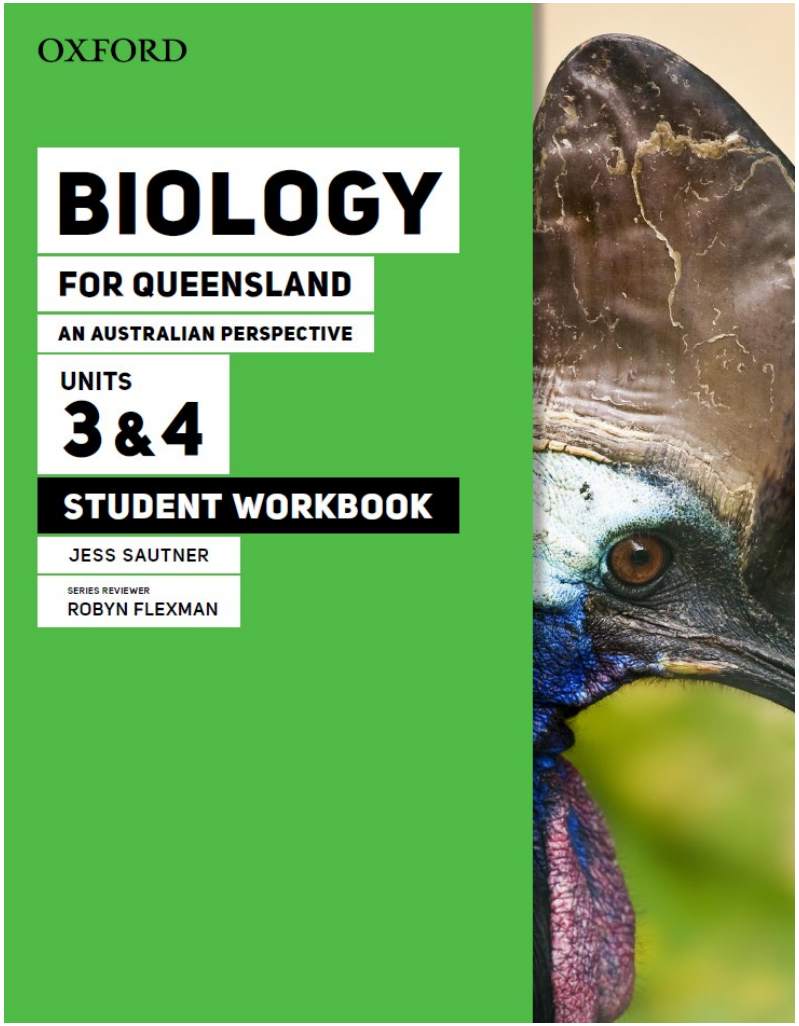

QCE Biology workshop series

Are you ready for the new QCAA assessments?

May 2019

OXFORD PROFESSIONAL DEVELOPMENT

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OXFORD UNIVERSITY PRESS AUSTRALIA & NEW ZEALAND

Welcome to today's workshop

PART A Brief overview of Biology General Senior Syllabus Units 3 & 4

PART B An introduction to Oxford's *Biology for Queensland An Australian Perspective* series

PART C Overview of internal assessment and how Oxford is supporting you

PART D Questions and comments

Meet our authors

Lorraine Huxley

- Experienced Head of Biology and involved in QCAA district and state review panels

Margaret Walter

- Experienced Head of Science and involved in QCAA district and state review panels as well as the 2004 QSA syllabus sub-committee

Series consultant: Robyn Flexman

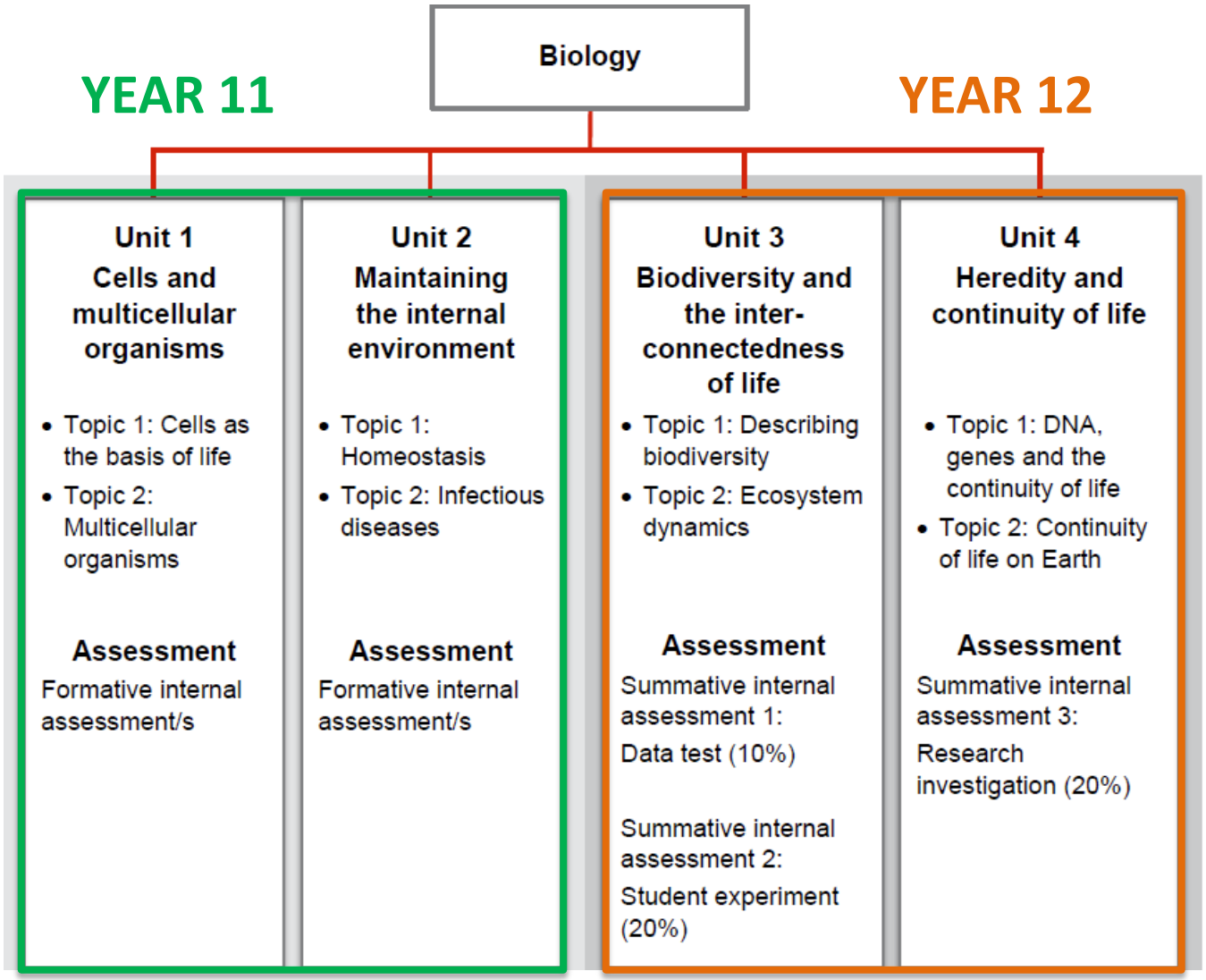
- Experienced Biology teacher and Head of Science at Alexandra Hills State High School
- Involved in the QCAA review panel the endorsement process for the new SATE system.
- Recipient of Peter Doherty Award for Outstanding Science Teacher
- Worked as a project officer for the Queensland Minerals and Energy Academy (QMEA) and presented at international conferences and CONASTA

PART A

Key dates for Biology for Queensland

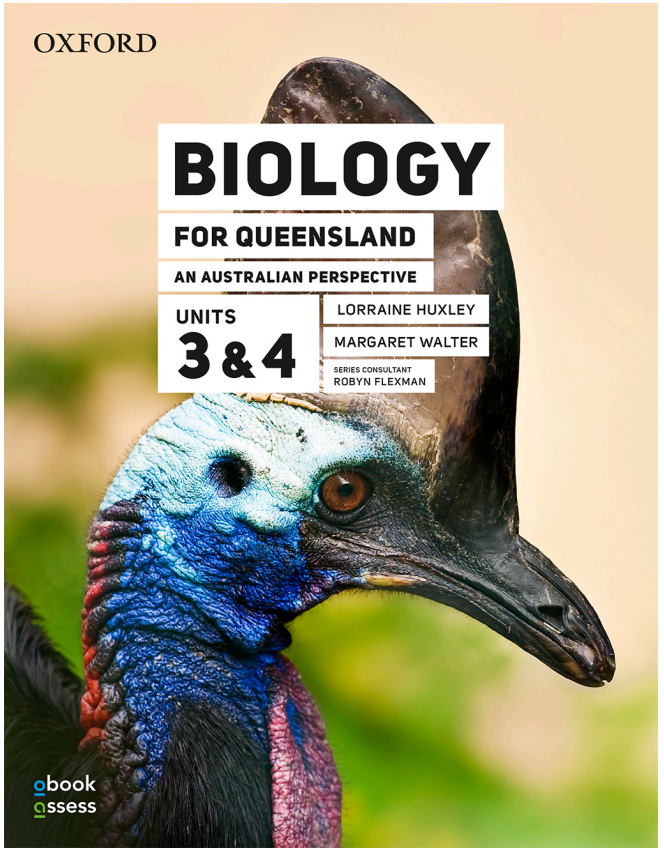
Units 1 & 2 – 2019	Units 3 & 4 – 2020
TERM 1	T1 W2 Endorsement IA3
Units 1 & 2 FIA1 Data test	Units 3 & 4 IA1 Data test
TERM 2	T2 W1 Confirmation IA1
Units 1 & 2 SUBMIT FIA2 SE	Units 3 & 4 SUBMIT IA2 SE
TERM 3	
T3 W6 Endorsement FIA1, FIA2	
Mock assessments available	SUBMIT IA3 RI T3 W8 Confirmation IA2, IA3
TERM 4	
Units 1 & 2 SUBMIT FIA3 RI	T4 W4-7 External assessment
	T4 W4-7 External assessment
	T4 W4-7 External assessment
Units 1 & 2 Exam	

Course structure



PART B

An introduction to Oxford's new series *Biology for Queensland Units 3 & 4 (3rd edition)*



Our goal for this series is to:

- **support** teachers and students through a massive period of change
- **provide** a set of resources that give students of all abilities the chance to experience real success in science
- offer the **best content** and the most valuable and **practical support materials for assessment**.

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Pain points in the Biology syllabus

Unit 3 Biodiversity and the interconnectedness of life	Unit 4 Heredity and the continuity of life
Topic 1: Describing biodiversity	**Topic 1: DNA, genes and the continuity of life**

• calculations of diversity
  - species richness
  - Simpson's diversity index
• interpreting cladograms
• cladistics
	• biotechnology – use of restriction enzymes, PCR or CRISPR based technologies, gel electrophoresis

Topic 2: Ecosystem dynamics	**Topic 2: Continuity of life on Earth**
• energy transfer calculations • carrying capacity • Lincoln index calculations • population growth models (J and S curves) • *r* and *K* species	• using data to interpret phylogenetic relationships • using data to interpret and describe phenotypic selection • gene flow, genetic drift and the selective pressures in the gene pool

Top 5 things to know about Oxford's new Biology for Queensland series

OXFORD PROFESSIONAL DEVELOPMENT

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1

We offer complete syllabus coverage

- All subject matter in the syllabus has been included and ordered **sequentially** to help scaffold learning.
- Every chapter opener clearly indicates which syllabus points are covered.
- If it's covered in the syllabus, it's covered in our book!

OXFORD UNIVERSITY PRESS
AUSTRALIA & NEW ZEALAND

Top 5 things to know about Oxford's new Biology for Queensland series

2

We offer extensive support for the assessments

- Toolkits in both the student book and student workbook provide guidance for all assessments.
- Complete syllabus coverage allows teachers and students to be prepared for the external exam.
- **Student workbooks** provide students with engaging write-in activities that support the skills required for the internal and external assessments.
- Practice Data tests, cumulative tests and exams are provided in your obook assess.
- SHE spreads in the student book provide context for starting the Research investigation.

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Top 5 things to know about Oxford's new Biology for Queensland series

3

Our resources are easier to use and more accessible than ever before

To make our resources simple and easy to use, we have:

- a **section-based approach** to ensure our Student books are easier to navigate
- used clear, concise, instructional language throughout
- reduced the amount of text on each page and added more **graphic organisers** (i.e. tables, dot points, flowcharts) and **images** to convey meaning
- built in opportunities for teachers to support and challenge students of all abilities
- added a bright, attractive and functional design.

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Top 5 things to know about Oxford's new Biology for Queensland series

OXFORD PROFESSIONAL DEVELOPMENT

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4

We offer full coverage of all syllabus practicals

- Videos for challenging practicals
- Editable worksheets for all practicals in the obook assess alongside mock data and answers
- Full risk assessment and lab tech notes for all practicals – authored by a fully-qualified lab technician
- Mandatory practicals in the Student book
- All practicals are included in the Student Workbooks as worksheets

OXFORD UNIVERSITY PRESS AUSTRALIA & NEW ZEALAND

Top 5 things to know about Oxford's new Biology for Queensland series

5

We offer full support for teachers to encourage student success

- Teachers are provided with a range of **additional support materials** to help them successfully implement the new syllabus (i.e. **teaching notes**, **lesson plans**, **assessment tasks** and **answers** to all questions).
- Videos of key practicals and challenging concepts
- Spread-based learning
- obook content is assignable at the discretion of teachers

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Biology Toolkit

The Biology Toolkit is a **stand-alone reference chapter** that appears at the front of each Student book. It includes:

- an overview of the course for students
- advice and step-by-step instructions on how to master relevant skills
- information about relevant assessment tasks
- study tips.

A quick tour of our new Student books

Join us on a quick walkthrough of *Biology for Queensland An Australian Perspective Units 3 & 4*

A sample/page proof is available!

Key features

- Key ideas
- Case studies
- Worked examples
- Study tips
- Margin glossary
- Check your learning
- Science as a human endeavour
- Chapter review
- Revision questions
- Unit practice exam questions
- **Biology toolkit** (skills chapter)
- **Practical manual** (covers all mandatory and suggested practicals)

If two roan-coloured cattle are crossed ($C^R C^W \times C^R C^W$):

	C^R	C^W
C^R	$C^R C^R$ Red hair colour	$C^R C^W$ Roan hair colour
C^W	$C^R C^W$ Roan hair colour	$C^W C^W$ White hair colour

the offspring will have the hair colours:
¼ red ($C^R C^R$) : ½ roan ($C^R C^W$) : ¼ white ($C^W C^W$)
Therefore the ratio is 1 red : 2 roan : 1 white

Intermediate dominance

Sometimes heterozygous alleles result in a phenotype in-between the two traits. Some flowers, such as the snapdragon, have an allele for red flowers (R_1) and an allele for white flowers (R_2). In the heterozygous condition ($R_1 R_2$), the flowers are pink: that is, they are intermediate between red and white.

If two pink-flowered plants are crossed ($R_1 R_2 \times R_1 R_2$):

	R_1	R_2
R_1	$R_1 R_1$ red	$R_1 R_2$ pink
R_2	$R_1 R_2$ pink	$R_2 R_2$ white

the offspring will be:
¼ red ($R_1 R_1$) : ½ pink ($R_1 R_2$) : ¼ white ($R_2 R_2$)
Therefore the ratio is 1 red : 2 pink : 1 white

intermediate dominance (partial dominance or incomplete dominance) a pattern of inheritance in which neither allele for a characteristic completely masks the effects of the other; results in a blending of traits for the characteristic

Although neither trait is dominant over the other, one of the alleles has a stronger influence than the other. The phenotype is an intermediate between that of complete dominance and codominance. This situation is termed **intermediate dominance**. Other terms used to describe this type of inheritance are **partial dominance** or **incomplete dominance**. There are many blends of intermediate dominance, and thus a wide range of intermediate varieties between two extremes.

If a flower has two alleles for colour but three phenotypes, codominance or intermediate dominance may be involved.

FIGURE 2 Intermediate dominance between red and white flowers: (a) red snapdragon, (b) pink Snapdragon (c) white snapdragon.

Glossary definitions in the margin – Placed to reinforce concepts at the point of learning.

Multiple alleles

Many characteristics are governed by more than two alleles, in which case inheritance is said to be controlled by **multiple or poly alleles**. Although more than two alleles may control the characteristic, there are only ever two present in an individual, one allele on each of the pair of homologous chromosomes.

multiple or poly alleles the inheritance of

Human ABO blood groups, for ex
i. Alleles I^A and I^B are both dominant
the code for an enzyme that produces
cells (blood type A). The allele I^B cod
type B). In contrast, allele i does not p
heterozygous individual $I^A I^B$ will proc
their red blood cell (blood type AB).
either enzymes (or sugars) and will th

There are four possible phenotypi

TABLE 1 The different phenotypes of human

Phenotype	Genotype
A	$I^A I^A$ or $I^A i$
B	$I^B I^B$ or $I^B i$
AB	$I^A I^B$
O	ii

NEW! Worked examples Step-by-step working for students to follow and understand key formulas, calculations and application of ideas.

The membrane sugars A and B can act as antigens if the blood is transfused into another person with a different blood type. This means red blood cells with an A sugar will activate an immune response in a person with type B blood type. The person who receives the type A blood (the recipient) will produce protein antibodies against the (donor) A sugar, causing the donated

WORKED EXAMPLE 11.2A

A woman who is heterozygous for blood type A had a child with a heterozygous male with blood type B. Determine if it is possible for the child to have a blood type that is different to either their mother or their father.

SOLUTION

1 Identify the genotypes for the parents. The genotype of the heterozygous mother must be $I^A i$ and the genotype of the heterozygous father must be $I^B i$.

2 Construct a Punnett square to indicate the possible genotypes of the offspring.

	I^A	i
I^B	$I^A I^B$	$I^B i$
i	$I^A i$	i i

3 This means there is an equal chance that the phenotypes of the offspring would be A, B, (same as parents) or AB or O (different to parents).

Study tip

Codominant and incomplete dominant traits are always given a capital letter to represent the gene, and a superscript to indicate the allele. The I represents the gene for blood grouping and the superscript A (I^A) represents the allele that produces the enzyme for sugar A.

SCIENCE AS A HUMAN ENDEAVOUR

4.4 Keystone species

KEY IDEAS
- Keystone species
- Umbrella species
- Flagship species

keystone species a species that has a

In some ecosystems, a particular species may be responsible f
of organisms. If this species is lost, it affects a number of othe
the way
cosyste
ystem. This allows them to keep all
n to its biomass or abundance.
ntentionally or unintentionally) from an
hemselves are significant in
f the food chain, but provide myriad
n of their hard, skeletal structures.
at scrape and clean off algal deposits
d, the coral would become overgrown
with algae, affecting many of the other organisms living there. Therefore, both the coral and parrot fish could be considered keystone species for the reef ecosystem.

Some keystone species are mutualists, for example flying foxes, which are migratory, nomadic mammals that are significant in tree pollination and seed dispersal. Many forest plants are dependent on the flying fox for reproduction and spread of the species. With a more abundant supply of these fruiting trees, many other animals benefit. Flying foxes therefore drive biodiversity.

Other keystone species are carnivores. The northern quoll (*Dasyurus hallucatus*) is found across the northern part of Australia. It is an opportunistic feeder, consuming a wide range of organisms – insects, frogs, mam
helps to maintain a balance with
(the poison of which has killed 3
and bushfires.

One group of keystone species
the continuance of a particular ec
tunnelling activities in the soil im

In wildlife management, umb
conservation, protect many other

umbrella species species selected when making decisions about conservation because they are representative of other species, and protecting them indirectly protects other species in the same habitat

Keystone species come in many forms: a) the parrot fish eats algae on coral, b) the flying fox pollinates pollen attaches to its facial fur, c) the carnivorous northern quoll controls populations.

ts resource requirements are similar to a wide range of other species in that habitat.

Conservation groups often use a particularly charismatic animal as a **flagship species** to drive the protection of particular habitats or for a particular environmental cause. The koala (*Phascolarctos cinereus*) and wombat (*Vombatus ursinus*) are such flagship species. Use of these species has the effect of gaining more community interest, enabling the generation of funds that can then be used in habitat conservation.

Flagship species are deliberately selected based on their human appeal. The grey nurse shark is a highly endangered species but it is not used as a flagship species since many people fear sharks.

While a useful tool in wildlife management, there are some dangers in singling out a particular keystone, umbrella or flagship species in any ecosystem. Full knowledge of their significance is not always known. The difficulty in determining a possible keystone species can lead to mistaking the exact influence the species may have. The influence exerted by a species may be seasonal, depending on climatic conditions or migratory behaviour of other species. The distribution and abundance of these species may change with cyclic weather events and migration of other species.

flagship species a species chosen to raise support for biodiversity conservation in a chosen place or context

FIGURE 2 In a campaign to use recycled toilet paper, and so save trees, this appealing wombat was used as a flagship species.

CHECK YOUR LEARNING 4.4

Describe and explain

1 **Identify** an example of a keystone species that is:
   - **a** a mutualist
   - **b** an engineer
   - **c** a carnivore.
2 **Explain** why most keystone carnivores are generalist feeders.

Apply, analyse and interpret

3 **Distinguish** between a keystone and a flagship species.
4 **Consider** difficulties that might arise when attempting to identify a keystone species in a particular ecosystem.

Check your obook assess for these additional resources and more:
- » Student book questions Check your learning 4.4
- » Weblink – Umbrella species
- » Weblink – Flagship species

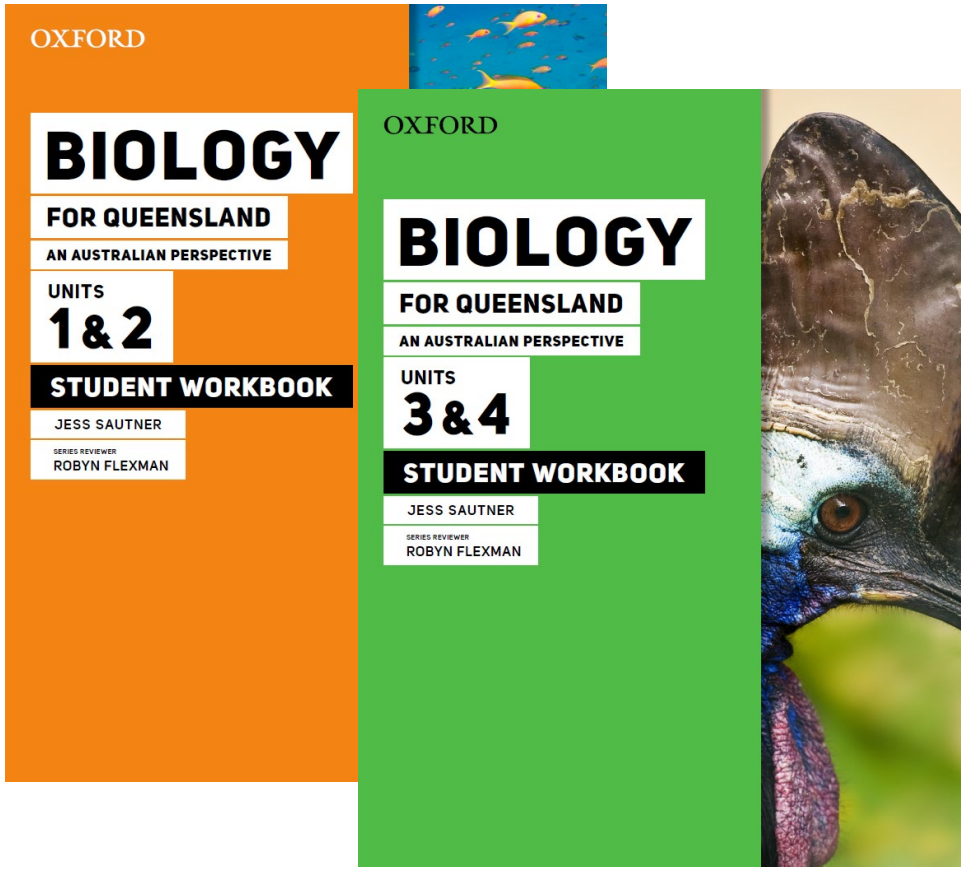
Science as a human endeavour
Engaging subject matter used to support the Research investigation.

Key ideas
Placed at the beginning of each section to signpost key learning outcomes and assist students to set learning goals.

Check your learning
A variety of questions for students using the cognitive verbs.

PART C

A quick tour of our new Student workbooks

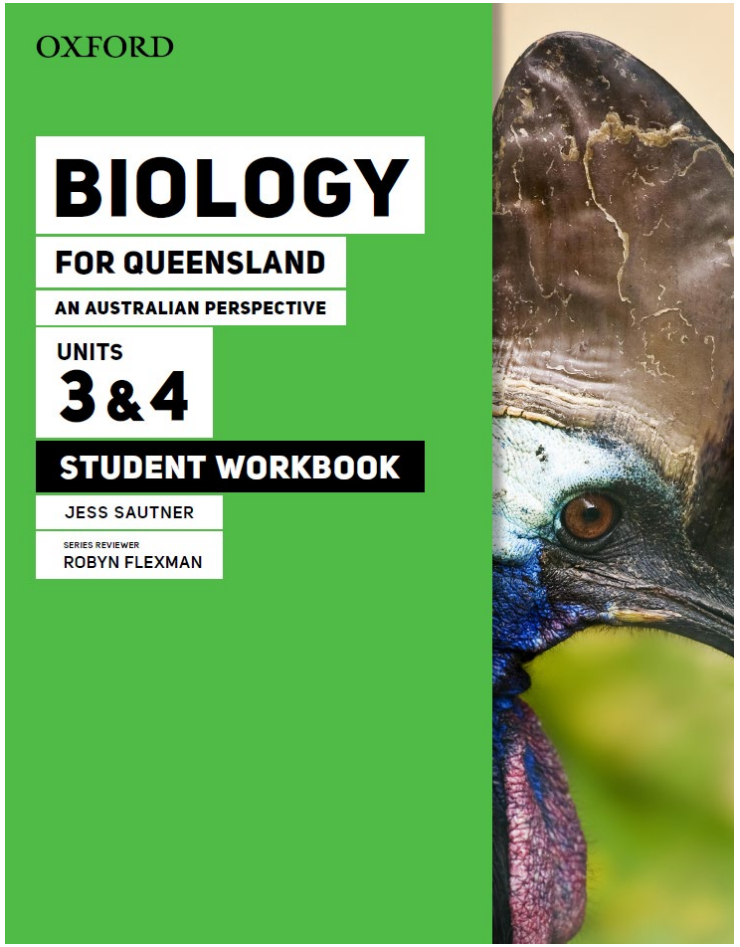


Join us on a quick walkthrough of the Student Workbooks

A sample chapter is available in your workshop pack!

Key features

- Biology toolkit – overview of internal assessments
- Chapter checklists – individual self determination of key subject matter
- Data drill – interpretation and analysis skills for the data test
- Experiment explorer – skills in modifying a practical
- Research review – evaluating a claim and conducting credible research
- Exam excellence – practice exam style questions
- Practice internal assessments
- Practical manual – all mandatory and suggested practicals
- Answers – to all questions and practice assessment



CHAPTER 4

Functioning ecosystems

This chapter begins with a discussion of the transfer and transformation of solar energy into biomass as it flows through the biotic components of an ecosystem. The conversion of solar energy into chemical energy through photosynthesis highlights the role of the producers, the plants, in ecosystems. Food webs are
energy from the producers to the higher order
ole of the decomposers and detritivores.
er method used to represent the number of
mass or energy at each trophic level. They are
ut the health and future of an ecosystem.
e the movement of elements through the
ransformations and transfers they undergo.
d between the environment and organisms.
he element is returned to the environment as
rganisms – it is said to be a perfect cycle. This
arbon and nitrogen cycles in depth.
ecies, umbrella species and flagship species –
ps who aim to protect them – are highlighted as
uit to preserve functioning ecosystems.

Chapter checklists
Individual self determination of key subject matter for each chapter

CHAPTER CHECKLIST

Read this checklist before you complete this chapter's activities and then return to it to check your understanding before your assessments.

Once you have completed this chapter, you can use the 'I can …' statements to assess your understanding and rate yourself by ticking the appropriate box in the 'rating' column.

I can …	Confidently	Partially	Not really
… understand the different sources of energy in ecosystems			
… construct ecological pyramids			
… explain different biogeochemical cycles			
… define a keystone species			

DATA DRILL 4

Constructing ecological pyramids

The Daintree rainforest in far north Queensland is a biodiverse tropical ecosystem. Many species of birds, reptiles, mammals and invertebrates are found nowhere else in the world.

A study was undertaken in a small section of the Daintree rainforest: within a 1 km^2 area, the following organisms were counted.

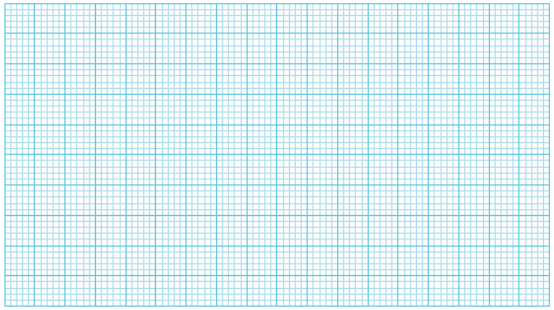
Organism	Number	Average weight of each individual	Biomass
Flowering plants/trees	120	1000 kg	
Butterflies/moths	9000	5 g	
Insectivorous bats	400	25 g	
Snakes	5	1 kg	
Owls	1	1.5 kg	

1 a **Construct** a pyramid of organism numbers in the space below.

b **Calculate** the biomass of organisms in this food chain and add your calculations to the tabl
above. Hint: Convert all units to the same when calculating biomass.

Data drills
Interpretation and analysis of data to practice skills required in the Data test (IA1)

3 Plot the average number of *Daphnia* eaten (vertical axis) against the number of *Daphnia* present at the start of the experiment.



Discussion

Write a discussion of your results including the following points:

- the relationship between the rate of predation and the density of the prey
- the homeostatic control of populations.

Conclusion

Write a brief summary of your findings.

5.1 SUGGESTED PRACTICAL Plant distribution and abundance using quadrants

Conduct an abundance and distribution study, including abiotic and biotic factors.

Source: *Biology 2019 v1.2 General Senior Syllabus* © Queensland Curriculum & Assessment Authority

Aims

1 To estimate the percentage coverage of grass in a lawn or on an oval, football field, etc. – Part A
2 To estimate the distribution and abundance of the weeds growing in the study area – Part B
Five areas are to be selected at random. Devise a way to achieve this and include it in your results.

Method

A Estimation of how much of the oval is covered by

1 Set up the quadrat randomly on the oval.
2 Make an estimation of percentage grass cover of the area v
distinguish between the different types of grass; however, r
that you think are present.
3 Repeat this procedure four more times and record your fi
4 Estimate the area of the study, e.g. the size of the oval.

Results

1 Average your five results.
2 Record the averaged results from the other groups in your cl
then record them in Table 1. This gives the class average perc

Group averages:

TABLE 1 Oval's percentage coverage of grass

Quadrat number	Percentage grass cover (%)	Estimated number of grass types
1		
2		
3		
4		
5		
Average (per m²)		
Class average (per m²)		

All practicals
Offers students write-in worksheets for all mandatory and suggested practicals from the syllabus

Unit 3 Research investigation

Note: The Research Investigation Internal Assessment (IA3) is completed in Unit 4 and covers content from Unit 4. There is no assessable Research investigation during Unit 3. This Research investigation has been included to practice skills required for the Unit 4 assessment.

CASE STUDY

Climate change: natural or not?

Evidence of climate change has been confirmed all over the world. Earth's average surface temperature has risen by 0.9°C since the late 1800s, with records for highest temperatures being broken every year. Oceans absorb much of this extra heat, leading to an increase in the water temperature by 0.2°C. Ice sheets in Greenland and Antarctica have decreased in mass by 400 billion tonnes since 1993. This, combined with the increased water temperature, has seen sea levels rise by 20 cm in the last century. The acidity of the ocean's surface has increased by about 30%, leading to coral bleaching. Climate change has been linked to an increase in levels of carbon dioxide, methane and other heat-trapping greenhouse gases.

Nations around the world are responding to climate change through two processes: mitigation and adaptation.

Mitigation involves reducing those factors that have been shown to cause climate change. It is an attempt to slow down and even halt the rapid rise of temperatures that we are seeing. Some forms of mitigation include planting trees to absorb carbon in the atmosphere, reducing the release of greenhouse gases, and switching to renewable energy wherever possible.

Adaptation relies on preparing civilisation to adjust to the future climate; this can be done by changing the agricultural and industrial practices we employ, how we process and use resources like water, and the way our cities are built. Most agricultural enterprises have some form of climate change policy available to help farmers adapt to climate change.

FIGURE 1 Greenhouse gases released from industry

Your task is to conduct a research investigation about the following claim which is related to the case study above:

Climate change is a natural cycle of planet Earth; in fact, Earth has gone through multiple warming and cooling periods. This is just another natural spike in temperature and is not caused by humans. Mitigation isn't necessary!

Research question

Conduct research

Resource 1

Title: _____

Authors: _____

Source and credibility: _____

Publication date: _____

Aim: _____

Resource's research question: _____

Methodology

- What data were collected?

Practice internal assessments

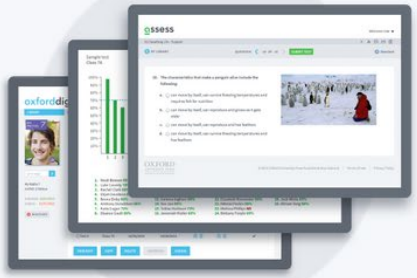
Support the skills required in the internal assessments.

**Note: these are not QCAA draft assessments and should only be used as practice for the internal assessments.*

Digital resources and purchasing options

obook

obook is a fully interactive digital version of every student book with note-taking, highlighting and dictionary support included. Every obook contains links to additional resources, such as videos, interactive modules and worksheets.



assess

assess is an online assessment platform that provides access to tens of thousands of additional auto-correcting questions designed to support student understanding and progression across all subjects.

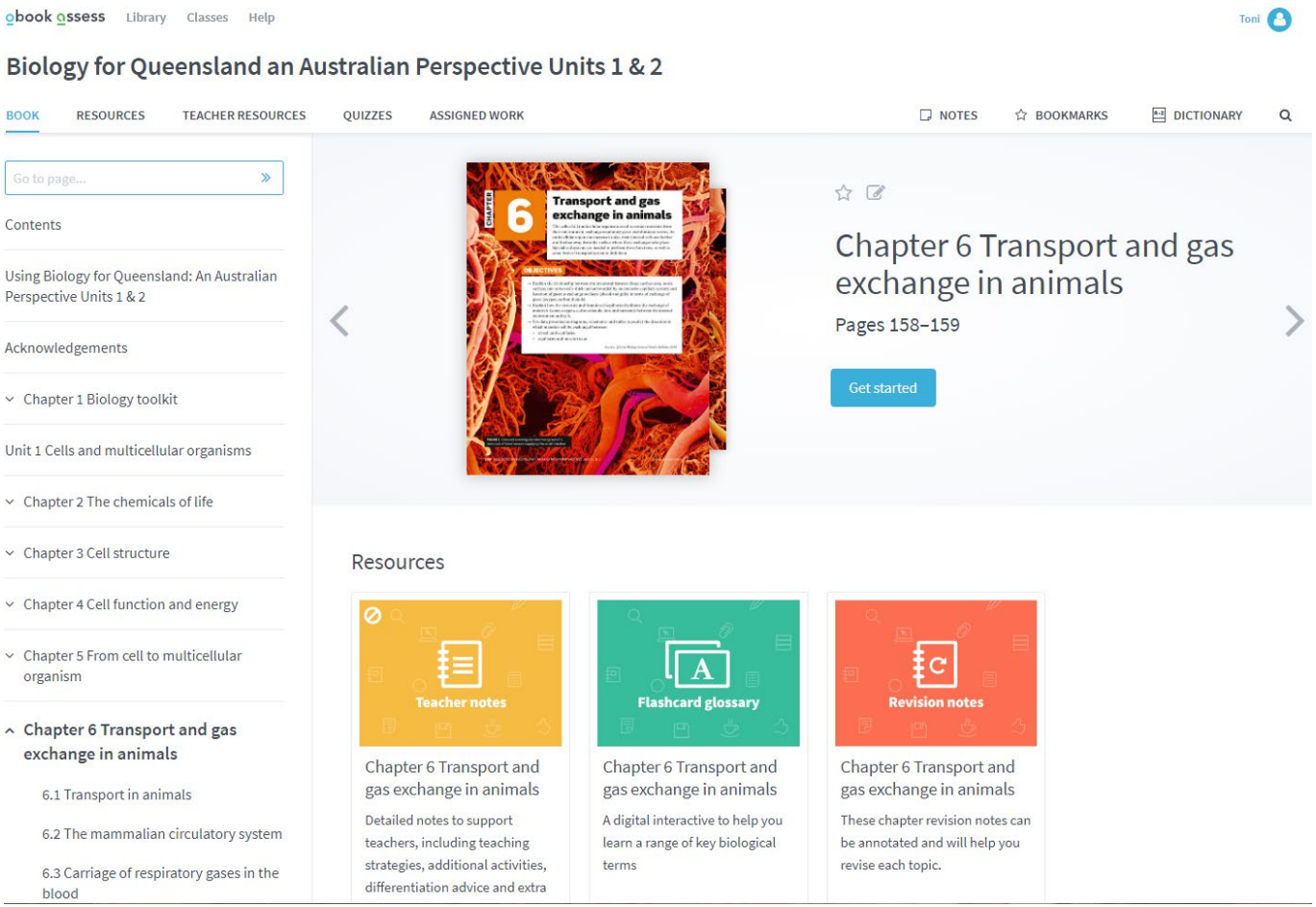
Teacher support

Additional teacher notes, answers, tests, and assessments and differentiated learning advice is all included for teachers. Teacher obook assess also allows teachers to assign work electronically, track progress, and manage results and assessment.

Biology for Queensland is supported by a range of additional digital resources, including:

- **obook**
- **assess**
- **Teacher support**.

obook



obook:

- is visually integrated with the printed Student book, enabling students to move seamlessly between print and digital products
- provides a range of additional teacher and student resources.

obook

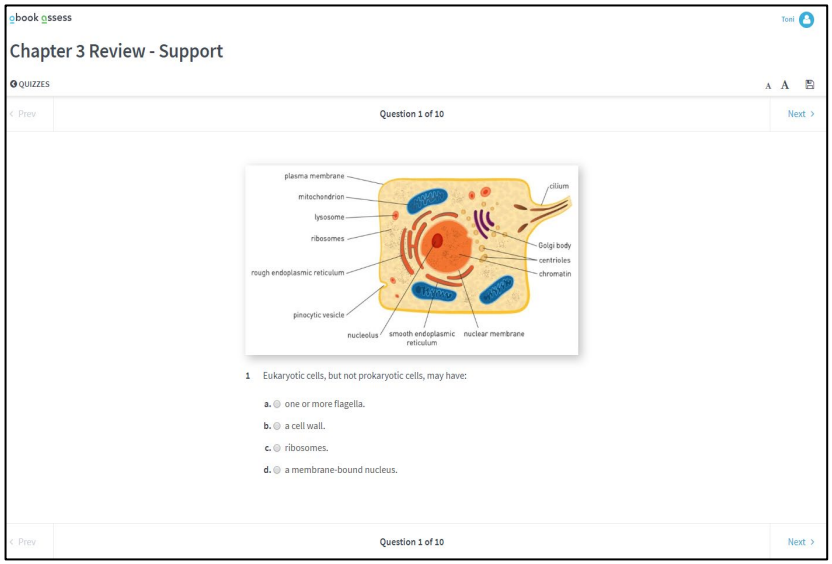
Additional resources

There is additional support available online, including:

- Teacher notes
- Answers
- Practice exams and cumulative tests
- Data tests
- Practical worksheets (for all mandatory and suggested practicals)
- Lab tech notes and risk assessments
- Video tutorials
- Revision notes for students
- Increase your knowledge (extra resources that consolidate and expand student understanding).

These are all designed to help you feel confident that your students will be prepared for their internal and external assessments.

assess



assess:

- provides hundreds of differentiated, auto-marked quiz questions, ideal for homework or in-class use
- questions are aligned to the syllabus and graded for different ability levels.

Teacher support

Teacher support includes:

- detailed **teaching notes** and **course planners**
- answers to **every** question and activity in the Student Book
- a range of **additional worksheets** (with answers)
- **editable data tests** (with suggested answers)
- **editable practice examinations** (with answers)

Students receive **digital access for 2 years** when purchasing print Student books – **ideal for revising Year 11 content in Year 12**.

Schools that purchase Oxford resources receive **FREE print Student Books for all teachers** and **ongoing access to all digital resources and teacher support**.

Biology for Queensland An Australian Perspective Units 3 & 4 (3rd edition)	Format	Price
Student book + obook assess Print book with 2-years' digital access included	PRINT + DIGITAL	$69.95
Student obook assess Digital book with 2-years' digital access included	DIGITAL	$49.95
Student obook assess MULTI Digital book that includes 3 x 2-years' digital access	DIGITAL	$59.95
Teacher obook assess* Digital book that includes access to additional teacher only resources – ongoing access	DIGITAL	$299.95
Workbook 4 colour write in print book that provides assessment support	PRINT ONLY	$24.95

* FREE ongoing access to Teacher obook assess with booklist or class set purchase

Digital renewal fees	
Institution	$5 per student for an additional 15-months' access. A service fee to support annual rollover of subscriptions

If your school has a different purchasing model, ask our team about options.

Biology for Queensland Units 3 & 4 (3rd edition)	Samples	Final product
Student book + obook assess (print + digital)	Full page proofs (print) **Available now**	**September 2019**
Student obook assess (digital only)	Full page proofs (digital) **Available now**	**June 2019**
Teacher obook assess (digital only)	Unit 3 – Topic 1 Chapters 1–4 • Teacher notes • Student book answers **Term 4 start 2019**	**January 2020**
Student workbooks (print only)	Units 3 & 4 **May 2019** Units 1 & 2 ***NA***	Units 3 & 4 **September 2019** Units 1 & 2 **November 2019**