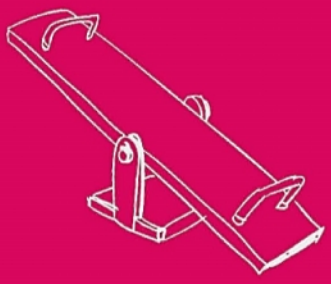
CAMBRIDGE

Teacher's Book

# Science Path 5

Better Learning

# WELCOME TO CAMBRIDGE SCIENCE PATH

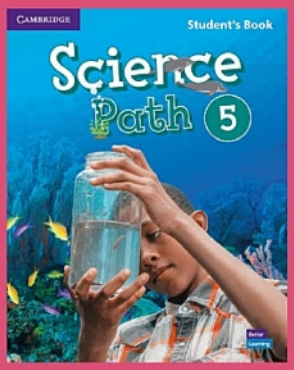


## Course objectives

- *Cambridge Science Path* takes students on a journey as they discover the wonders of biology, chemistry, and physics. Students are introduced to topics at a manageable pace, so they can engage with, enjoy, and fully assimilate new concepts.
- Students learn about and cement their understanding of new concepts through **projects**. There is an *Investigate* project that runs through each unit, in which students review and expand upon the concepts presented in the unit. Each individual stage of the *Investigate* project feeds into the project finale, in which students present or produce something to demonstrate their understanding of the topic.
- Students also engage with Science in a **hands-on** way by conducting **experiments**. This practices **critical-thinking skills** and promotes collaborative learning.
- Students learn about new concepts through discovery. In *Cambridge Science Skills*, **learner autonomy** is encouraged through the inclusion of interesting facts and thought-provoking questions. Our aim is for students to be inspired by the fun and wondrous world of Science.
- **Collaborative learning** is also encouraged through the *Investigate* projects that students carry out in pairs, in groups, and as a class.
- The course provides students with the **linguistic support** that they require to study Science in a second language. The course helps students develop their speaking, listening, reading, and writing skills. The unit projects give students practice of a range of skills and sub-skills.
- *Cambridge Science Skills* provides students with practice of the **Cambridge English Qualifications for young learners**. Level 5 provides practice of *Pre-A1 Starters* question types.
- **Mixed-ability assessment** provides teachers with support for students of different levels within the same class. They focus on lower- and higher- order thinking skills, as well as critical thinking.
- *Cambridge Science Path* aims to help students develop the following key competences: linguistic competence; mathematical competence and basic competences in science and technology; digital competence; learning to learn; social and civic competences; initiative and entrepreneurship; and cultural awareness and expression.

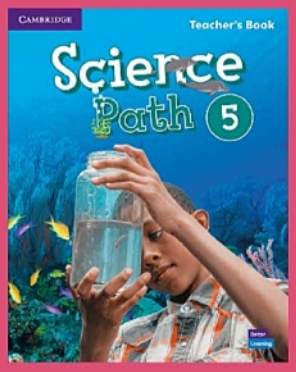
## Course components

**Student's Book:** each unit includes a project, experiments, mixed-ability assessment and practice of the Cambridge English Qualifications for young learners.



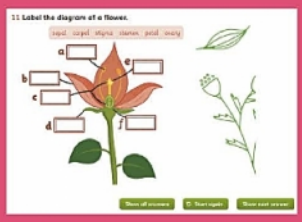

**Class audio:** provided through Presentation Plus, as well as being available to download at www.cambridge.org/scienceaudio.

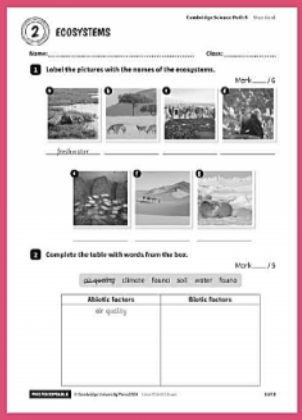
**Teacher's Book:** includes useful suggestions for activities at each stage of the lesson, answer keys, audio scripts, and track numbers for the audio.



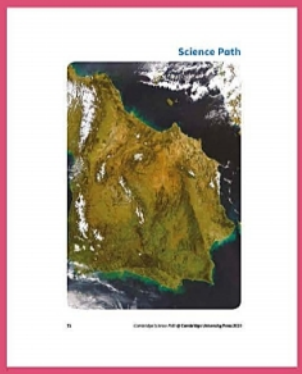

**Science Path Presentation Plus:** includes an interactive, digital version of the Student's Book with a variety of features to help students cement their understanding of key concepts:

- flashcards in digital format
- answer keys
- audio with scripts available
- mixed-ability tests
- documentary videos for each unit to engage students in a visual way and allow them to see Natural Science in action!






**Classroom materials:** include posters and a full bank of flashcards to be used across levels. The posters consolidate learning by helping students engage with Science vocabulary and concepts in the classroom.



# WELCOME UNIT
## PAGES 4–5

### Objective

**Student will be encouraged to ask questions about everyday surroundings, seek answers to those questions and understand the scientific method as a means of problem solving.**

### Key vocabulary

conclusion, experiment, hypothesis, prediction, problem, question, result, science, scientific method, scientist, solve

### Warm up

- Elicit answers to the question: *What is Science?* Create a word cloud on the board.

### Main concepts

- Read about the scientific method. Elicit questions students wonder about. Question examples: *I wonder how we could keep the classroom warmer? How does an eraser work? What would happen if there was no sunlight?*
- Choose a question to work through the scientific method together, explaining each step.

Science is the study of the physical world, which helps us to understand the things around us.

Students' own answers. Focus on classroom objects, activities, and students' bodily functions.

*A2 Key for Schools* Listening Part 1 Hairdresser



Which picture is being described? Listen and guess. 03


Look around you. Where is science being used?


**Welcome to the amazing world of science!**
**In this book, you will:**

- do a presentation on an ecosystem.
- create and promote your own nature reserve.
- create a plan to save energy at home.
- design a campaign warning about the risks of too much energy.
- design and build a board game.

5

1. Bungee jumping – applying the laws of physics for safety
2. Rock band – using sound energy to entertain people
3. Architect – applying the laws of physics and engineering
4. Chef – using chemistry to make tasty food
5. Scientist – using knowledge of biology and ecosystems
6. Children playing – using mechanical energy and physics to score goals
7. TV set – using technological inventions to provide entertainment
8. Hairdresser – using chemistry to dye hair
9. Sailboat – using wind energy to move

## Learn more

- Refer to the table of contents in the Student's Book. Students think of a question they want answered during the school year. They write it on a piece of paper and decorate it. Display the questions around the classroom. At the end of the year, allow students to reflect on their question and write the answer.

## Tip

**Introduce concepts over one or two lessons. Spend time getting students excited about science and the upcoming experiments. Emphasize the omnipresence of science in our daily lives.**

**Track 02**
Page 4, *What is Science?*

**Track 03**
Page 5, Listening activity

# 1 LIVING THINGS

## Learning objectives

By the end of this unit, students will have achieved a greater understanding of the following concepts:

- the characteristics of living things
- the internal organization of living things
- how living things are classified into kingdoms.

## Competences

This unit covers the following competences:

- Linguistic competence
- Mathematical and basic competences in science and technology
- Digital competence
- Learning to learn
- Social and civic competencies

## Key vocabulary

**Cell structure:** animal cell, cell, cell membrane, cell wall, chloroplast, cytoplasm, nucleus, plant cell, rigid, structure, vacuole

**Organisation:** cell, function, individual, multicellular, organ, organism, structural, system, tissue, unicellular

**Classification:** alga, Animal, bacteria, bacterium, classify, dichotomous key, Fungus, living, identify, invertebrate, kingdom, Monera, Plant, Protist, protozoon, taxonomist, vertebrate

**Other:** hypothesis, nutrition, specialized

## Cambridge English Qualifications practice

You will find ***A2 Key for Schools*** activity types in the following exercises:
Student's Book, Page 13 – Listening Part 2
Student's Book, Page 17, Activity 1 – Reading and Writing Part 4

Throughout this unit, you will find the following ***A2 Key for Schools*** vocabulary:
animal, believe, bird, belong, blood, body, collect, dangerous, heart, improve, interesting, scientist, wild, wonderful

Throughout this unit, you will find the following ***B1 Preliminary for Schools*** vocabulary:
avoid, disease, energy, exception, individual, ordinary, provide, support

## Materials needed for *Find out more*

- balloons
- shoe boxes

## Materials needed for other activities

- construction paper
- art materials for posters
- counters
- creative materials for cell structures
- dice
- examples / pictures of living and non-living things
- modeling clay
- non-living objects with characteristics of living things
- pictures of different organisms from the five kingdoms
- pre-made body organization game cards, one per student
- sticky notes

## *Explore*

The *Explore* project encourages students to research an organism of their choice and to describe their chosen organism in detail. Students will present their research to their classmates and produce a page, which will contribute to a class book. The different *Explore* stages focus on the following skills:

- producing accurately labeled diagrams
- using bullet points to convey scientific facts succinctly
- autonomous research
- preparing an information poster
- giving a presentation.

## Other resources

- Interactive activities
- Flashcards: *Living things*
- Song: *Cells, tissues, organs, systems*
- Video documentary: *Living or non-living?*

# UNIT 1
## PAGES 6–7

### Objective

**Students will be introduced to the five kingdoms of classification and prior knowledge of living and non-living things will be activated.**

### Key vocabulary

Animal, bacteria, Fungus, kingdom, living, Monera, organism, Plant, Protist

## Warm up

- On the board write: *bread mould, elephant, grass, green algae* and *rock*. Compare and contrast these items as a class. Ask: *Which ones are living? Which ones are non-living? How do we know?*
- In teams of four, students list as many living and non-living things as they can in three minutes.

## Main concepts

- Stimulate previous knowledge by asking students to name the five kingdoms of living things, if they can, and give examples. Write the kingdoms on the board. Students ask and answer the questions in pairs. Refer to the linguistic support in the speech bubbles and explain that they will be looking at kingdoms later in the unit.
- Discuss and identify the characteristics of living things. Check understanding by asking students to classify pictures and give reasons for choices.


Movement; respiration; reproduction; growth; sensitivity (or response); nutrition (or use of energy); excretion

***For next lesson...*** modeling clay, creative materials for cell structures

## Learn more

- *The Search for Life* game: Students are extra-terrestrials who must find living food to eat. Students move in small groups through different stations, correctly identifying living things from non-living things. They should review the seven characteristics and focus on properly forming questions with the auxiliary verb *do* / *does*.
- Refer back to the warm-up activity and the list of living and non-living things on the board. Did students classify them correctly? Can they classify them into kingdoms?

**Song**

This song focuses on body organization. It can be used on page 11. You could try using an action activity with the song.

**Documentary**

The documentary explores the characteristics of living and non-living things. It can be used after discussing the seven characteristics of living things. You could try having students call out *living* or *non-living*, and the characteristic with the video.

## Tip

**Show different non-living objects that have characteristics of living things and discuss these as a class (for example, melting ice and moving toys).**

# UNIT 1
# PAGE 8

## Objective

**Students will learn to identify and describe the structural features of a cell and the difference between animal and plant cells.**

## Key vocabulary

cell, cell membrane, cell wall, chloroplast, cytoplasm, nucleus, vacuole

## Warm up

- Students identify the objects in the pictures. Read the introduction. Explain that they will now focus on cells within living things.

## Main concepts

- Students imagine a cell is an individual organism. Ask: *What functions must a cell carry out to survive?* Write ideas on the board. Students match the functions to cell structures.
- Students copy the cell illustrations and label them. To revise, they cover the labels with sticky notes.

## Learn more

- Students build a cell model using modeling clay and creative materials. They should add labels and present their model to a partner.
- Students play a guessing game in pairs. They take turns to describe cell structures while their partner guesses the name of the structure.

Cells are made up of many different components including: nucleus, cell wall, cell membrane, vacuole, cytoplasm, chloroplast.

A plant

## WHAT ARE CELLS MADE UP OF?

05

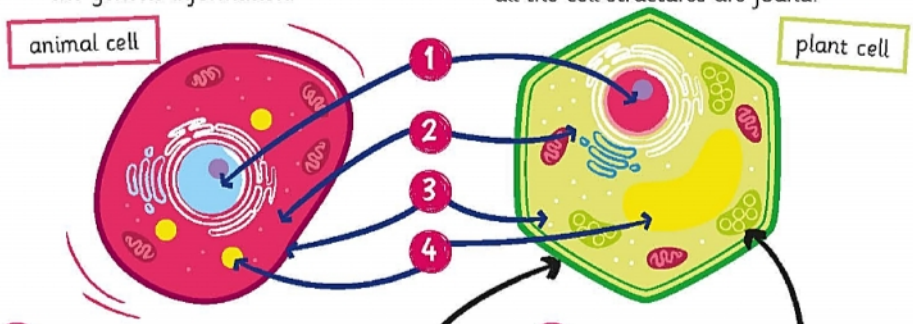
**Discover ...** what the jelly-like substance inside a cell is called.

All living things are made up of **cells**. Although we can only see them with a microscope, they are very important.

The cells on the far left are human cheek cells. Can you guess what type of organism these cells belong to?

**Cells** may look very different from one another, but they have several similar characteristics and structures.

1. **Nucleus:** controls what happens inside the cell and contains all the genetic information.
2. **Cytoplasm:** jelly-like substance that helps give the cell shape and is where all the cell structures are found.




3. **Cell membrane:** controls the movement of substances in and out of cells.

**Cell wall:** gives structural support to the cell.

4. **Vacuole:** a storage space for the cell.

**Chloroplasts:** help the plant make food from sunlight and water.

Find out about other structures within a cell. What jobs do they do?

8

Example answers:
mitochondria – provides energy; ribosome – makes proteins; vesicle – small compartments that help with nutrition and excretion; rough endoplasmic reticulum – creates enzymes for the cell; Golgi apparatus – packages proteins into vesicles; smooth endoplasmic reticulum – where lipids are made; lysosome – where digestion takes place; nucleolus – where ribosomes are made

***For next lesson...*** shoe boxes

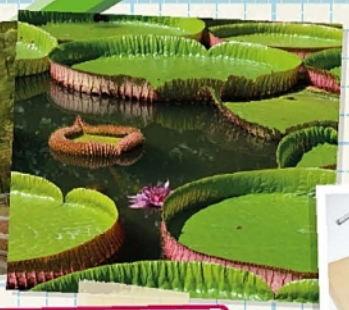
For support. They do not have an internal skeleton like some other living things, so the cell wall enables them to grow taller.

Balloons represent cell membranes. Shoe boxes represent cell walls.

# WHY DO PLANT CELLS HAVE A RIGID WALL?

## Hands on!

By the end of this lesson, you will be able to describe the features of a cell and differentiate plant and animal cells.



**Background**
There are some similar structures in animal and plant cells, but only plant cells have a cell wall.

**Hypothesis**
Why do plant cells have a cell wall? Write your hypothesis in your notebook.

**Materials**
eight balloons, four shoe boxes

**Method**
1 Blow up the balloons (not too big). Put one balloon in each shoe box and leave the rest out.

2 Build two towers, one using only the balloons and the other using the shoe boxes with balloons inside.

**Conclusions**
What is the function of a plant cell wall?

**Reflect 1**
What do the balloons represent? What do the shoe boxes represent?

**Reflect 2**
Which tower is easiest to build?

Animal cells don't have a cell wall. Compare the human body with a tree. What does the human body have to help with support that a tree doesn't?



Structure and support

A skeleton
(Remind students to use the linguistic support feature when phrasing answers.)

The shoe box tower
(plant cells with a cell wall)

# UNIT 1
# PAGE 9

## Objective

**Students will learn about the function and importance of cell walls through experimentation, using the scientific method.**

## Key vocabulary

animal cell, cell wall, hypothesis, plant cell, provide, rigid, structure, support

## Warm up

- Students read the background information and then discuss the possible functions of a cell wall.

## Main concepts

- Ask: *What is the opposite of rigid?* Elicit *flexible*. Discuss if it is easier to build with rigid materials or flexible ones, giving examples like houses and bridges.
- Remind students that a hypothesis is a guess. They should not worry about a right or wrong answer.

## Learn more

- Students find out about the tallest trees on Earth, Giant sequoias. Alternatively, they can find out about the tallest animals and make comparisons with the Giant sequoia.
- Students learn a chant: *Cell walls, cell walls, what do they do? Cell walls, cell walls, support is what they do!*

# UNIT 1
## PAGES 10–11

### Objective

**Students will learn to identify and describe the principle characteristics and functions of cells, tissues, organs and systems.**

### Key vocabulary

cell, function, individual, multicellular, organ, organism, structural, system, tissue, unicellular

## Warm up

- In pairs, students name the different parts of their bodies, reminding them to include their insides. Ask: *What is the smallest functional part in their body?* Elicit *cell*.

## Main concepts

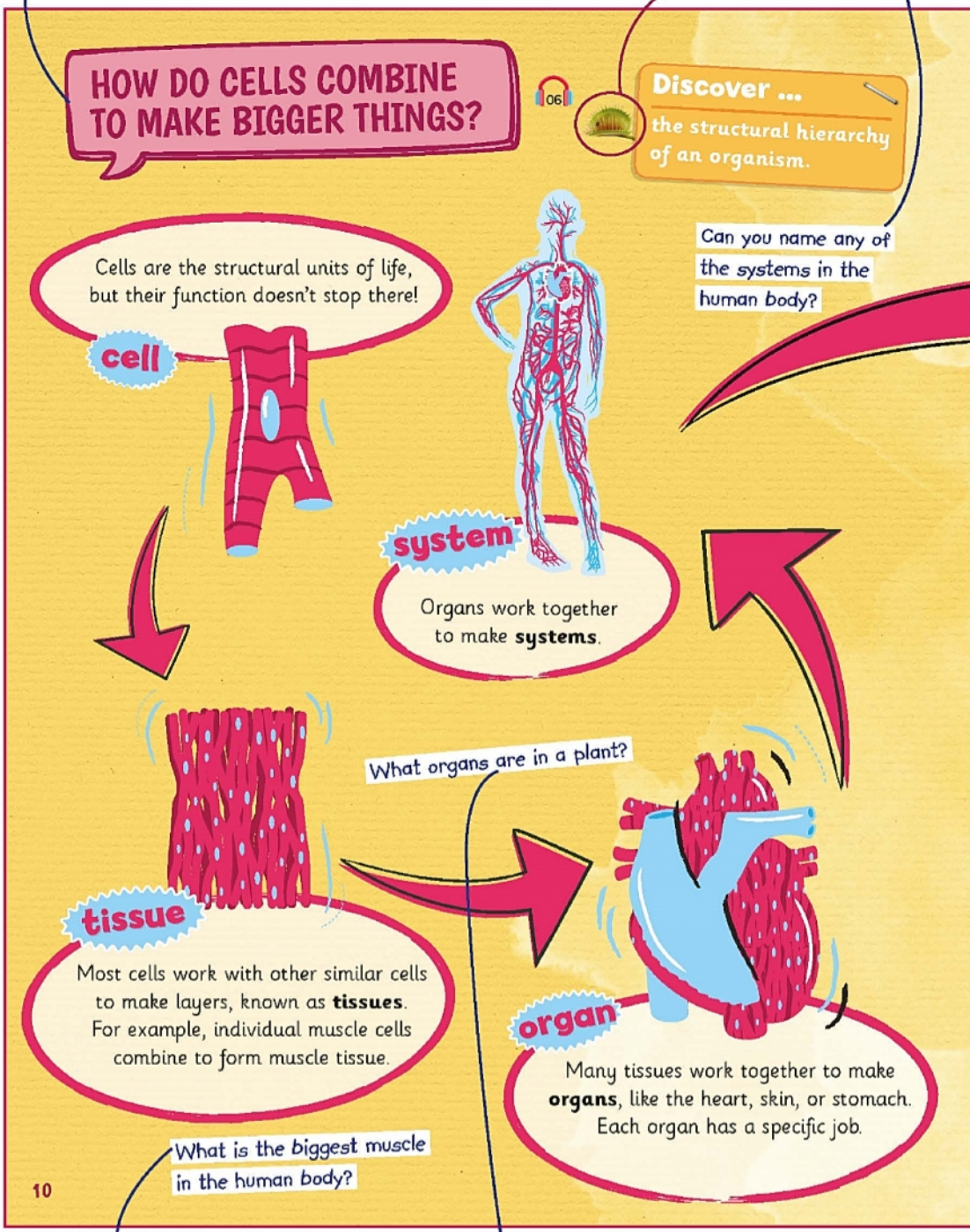
- Students should think of their body as a machine, with lots of different parts. Each part performs a specific job, but all the parts work together to perform an overall function. Students make up actions for *cells*, *tissues*, *organs*, and *systems* to do while they sing.
- *What's this?* game: Give each student a card with a picture of body organization from different species. The word (*cell*, *tissue*, etc.) should be written on the back. Students move around and show the picture to another student asking *What's this?* and *How do you spell it?* If the student answers correctly, they move on. If not, they exchange cards.



Cells are the building blocks of all living things. Cells combine to make tissues. Tissues combine to make organs. The organs work together to make systems. All the systems together make a living thing.

Circulatory; respiratory; nervous; digestive; excretory; endocrine; immune; integumentary; skeletal; muscle; reproductive

Here's the hidden object!




The gluteus maximus, or the buttocks

Leaves; roots; stems; flower; fruit