

# OXFORD Study Buddy

## Revision and Exam Guide

# QCE BIOLOGY

## UNITS 3 & 4

## VOLUME 1

WRITTEN BY  
NATALIE QUINN

ILLUSTRATED BY  
JOSHUA SCOTT



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Illustrated by Joshua Scott Designs  
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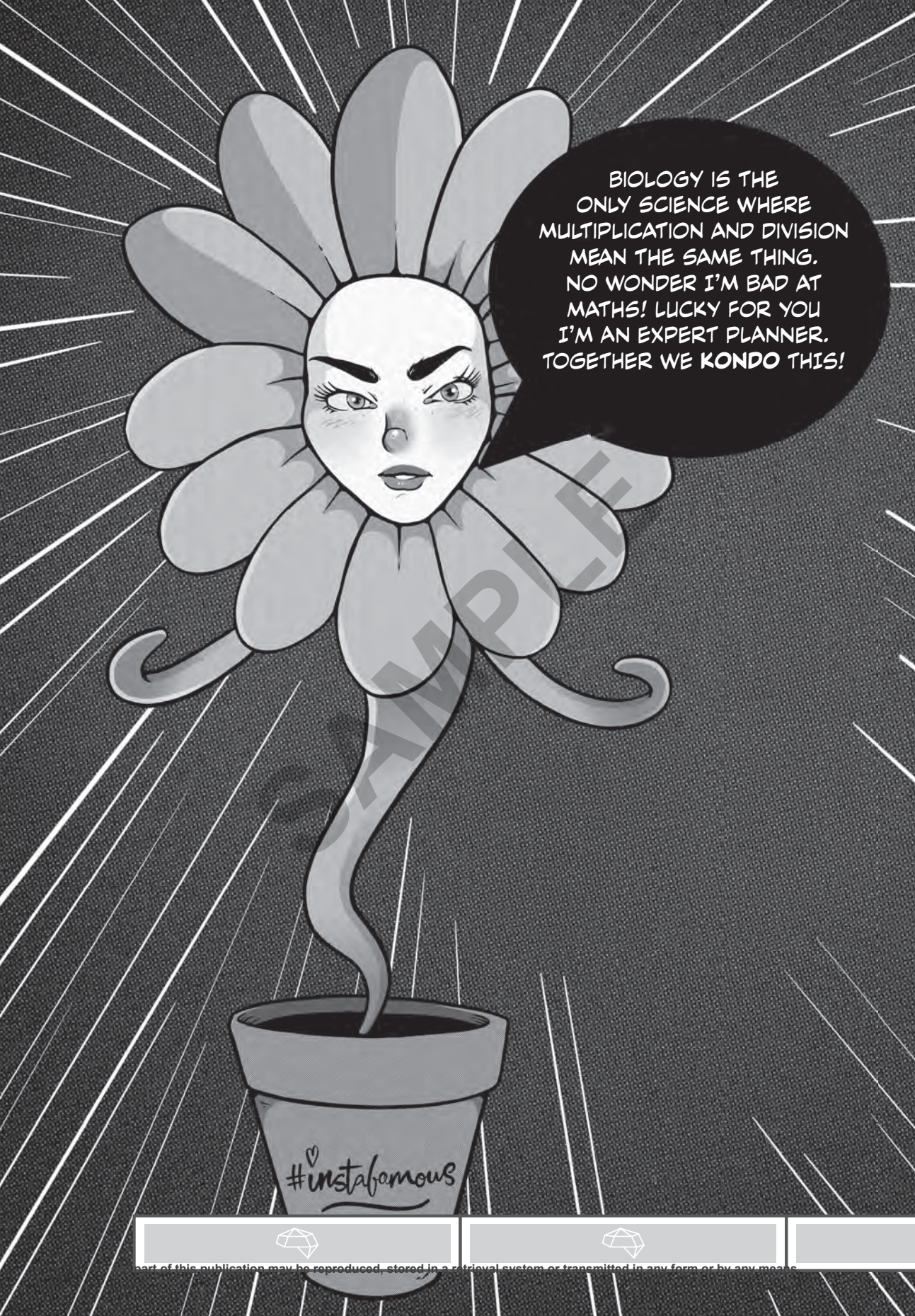
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BIOLOGY IS THE  
ONLY SCIENCE WHERE  
MULTIPLICATION AND DIVISION  
MEAN THE SAME THING.  
NO WONDER I'M BAD AT  
MATHS! LUCKY FOR YOU  
I'M AN EXPERT PLANNER.  
TOGETHER WE KONDO THIS!

#instafamous



## CHAPTER

# 1

# STUDYING FOR SUCCESS

Before you start studying for your QCE Biology exams, it's important to set yourself up for success. That's exactly what this chapter is designed to do, so thanks for stopping by!

As soon as it's time to start studying for the external assessment, we recommend that you work through this whole chapter before doing anything else!

You might do this at the start of the school year or at the start of your exam study period, but whatever you do, don't skip this chapter; it contains a lot of really important information and tips that might just give you the edge you're looking for.

YOUR THIRST FOR  
KNOWLEDGE IS **CRYSTAL**  
**CLEAR!** COMPLETE THIS  
CHAPTER TO UNLOCK  
YOUR FIRST KNOWLEDGE  
CRYSTAL.  
GOOD LUCK!



# 1.1

## OVERVIEW OF QCE BIOLOGY UNITS 3 & 4

In this section, we will:

- provide a brief overview of how the QCE Biology Units 3 & 4 course is structured
- list all of the concepts and topics that you will need to learn and understand
- explain how you will be assessed.



1.1.1

Resource: Biology  
General Senior  
Syllabus

### Study tip

The QCE Biology General Senior Syllabus sets out all of the information you are expected to learn and also provides important information on how you will be assessed.

In this chapter, we have summarised all the key information relating to external assessment you need to know, but the QCAA may update the syllabus from time to time, so it's important that you make sure you are using the most current version!

Make sure you visit the QCAA website and download a copy of the Biology General Senior Syllabus and read it carefully before you sit your external assessment. To save you time, we've also included a link to it on your obook!

## UNDERSTANDING THE QCE BIOLOGY UNITS 3 & 4 COURSE STRUCTURE

The Biology General Senior Syllabus is the most important document supporting the QCE Biology course. It sets out all the content – known as subject matter – that you'll be expected to learn and provides important information about how you will be assessed.

QCE Biology is a course of study consisting of four units (i.e. Units 1 & 2 and Units 3 & 4) taught over 2 years; but in this revision and exam guide, we will only be focusing on information relating to Units 3 & 4 of the course. The topics you will be learning about in Units 3 & 4 are summarised in Table 1.

### Study tip

The notional hours shown in Table 1 are provided by the QCAA to help teachers with their planning and to give them an estimate of how long to spend teaching the subject matter in each topic.

Notional hours can be a handy way to help you to structure and allocate your revision and preparation time for the external assessment because, as a general rule, there are likely to be more questions on subject matter with higher notional hours.





## Course structure for QCE Biology Units 3 & 4

Unit 3 Biodiversity and the interconnectedness of life	Unit 4 Heredity and continuity of life
<b>Topic 1: Describing biodiversity</b> <i>Subject matter:</i> <ul style="list-style-type: none"> <li>Biodiversity [9 hours]</li> <li>Classification processes [12 hours]</li> </ul> <b>Topic 2: Ecosystem dynamics</b> <i>Subject matter:</i> <ul style="list-style-type: none"> <li>Functioning ecosystems [12 hours]</li> <li>Population ecology [4 hours]</li> <li>Changing ecosystems [8 hours]</li> </ul>	<b>Topic 1: DNA, genes and the continuity of life</b> <i>Subject matter:</i> <ul style="list-style-type: none"> <li>DNA structure and replication [5 hours]</li> <li>Cellular replication and variation [5 hours]</li> <li>Gene expression [6 hours]</li> <li>Mutations [3 hours]</li> <li>Inheritance [3 hours]</li> <li>Biotechnology [8 hours]</li> </ul> <b>Topic 2: Continuity of life on Earth</b> <i>Subject matter:</i> <ul style="list-style-type: none"> <li>Evolution [3 hours]</li> <li>Natural selection and microevolution [6 hours]</li> <li>Speciation and macroevolution [6 hours]</li> </ul>

**Table 1** Each unit is developed to a notional (i.e. estimated) time of 55 hours of teaching and learning, including assessment. Notional times for each subtopic are also provided.

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# UNDERSTANDING THE QCE BIOLOGY UNITS 3 & 4 ASSESSMENT STRUCTURE

You will be expected to complete a total of four **summative assessments** in QCE Biology Units 3 & 4. Summative assessments are designed to evaluate your understanding of the subject matter and compare your performance against the understanding of students from across the state.

Three of these assessments are **internal** and one is **external**, but all will contribute to your Australian Tertiary Admission Rank (ATAR) calculation and to your Queensland Certificate of Education (QCE).

### Study tip

This revision and exam guide is only designed to help you prepare for the summative external assessment, so if you need any further information about any of the summative internal assessments for QCE Biology Units 3 & 4, ask your teacher or refer to the syllabus.

## INTERNAL ASSESSMENTS

- Schools will develop **three internal assessments** for QCE Biology based on the subject matter described in Units 3 & 4 of the syllabus.
- The three summative internal assessments will be endorsed (i.e. the mark awarded by your teacher will be cross-checked and verified by an independent marker) and the results confirmed by the QCAA.
- As shown in Figure 1, the three internal assessments will contribute **50% to your overall mark**.

## EXTERNAL ASSESSMENT

- The QCAA will develop and mark the **external assessment** for QCE Biology. It is designed to assess your understanding of the learning described in Units 3 & 4 of the syllabus (i.e. only the topics shown in Table 1 will be assessed).







YOU'RE ONLY JUST  
STARTING YOUR  
REVISION??? WHAT'S  
STOMATA WITH YOU?  
LUCKY CLARA'S HERE  
TO HELP! LET'S PUT THE  
PETAL TO THE METAL  
AND ACE THIS!





## CHAPTER

# 2

# REVISION

In this chapter, we provide a clear, concise summary of all examinable content from QCE Biology Units 3 & 4 to help you revise and prepare for the external assessment.

Everything has been organised by unit, topic and subtopic in the General Senior Syllabus to help you focus your time and attention where it is needed most.

The revision notes are not designed to replace your teacher or your textbook. Instead, they have been designed to help you gauge your level of understanding and confidence of the subject matter before the exam. You can use them to identify those topics you know inside out and those that still require some extra attention.

The revision notes are also supported by a bunch of handy features, tips and icons designed to help you get the very best result on the day.

WE'RE ON THE  
SEARCH FOR YOUR SECOND  
KNOWLEDGE CRYSTAL. DON'T  
DOUBT YOURSELF, OF QUARTZ  
YOU CAN DO IT!





# 2.1

## UNIT 3 TOPIC 1 – DESCRIBING BIODIVERSITY



**More detail**  
on pages 26–57  
of *Biology for  
Queensland  
Units 3 & 4*



**Questions**  
on pages 120–131

### BIODIVERSITY

#### SUBJECT MATTER

Before the external assessment, you should be able to:

- recognise that biodiversity includes the diversity of species and ecosystems
- determine diversity of species using measures such as species richness, evenness (relative species abundance), percentage cover, percentage frequency and Simpson's diversity index
- use species diversity indices, species interactions (predation, competition, symbiosis, disease) and abiotic factors (climate, substrate, size/depth of area) to compare ecosystems across spatial and temporal scales
- explain how environmental factors limit the distribution and abundance of species in an ecosystem.

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### DEFINING AND MEASURING BIODIVERSITY

#### biodiversity

diversity of life; the number, variety, and variation of genes, species and ecosystems on Earth

#### organism

an individual lifeform

#### species

a group of individuals belonging to the same lowest taxonomic unit, capable of breeding and producing fertile offspring

#### ecosystem

communities of organisms interacting with their physical and biological environment

#### KEY CONCEPT

- **Biodiversity** describes the number and variety of **organisms** living in a geographical area, and can be measured at the level of **species** or **ecosystem**.
- Biodiversity can be measured quantitatively using a variety of instruments, scales and methodologies.
- Measures of biodiversity include **percentage cover**, **percentage frequency**, **species evenness** and **species richness**.

A  
GREAT WAY TO  
LEARN THE DEFINITIONS  
OF KEY TERMS IS TO MAKE  
STUDY CARDS! WRITE THE  
TERM ON ONE SIDE AND THE  
DEFINITION ON THE OTHER.  
TEST YOURSELF ON THEM TWICE  
DAISY - I MEAN DAILY -  
UNTIL YOU KNOW THEM  
BY HEART.



## DIVERSITY OF SPECIES

### habitat

a specific location with a particular set of biotic and abiotic conditions; where an organism normally lives

### species diversity

a measure of the number and abundance of species in a community

### adaptation

a feature of an organism that enhances its ability to survive and reproduce in a particular environment

### abiotic factors

the non-living physical factors that influence organisms and ecosystems

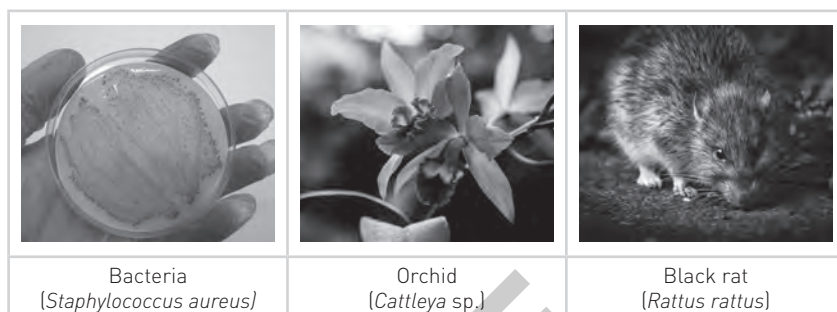
### biotic factors

the living components in the environment that influence organisms and ecosystems

### ecosystem diversity

a measure of the variety of different habitats, communities and ecological processes within a geographical location

Species of living things are diverse in their appearance, **habitat**, lifespan, behaviour and reproductive strategies. This concept is known as **species diversity**, and is caused by the **adaptations** of each species due to **abiotic factors** (non-living) and **biotic factors** (living) in its environment.



**Figure 1** Earth supports a diverse range of living organisms that have adapted and continue to adapt to their changing environments.

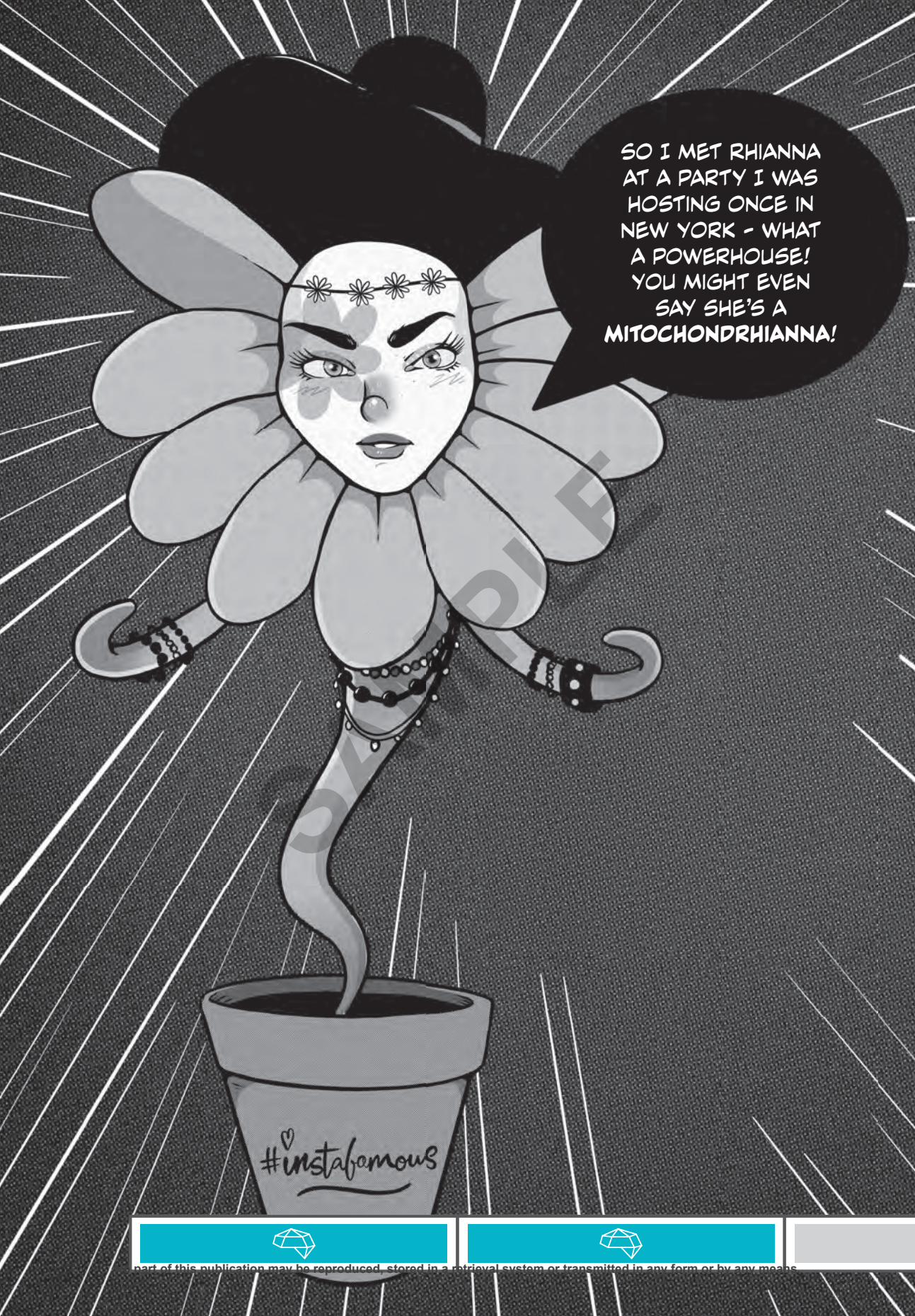
## DIVERSITY OF ECOSYSTEMS

An ecosystem is a community of living and non-living things interacting with each other in a particular location. **Ecosystem diversity** is a measure of the variety of different habitats, communities and ecological processes. Ecosystem diversity is determined by abiotic factors.



**Figure 2** Ecosystems can be measured, categorised and compared in terms of the number of organisms and diversity of species they contain. Rainforests (a) have higher species diversity than deserts (b) because thousands of different species of plants, animals and fungi exist there.





SO I MET RHIANNA  
AT A PARTY I WAS  
HOSTING ONCE IN  
NEW YORK - WHAT  
A POWERHOUSE!  
YOU MIGHT EVEN  
SAY SHE'S A  
MITOCHONDRIANNA!

#instafamous





## CHAPTER

# 3

# PRACTICE QUESTIONS

In this chapter, we provide a range of practice questions for all of the examinable content from QCE Biology Units 3 & 4. What a surprise ... not! Did the title give it away?

No fancy tricks here, just heaps of questions organised by topic so you can move effortlessly between revision and practice as you study. We've also grouped the multiple choice and short response questions together so you can prepare for both papers and build your confidence.

COMPLETE THIS CHAPTER  
TO MINE YOUR THIRD  
KNOWLEDGE CRYSTAL!  
**YOU (BIG SHINY) ROCK!**



# 3.1

## UNIT 3 TOPIC 1 – DESCRIBING BIODIVERSITY

### MULTIPLE CHOICE QUESTIONS



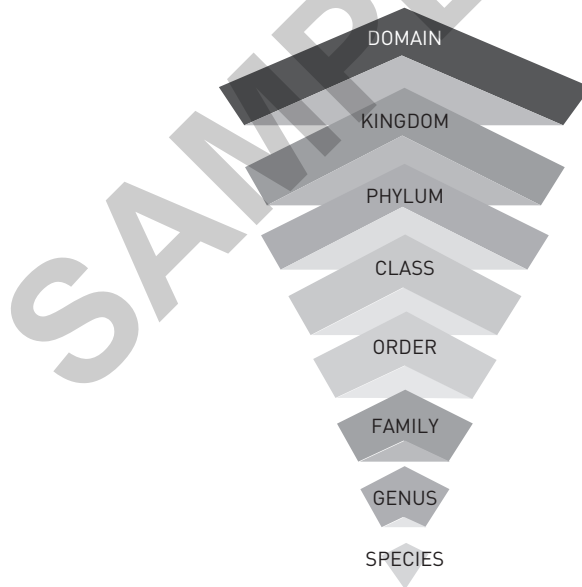
**Answers**  
on pages 230–232

#### QUESTION 1

Biodiversity can be defined as the

- (A) measure of the number of living organisms in a habitat, ecosystem, or on Earth.
- (B) measure of the variation of living organisms in a habitat, ecosystem, or on Earth.
- (C) relationships between living organisms and their environment.
- (D) study of living organisms.

#### QUESTION 2



Which of the following taxonomic ranks contains the largest number of organisms?

- (A) class
- (B) genus
- (C) order
- (D) family



**QUESTION 3**

One of the abiotic factors contributing to a rainforest ecosystem's ability to support high species diversity is

- (A) deep leaf litter.
- (B) low temperature.
- (C) high rainfall.
- (D) percentage canopy cover.

**QUESTION 4**

The species richness of an ecosystem is determined by the

- (A) number of different species within the ecosystem.
- (B) total population of individuals of all species.
- (C) population of individuals of one species compared with the population of individuals of all other species.
- (D) number of different species of plants within the ecosystem.

**QUESTION 5**

Percentage cover is a useful tool when measuring

- (A) a rainforest canopy.
- (B) changes in fish populations over time.
- (C) the average amount of time that crabs stay in a rock pool before moving on to another rock pool.
- (D) the number of different species of plants growing in an urban park.

**QUESTION 6**

Percentage frequency calculated in a vegetation survey provides information about

- (A) how often a plant species reproduces.
- (B) how often a plant species appears in samples.
- (C) the number of different plant species in a sample.
- (D) the proportion of a quadrat covered by a particular plant species.

**QUESTION 7**

Simpson's Diversity Index

- (A) allows for comparison of diversity between two different areas.
- (B) calculates the number of different species in a community.
- (C) gives an estimate of the population of a species in a sample area.
- (D) uses the capture-mark-recapture method.





### QUESTION 24

The term microhabitat describes the

- (A) bacteria living on an animal.
- (B) habitat of microscopic organisms.
- (C) immediate habitat of an organism that is part of a larger habitat.
- (D) relationship an organism has with other organisms living close by.

### QUESTION 25

Herbivores, carnivores and detritovores are all

- (A) autotrophs.
- (B) chordates.
- (C) heterotrophs.
- (D) omnivores.

## SHORT RESPONSE QUESTIONS



**Answers**  
on pages 232–235

### QUESTION 26 (4 marks)

Contrast the processes of primary succession and secondary succession.

MY MARK

/4

### QUESTION 27 (2 marks)

Explain the impact of population density on infectious disease in a species.

MY MARK

/2

### QUESTION 28 (3 marks)

Contrast eukaryotic and prokaryotic organisms.

MY MARK

/3



**QUESTION 29 (4 marks)**

In 1953, a volcanic eruption created a lava flow on an island in Hawaii. The lava flow cooled and became a lava field, and plant surveys of the area were taken in the following years. The results are shown in the table below.

Species	Number of individuals recorded on each sample date					
	January 1960	January 1963	January 1966	January 1969	January 1972	January 1975
<i>Metrosideros polymorpha</i>	–	–	4	9	13	26
<i>Coprosma menziesii</i>	–	–	–	3	6	11
<i>Stereocaulon vulcani</i>	160	192	211	215	203	197
<i>Agrostis sandwicensis</i>	17	62	102	132	127	141
<i>Vaccinium reticulatum</i>	2	17	36	50	57	88
<i>Lycopodium cernuum</i>	16	30	42	80	92	116

- a) Determine which plant acted as the pioneer species in this example of succession.

[1 mark]

MY MARK

/1

- b) Explain the characteristics the plant requires in order to colonise a substrate with no soil or reliable source of water.

[2 marks]

MY MARK

/2

- c) Propose a possible reason that *Metrosideros polymorpha* did not appear on the lava field until 16 years after the eruption.

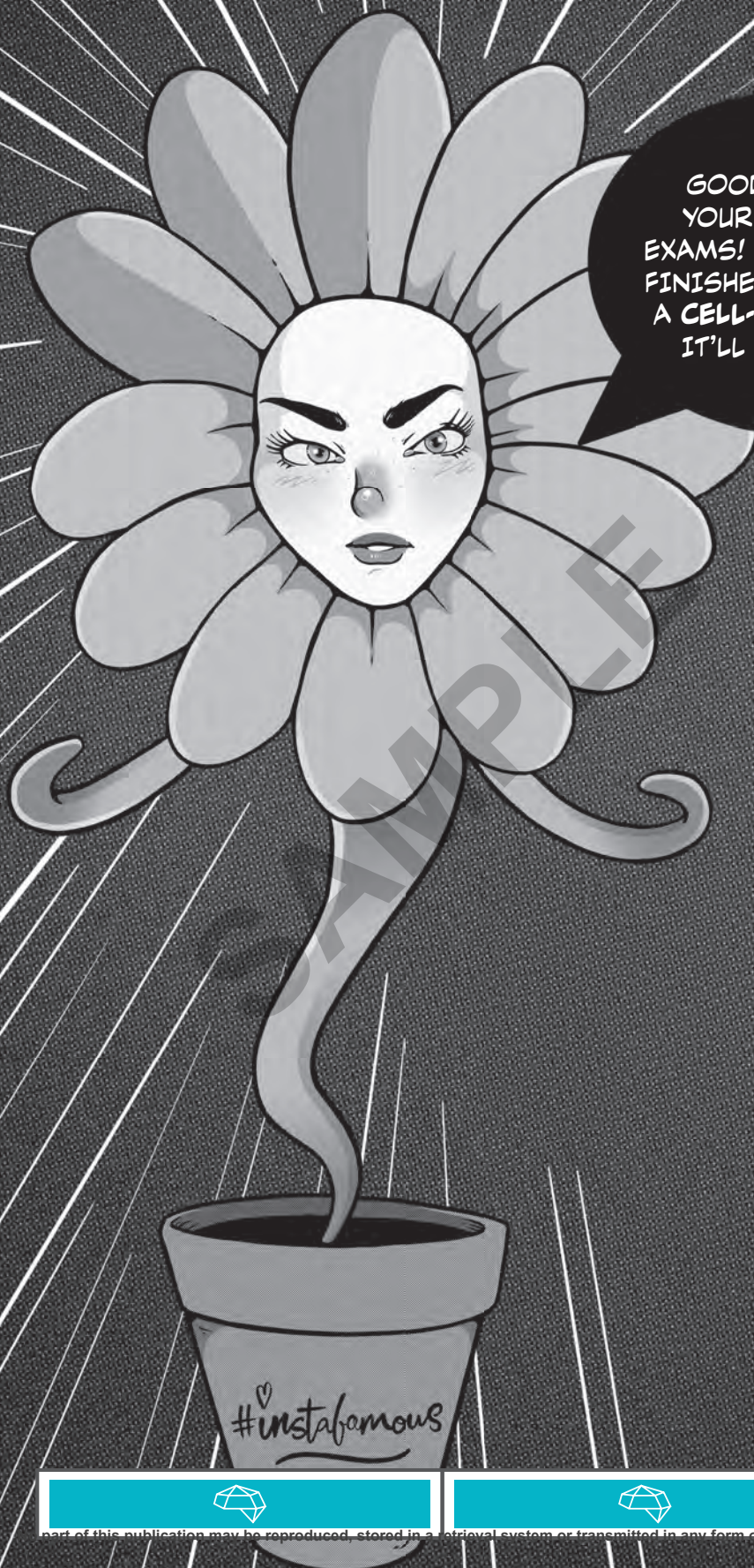
[1 mark]

MY MARK

/1







GOOD LUCK ON  
YOUR PRACTICE  
EXAMS! ONCE YOU'RE  
FINISHED, LET'S TAKE  
A **CELL-FIE**... MAYBE  
IT'LL GO VIRAL!





## CHAPTER

# 4

# OFFICIAL PAST PAPERS

In this chapter, things get serious! It's now time for you to put your revision and practice to the test – literally – by completing the official QCE Biology External assessment from 2020!

We recommend you:

- don't look at this chapter until you've finished with your revision and completed all of the practice questions in Chapter 3
- complete these papers under exam conditions (i.e. follow the instructions regarding perusal time and working time, don't refer to any notes or other materials that will not be allowed during the real exams)
- refer to the answers in Chapter 5 and use the marking advice to self-assess your responses once you've finished.

Remember ... these are the QCE Biology papers from 2020, so – if you complete them under exam conditions – they are arguably the best indicator of how well you're likely to perform on the day! Good luck!



**SHINE ON! ACE THESE  
EXAMS TO BAG YOUR  
FOURTH KNOWLEDGE  
CRYSTAL!**



# 4.1

# EXTERNAL ASSESSMENT 2020 BIOLOGY PAPER 1

## Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

## General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

## Section 1 (20 marks)

- 20 multiple choice questions

## Section 2 (25 marks)

- 8 short response questions

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## Section 1 (20 marks)



**Answers**

on pages 265–270

### QUESTION 1

In prokaryotes, deoxyribonucleic acid (DNA) is found as unbound circular DNA in the

- (A) mitochondria.
- (B) chloroplasts.
- (C) nucleus.
- (D) cytosol.

### QUESTION 2

Which form of inheritance usually determines traits that display continuous phenotypic variation?

- (A) polygenic
- (B) sex-linked
- (C) multiple allele
- (D) incomplete dominance



### QUESTION 3

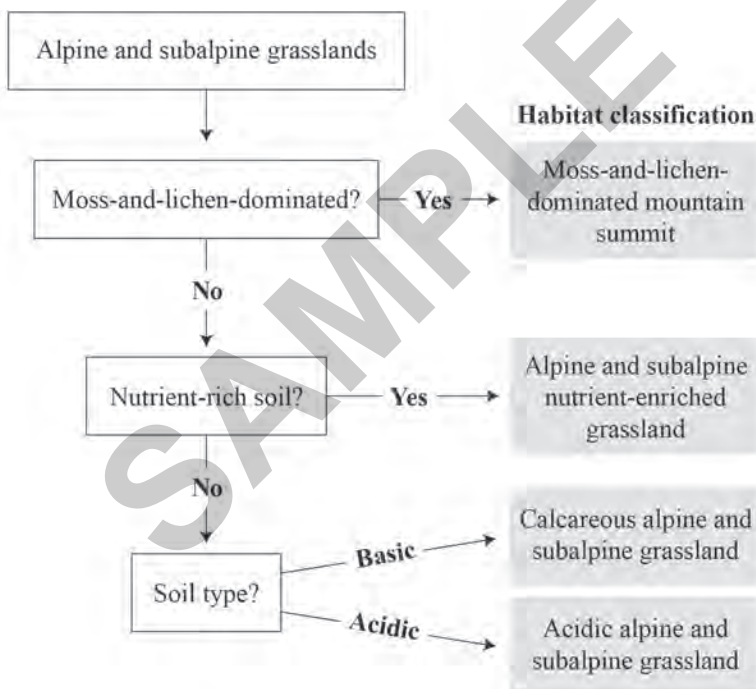
A genome is defined as

- (A) the molecular unit of heredity.
- (B) all the genetic material in the chromosomes of an organism.
- (C) the sequence of triplets of DNA nucleotides that make up a gene.
- (D) the combination of alleles for a particular trait carried by an individual.

### QUESTION 4

The following information includes:

- a key that is used to classify the types of alpine and subalpine grassland habitats
- a table of abiotic and biotic data obtained from a habitat survey.



Abiotic physical parameter	Reading	Reference range for nutrient-poor soil (mg/kg)
pH	6.1	
Nitrates/nitrites (mg/kg)	4	< 5
Ammonia (mg/kg)	1	< 4
Total phosphorous	16	< 20



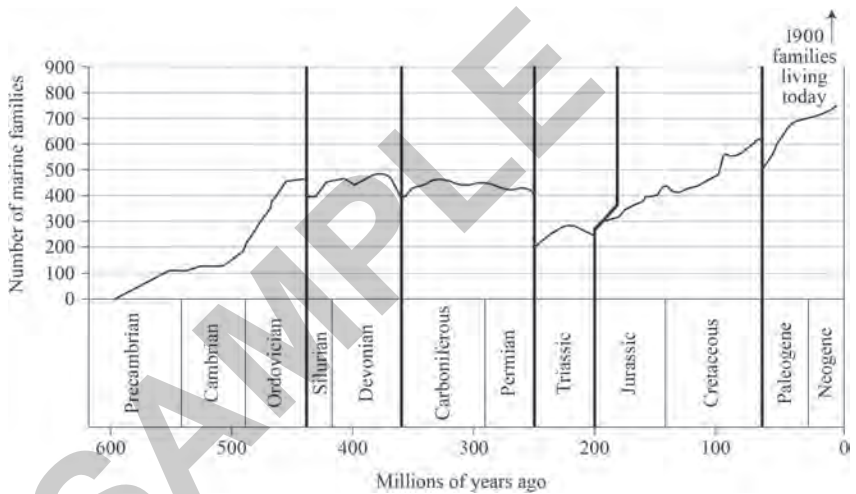
**Biotic description:** Small amount of low-lying moss, growing on soil substrate. Predominantly low-lying grasses.

Using the data in the table and the key, this alpine and subalpine grassland would be classified as

- (A) a moss-and-lichen-dominated mountain summit.
- (B) an alpine and subalpine nutrient-enriched grassland.
- (C) a calcareous alpine and subalpine grassland.
- (D) an acidic alpine and subalpine grassland.

## QUESTION 5

The figure shows the diversity of marine animals since the late Precambrian time. The data is from marine animal families that have been reliably preserved in the fossil record.



Which of the following time periods saw the greatest evolutionary radiation of the marine families?

- (A) Ordovician
- (B) Cretaceous
- (C) Devonian
- (D) Permian





**QUESTION 6**

The carrying capacity of an ecosystem refers to the

- (A) total biomass of primary producers in the ecosystem at a given time that supports the higher trophic levels.
- (B) size of a population that can be supported indefinitely on the available resources and services of that ecosystem.
- (C) number of individual top predators in the ecosystem at a given time that can be supported by the lower trophic levels.
- (D) maximum population of individuals of different species that the ecosystem can support for an extended period of time.

**QUESTION 7**

When predicting successional change, which of the following would typically indicate that an ecosystem is progressing toward its climax community?

	Abundance of K-selected species	Biomass
(A)	Increasing	Decreasing
(B)	Decreasing	Increasing
(C)	Increasing	Increasing
(D)	Decreasing	Decreasing







NO MATTER HOW POPULAR  
THEY ARE, ANTIBODIES WILL  
NEVER GO VIRAL! #HOWSAD  
OH WELL, LET'S CHECK YOUR  
ANSWERS TO (HOPEFULLY)  
CHEER OURSELVES UP!





## CHAPTER

# 5

# ANSWERS

OMG, another cliffhanger ... What on Earth could be in this chapter, I wonder? You guessed it: in this chapter, we provide the answers to absolutely everything! Sounds simple, I know, but to get the most out of this chapter, don't just cast an eye over the answers provided and move on.

If you really want to increase your chances of excelling on the exam, we recommend you look carefully over each of your answers to the questions in Chapters 3 and 4 and compare them with the answers in this chapter. Use the 'My mark' box under each short response question to self-assess your own answers. This will help to get you into the habit of structuring your responses in order to receive maximum marks and show you what the exam marker will be looking for.

### Notice to students

The answers and marking advice provided in this chapter are intended for practice purposes only. Unless specifically credited, the QCAA has not written or endorsed this material.

A KNOWLEDGE CRYSTAL  
IS JUST A PIECE OF COAL THAT  
HANDLED PRESSURE REALLY  
WELL! COMPLETE THIS CHAPTER  
TO MINE YOUR FINAL ONE!  
YOU'VE GOT THIS!





# 5.1

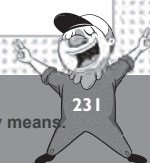
## UNIT 3 TOPIC 1 – DESCRIBING BIODIVERSITY

### MULTIPLE CHOICE ANSWERS

Question	Correct answer	Explanation
QUESTION 1	B	B is correct because ‘diversity’ refers to variation rather than number, relationship or study of organisms.
QUESTION 2	A	A is correct because class is a higher rank in the taxonomic hierarchy than genus, order or family.
QUESTION 3	C	A is incorrect because rainforests do not have deep leaf litter. B is incorrect because rainforests do not have low temperatures. D is incorrect because percentage canopy cover does not directly influence high species diversity.
QUESTION 4	A	B is incorrect because it does not measure the number of different species. C is incorrect because comparing populations of species relates to species abundance. D is incorrect because species richness is not specific to plants; it can be used for other organisms such as animals or bacteria.
QUESTION 5	A	B is incorrect because fish move around too quickly to estimate percentage cover. C is incorrect because percentage cover does not measure time, and crabs move around too quickly. D is incorrect because percentage cover does not measure variation in species.
QUESTION 6	B	A is incorrect because percentage frequency does not use a temporal scale. C is incorrect because percentage frequency does not compare different species. D is incorrect because this describes percentage cover, not percentage frequency.
QUESTION 7	A	B is incorrect because this describes species richness. C is incorrect because this describes species population estimates. D is incorrect because this describes the Lincoln Index.
QUESTION 8	B	A is incorrect because ‘interspecific’ means between different species. C is incorrect because the zebras are the same species and symbiosis describes interspecific interactions. D is incorrect because the zebras are the same species and mutualism describes interspecific interactions.
QUESTION 9	C	C is correct because rainforests are able to support higher diversity than desert, grassland and tundra due to their ideal abiotic and biotic factors.



Question	Correct answer	Explanation
<b>QUESTION 10</b>	C	A is incorrect because only one parent is involved in asexual reproduction. B is incorrect because some eukaryotic organisms can reproduce asexually. D is incorrect because asexually produced offspring are usually fertile and can reproduce asexually.
<b>QUESTION 11</b>	A	B is incorrect because soil microbes are living and are therefore biotic factors. C is incorrect because enzymes are biological molecules. D is incorrect because fecundity refers to reproduction in living organisms.
<b>QUESTION 12</b>	B	B is correct because family is a lower rank in taxonomic hierarchy than class, phylum or order.
<b>QUESTION 13</b>	A	B is incorrect because the tree does not benefit from the presence of the kookaburra. C is incorrect because the kookaburra does not kill and eat the tree. D is incorrect because the neither the tree nor kookaburra are harmed by the other.
<b>QUESTION 14</b>	B	A is incorrect because both the truffles and oak tree benefit from the relationship. C is incorrect because neither the oak tree nor truffles are killed and eaten by the other. D is incorrect because neither the oak tree nor truffles are harmed by the other.
<b>QUESTION 15</b>	B	B is correct because binomial Latin names are composed of the genus and species names and all other combinations are incorrect.
<b>QUESTION 16</b>	A	B is incorrect because homologous structures are gross anatomy that are not compared at a molecular level. C is incorrect because karyotypes provide information at a chromosomal level but cannot be used for comparison at a molecular level. D is incorrect because recombinant DNA technology is not used as a tool to compare individuals or species.
<b>QUESTION 17</b>	A	B is incorrect because the seal is excluded. C is incorrect because the cat is excluded. D is incorrect because the dog and cat are excluded.
<b>QUESTION 18</b>	C	A is incorrect because speciation does not occur at individual level. B is incorrect because offspring produced through sexual reproduction are unique individuals, not identical clones of parents. D is incorrect because mutations occur at gene level and not at the level of individual organism.
<b>QUESTION 19</b>	C	A is incorrect because autotrophs do produce their own food. B is incorrect because autotrophs are producers, not consumers. D is incorrect because some multicellular organisms are autotrophs.



Question	Correct answer	Explanation
<b>QUESTION 20</b>	D	A is incorrect because tolerance range is not dependent on the lifespan of the organism. B is incorrect because tolerance range is not dependent on biotic factors such as predation. C is incorrect because an organism's optimal range is narrower than its tolerance range.
<b>QUESTION 21</b>	B	A is incorrect because both the clownfish and anemone benefit. C is incorrect because the clownfish does not kill and eat the anemone. D is incorrect because both the clownfish and anemone benefit and neither is harmed.
<b>QUESTION 22</b>	D	A is incorrect because homologous structures show evolutionary relatedness, not advantage. B is incorrect because not all mutations are advantageous. C is incorrect because not all phenotypes are advantageous.
<b>QUESTION 23</b>	B	A is incorrect because this describes interspecific hybrids. C is incorrect because species sharing a common ancestor may have different numbers of chromosomes. D is incorrect because species sharing a common ancestor may live in different ecosystems.
<b>QUESTION 24</b>	C	A is incorrect because it describes a relationship between two species, not a habitat. B is incorrect because the prefix 'micro' refers to the size of the habitat, not the size of the organism. D is incorrect because habitat describes the organisms close by, but not relationships between organisms.
<b>QUESTION 25</b>	C	A is incorrect because autotrophs use energy from the sun to produce their own food. B is incorrect because herbivores, carnivores and detritovores belong to many phyla, not only chordates. D is incorrect because omnivores eat both animals and plants as food.

- 1 mark for each correct multiple choice answer.

## SHORT RESPONSE ANSWERS

### QUESTION 26 (4 marks)

- a) Primary succession occurs in an area with no existing living organisms, whereas secondary succession occurs after a disturbance in an existing ecosystem. Primary succession begins with pioneer species and slowly increases opportunities for other more complex organisms to grow, whereas secondary succession provides opportunities

for existing seeds or seedlings to grow where they were previously outcompeted by other organisms.

- 1 mark for primary succession in area without life.
- 1 mark for secondary succession in area of disturbance.
- 1 mark for primary succession begins with pioneer species.





- 1 mark for secondary succession allows opportunities for seeds and seedlings to grow.

### QUESTION 27 (2 marks)

As population density increases, so does the need for individuals within a population to share resources or come into close contact with each other. This close contact and sharing of resources allows infectious disease to spread rapidly throughout the population, resulting in a higher death rate.

- 1 mark for sharing resources and close contact.
- 1 mark for rapid spread of disease.

### QUESTION 28 (3 marks)

Eukaryotic cells have DNA arranged in chromosomes inside a membrane-bound nucleus, while prokaryotic cells have DNA in a large single loop or plasmids inside a nucleoid. Eukaryotic organisms are multicellular, while prokaryotic organisms are unicellular. Eukaryotic organisms have a high level of organisation in cells in membrane-bound organelles, while prokaryotic organisms have no membrane-bound organelles.

- 1 mark for membrane-bound nucleus versus loop/plasmid in nucleoid.
- 1 mark for multicellular versus unicellular.
- 1 mark for membrane-bound organelles versus no membrane-bound organelles.

### QUESTION 29 (4 marks)

- Stereocaulon vulcani* is the pioneer species since it had the highest population soon after the eruption.
  - 1 mark for identification of *Stereocaulon vulcani*.
- Pioneer species must be able to extract water and nutrients from the surrounding air or by fixing nitrogen from the atmosphere.
  - 1 mark for water and nutrients from air.
  - 1 mark for fixing nitrogen from atmosphere.
- Metrosideros polymorpha* may be a plant that requires the shade, nutrients, water or soil substrate that comes from a more advanced community.
  - 1 mark for any of shade, nutrients, water, or soil substrate.

### QUESTION 30 (5 marks)

- If nitrogen-fixing bacteria are absent from the soil environment, less water-soluble nitrogen is available for plants and their growth would be reduced.
  - 1 mark for less nitrogen available for plants so growth reduced.
- Free nitrogen in the atmosphere is fixed to nitrates in the soil and then assimilated by plants.
  - Nitrogen in plants is eaten by animals and then transformed into ammonia in animal waste and during decomposition by fungi and bacteria.
  - Nitrifying bacteria convert ammonia to nitrates, which are assimilated by plants.
  - Denitrifying bacteria liberate nitrogen gas, returning it to the atmosphere.
    - 1 mark for each step listed above.

### QUESTION 31 (2 marks)

Homologous structures are present in different species, having been inherited by a common ancestor. Differences in environmental pressures leads to differing adaptive changes and uses between species. Analogous structures have evolved separately in different species with the same purpose according to shared selection pressures in the species' environment.

- 1 mark for different species with common ancestor and adaptations to different environmental pressures.
- 1 mark for separate evolution with same purpose due to shared environmental pressures.

### QUESTION 32 (1 mark)

Linnaean classification classifies species according to similarity in physical structures, where cladistics classification uses most common shared ancestor to group species into clades.

- 1 mark for physical structures versus common shared ancestor/clades.

### QUESTION 33 (2 marks)

- Kingdom includes all organisms classified into phylum, class, order, family, genus and species. All organisms that fall under one animal species also belong to the animal kingdom.
  - 1 mark for explanation of hierarchy.
- Example: Mammals are part of the class Mammalia, and reptiles are part of the class Reptilia, but both are part of the same phylum, Chordata.
  - 1 mark for any correct example.

