

Cambridge IGCSE™ Biology

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TEACHER'S
GUIDE

How to Use This Book

This Teacher's Guide is part of the Marshall Cavendish Education (MCE) suite of resources designed and created to support you as you teach the Cambridge IGCSE and IGCSE (9–1) Biology syllabuses (0610/0970).

The lesson plans in the Teacher's Guide are made available online in editable Word format for you to customise according to your classroom needs. The answer keys mentioned in the lesson plans are available online in MCEduHub.

Lesson Plan

Each chapter includes several Lesson Plans to help you conduct your lessons. If you are new to the syllabus, the Lesson Plan is written in such a way that gets you up and running quickly. If you are an experienced teacher, the editable Lesson Plans allow you to customise your lessons, making use of selected parts of the Teacher's Guide to support your teaching flow and include your own teaching ideas.

Content Matrix

The Content Matrix serves as a directory to help you to easily locate the contents in the Student's Book, Theory Workbook and Practical Workbook that are relevant to each Learning Objective grouping.

Warm-up

This section helps you begin your lesson with a variety of teaching ideas. For example, to start off a new chapter, you are provided with teaching ideas to engage your students using the Chapter Opener, which includes *Bio Watch* and *Questions*.


[MCE Cambridge IGCSE App]

You can download this App to your computer or mobile device. Using this App, you can choose to project digital resources from *Bio Watch* on the screen for the class.

Ask and Answer

You can use suggested questions provided to prompt students and draw out their ideas and understanding. Answers to these questions are provided immediately for your easy reference.

Core/Supplement Differentiation

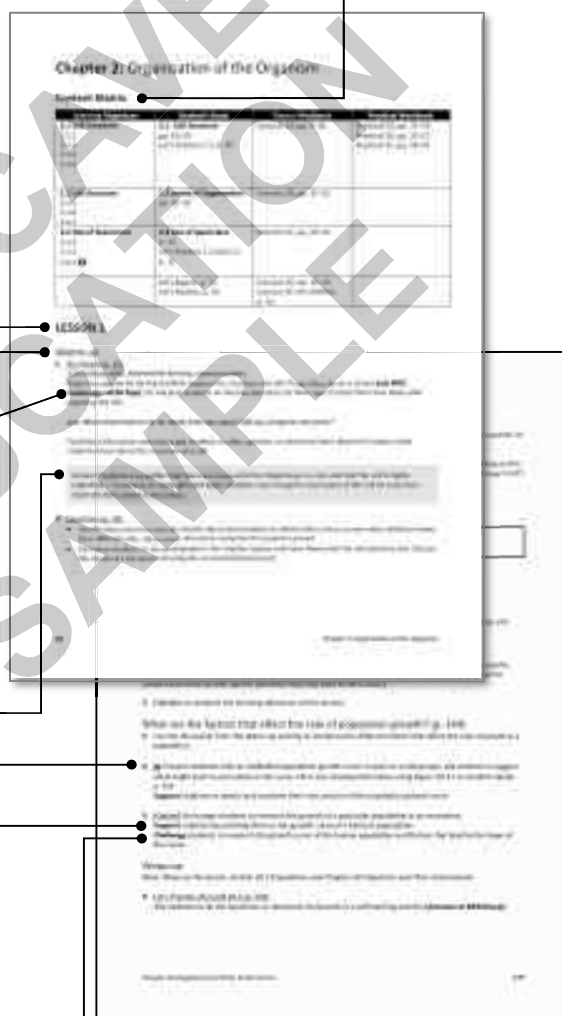
Supplement content is indicated using the icon  to differentiate it from Core content.

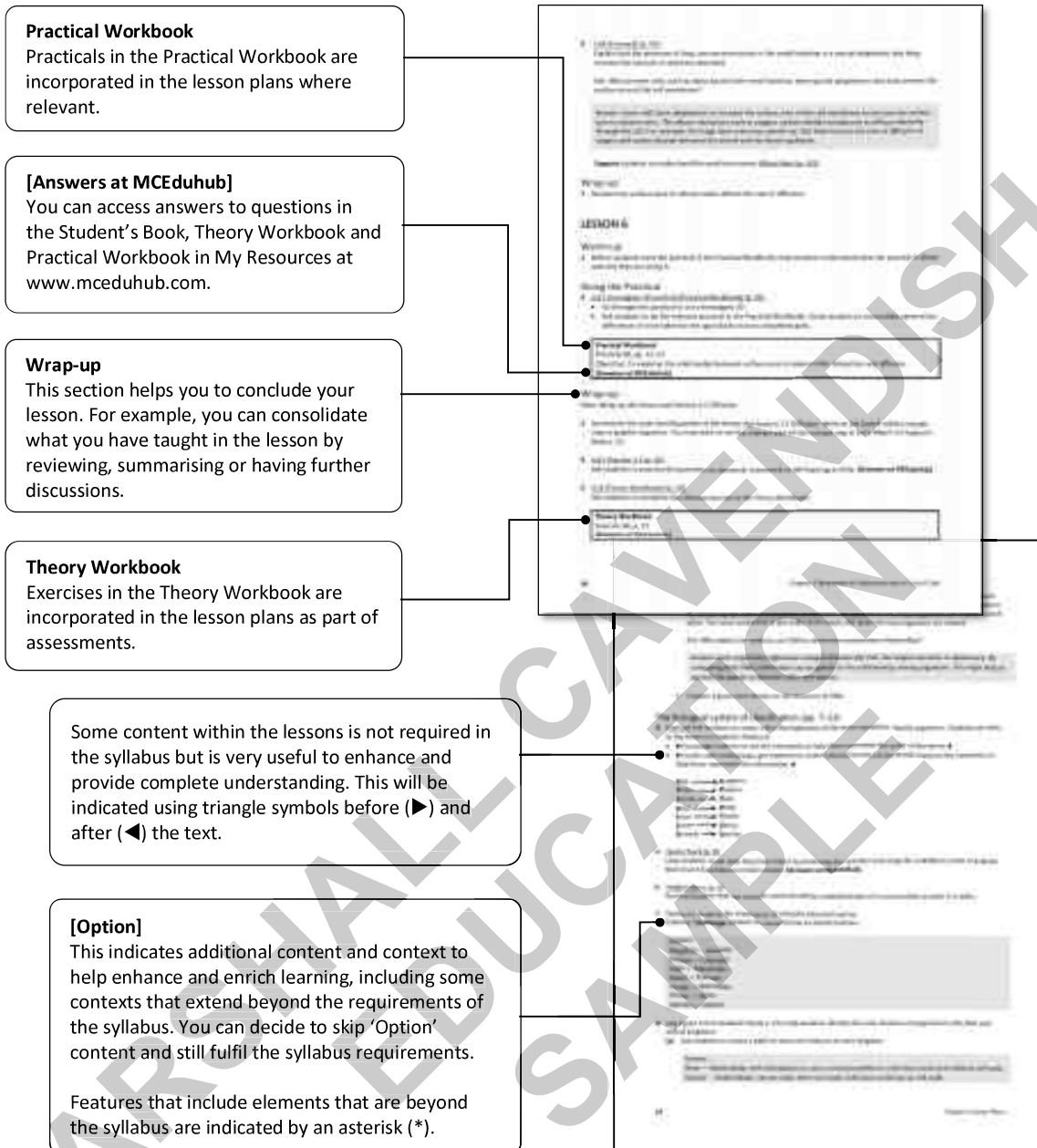
Support

This suggests ideas for you to facilitate understanding of the concepts to be learnt.

Challenge

This suggests ideas for you to challenge your students and foster a deeper understanding of the topic.





Additional Teacher's Resources

In addition, MCEduHub contains further teacher's resources as listed below:

- **Scheme of Work (SOW)** – in editable Word format
- **PowerPoint Slides** – covering key concepts, to support frontal teaching in the classroom or for online lessons
- **Question Bank** – providing you with an online resource of questions from the Student's Book and Theory Workbook, as well as some additional questions. Questions are in Word format, for easy editing and customisation.








These additional teacher's resources are not endorsed by Cambridge Assessment International Education.

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Chapter 1: Characteristics and Classification of Living Organisms

Content Matrix

Learning Objectives	Student's Book	Theory Workbook	Practical Workbook
1.1 Characteristics of living organisms 1.1.1	1.1 Characteristics of Life pp. 2–6 Let's Practise 1.1, p. 6	Exercise 1A, pp. 1–2	
1.2 Concept and uses of classification systems 1.2.1 1.2.5  1.2.2 1.2.3 1.2.4 1.2.6  1.2.7  1.3 Features of Organisms 1.3.1 1.3.4  1.3.2 1.3.5  1.3.3 1.3.6  1.3.7 	1.2 Classifying Living Organisms pp. 7–15 Let's Practise 1.2, p. 15	Exercise 1B, pp. 2–4	
	Let's Map It, p. 16 Let's Review, p. 17	Exercise 1C, pp. 5–6 Exercise 1D Let's Reflect, p. 7	

LESSON 1

Warm-up

1 Bio Watch (p. 1)

21st century skills: information literacy, communication

Begin the chapter by having students watch a clip about the *Lithops* plant. Project the clip on a screen [via MCE Cambridge IGCSE App]. Do not give students an introduction first. Let them start to form their own ideas after watching the clip.

2 Questions (p. 1)

Use the discussion from the Bio Watch clip to lead students to think about what makes something a living thing. Start the discussion by writing 2 columns on the board, one headed “Robot” and another headed “Cat”, and asking students to name characteristics of each.

1.1 Characteristics of Life (pp. 2–6)

Note: Ask students to read Student's Book pp. 2–6. (If possible, this should take place as a pre-lesson activity, done outside of curriculum time, a day or two ahead of the lesson. This would allow students to think about the content and come up with specific questions they may want to ask in class).

3 Highlight to students the learning objectives of this section.

What is life? (p. 2)

- 4 Encourage students to share what they know about the word *biology*. Then use the section on Student's Book p. 2 to explain the meaning of the word to students.

Support students by drawing their attention to the breakdown of the word *biology* and what each part means: *Bio* means *living*, and *Logos* means *knowledge*, therefore *biology* means *knowledge of living things*.

Ask: Why do biologists study organisms? What is the organism made up of? Where does it live and why? How does the organism interact with other organisms?

Answer: Biologists study the life of organisms on Earth. Understanding how one organism lives could help us understand how other organisms live. By building up information such as the similarities and differences between different organisms, we can learn more about the living world. It is also important to understand how organisms interact so we can make judgements about the consequences of changes that happen to each type of organism. Without asking these questions, we might end up increasing the volume of work we do and slowing down our progress of discovery.

What are the characteristics of life? (pp. 2–6)

- 5 Help students recall what they know about the characteristics of living organisms and write all correct information on the whiteboard. You could do this as a list or a mind map.

(a) **[Option] Enrichment [Activity] (p. 2)**

21st century skills: information literacy, communication

Explain that all living organisms are made up of cells, while non-living objects are not.

- Bring samples of living and non-living things to the classroom.
- To introduce some fun, give students one minute to identify as many living and non-living things around the classroom and write them in two lists. Whoever has the most correct items on his or her list, wins! Then, ask students individually to create a list of characteristics the living things share.
- Remind students that all the characteristics of life must be considered when distinguishing between a living organism and non-living matter.

Ask: What general headings do all the characteristics of living things fall under? Do non-living things show any of these characteristics?

Possible answers:

- Extract ideas about living things, e.g., that they can move. Discuss how plants grow towards light and how some flowers open and close at different times, which is considered movement.
- Non-living things can demonstrate some similar characteristics to living things but they will not demonstrate **all** characteristics of living things. For example, a non-living thing will never reproduce.

(b) **[Option]** Ask students to work in pairs or small groups to create a colourful and engaging poster illustrating the different characteristics of life.

Encourage students to list the characteristics of life and summarise what each characteristic means.

Ask students to create the poster using the mnemonic *MRS GREN* (some students might have come across this before as *Mrs Nerg* — it does not matter which way students remember it.).

Movement

Respiration

Sensitivity

Growth (and development)

Reproduction

Excretion

Nutrition

Support students by directing students to the sub-headers on pp. 2–6 in the Student's Book to help them complete this task.

- (c) **Support** students to understand the word *dehydrate* [Word Alert (p. 3)].
- (d) Link [Forward] (p. 3)
Encourage students to discuss about excretion and excretory products, encouraging students to suggest the organs involved. Highlight link to Chapter 13.
- (e) Quick Check (p. 3)
Help students recall what they have learnt by answering the question and using the confidence meter to indicate their level of confidence in their answer. [**Answers at MCEduHub**]
- (f) **Support** students to understand the term *dry mass* [Word Alert (p. 4)].

Wrap-up

What are the differences between a living organism and non-living matter? (p. 6)

- 6 Explain how to distinguish between a living organism and non-living matter.
- 7 Let's Practise 1.1 (p. 6)
Ask students to work on question 1. For question 2, ask prompt questions to get a summary from the class of the main learning points of the lesson. Write on the board using a concept map or graphic organiser. [**Answers at MCEduHub**]
- 8 Link [Theory Workbook] (p. 6)
Ask students to complete the relevant exercise in the Theory Workbook.

Theory Workbook Exercise 1A, pp. 1–2 [Answers at MCEduHub]
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LESSON 2

Warm-up

- 1 Help students recall what they have learnt about the characteristics of life in the previous lesson.
Ask: What are the eight different characteristics of life?
[Option] **Challenge** students by asking them to explain what each characteristic means and give examples.
Support students by reminding them of the mnemonic MRS GREN.

Answer: MRS GREN — movement, respiration, sensitivity, growth (and development), reproduction, excretion, nutrition

1.2 Classifying Living Organisms (pp. 7–15)

Note: Ask students to read Student's Book pp. 7–15. (If possible, this should take place as a pre-lesson activity, done outside of curriculum time, a day or two ahead of the lesson. This would allow students to think about the content and come up with specific questions they may want to ask in class).

- 2 Highlight to students the learning objectives of this section.
- 3 **How is classification useful? (p. 7)**
- 3 Help students recall what they have learnt about classification and write all correct information on the whiteboard. You could do this as a list or a mind map.
- (a) **Support** students to understand the word *evolutionary* [Word Alert (p. 7)].

(b) Link [Forward] (p. 7)

- Invite students to share what they know about DNA and write all correct information on the whiteboard. Explain that DNA is made up of four different bases arranged in specific orders depending on the organism. By comparing the order and sequence of the bases, we can look to see if two organisms are related to each other. The more similarities in the order of the bases, the closer the two organisms are related.

Ask: Why might it be useful to use DNA to determine evolutionary relationships?

Answer: Some organisms might have changed dramatically from the original ancestor in appearance. By comparing their DNA, information can be gained on the relationships among organisms. This might help us protect the species or discover other new species.

- Chapter 4 gives more details on the structure of DNA.

The biological system of classification (pp. 7–13)

4 [Option] Ask students to create a Key Word glossary of the terms needed to classify organisms. Students can refer to the terms on Student's Book p.8.

- ► Encourage students to use the mnemonic to help them remember the order of the terms.◀
- ► In pairs and small groups, get students to create colourful posters of key words based on the mnemonic to help them remember this information.◀

Kids → Kingdom
Prefer → Phylum
Candy → Class
Over → Order
Fried → Family
Green → Genus
Spinach → Species

5 Quick Check (p. 8)

Help students recall what they have learnt by answering the question and using the confidence meter to indicate their level of confidence in their answer. **[Answers at MCEduHub]**

6 Helpful Notes (p. 8)

Remind students that the scientific name should be underlined when it is not possible to write it in italics.

7 Explain to students the importance of using the binomial system.
[Option] ***Challenge** students to research how to classify humans.

Answer:

Kingdom — Animalia
Phylum — Chordata
Class — Mammalia
Order — Primate
Family — Hominidae
Genus — *Homo*
Species — *sapiens*

8 Use Figure 1.9 on Student's Book p. 9 to help students identify the main features of organisms in the plant and animal kingdoms.

(a) Ask students to create a table to show the features of each kingdom.

Answer:

Plant — Multicellular with chloroplasts to carry out photosynthesis; Cells have nuclei and cellulose cell walls.
Animal — Multicellular; Cannot make their own food; Cells have nuclei but no cell walls.

- (b) **S** [Option] Ask students to research features of fungi, protocista and prokaryote and add them to the table.

Answer:

Fungi — Multicellular and live on dead matter on which they feed; Cells have nuclei and chitin cell walls.

Protocista — Mostly unicellular; Cells have nuclei and some have cell walls not made from chitin.

Prokaryote — Unicellular; Cells have flexible cell walls and do not have nuclei.

- (c) **L** [Forward] (p. 9)

Encourage students to discuss about organelles, encouraging students to suggest how these might differ in plant, animal and bacterial cells. Highlight the link to Chapter 2.

Wrap-up

- 9 Ask prompt questions to get a summary from the class of the main learning points of this lesson. Write on the board using a concept map or graphic organiser.

LESSON 3

Warm-up

- 1 Revise with students the biological system of classification and the main features of plants and animals covered in the previous lesson.

The biological system of classification (pp. 7–13) (continued)

- 2 **S** Explain to students what viruses are.

Share with students a diagram of a virus. Ask students to label the protein coat and genetic material.

Support students with the labelling using information on Student's Book p. 10.

Have a class discussion about why a virus is not considered a living organism.

Ask: Why is a virus not considered a living organism?

Answer: Viruses are not made of cells. They need a host cell to grow or reproduce therefore they do not show all the characteristics of a living organism.

- 3 **S** Go through the classification of plants with students.

Use Table 1.2 on Student's Book p. 11 to identify the key features needed to classify organisms within the plant kingdom.

- 4 Explain what are arthropods (which are invertebrates) and vertebrates. Use Figures 1.19 and 1.20 on Student's Book pp. 12–13 to identify the key features needed to classify organisms within the animal kingdom.

Wrap-up

- 5 (a) **L** [Option] **Bio Watch** (p. 13)

21st century skills: information literacy, communication

Have students take a short quiz on the characteristics and classification of living organisms. Project the quiz on a screen [via **MCE Cambridge IGCSE App**].

- (b) **L** [Option] Provide samples of different plants and animals — these could be living or dead samples or photos.

- Students apply their knowledge from Student's Book pp. 9–13 to classify the samples as animal or plant with reasons.

- **S** Classify the fungi, protocists or prokaryotes with reference to Student's Book p. 9.

LESSON 4

Warm-up

- 1 Encourage students to share what they know about the biological system of classification.
Ask: What is the biological system of classification? Name the order starting with Kingdom.
[Option] ***Challenge** students to explain each level of the classification system. Ask them to give an example.
▶**Support** students by reminding them of the mnemonic **Kids Prefer Candy Over Fried Green Spinach**.◀

Answer:

Kids → Kingdom
Prefer → Phylum
Candy → Class
Over → Order
Fried → Family
Green → Genus
Spinach → Species

How do we construct and use a dichotomous key to identify organisms? (pp. 14–15)

- 2 Share with students an example of a dichotomous key and discuss how the key can be used to identify organisms. Write all correct information on the whiteboard. You could do this as a list or a mind map.
- 3 [Option] Enrichment [Activity] (p. 15)
21st century skills: information literacy, communication
 - (a) Explain the importance of classifying organisms based on their observable features.
 - Ask one student to pick one of the animals from Figure 1.22 on Student's Book p. 15. They do not tell you which one.
 - Ask the student the questions on the dichotomous key to identify the animal.
 - (b) Provide students with pictures of the following animals: giant panda, Bengal tiger, Asian elephant, Komodo dragon, king cobra, bull shark. Ask students to create a dichotomous key based on the observable features of each animal.
 - (c) Ask students to exchange their key with a classmate to check if it works.
 - (d) Encourage students to explore the reasons why some keys worked and why some did not.

Ask: Did the keys work? If they did work, what other animals could be included in the key? If they did not work, why did they not work and what needs to be done to make them work?

Answer: If the keys work, this shows the importance of using dichotomous keys in identifying organisms. The keys may not work if the student has failed to observe a characteristic present in two animals or the student has not picked questions that distinguish the animals by observable characteristics. This will make sure students are able to understand and observe key traits in the different animals.

- 4 Let's Practise 1.2 (p. 15)
Ask students to do the questions as classwork, homework or self-learning activity. **[Answers at MCEduHub]**
- 5 Link [Theory Workbook] (p. 15)
Ask students to complete the relevant exercise in the Theory Workbook.

Theory Workbook
Exercise 1B, pp. 2–4
[Answers at MCEduHub]

Wrap-up

Note: Wrap up this lesson and Chapter 1 Characteristics and Classification of Living Organisms.

6 Let's Map It (p. 16)

- (a) Refer to the end-of-chapter mind map. As this may be the first time students are encountering a mindmap, introduce the concept and its benefits.

- (b) Summarise the key concepts of the chapter by pointing them out in the map. Be sure to spend as much time explaining the interrelationship between concepts as revisiting concepts. Ask students if there are areas that should be expanded into their own mini mind-maps. If these topics have been mapped by students during a Let's Practise exercise, pick a few to display and discuss the differences between individual maps.

7 Let's Review (p. 17)

Ask students to complete the questions to review their understanding of the chapter. **[Answers at MCEduHub]**

8 Link [Theory Workbook] (p. 15)

- Ask students to complete the relevant exercise in the Theory Workbook.

Theory Workbook

Exercise 1C, pp. 5–6

[Answers at MCEduHub]

- Ask students to reflect on their learning by completing the Let's Reflect exercise in the Theory Workbook. Encourage students to write and share their thoughts.

Theory Workbook

Exercise 1D Let's Reflect, p. 7

For over 60 years Marshall Cavendish Education has been empowering educators and students in over 80 countries with high-quality, research-based, Pre-K-12 educational solutions. We nurture world-ready global citizens by equipping students with crucial 21st century skills through our resources for schools and education centres worldwide, including Cambridge schools, catering to national and international curricula.

The *Marshall Cavendish Education Cambridge IGCSE™ Biology* series is designed for students preparing for the Cambridge IGCSE and IGCSE (9–1) Biology syllabuses (0610/0970). The series translates insights from educational psychology classic “How People Learn” into highly effective learner-centred classroom practices.

TG The **Teacher’s Guide** contains step-by-step lesson plans to support teachers. The lesson plans include suggestions for classroom activities and discussions. Warm-up and wrap-up activities are provided to stimulate discussion and check understanding, while the challenge and support features provide for differentiated instruction.

Answer keys to questions in the Student’s Book, Theory Workbook and Practical Workbook are available in My Resources at www.mceduhub.com.



This resource is endorsed by
Cambridge Assessment International Education

- ✓ Provides teacher support for the Cambridge IGCSE and IGCSE (9–1) Biology syllabuses (0610/0970) for examination from 2023
- ✓ Has passed Cambridge International’s rigorous quality-assurance process
- ✓ Developed by subject experts
- ✓ For Cambridge schools worldwide

Series architecture

- Student’s Book
- Theory Workbook
- Practical Workbook
- Teacher’s Guide
- e-book

