CAMBRIDGE

Cambridge

Natural Science

6

Pupil's Book

Experience
Better
Learning

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!

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!

Which scientist is being described? Listen and guess.

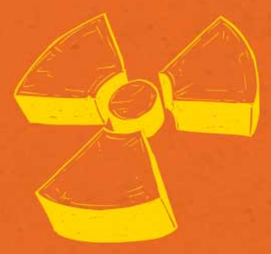
Did you know … discovered … ?

Their work was important because …

4

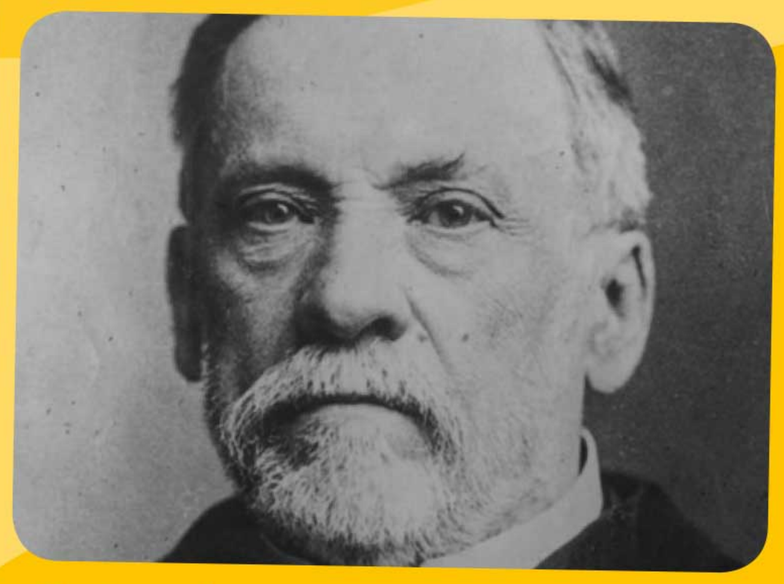
Marie Curie

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



Before him, scientists thought fermentation occurred spontaneously. He discovered that yeast was responsible for turning sugar into alcohol, carbon dioxide and other products.

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?

1 INTERACTION

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.

Look and discuss...

Which senses are being used? How?

1

2

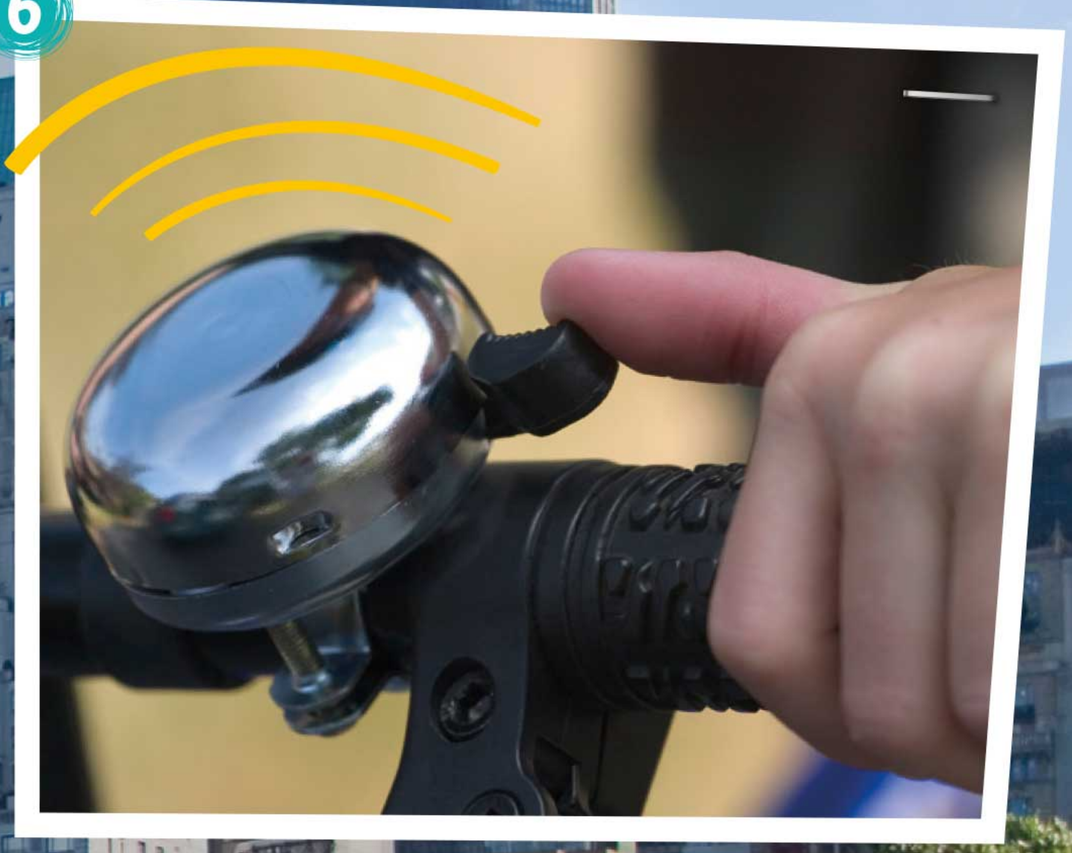
We use our ... to ...

... is being used to ...

3

4

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



I'm Super Sensational Girl! I'll help you learn how we interact with our environment and how our nervous system works.

Can you think of ways our senses help us escape danger?

Song

See, hear, touch, smell, taste

DOCUMENTARY

Sensing our world

Explore

Invent a superhero and make a comic book about the nervous system. You will:

- learn how our bodies detect and respond to stimuli.
- understand the pathways of the nervous system.
- imagine life without one of your senses and develop empathy and respect for others.
- create a visual and written comic book relating to a sense and a reaction.

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**.

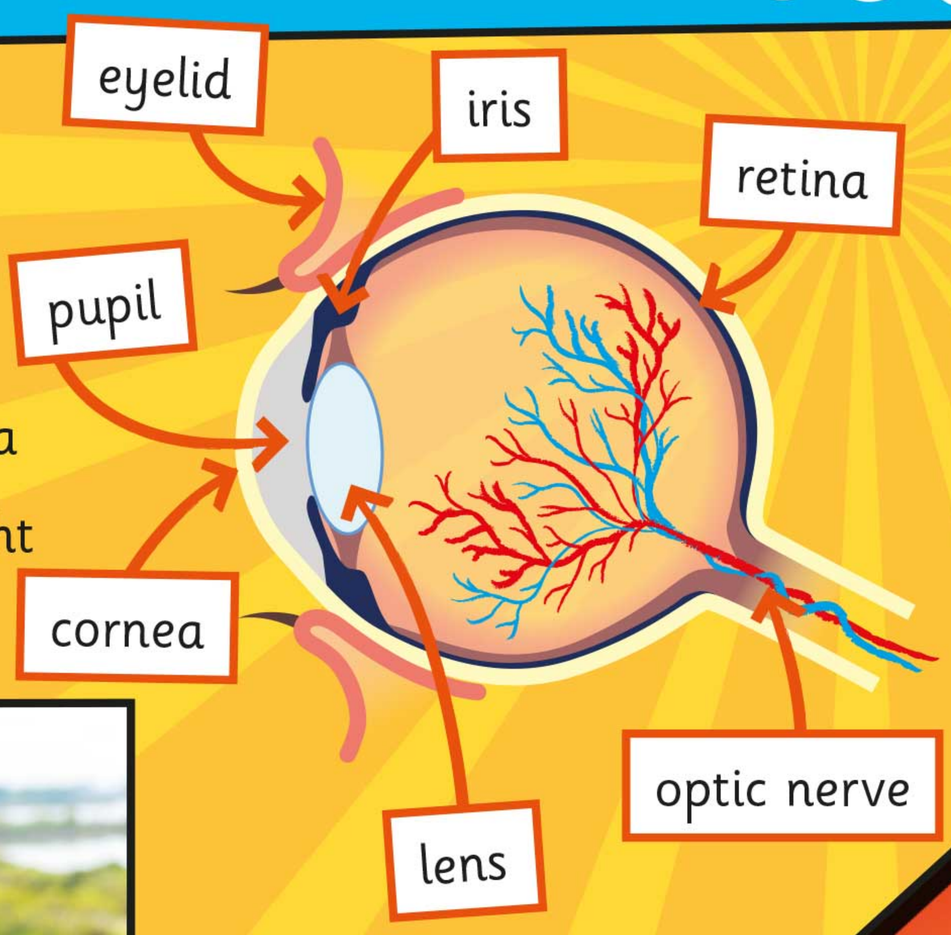
SIGHT

Organ: eye

Receptors: in the retina

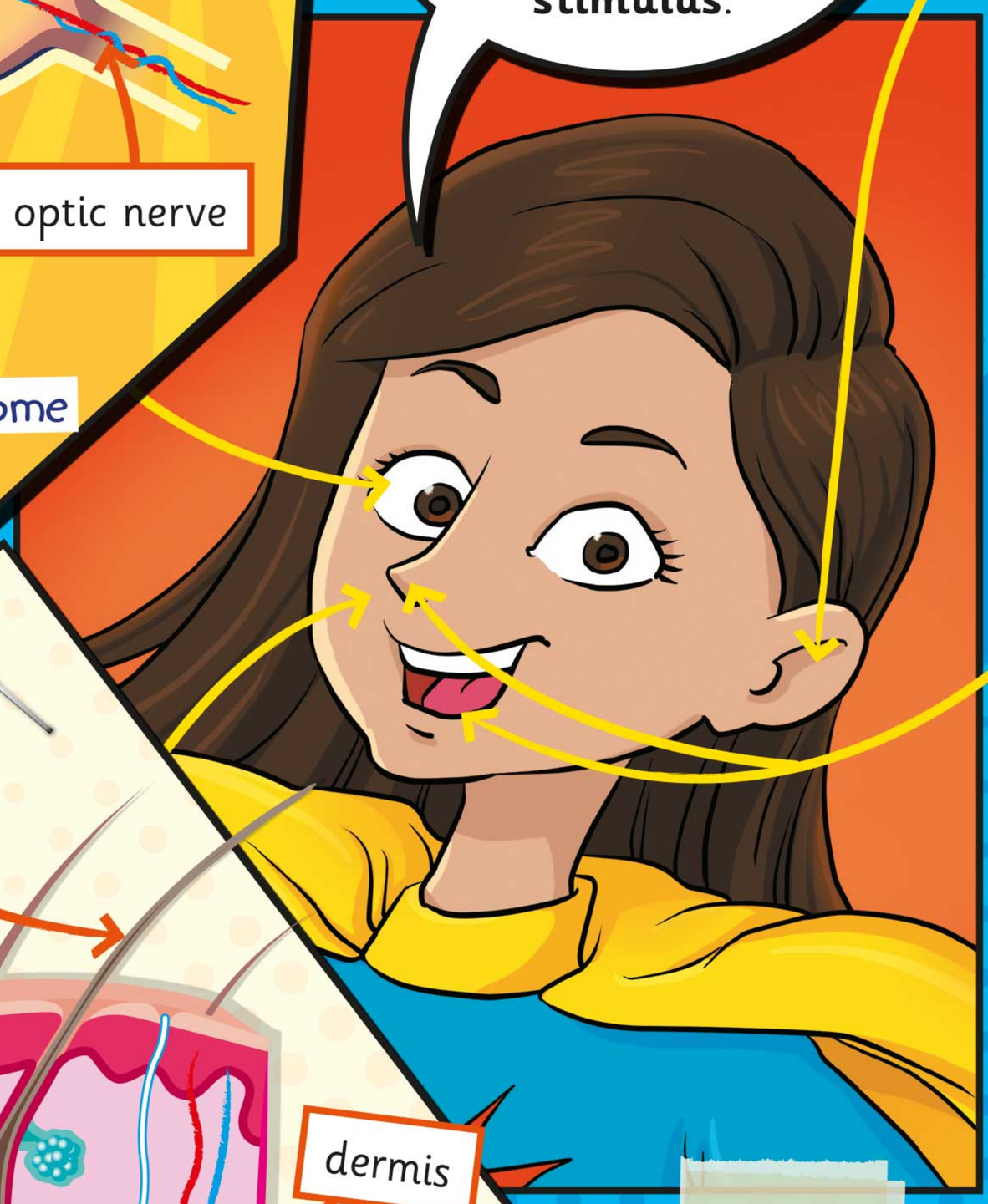
Stimulus: reflected light

Nerve: optic



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

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



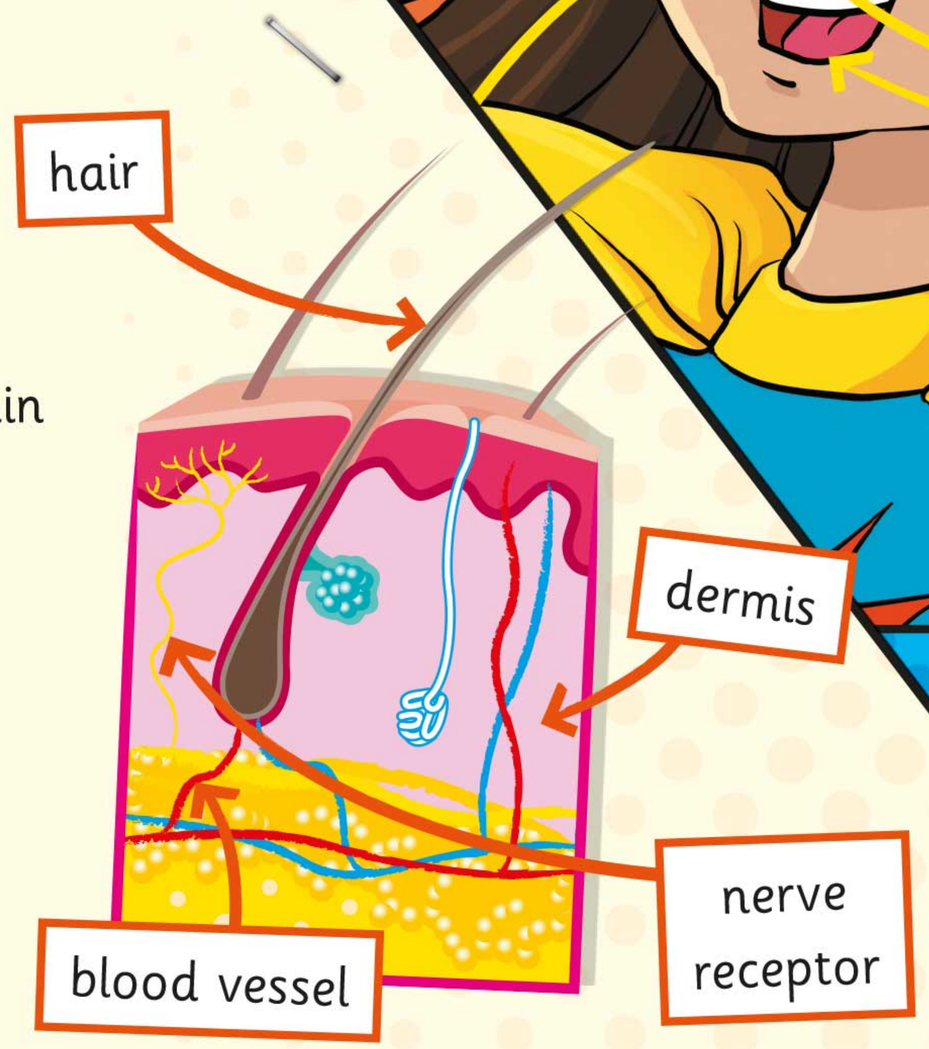
TOUCH

Organ: skin

Receptors: in the dermis

Stimulus: pressure, texture, heat, pain

Nerve: many sensory nerves in the peripheral nervous system



HEARING

Organ: ear

Receptors: in the cochlea

Stimulus: sound waves

Nerve: auditory

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

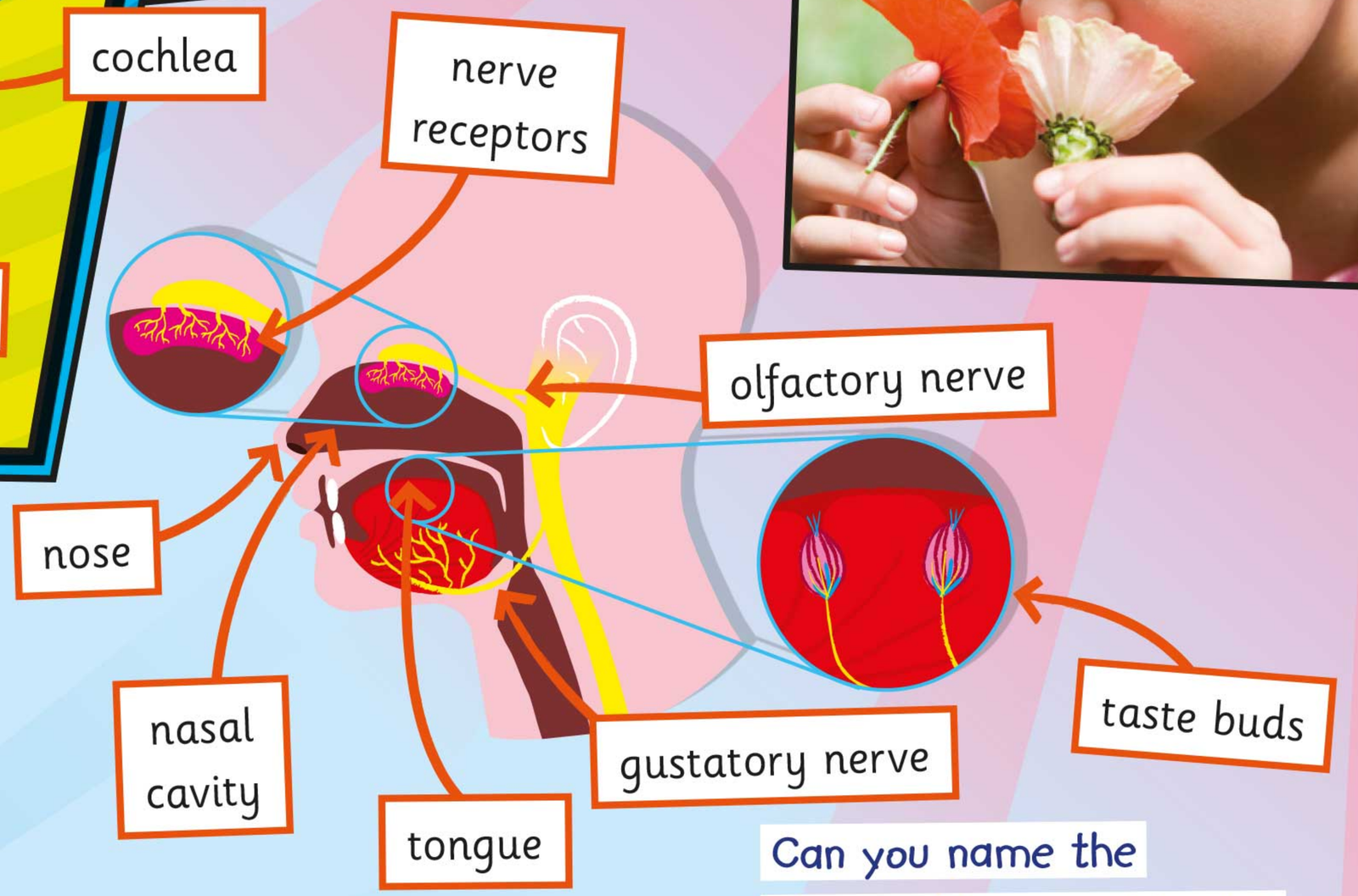
SMELL

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.

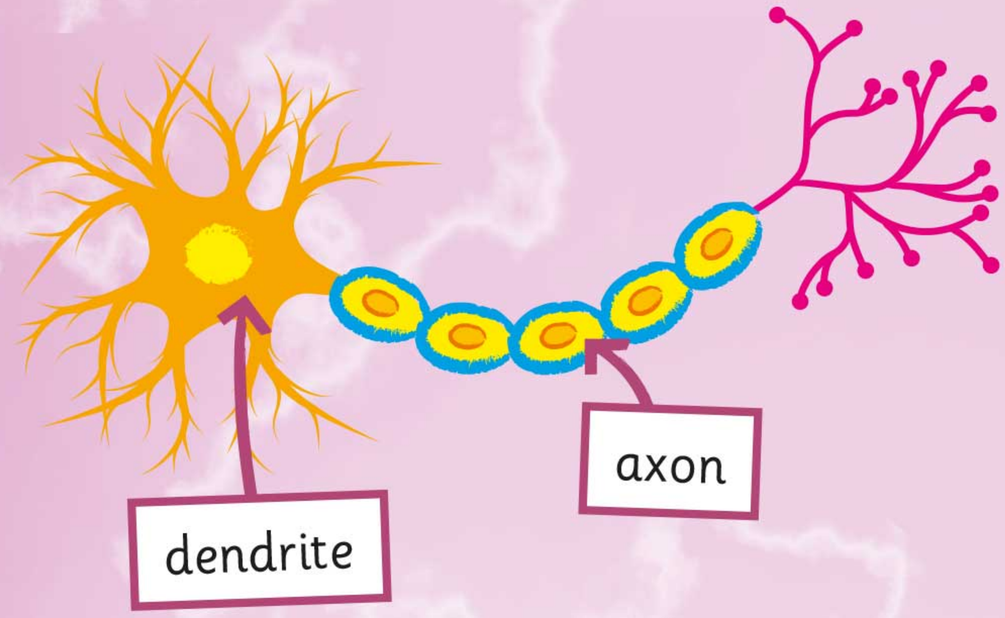
DO PARTS OF OUR BRAIN CONTROL DIFFERENT THINGS?

Discover...

how the nervous system works.

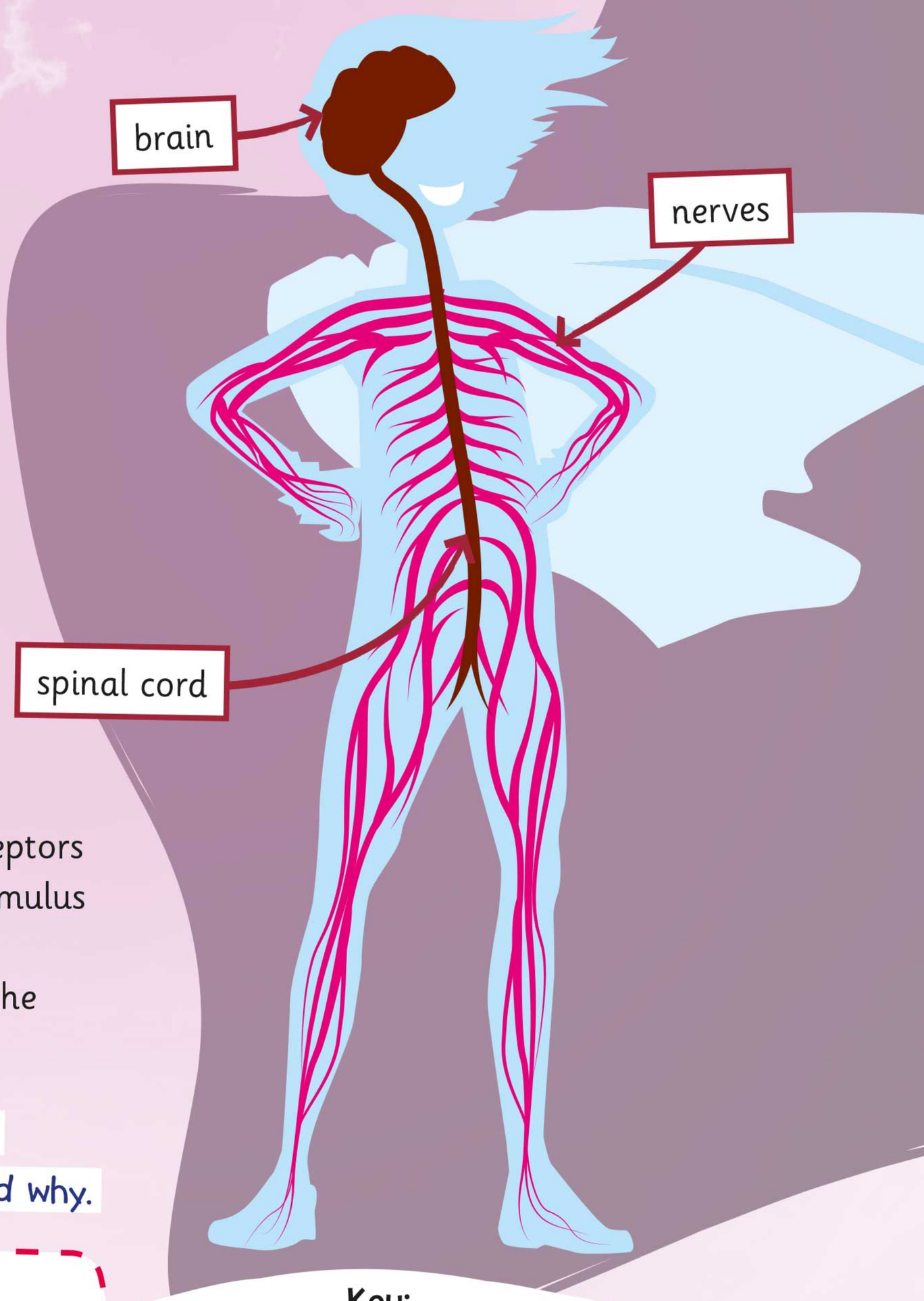
Our nervous system is our body's control centre. It interprets all the information we receive and tells our body what to do.

Like other systems, the nervous system is made up of cells, tissues and organs. The smallest part is a nerve cell, or **neuron**.



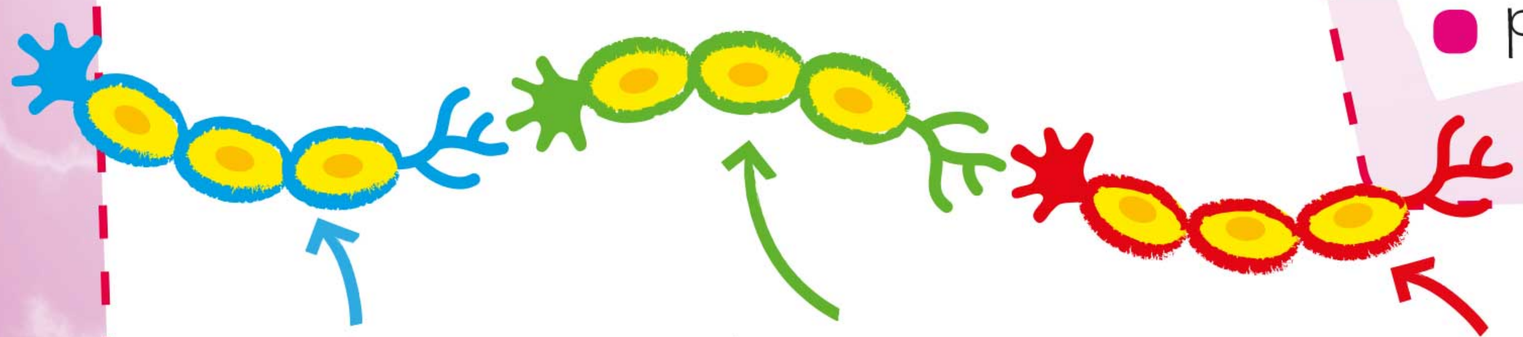
The **dendrites** in neurons are often the receptors from our sense organs. They transform a stimulus into an electrical signal, called an **impulse**. Once an impulse is started, it is sent along the **axons** of the neurons, through the body.

Nerve impulses can travel at speeds of 70 metres per second! Find out how and why.



Key:
- central nervous system
- peripheral nervous system

There are three main types of neuron within the nervous system:



sensory neurons: carry signals from receptors to the spinal cord and brain.

interneurons: carry signals between the different parts of the central nervous system.

motor neurons: carry signals from the central nervous system to effectors.

Where in the body can you find each type of neuron?

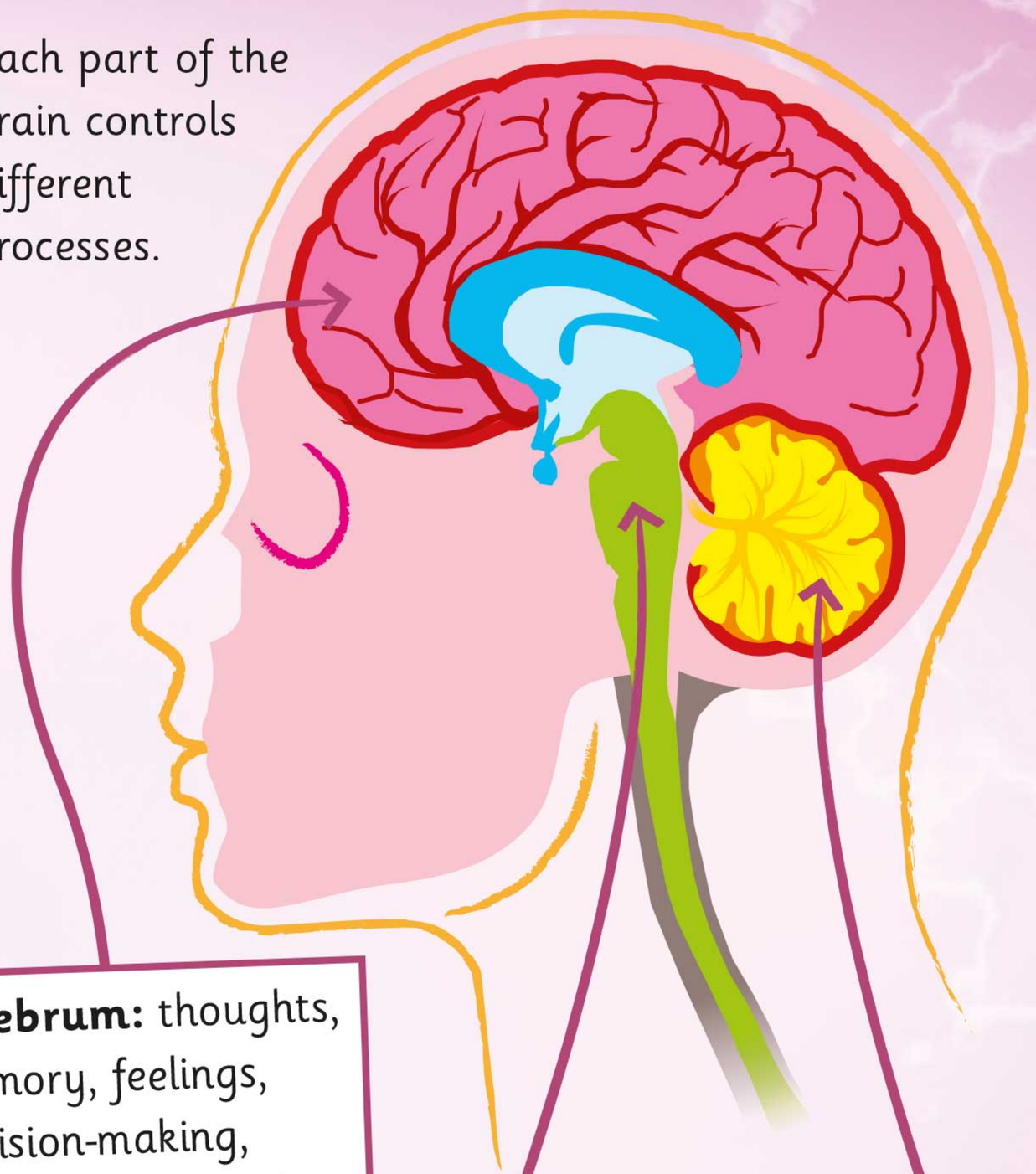
The nervous system is divided into two parts: the **central nervous system** and the **peripheral nervous system**.

Look at the illustration.
What does each part include?

The **spinal cord** is nerve tissue that runs down our spine. It connects the nerves to our brain. It also controls reflexes.

The **brain** decodes the information from nerve impulses and decides if a response is needed. It coordinates a **response** with motor neurons.

Each part of the brain controls different processes.



cerebrum: thoughts, memory, feelings, decision-making, interpreting stimuli

brain stem: involuntary actions, sleeping

cerebellum: movement, balance, coordination

Find out more about what the brain controls and draw a brain map.

Find another brain hidden in the unit.

Explore

STAGE 2

- **Think about your superhero's super sense. How does it reach the central nervous system?**
- **Create the next scenes for your comic book and include written descriptions. Remember to use connectors.**
- **Show the stimulus travelling along neurons and reaching the central nervous system.**

Then, …

Next, …

Afterwards, …

Finally, …