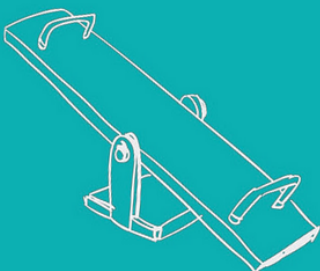
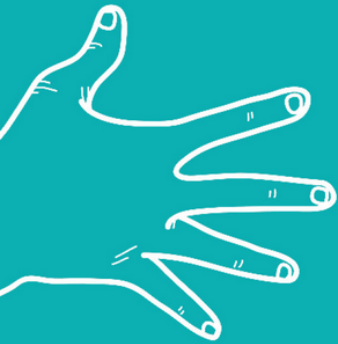






# WELCOME TO CAMBRIDGE SCIENCE SKILLS



## Course objectives

- *Cambridge Science Skills* takes learners on a journey as they discover the wonders of biology, chemistry and physics. Pupils are introduced to topics at a manageable pace, so they can engage with, enjoy and fully assimilate the new concepts.
- Pupils learn about and cement their understanding of new concepts through **projects**. There is an *Explore* project that runs through each unit, in which pupils review and expand upon the concepts presented in the unit. Each individual stage of the *Explore* project feeds into the project finale, in which pupils present or produce something to demonstrate their understanding of the topic.
- Pupils also engage with Science in a **hands-on** way by conducting **experiments**. This practises **critical-thinking skills** and promotes collaborative learning.
- Pupils 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 pupils to be inspired by the fun and wondrous world of Science.
- **Collaborative learning** is also encouraged through the *Explore* projects, which pupils carry out in pairs, in groups and as a class.
- The course provides pupils with the **linguistic support** that they require to study Science in a second language. The course helps pupils develop their speaking, listening, reading and writing skills. The unit projects give pupils practice of a range of skills and sub-skills.
- *Cambridge Science Skills* provides pupils with practice of the **Cambridge English Qualifications for young learners**. Level 6 provides practice of *B1 Preliminary for Schools* question types.
- **Mixed-ability assessment** provides teachers with support for pupils of different levels within the same class. They focus on lower- and higher-order thinking skills, as well as critical thinking.
- *Cambridge Science Skills* aims to help pupils develop the following key competences: linguistic competence; mathematical competence and basic competences in science and technology; digital competence; learning to learn; social and civic competencies; initiative and entrepreneurship; and cultural awareness and expression.

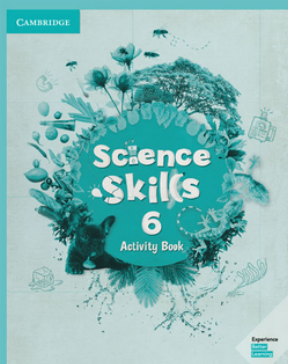


## Course components

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



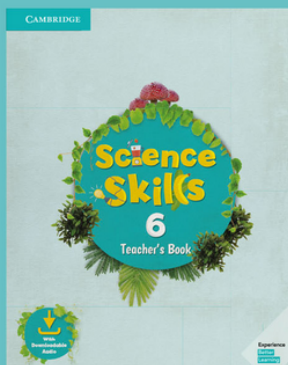
**Activity Book:** each unit includes activities that consolidate and expand upon the concepts introduced in the Pupil's Book, practice of the Cambridge English Qualifications for young learners and a bilingual glossary.



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



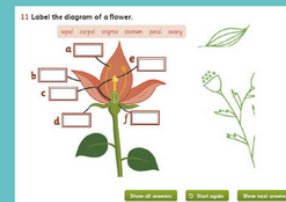
**Teacher's Book:** includes useful suggestions for activities at each stage of the lesson, answer keys, audio scripts and track numbers for the audio.



### Science Skills Presentation Plus

includes an interactive digital version of the Pupil's Book with a variety of features to help pupils cement their understanding of key concepts:

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



### Classroom materials:

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





# WELCOME UNIT

## PAGES 4–5

### Objective

Pupils will be encouraged to reflect on the usefulness of science and learn about scientists who have contributed to the improvement of our society.

### Key vocabulary

curiosity, discover, experiment, famous, important, improve, scientist

### Warm up

- Make two lists on the board. On the left-hand side write: *Scientists* (header), *Buck*, *Hodgkin*, *Franklin*, *Curie*, *Pasteur* and *Ørsted*, and on the right-hand side write: *Contributions* (header), *fermentation*, *DNA structure*, *understanding our sense of smell*, *connected electricity to magnetism*, *structure of penicillin*, *radium*. Ask if any of the information is familiar and discuss pupils' responses. Afterwards, they should match the scientist with their contribution to science.

### Main concepts

- Discuss the topics pupils will study this year (body systems, reproduction, mixtures, chemical reactions, electricity, magnetism). Elicit answers to questions about their scientific curiosity. Encourage pupils to write down what they are curious about.

See description on cards.

## WHO ARE THESE GREAT SCIENTISTS?

These scientists have used science to improve our lives, but science is easy for anyone to use, including you. The most important quality to have is curiosity!

Before reading the text, can you guess what each scientist did?

1

Linda B. Buck



She worked out how the receptors in our noses enable us to sense so many different smells. You should think of her the next time you smell something delicious!



Which scientist is being described? Listen and guess.

Did you know ... discovered ... ?

Their work was important because ...

4

2

Dorothy Crowfoot Hodgkin



She used X-rays to determine what certain molecules look like, e.g. penicillin, vitamin B12 and insulin.

3

Rosalind Franklin



She carried out the first X-rays of genetic material, which allowed other scientists to discover the structure of DNA. Now we know that DNA is arranged in a spiral!

PET Listening Part 1.

Dorothy Crowfoot Hodgkin



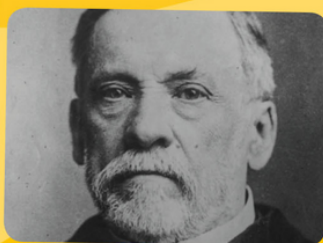
4

**Marie Curie**

She discovered and studied the radioactive elements radium and polonium. These became important in other scientific experiments and in medicine, to treat tumours.



5

**Louis Pasteur**

The vaccines he developed have saved many lives and protected millions of people. He found ways to make our food safer to eat.

6

**Hans Christian Ørsted**

He demonstrated the relationship between electricity and magnetism, using an electrical circuit to move a magnetised compass needle. This is now known as the Ørsted experiment and it's so easy you can do it at home!

**You!**

Starting with the fascinating topics you will learn about this year, how can you use your curiosity to contribute to science?

Can you name any other famous scientists?

What discoveries have they made?

5

Example answers: Albert Einstein, theory of relativity; Isaac Newton, gravity; Galileo Galilei, astronomer/inventor; Charles Darwin, evolution; Linnaeus, botany; Stephen Hawking, general relativity; Gregor Mendel, genetics

- Read about the scientists and how they have improved our lives.
- Play the audio for the listening activity. Discuss the reasons for pupils' answers.
- In small groups, pupils create trading cards of famous scientists to share with classmates. They can create one with their own photo and ambition, too.

**Learn more**

- Have pupils create a mural of famous scientists. You can choose to focus on women in science or a specific field of science.
- Pupils can reflect on a discovery or a way in which a scientist has improved their life, then write a thank you letter to them.

**Tip**

**Introduce concepts over one or two lessons. Spend time getting pupils interested in scientists and how they have contributed to our society by placing photos or posters around the classroom.**

**Track 01**

Page 4, *Who are these great scientists?*

**Track 02**

Page 4, *Who are these great scientists?* Listening activity



# 1

## INTERACTION

### Learning objectives

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

- the characteristics of human interaction
- the organs and systems of the nervous system
- the organs and systems of the musculoskeletal system.

### Competences

This unit covers the following competences:

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

### Key vocabulary

**Senses:** hearing, receptors, sense organs, sight, smell, stimuli, stimulus, taste, touch

**Nervous system:** axon, brain, brain stem, central nervous system, cerebellum, cerebrum, dendrite, impulse, interneuron, involuntary, motor neuron, nerve, nervous system, neuron, peripheral nervous system, reflex, reflex arc, response, sense, sensory neuron, spinal cord

**Musculoskeletal:** abdominal, cardiac, contract, deltoid, effector, femur, humerus, fixed, flexible, gluteus, joint, muscle, musculoskeletal system, patella, pelvis, quadriceps, relax, ribs, scapula, semi-flexible, skeletal, skeleton, skull, smooth, spine

### Cambridge English Qualifications practice

You will find **B1 Preliminary for Schools** activity types in the following exercises:

Pupil's Book, Page 16, Activity 3 – Listening Part 3

Activity Book, Page 3, Activity 3 – Reading Part 4

Throughout this unit, you will find the following **B1 Preliminary for Schools** vocabulary:

activate, appreciate, athlete, contract, control, danger, fixed, flexible, indent, interact, interpret, involuntary, knee, react, reaction, receive, relax, respond, response, smooth, voluntary







## Materials needed for *Find out more*

- table or desk
- your hand

## Materials needed for other activities

- A4 card
- bag or box
- blind spot image test
- blindfold
- bowls
- cotton balls
- modelling clay
- noise maker
- photo of the patellar tendon
- poster paper roll
- rubbers
- sensory items for sense bag
- smell experiment: coffee, orange, vanilla, chocolate, boiled egg, etc.
- taste test: sugar, mint candy, honey, pickles, plain yogurt, salt, crisps, parmesan cheese, dark chocolate, decaffeinated coffee, grapefruit, etc.
- toothpicks
- tracing paper
- transparent object, e.g. goggles/sheet of plastic
- water: hot, cold, room temperature

## Explore

The *Explore* project encourages pupils to invent a superhero and create a comic book about the nervous system, relating to a sense and a reaction. Pupils will learn how humans detect and respond to stimuli, understand the nervous system pathways and develop empathy for others.

The different *Explore* stages focus on the following skills:

- brainstorming ideas and making decisions
- producing creative written and visual elements
- autonomous research
- understanding others and accepting differences
- giving feedback about personal creations.

## Other resources

- Interactive activities
- Flashcards: *The human body*
- Song: *See, hear, touch, smell, taste*
- Video documentary: *Sensing our world*



# UNIT 1

## PAGES 6-7

### Objective

Pupils will be introduced to human interaction and prior knowledge of the senses will be activated.

### Key vocabulary

appreciate, danger, interact, interpret, nervous system, react, sense

### Warm up

- Write the five senses (*sight, hearing, smell, taste, touch*) horizontally across the board, leaving space to write underneath. Show pupils the documentary. Then, have pupils take turns to write words on the board relating to each sense. Discuss pupils' choices.

### Main concepts

- Pupils guess which sense is being used in each photo and describe how it is being used.  
Give pupils two minutes to list how they have used their senses in the past hour. Have them share their lists in small groups and award points each time a unique example is given.
- Create a sense bag. Each pupil could bring in an item of their choice and take turns feeling, describing and guessing.

# 1

## INTERACTION

### Look and discuss...

Which senses are being used? How?

**1**



**2**



We use our ... to ...

... is being used to ...

**3**



1 taste; 2 sight; 3 smell; 4 sight and hearing; 5 sight and touch; 6 hearing

**4**



6

Our senses allow us to appreciate and interact with our environment. We could not survive without them! Our nervous system enables us to interpret the information from the senses and react.





## Learn more

- Guessing game: Pupils describe a place for their classmates to guess. For example, *I hear the waves, I see fish, the sand feels warm on my skin. Is it the beach? Yes, it is.*
- Pupils create a sense poem. They choose a place they like, then reflect on how they use their five senses in that place. They can read their poems to the class.

### Song

This song focuses on the five senses. It can be used on pages 10–11 for consolidation. You could create actions for the song.

### Documentary

The documentary explores human interaction through the senses. It can be used in this lesson and on pages 10–11 to introduce the main concepts. You could have pupils comparing and contrasting positive and negative senses shown in the documentary.

## Tip

**Spend one or two lessons exploring the senses on this spread and the next. Encourage pupils to pay more attention to information they receive from their senses.**



# UNIT 1

## PAGES 8–9

### Objective

Pupils will learn to identify and locate the receptors and organs involved in the senses.

### Key vocabulary

hearing, nervous system, receptors, sense organs, sight, smell, stimulus, taste, touch

### Warm up

- Pupils sit in silence, eyes closed. Lead a meditation, focusing on each sense: smell, taste, touch (rocking side to side, flexing muscles) and sound (ticking clock, distant voices). Towards the end, they should open their eyes and focus on the details of something visual. Discuss new discoveries.
- Pupils may not be familiar with vocabulary like *nerve*, *sensory nerves* and *peripheral nervous system*, but these will be explained in the following lesson.

### Main concepts

- Set up experiment stations, for each sense.
- Sight: Pupils find their blind spots (where the optic nerve is attached so there are no photoreceptors) with an image test.
- Smell: Pupils use blindfolds and smell the different items. Can they identify each smell?

Chemicals in food cannot reach the receptor cells in our nostrils when we have a blocked nose, which affects our sense of taste.

### HOW DOES A COLD AFFECT YOUR SENSE OF TASTE?

#### Discover...

the organs and systems involved in interaction.

Interaction begins with our **sense organs**. These contain **receptors**, which are specialised cells that collect information, known as **stimuli**, from all around us. This information is then passed on to the **nervous system**.

#### SIGHT

**Organ:** eye  
**Receptors:** in the retina  
**Stimulus:** reflected light  
**Nerve:** optic



How does the eye work? Find some videos! Make a labelled model and write a description.

#### TOUCH

**Organ:** skin  
**Receptors:** in the dermis  
**Stimulus:** pressure, texture, heat, pain  
**Nerve:** many sensory nerves in the peripheral nervous system



Humans have five main sense organs. Each one is sensitive to a different type of **stimulus**.





Reflected light passes through the cornea and pupil; the muscular iris controls the amount of light allowed in; the lens focuses the light onto the retina at the back of the eye, which collects it, and passes the information to the optic nerve.



Sound waves enter the auditory canal, vibrating the eardrum and travelling through three small bones in the middle ear. These vibrations reach the cochlea and are transformed into an electrical signal at the auditory nerve.

Pupils should be blindfolded. They should eat similarly scented and textured foods with their nose plugged, for example, apple, potato, pear, etc. They should guess which foods they are, then repeat with their nose unplugged to see the difference.

## HEARING

**Organ:** ear

**Receptors:** in the cochlea

**Stimulus:** sound waves

**Nerve:** auditory



Investigate how sound waves reach the nervous system through the ear.



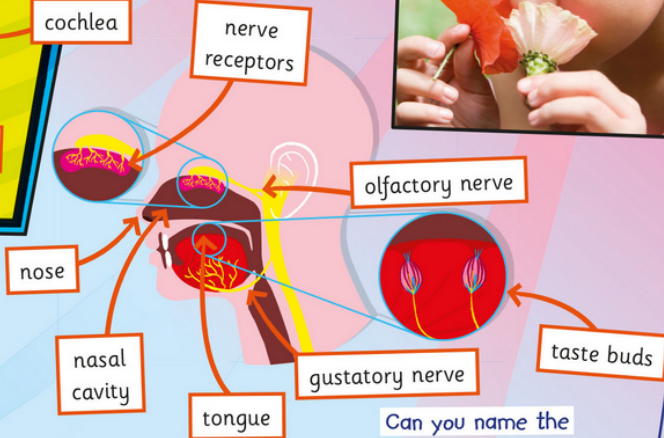
## SMELL

**Organ:** nose

**Receptors:** cells inside nostrils

**Stimulus:** chemicals in the air

**Nerve:** olfactory



Can you name the different types of taste?

## TASTE

**Organ:** tongue

**Receptors:** cells in taste buds

**Stimulus:** chemicals in food

**Nerve:** gustatory



A lot of what we taste comes from smelling our food. When our nose is blocked, the chemicals cannot reach the receptor cells in our nostrils which affects our sense of taste as well.

Design and carry out an experiment to test this!

## Explore

STAGE 1

- Choose a stimulus for your superhero. For example, they see something dangerous or hear someone shouting from far away. This will be their *super sense*.
- Find out how humans detect this stimulus. What receptors and organs are used?
- Create the first scene for your comic book. Draw and write about the sense, receptors and organs involved.

Brainstorm stimuli and different sensations that humans can sense. Have pupils choose one for their comic. Support pupils while they research facts. Remind pupils that the first scene should introduce their superhero and their super sense. For pupils who struggle to draw, encourage them to use photos and pictures from magazines instead.

Primary tastes: salty, sweet, sour, savoury. Some people also include bitter, fatty and umami (which means delicious in Japanese).

- **Touch:** To understand temperature perception, pupils put one hand in hot water and the other in cold, leaving them for 30 seconds. Then, they put both hands into room temperature water at the same time to see how each hand feels.
- **Taste:** Are girls more sensitive to taste than boys? Use blindfolds and experiment with the different food items.
- **Hearing:** Blindfold one pupil, who stands in the centre of the room. Approach them with a noise maker. The blindfolded pupil advises when they can hear the noise and where it is coming from. Repeat, approaching from different angles and directions.

## Learn more

- Discuss the differences between the words *see*, *look* and *watch*, and *hear* and *listen*. Give examples of how each word is used.
- Pupils find out about sense idioms (sixth sense, a taste of one's own medicine, smell the roses, etc.) and draw a picture of what they think each one means.

### Extra Activity, page 90:

Pupils use toothpicks to experiment with sensory receptors. It is not necessary to press hard to observe a result.