Media	N/A	CD-ROM	$399.95	N/A
Biology for NGSS - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Biology for NGSS - eBOOK	978-1-98-856614-6	Web Browser / iPad App	19.95^{\circlearrowright}$	$29.95
Biology for NGSS - BIOZONE Academy	N/A	Online Course	$19.95	N/A

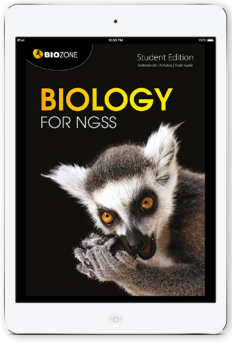
* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
$^{\Delta}$ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
$^{\circlearrowright}$ eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 30 + copies of the same title required to qualify).





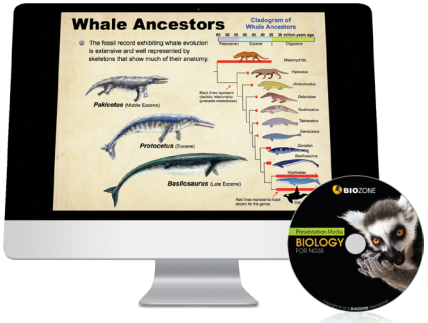
Student Edition

Engage students with write-on activities that build and extend on prior knowledge



eBOOKs *(laptop & iPad)*

eBOOK format renders a replica of the printed book with students answering questions online



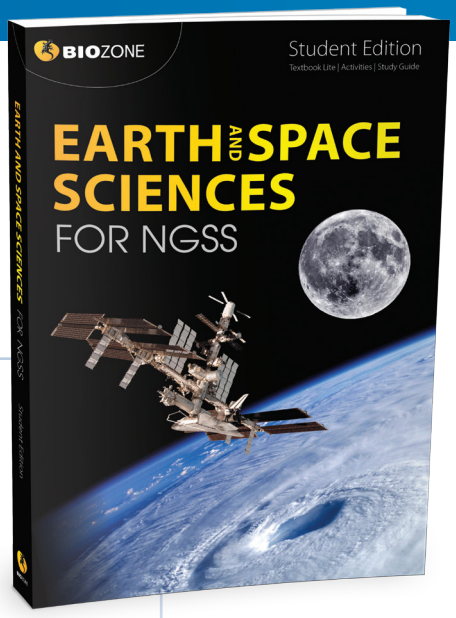
Presentation Media

Enhance workbook activities with Presentation Media - editable PowerPoint slides

Teacher's Digital Edition

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

EARTH AND SPACE SCIENCES FOR NGSS



Earth and Space Sciences for NGSS has been specifically written to meet the high school earth and space sciences requirements of the **Next Generation Science Standards** (NGSS). The three dimensions of the standards: **science and engineering practices** (SEPs), **crosscutting concepts** (CCCs), and **disciplinary core ideas** (DCIs) are integrated throughout. Refer to pages 4-5 of this catalog for a detailed overview of how **BIOZONE** addresses these dimensions.

Student Edition:

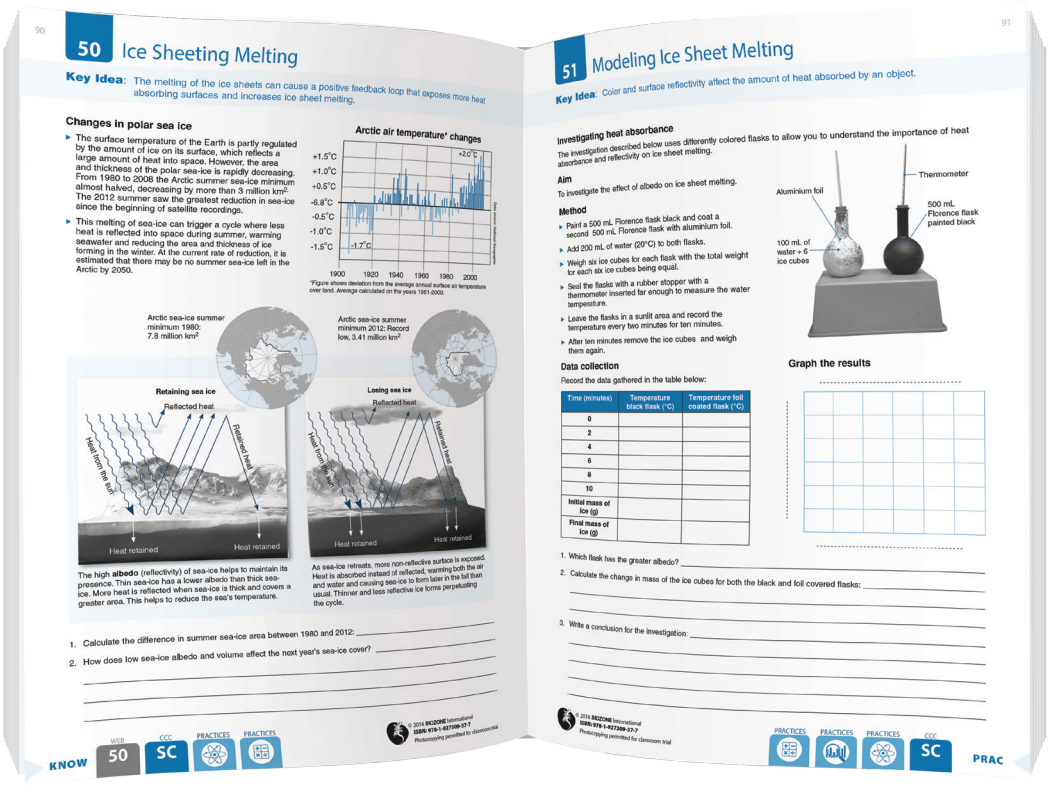
- The introduction to each chapter provides the student with clear, achievable learning
- outcomes, mapping the integration of DCIs, CCCs, and SEPs across a wide range of activities.
- Different aspects of the Nature of Science are addressed throughout the book, drawing the student's attention to key principles in context.
- Specifically designed activities connect the engineering design component of NGSS to DCIs sharing the same performance expectations.

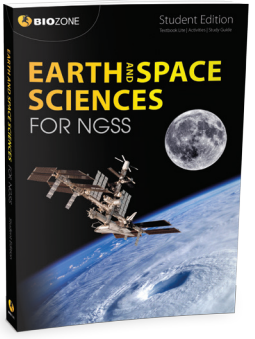
EARTH AND SPACE SCIENCES FOR NGSS SERIES PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
Earth and Space Sciences for NGSS - Student Edititon	978-1-927309-37-7	A4 paperback *(2 colour)*	$29.95	$19.95*
Earth and Space Sciences for NGSS - Teacher's Edition	978-1-927309-50-6	A4 paperback *(2 colour)*	$85.95	N/A
Earth and Space Sciences for NGSS - Model Answers	978-1-927309-38-4	A4 paperback *(B&W)*	$8.95	$5.95*
Earth and Space Sciences for NGSS - Teacher's Digital Edition$^{\Delta}$	978-1-927309-39-1	CD-ROM *(1 year license)*	$499.95	$59.99++
Earth and Space Sciences for NGSS - Presentation Media	N/A	CD-ROM	$399.95	N/A
Earth and Space Sciences for NGSS - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Earth and Space Sciences for NGSS - eBOOK	978-1-98-856615-3	Web Browser / iPad App	19.95^{\circlearrowleft}$	$29.95
Earth and Space Sciences for NGSS - BIOZONE Academy	N/A	Online Course	$19.95	N/A

* Discount price applies to purchases of 30+ copies.
++ A discount price is available with orders of 100 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
$^{\Delta}$ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
$^{\circlearrowleft}$ eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 30 + copies of the same title required to qualify).





Student Edition

Engage students with write-on activities that build and extend on prior knowledge

eBOOKs *(laptop & iPad)*

eBOOK format renders a replica of the printed book with students answering questions online

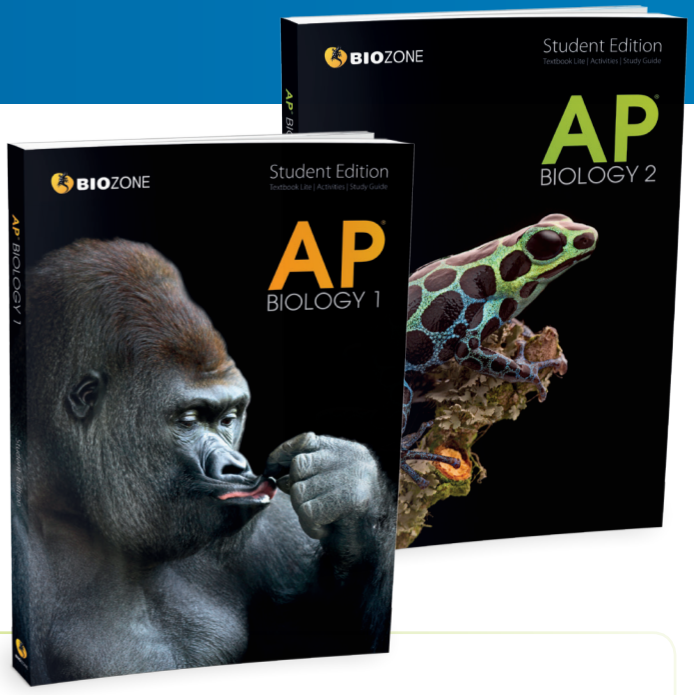
Presentation Media

Enhance workbook activities with Presentation Media - editable PowerPoint slides

Teacher's Digital Edition

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

AP BIOLOGY 1 & 2



BIOZONE's AP BIOLOGY 1 & 2 have been written for the amended **AP Biology Curriculum** Framework.

Clear diagrams, concise explanations, and targeted learning objectives accompany intelligent questioning to create an innovative resource that encourages achievement in students of all abilities.

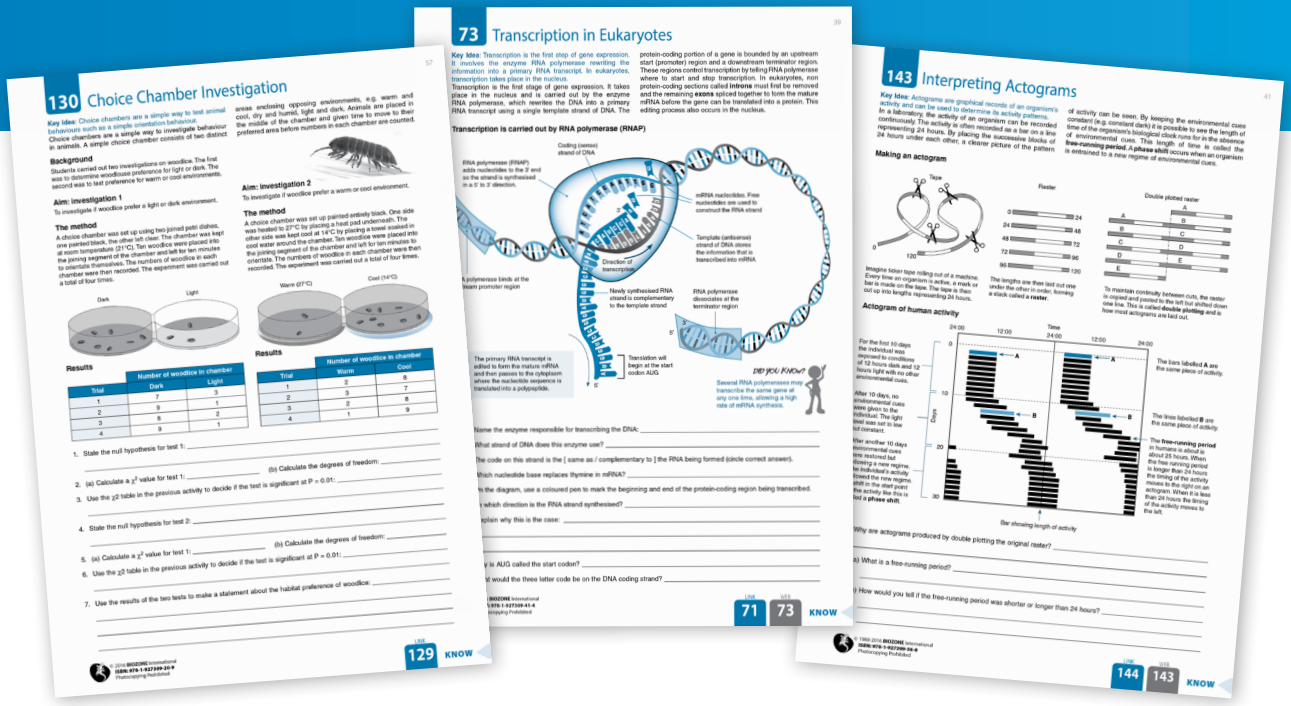
AP Biology Student Editions are well suited for classroom or homework use, independent study, review, and extension. Together, the two volumes cover all topics.

Features & Benefits

- **400+ activities**: Varied, engaging activities provide ample opportunity for students to explore and test their understanding of the content.
- The **four big ideas** provide a thematic framework for presenting a wealth of illustrative examples to support the required content.
- **Enduring understandings** are clearly identified and developed through the learning objectives and their supporting activities.
- **Essential knowledge** statements outline the content of the AP Biology program.
- **Learning objectives** provides students with a guide to the skills and knowledge expected of them.
- Concept maps make connections between key content areas.
- A **key idea** for each activity and access to support online engages students and supports a deeper understanding.

We have been using Biozone's AP Biology 1 and 2 over the past two years and I have found it to be an incredible resource. The alignment to the learning objectives in the new curriculum make it easy to customize to your own course. The progression of increasingly difficult activities in the book are perfect.

Michael Szczepanik



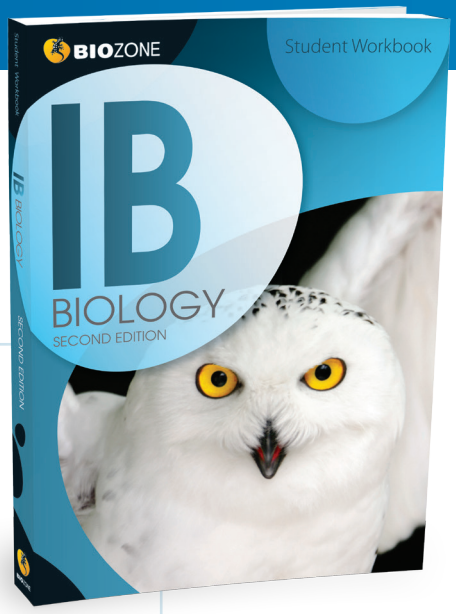
AP BIOLOGY SERIES PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
AP Biology 1 - Student Edition	978-1-927309-62-9	A4 paperback *(2 colour)*	$34.95	$24.95*
AP Biology 2 - Student Edition	978-1-927309-65-0	A4 paperback *(2 colour)*	$34.95	$24.95*
AP Biology 1 & 2 - Student Editions **Bundle**	*(see above)*	A4 paperback *(2 colour)*	$59.90	$39.90*
AP Biology 1 - Model Answers	978-1-927309-63-6	A4 paperback *(B&W)*	$8.95	$5.95*
AP Biology 2 - Model Answers	978-1-927309-66-7	A4 paperback *(B&W)*	$8.95	$5.95*
AP Biology 1 - Teacher's Digital Edition Δ	978-1-927309-64-3	CD-ROM *(1 year license)*	$399.95	$59.95++
AP Biology 2 - Teacher's Digital Edition Δ	978-1-927309-67-4	CD-ROM *(1 year license)*	$399.95	$59.95++
AP Biology 1 & 2 - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Brundle
AP Biology 1 - eBOOK	978-1-927309-90-2	Web Browser / iPad App	$24.95	$37.45
AP Biology 2 - eBOOK	978-1-927309-91-9	Web Browser / iPad App	$24.95	$37.45
AP Biology 1 & 2 - eBOOK	*(see above)*	Web Browser / iPad App	$39.90	$59.90
AP Biology 1 - BIOZONE Academy	N/A	Online Course	$19.95	N/A

* Discount price applies to purchases of 20+ copies.
++ A discount price is available with orders of 20 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
Δ Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
ↄ eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 20 + copies of the same title required to qualify).

IB BIOLOGY



BIOZONE's IB BIOLOGY Student Workbook covers the current **IB Biology Diploma Program**. It incorporates both SL and HL content in a single, easily navigated volume, with clear indicators to specific components of the program. Each of the 11 comprehensive chapters is prefaced with targeted learning objectives summarizing the required understandings, applications, and skills.

Features & **Benefits**

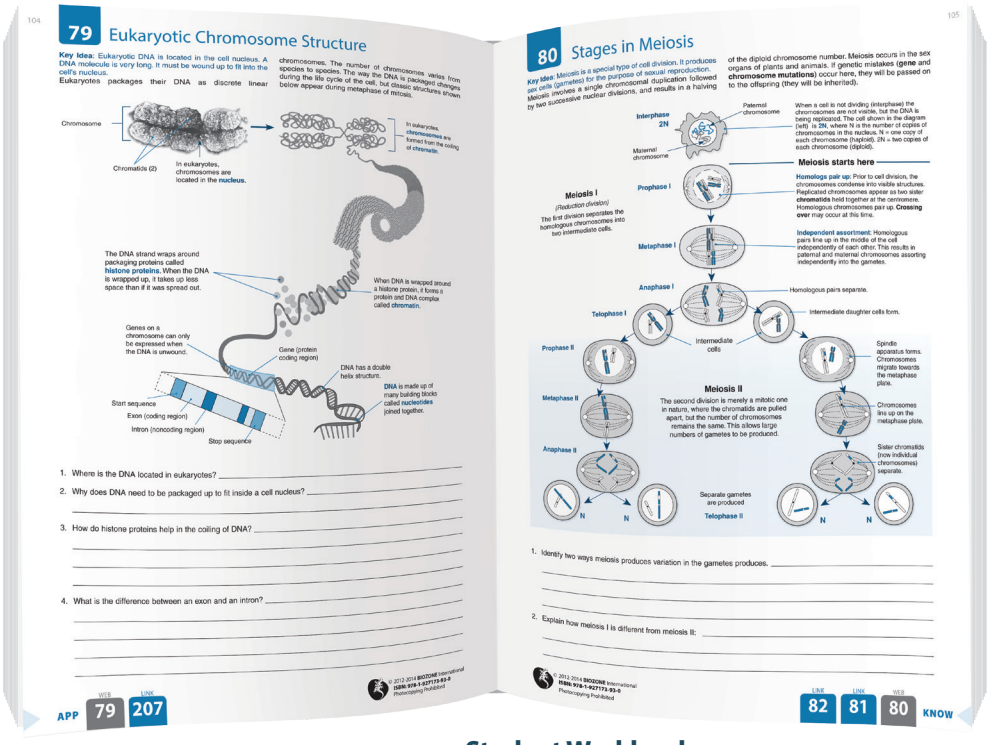
- **320 activities**: Varied, engaging activities provide ample opportunity for students to address the program content and build the skills required to meet the Group 4 aims.
- **TOK and International-Mindedness**: These components of the IB program are clearly indicated in the introduction to each chapter and throughout the workbook.
- **Literacy and comprehension**: A literacy and comprehension activity concludes each chapter. A perfect synoptic self-assessment for students.
- **Cross-curricula links**: BIOZONE's unique tab system identifies specific utilisations and makes connections to related concepts across the entire program.
- **Experimental skills and mathematical requirements**: Activities focused on building skills in data handling and interpretation are integrated throughout the workbook.

IB BIOLOGY SERIES PRODUCT LIST

PRODUCT	ISBN	FORMAT	RRP	Discount Price
IB Biology - Student Edititon	978-1-927173-93-0	A4 paperback *(2 colour)*	$39.95	$29.95*
IB Biology - Model Answers	978-1-927173-94-7	A4 paperback *(B&W)*	$8.95	$5.95*
IB Biology - Teacher's Digital Edition$^{\Delta}$	978-1-927173-95-4	CD-ROM *(1 year license)*	$399.95	$59.99++
IB Biology - Presentation Media	N/A	CD-ROM	$399.95	N/A
IB Biology - Classroom Guide	N/A	A4 *(downloadable PDF)*	FREE	N/A

DIGITAL PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
IB Biology - eBOOK	978-1-98-856600-9	Web Browser / iPad App	29.95^{\circlearrowright}$	$44.95

* Discount price applies to purchases of 20+ copies.
++A discount price is available with orders of 20 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
$^{\Delta}$Teacher's Digital Edition must be purchased in conjunction with 10+ copies of the corresponding Student Edition.
$^{\circlearrowright}$eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 20 + copies of the same title required to qualify).

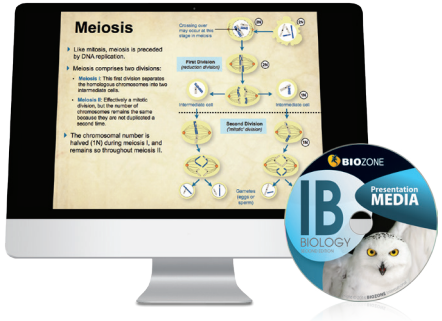


Student Workbook

Engage students with write-on activities directly in the Workbook

eBOOKS *(laptop & iPad)*

eBOOK format renders a replica of the printed book with students answering questions online

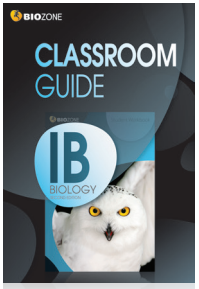


Presentation Media

Enhance workbook activities with Presentation Media - editable PowerPoint slides

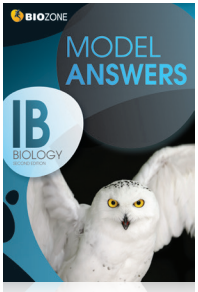
Teacher's Digital Edition

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



Classroom Guide

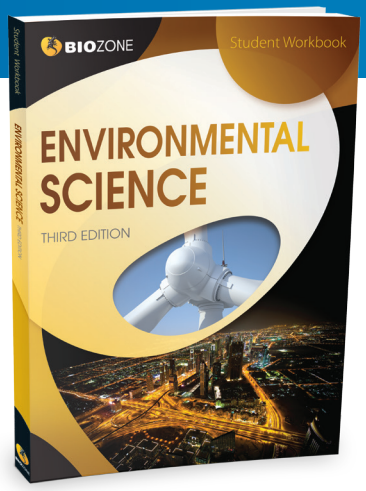
Provides teaching strategies



Model Answers

Provides suggested answers to all activities

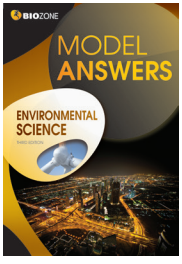
ENVIRONMENTAL SCIENCE

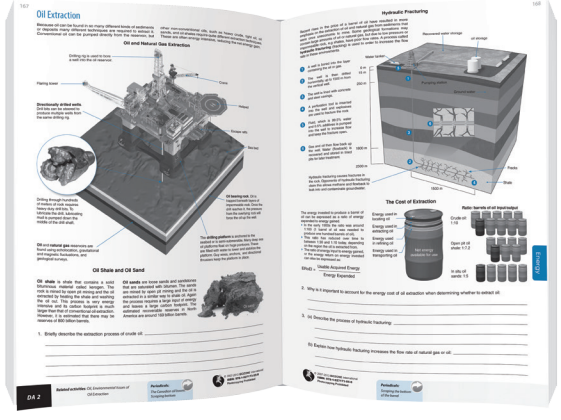


The ideal companion to both the **APES** program with an alignment to the **IB Environmental Systems and Societies**. Environmental Science Student Workbook introduces students to the Earth's physical and biological systems, and the interactions of humans with these. This revision introduces new content and aligns the workbook to its supporting digital resources.

Content developments include updates on the Gulf of Mexico oil spill and the Fukushima Daiichi nuclear disaster, and in-depth coverage of energy extraction issues, pollution, and the wider environmental implications of urban development.

- The Earth's Systems
- Ecosystems
- Natural Ecosystem Change
- Populations
- Investigating Ecosystems
- Land and Water
- Energy
- Pollution
- Global Change



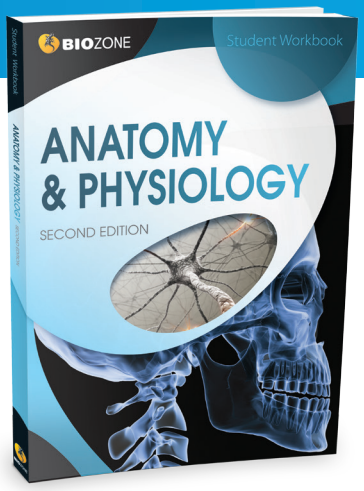


PRODUCT	ISBN	FORMAT	RRP	Discount Price
Environmental Science - Student Edititon	978-1-927173-55-8	A4 paperback *(2 colour)*	$29.95	$19.95*
Environmental Science - Model Answers	978-1-927173-60-2	A4 paperback *(B&W)*	$8.95	$5.95*
Environmental Science - Presentation Media	N/A	CD-ROM	$299.95	N/A

PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Environmental Science - eBOOK	978-1-927309-99-5	Web Browser / iPad App	$19.95❍	$29.95

* Discount price applies to purchases of 20+ copies.
++A discount price is available with orders of 20 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
❍ eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 20 + copies of the same title required to qualify).

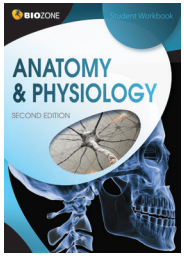
ANATOMY & PHYSIOLOGY

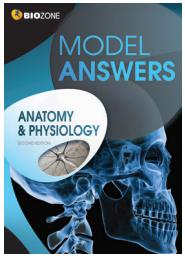


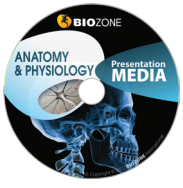
The **Anatomy and Physiology** Student Workbook explores the essentials of human structure and function through engaging, generously illustrated write-on activities. Much of the content in the first edition has been revised to include larger diagrams, more photographs, and greater depth of coverage in key areas.

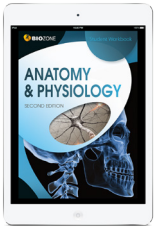
Sound biological principles are emphasized throughout, and key interactions between body systems are indicated using annotated introductory figures. Using key examples, students are encouraged to explore each body system within the contexts of disease, medicine and technology, aging, and exercise. The result is a rounded exploration of the functioning human.

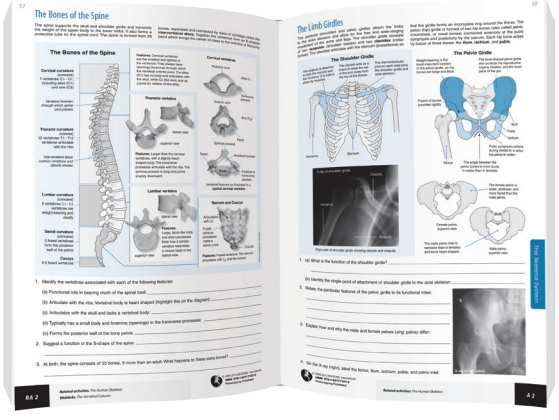
- Cells and Tissues
- The Integument and Homeostasis
- The Skeletal System
- The Muscular System
- The Nervous System
- The Endocrine System
- The Cardiovascular System
- The Lymphatic System and Immunity
- The Respiratory System
- The Digestive System
- The Urinary System
- Reproduction and Development











PRODUCT	ISBN	FORMAT	RRP	Discount Price
Anatomy & Physiology - Student Edititon	978-1-927173-57-2	A4 paperback *(2 colour)*	$29.95	$19.95*
Anatomy & Physiology - Model Answers	978-1-927173-59-6	A4 paperback *(B&W)*	$8.95	$5.95*
Anatomy & Physiology - Presentation Media	N/A	CD-ROM	$449.95	N/A

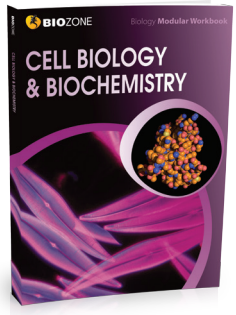
PRODUCT	ISBN	FORMAT	RRP	eBOOK + Print Bundle
Anatomy & Physiology - eBOOK	978-1-927309-89-6	Web Browser / iPad App	$19.95❍	$29.95

* Discount price applies to purchases of 20+ copies.
++A discount price is available with orders of 20 or more workbooks when purchasing direct from Biozone. Please contact our Sales Team: sales@thebiozone.com
❍ eBOOKs are not for individual sale. Only sold as class sets (minimum purchase of 20 + copies of the same title required to qualify).

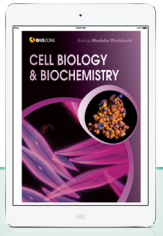
Cell Biology & Biochemistry

Second Edition

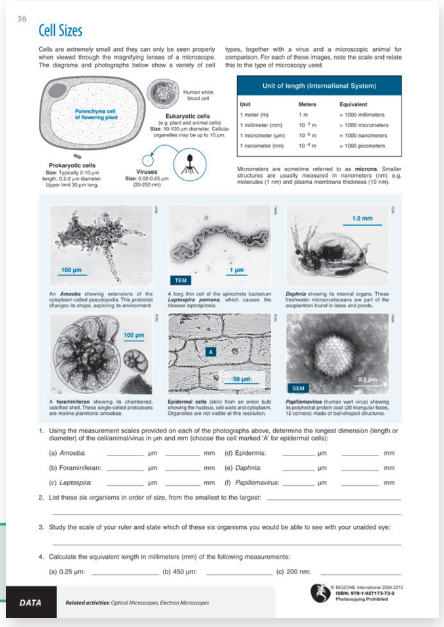
Cell Biology & Biochemistry covers the structure, function, and study of cells and their components and is an ideal support volume for a wide range of courses in life sciences. Challenging concepts are presented clearly and in a way that is accessible even to those with a limited background in chemistry.



ISBN	978-1-927173-73-2
FORMAT	A4 paperback (2 color)
PAGES	116
RRP (1-19 COPIES)	$14.95
DISCOUNT PRICE (20+ COPIES)	**$9.95**



Coming Soon as an eBOOK
see page 4


36

Cell Sizes

Cells are extremely small and they can only be seen properly when viewed through the magnifying lenses of a microscope. The diagrams and photographs below show a variety of cell types, together with a virus and a microscopic animal for comparison. For each of these images, note the scale and relate this to the type of microscopy used.

Unit of length (International System)

Unit	Meters	Equivalent
1 meter (m)	1 m	= 1000 millimeters
1 millimeter (mm)	10^{-3} m	= 1000 micrometers
1 micrometer (µm)	10^{-6} m	= 1000 nanometers
1 nanometer (nm)	10^{-9} m	= 1000 picometers

Micrometers are sometime referred to as **microns**. Smaller structures are usually measured in nanometers (nm) e.g. molecules (1 nm) and plasma membrane thickness (10 nm).

Parenchyma cell of flowering plant
Human white blood cell
Eukaryotic cells
Prokaryotic cells
Viruses

100 µm
TEM
1 µm
1.0 mm
100 µm
A
30 µm
SEM
0.5 µm

An *Amoeba* showing extensions of the cytoplasm called pseudopodia. This protoctist changes its shape, exploring its environment.
A long, thin cell of the spirochete bacterium *Leptospira parnuna*, which causes the disease leptospirosis.
Daphnia showing its internal organs. These freshwater crustaceans are part of the zooplankton found in lakes and ponds.
A *foraminiferan* showing its chambered, calcified shell. These single-celled protozoans are marine planktonic amoebae.
Epidermal cells (skin) from an onion bulb showing the nucleus, cell walls and cytoplasm. Organelles are not visible at this resolution.
Papillomavirus (human wart virus) showing its polyhedral protein coat (20 triangular faces, 12 corners), made of ball-shaped structures.

1. Using the measurement scales provided on each of the photographs above, determine the longest dimension (length or diameter) of the cell/animal/virus in µm and mm (choose the cell marked 'A' for epidermal cells):
   (a) *Amoeba*: _____ µm _____ mm (d) Epidermis: _____ µm _____ mm
   (b) Foraminiferan: _____ µm _____ mm (e) *Daphnia*: _____ µm _____ mm
   (c) *Leptospira*: _____ µm _____ mm (f) *Papillomavirus*: _____ µm _____ mm
2. List these six organisms in order of size, from the smallest to the largest: _____
3. Study the scale of your ruler and state which of these six organisms you would be able to see with your unaided eye: _____
4. Calculate the equivalent length in millimeters (mm) of the following measurements:
   (a) 0.25 µm: _____ (b) 450 µm: _____ (c) 200 nm: _____

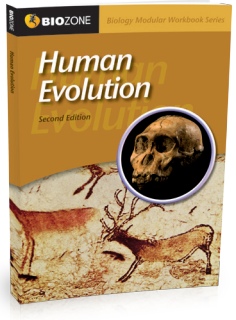
DATA

Related activities: Optical Microscopes, Electron Microscopes

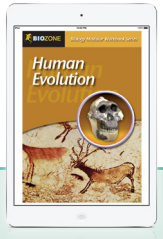
Human Evolution

Second Edition

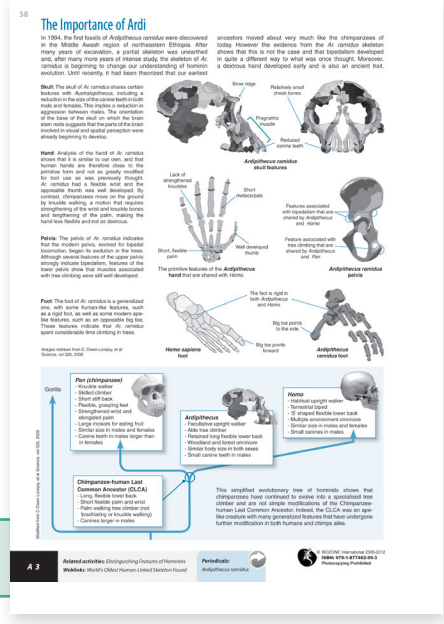
A comprehensive treatment of one of biology's most controversial and rapidly changing topics. With an engaging treatment of primate biology and comprehensive, up-to-date coverage of both human physical and cultural evolution, Human Evolution is the perfect supplement for both biology and anthropology students.



ISBN	978-1-877462-99-3
FORMAT	A4 paperback (2 color)
PAGES	92
RRP (1-19 COPIES)	$14.95
DISCOUNT PRICE (20+ COPIES)	**$9.95**



Coming Soon as an eBOOK
see page 4


58

The Importance of Ardi

In 1994, the first fossils of *Ardipithecus ramidus* were discovered in the Middle Awash region of northeastern Ethiopia. After many years of excavation, a partial skeleton was unearthed and, after many more years of intense study, the skeleton of *Ar. ramidus* is beginning to change our understanding of hominin evolution. Until recently, it had been theorized that our earliest ancestors moved about very much like the chimpanzees of today. However the evidence from the *Ar. ramidus* skeleton shows that this is not the case and that bipedalism developed in quite a different way to what was once thought. Moreover, a dextrous hand developed early and is also an ancient trait.

Skull: The skull of *Ar. ramidus* shares certain features with *Australopithecus*, including a reduction in the size of the canine teeth in both sexes, which is linked to a reduction in male aggression between males. The orientation of the base of the skull on which the brain stem rests suggests that the parts of the brain involved in visual and spatial perception were already beginning to develop.

Brow ridge
Relatively small cheek bones
Prognathic muzzle
Reduced canine teeth
Ardipithecus ramidus skull features

Hand: Analysis of the hand of *Ar. ramidus* shows that it is similar to our own, and that human hands are therefore close to the primitive form and not as greatly modified for tool use as was previously thought. *Ar. ramidus* had a flexible wrist and the ability to grasp with a power grip and, in contrast, chimpanzees move on the ground by knuckle walking, a motion that requires strengthening of the wrist and knuckle bones and lengthening of the palm, making the hand less flexible and not as dextrous.

Lack of strengthened knuckles
Short metacarpals
Short, flexible palm
Well developed thumb
The primitive features of the *Ardipithecus* **hand** that are shared with *Homo*

Pelvis: The pelvis of *Ar. ramidus* indicates that the modern pelvis, evolved for bipedal locomotion, began its evolution in the trees. Although several features of the upper pelvis strongly indicate bipedalism, features of the lower pelvis show that muscles associated with tree climbing were still well developed.

Features associated with bipedalism that are shared by *Ardipithecus* and *Homo*
Feature associated with tree climbing that are shared by *Ardipithecus* and *Pan*
Ardipithecus ramidus pelvis

Foot: The foot of *Ar. ramidus* is a generalized one, with some human-like features, such as a rigid foot, as well as some modern ape-like features, such as an opposable big toe. These features indicate that *Ar. ramidus* spent considerable time climbing in trees.

The foot is rigid in both *Ardipithecus* and *Homo*
Big toe points to the side
Big toe points forward
Homo sapiens foot
Ardipithecus ramidus foot

Images redrawn from C. Owen Lovejoy, et al. Science, vol 326, 2009

Gorilla
***Pan* (chimpanzee)**
- Knuckle walker
- Skilled climber
- Short stiff back
- Flexible, grasping feet
- Strengthened wrist and elongated palm
- Large incisors for eating fruit
- Similar size in males and females
- Canine teeth in males larger than in females

Ardipithecus
- Facultative upright walker
- Able tree climber
- Retained long flexible lower back
- Woodland and forest omnivore
- Similar body size in both sexes
- Small canine teeth in males

Homo
- Habitual upright walker
- Relaxed hand
- 'S' shaped flexible lower back
- Multiple environment omnivore
- Similar size in males and females
- Small canines in males

Chimpanzee-human Last Common Ancestor (CLCA)
- Long, flexible lower back
- Short flexible palm and wrist
- Palm walking tree climber (not brachiating or knuckle walking)
- Canines larger in males

This simplified evolutionary tree of hominids shows that chimpanzees have continued to evolve into a specialised tree climber and are not simple modifications of the Chimpanzee-human Last Common Ancestor. Indeed, the CLCA was an ape-like creature with many generalized features that have undergone further modification in both humans and chimps alike.

Modified from C Owen Lovejoy, et al. Science, vol 326, 2009

A 3

Related activities: Distinguishing Features of Hominins
Weblinks: *Mindful Oldest Human-Linked Skeleton Found*
Periodicals: *Ardipithecus ramidus*

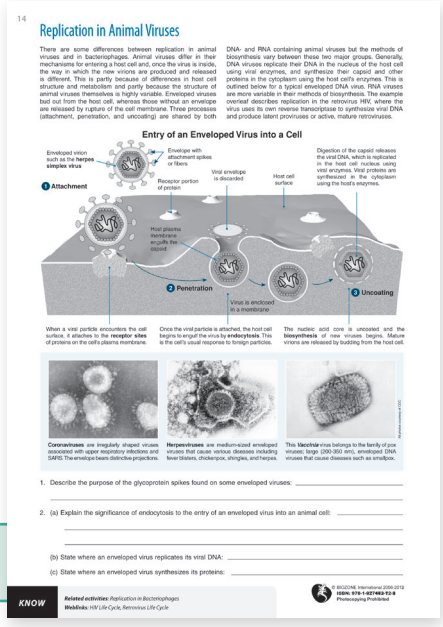
Microbiology & Biotechnology

Third Edition

This compact but thorough supplement provides objectives and activities through which students can explore aspects of microbial diversity and modern biotechnology, including genetic engineering, cloning, and genome research.

ISBN	978-1-927173-72-5
FORMAT	A4 paperback (2 color)
PAGES	124
RRP (1-19 COPIES)	$14.95
DISCOUNT PRICE (20+ COPIES)	**$9.95**

Coming Soon as an eBOOK
see page 4


14

Replication in Animal Viruses

There are some differences between replication in animal viruses and in bacteriophages. Animal viruses differ in their mechanisms for entering a host cell and, once the virus is inside, the way in which the new virions are produced and released is different. This is partly because of differences in host cell structure and metabolism and partly because the structure of animal viruses themselves is highly variable. Enveloped viruses bud out from the host cell, whereas those without an envelope are released by rupture of the cell membrane. Three processes (attachment, penetration, and uncoating) are shared by both DNA- and RNA containing animal viruses but the methods of biosynthesis vary between these two major groups. Generally, DNA viruses replicate their DNA in the nucleus of the host cell using viral enzymes, and synthesize their capsid and other proteins in the cytoplasm using the host cell's enzymes. This is outlined below for a typical enveloped DNA virus. RNA viruses are more variable in their methods of biosynthesis. The example overleaf describes replication in the retrovirus HIV, where the virus uses its own reverse transcriptase to synthesize viral DNA and produce latent provirusses or active, mature retroviruses.

Entry of an Enveloped Virus into a Cell

Enveloped virion such as the herpes simplex virus
Envelope with attachment spikes or fibers
Viral envelope is discarded
Host cell surface
Digestion of the capsid releases the viral DNA, which is replicated in the host cell nucleus using viral enzymes. Viral proteins are synthesized in the cytoplasm using the host's enzymes.
1 Attachment
Receptor portion of protein
Host plasma membrane engulfs the capsid
2 Penetration
3 Uncoating
Virus is enclosed in a membrane

When a viral particle encounters the cell surface, it attaches to the **receptor sites** of proteins on the cell's plasma membrane.
Once the viral particle is attached, the host cell begins to engulf the virus by **endocytosis**. This is the cell's usual response to foreign particles.
The nucleic acid core is uncoated and the **biosynthesis** of new viruses begins. Mature virions are released by budding from the host cell.

Coronaviruses are irregularly shaped viruses associated with upper respiratory infections and SARS. The envelope bears distinctive projections.
Herpesviruses are medium-sized enveloped viruses that cause various diseases including fever blisters, chickenpox, shingles, and herpes.
This **Vaccinia** virus belongs to the family of pox viruses; large (200-350 nm), enveloped DNA viruses that cause diseases such as smallpox.

1. Describe the purpose of the glycoprotein spikes found on some enveloped viruses:
2. (a) Explain the significance of endocytosis to the entry of an enveloped virus into an animal cell:
(b) State where an enveloped virus replicates its viral DNA:
(c) State where an enveloped virus synthesizes its proteins:

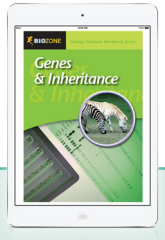
KNOW
Related activities: Replication in Bacteriophages
Weblinks: HIV Life Cycle, Retrovirus Life Cycle
© BIOZONE International 2006-2013
ISBN: 978-1-927173-72-5
Photocopying Prohibited

Genes & Inheritance

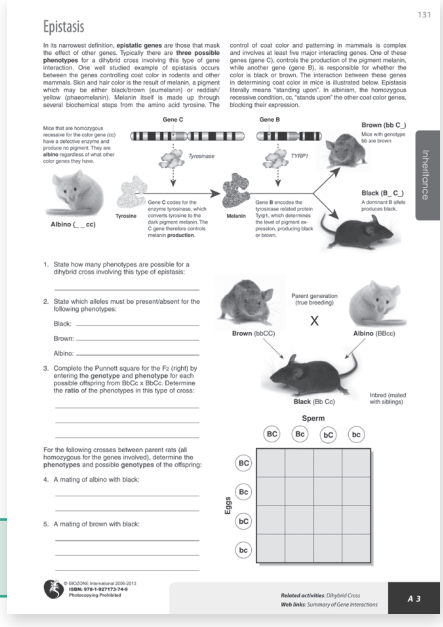
ONLY AVAILABLE AS EBOOK

A seamless integration of fundamental concepts and new information, Genes & Inheritance offers students ample opportunity to both consolidate and extend their knowledge in the rapidly developing areas of molecular genetics and heredity.

ISBN	978-1-988566-07-8
FORMAT	eBOOK (B&W)
PAGES	132



Coming Soon as an eBOOK
see page 4


131

Epistasis

In its narrowest definition, **epistatic genes** are those that mask the effect of other genes. Typically there are **three possible phenotypes** for a dihybrid cross involving this type of gene interaction. One well studied example of epistasis occurs between the genes controlling coat color in rodents and other mammals. Skin and hair color is the result of melanin, a pigment which may be either black/brown (eumelanin) or reddish/yellow (phaeomelanin). Melanin itself is made up through several biochemical steps from the amino acid tyrosine. The control of coat color and patterning in mammals is complex and involves at least five major interacting genes. One of these genes (gene C), controls the production of the pigment melanin, while another gene (gene B), is responsible for whether the color is black or brown. The interaction between these genes in determining coat color in mice is illustrated below. Epistasis literally means "standing upon". In albinism, the homozygous recessive condition, cc, "stands upon" the other coat color genes, blocking their expression.

Gene C
Gene B
Mice that are homozygous recessive for the color gene (cc) have a defective enzyme and produce no pigment. They are **albino** regardless of what other color genes they have.
Tyrosinase
TYRP1
Brown (bb C_)
Mice with genotype bb are brown
Albino (_ _ cc)
Tyrosine
Gene C codes for the enzyme tyrosinase, which converts tyrosine to the dark pigment melanin. The C gene therefore controls melanin **production**.
Melanin
Gene B encodes the tyrosinase related protein Tyrp1, which determines the level of pigment expression, producing black or brown.
Black (B_ C_)
A dominant B allele produces black.

1. State how many phenotypes are possible for a dihybrid cross involving this type of epistasis:
2. State which alleles must be present/absent for the following phenotypes:
Black:
Brown:
Albino:
3. Complete the Punnett square for the F2 (right) by entering the **genotype** and **phenotype** for each possible offspring from BbCc x BbCc. Determine the **ratio** of the phenotypes in this type of cross:
For the following crosses between parent rats (all homozygous for the genes involved), determine the **phenotypes** and possible **genotypes** of the offspring:
4. A mating of albino with black:
5. A mating of brown with black:

Parent generation (true breeding)
X
Brown (bbCC)
Albino (BBcc)
Black (Bb Cc)
Inbred (mated with siblings)
Sperm
BC Bc bC bc
Eggs
BC Bc bC bc

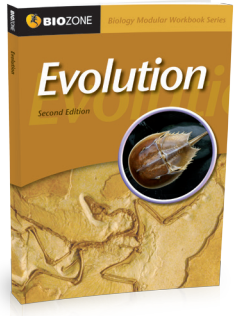
© BIOZONE International 2006-2013
ISBN: 978-1-927173-74-9
Photocopying Prohibited
Related activities: Dihybrid Cross
Web links: Summary of Gene Interactions
A 3

Inheritance

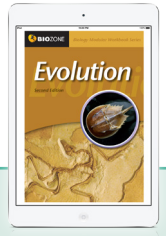
Evolution

Second Edition

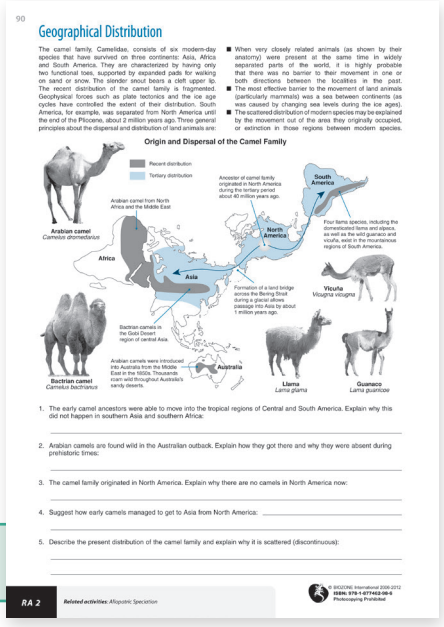
A fresh approach to teaching evolutionary principles at this level. Students are invited to explore and critically evaluate the wealth of evidence for our current understanding of evolution through a variety of engaging and thought-provoking activities.



ISBN	978-1-877462-98-6
FORMAT	A4 paperback (2 color)
PAGES	124
RRP (1-19 COPIES)	$14.95
DISCOUNT PRICE (20+ COPIES)	**$9.95**



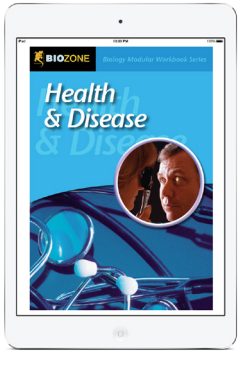
Coming Soon as an eBOOK
see page 4



Health & Disease

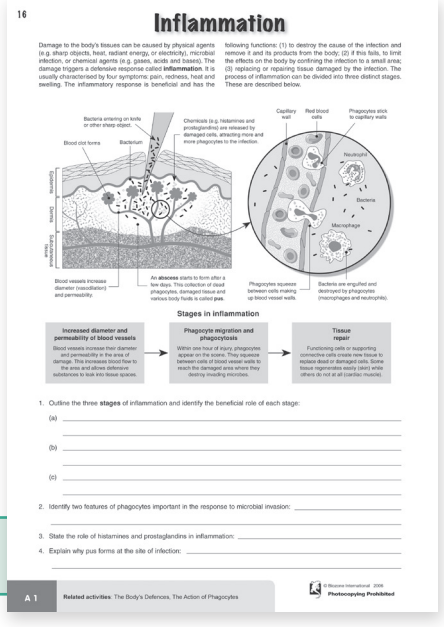
ONLY AVAILABLE AS EBOOK

The ideal companion for students of the life sciences. Health & Disease provides comprehensive coverage of human health, human disease, and the role of modern medicine in treating and preventing health disorders.



ISBN	978-1-988566-06-1
FORMAT	eBOOK (B&W)
PAGES	124

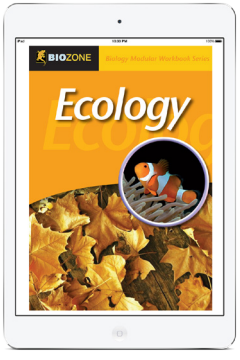
Coming Soon as an eBOOK
see page 4



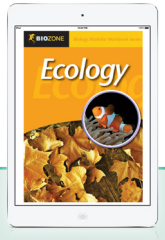
Ecology

ONLY AVAILABLE AS EBOOK

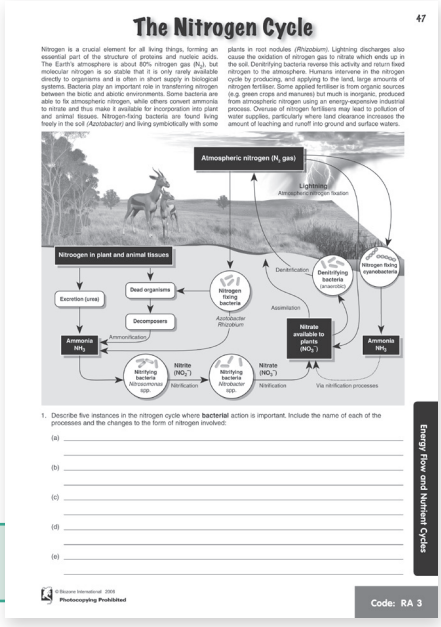
Explore fundamental concepts in ecology, from the nature of ecosystems and the basics of ecosystem structure and function, to the complex relationships within and between species and between humans and their environment.



ISBN	978-1-988566-13-9
FORMAT	eBOOK (B&W)
PAGES	124



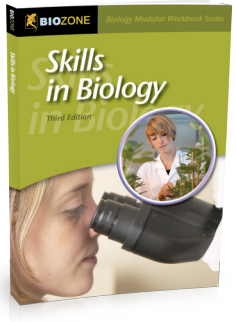
Coming Soon as an eBOOK
see page 4



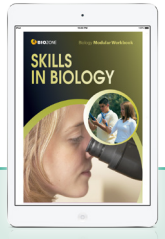
Skills in Biology

Third Edition

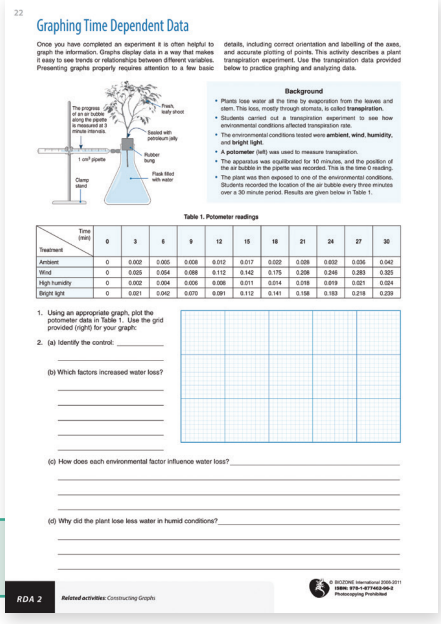
An essential supplement for all biology students, Skills in Biology provides clear guidelines for planning and executing biological investigations in both the laboratory and the field. Comprehensive coverage of data handling and analysis is also provided.

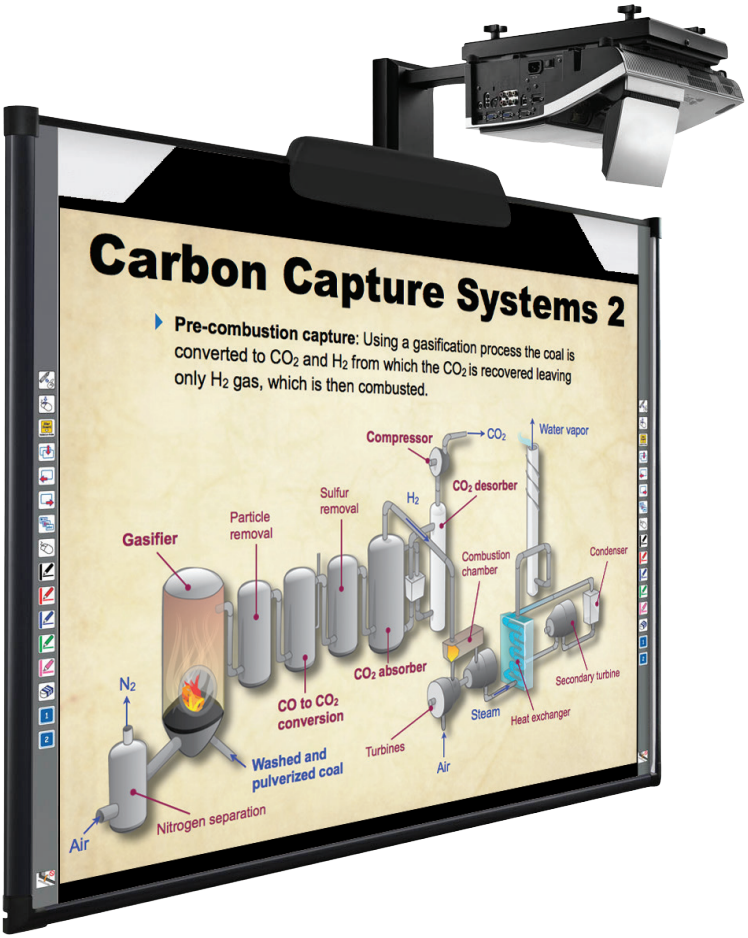


ISBN	978-1-877462-96-2
FORMAT	A4 paperback (2 color)
PAGES	156
RRP (1-19 COPIES)	$14.95
DISCOUNT PRICE (20+ COPIES)	**$9.95**



Coming Soon as an eBOOK
see page 4





Presentation MEDIA

The perfect start to creating your own classroom presentations, in half the time!

Enhance your lessons with BIOZONE's comprehensive ready-made collection of **Presentation Media**. Can be used on **Interactive Whiteboards**, or with **Digital Projectors**. Provided as fully editable **PowerPoint** and **Keynote** files on disc or as a download.

- Fully editable slides
- Generous site license

Full conditions can be viewed at:
www.theBIOZONE.com/faqconditionsofuse/

For the FULL range of **PRESENTATION MEDIA** visit:

www.theBIOZONE.com/PM

Bag a Bundle

A cost effective way to purchase BIOZONE's Presentation Media titles comprising thousands of slides of information:

	Price	Number of Slides	Genes & Inheritance	Evolution	Human Evolution	Ecology	Cell Biology & Biochemistry	Health & Disease	Environmental Science	Anatomy & Physiology
Genetics and Evolution Bundle	US$399.95	1060	●	●	●					
Super Bundle	US$999.95	2400	●	●	●	●	●	●		
The Complete Collection Bundle	US$1599.95	4200	●	●	●	●	●	●	●	●

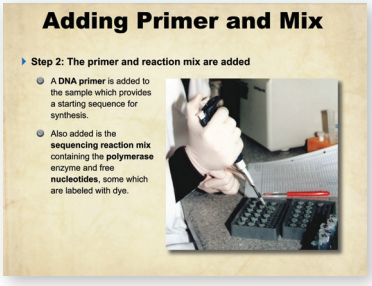
Buy a bundle and get a bonus set absolutely free!

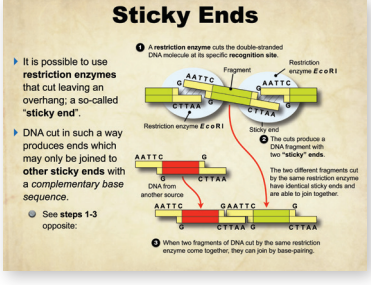
Gene Technology

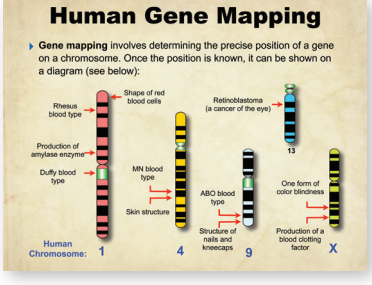
(valued at $82.50)

144 SLIDES (to appear on a future series: Microbiology & Biotechnology)

- Restriction enzymes and ligation
- PCR
- Electrophoresis
- DNA profiling, chips and sequencing
- Gene cloning and artificial genes
- Gene therapy
- Transgenesis
- Genetically modified organisms
- Ethics of gene technology
- Cloning by embryo splitting and SCNT
- Organ transplants
- Genome research and analysis
- Genome projects including the Human Genome Project
- Bar code of life







Bill & Scott SCHULTZ - CA & NV
billschultzedu@gmail.com
949 295 0731
scottschultzedu@gmail.com
949 295 0319

Dan TAYLOR - WA, OR, ID, UT, AK
dan@tayloreducationalmedia.com
360 - 608 - 2069

Maureen RICH - MD, DC, DE & VA
maureenrich15@gmail.com
410-207-9295

Amy GUERRA - FL
aguerra@bairdguerra.com
305-266-9496

Charlie EISENBERGER - NJ
chaseisen@aol.com
732-257-4115

Bill ROSS - CT, ME, MA, NH, RI & VT
bross@needres.com
860 - 653 - 7366
860 - 999 - 3743

Kathie CROWLEY-CARUCCI - NY
cat9632@aol.com
631 - 946 - 1586

Nadège STOFFEL & Gwen GILBERT
All other States & Canada
sales@thebiozone.com
1-855-935-3555

CAT19-US

BIOZONE Corporation

CONTACT US:

Email: sales@thebiozone.com

USA & CANADA:

Free Phone: 855-246-4555
Free Fax: 855-935-3555

ADDRESS:
18801 E. Mainstreet
Suite 240
Parker
Colorado, 80134-3445

theBIOZONE.com