

## 2 VOCABULARY & PRONUNCIATION

stress in word families, science

- a Look at these extracts from the listening in 1b and write the **highlighted** words in the table below.

This is one of the most popular **scientific** myths...  
 ...until very recently **scientists** thought that this really was the case.  
 He got very high marks in maths and **science**.

| person     | adjective | subject |
|------------|-----------|---------|
| scientist  |           |         |
| chemist    |           |         |
| biologist  |           |         |
| physicist  |           |         |
| geneticist |           |         |

- b Now complete the chart for the other four words.

### Stress in word families

In some word groups the stressed syllable changes in the different parts of speech, e.g. *geographer*, *geographic*, *geography*.

- c **5 28**) Listen and check. Then listen again and underline the stressed syllables in the words. In which groups does the stress change?
- d Practise saying the word groups.
- e Complete the sentences with a word from the list.

discovery drugs experiments guinea pigs laboratory  
 research side effects tests theory

- Scientists **carry out** *experiments* in a \_\_\_\_\_.
  - Archimedes **made** an important \_\_\_\_\_ in his bath.
  - Isaac Newton's experiments **proved** his \_\_\_\_\_ that gravity existed.
  - Before a **pharmaceutical company** can sell new \_\_\_\_\_ they have to **test** them to make sure they are safe.
  - Scientists have to **do** a lot of \_\_\_\_\_ into the possible \_\_\_\_\_ of new drugs.
  - People can **volunteer** to be \_\_\_\_\_ in **clinical trials**.
- f **5 29**) Listen and check, and mark the stress on all the multi-syllable words in **bold**. Practise saying the sentences.

## 3 SPEAKING

Work with a partner. A interview B with the questions in the **red** circles. Then B interview A with the **blue** circles.

Which scientific subjects do / did you study at school? What do / did you enjoy the most / the least?

Which scientific subjects do you think have actually taught you something useful?

Is there a scientist (living or dead) who you admire? Who?

What do you think is the most important scientific discovery of recent years? Why?

Are there any scientific discoveries that you wish hadn't been made?

If you were ill, would you agree to be a guinea pig for a new kind of treatment?

Do you think it is acceptable for animals to be used in experiments? Does it make a difference if the experiments are for medical research or for cosmetics testing?

Are you happy to eat genetically modified food? Why (not)?

Are there any scientific stories in the news at the moment?

Are you worried about any of the things scientists are currently experimenting with?

What would you most like scientists to discover in the near future?

## 4 READING

- a You are going to read about four scientists who suffered to make their discoveries. Read the article once. How many of the scientists were killed by their experiments or inventions?
- b Read the extracts again and answer questions 1–8 from memory. Write A–D in the right box.

### Which scientist or scientists...?

- got ill after trying to show that his discovery was harmless
- made a fatal mistake during an experiment
- died of diseases he caught as a result of his experiment
- caused the death of other scientists
- used to breathe in toxic substances
- was doing his experiments to reverse / stop the ageing process
- is remembered today for the negative effects of his discovery
- was not very successful in his first job

# Suffering scientists

Four scientists who were injured or killed by their own experiments.

## A Sir Humphry Davy (1778–1829)



Sir Humphry Davy, the British chemist and inventor, had a very bumpy start to his science career – as a young apprentice he was fired from his job as an apothecary\* because he caused too many explosions! When he eventually took up the field of chemistry, he had a habit of inhaling the various gases he was dealing with. Fortunately, this bad habit led to his discovery of the anaesthetic properties of nitrous oxide. Unfortunately, the same habit led him to nearly kill himself on many occasions and the frequent poisonings left him an invalid for the last two decades of his life. During this time he also permanently damaged his eyes in a nitrogen trichloride explosion.

\* apothecary = person who in the past used to make and sell medicines

## B Alexander Bogdanov (1873–1928)



Alexander Bogdanov was a Russian physician, philosopher, economist, science fiction writer, and revolutionary. In 1924, he began experiments with blood transfusion – in a search for eternal youth. After 11 transfusions (which he performed on himself), he declared that he had stopped going bald, and had improved his eyesight. Unfortunately for Bogdanov, the science of transfusion was not very advanced and Bogdanov had not been testing the health of the blood he was using, or of the donors. In 1928, Bogdanov took a transfusion of blood infected with malaria and tuberculosis, and died soon after.

## C Thomas Midgley (1889–1944)



Thomas Midgley was an American chemist who helped to develop leaded petrol (lead was added to petrol to make car engines less noisy). General Motors commercialized Midgley's discovery, but there were several deaths from lead poisoning at the factory where the additive was produced. In 1924, Midgley took part in a press conference to demonstrate the safety of his product and he inhaled its vapour for a minute. It took him a year to recover from the harmful effects! Weakened by lead poisoning, he contracted polio at the age of 51, which left him disabled. He invented a system of ropes and pulleys so that he could pull himself out of bed, but his invention caused his death when he was strangled by the ropes. The negative impact on the environment of leaded petrol seriously damaged his reputation and he has been described as 'the human responsible for most deaths in history'.

- c 5 30)) Look at the **highlighted** words, which are all related to science and medicine. Do you know what they mean? Are they similar in your language? How do you think they are pronounced? Listen and check.

## D Louis Slotin (1910–1946)

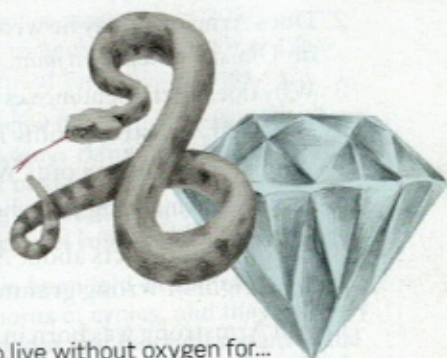
Louis Slotin, a Canadian physicist, worked on the Manhattan project (the American project which designed the first **nuclear** bomb). In 1946, during an experiment with plutonium, he accidentally dropped a container causing a critical reaction. Other scientists in the room witnessed a 'blue glow' and felt a 'heat wave'. Slotin had been exposed to a **lethal dose** of radiation. He rushed outside and was sick and then was taken to hospital. Although volunteers donated blood for transfusions, he died nine days later. Three of the other scientists who were present died later of illnesses related to radiation.



## 5 GRAMMAR quantifiers: all, every, both, etc.

- a With a partner **circle** the right word or phrase.
- 1 *Both* / *Both of* Sir Humphry Davy and Thomas Midgley damaged their health as a result of inhaling chemicals.
  - 2 *Either* / *Neither* Thomas Midgley nor General Motors were prepared to admit how dangerous lead was.
  - 3 Until 1973, *all* / *every* cars used leaded petrol.
  - 4 *All the* / *All* blood Bogdanov used in his experiments might have been contaminated, because he never tested any of it.
  - 5 Sir Humphry Davy was fascinated by *all* / *everything* to do with gases.
- b > p.150 Grammar Bank 10A. Learn more about quantifiers, and practise them.
- c Do the Science quiz with a partner.

- 1 In Direct current, the electrons...
  - a move in only one direction
  - b move in both directions
  - c don't move at all
- 2 Helium gas can be found...
  - a only in liquid form
  - b in neither liquid nor solid form
  - c in both liquid and solid form
- 3 Adult giraffes remain standing...
  - a some of the day
  - b all day
  - c most of the day
- 4 Of all the water on our planet, ... is found underground.
  - a hardly any of it
  - b about half of it
  - c most of it
- 5 Snakes eat...
  - a only other animals
  - b either other animals or eggs
  - c either other animals or fruit
- 6 A diamond can be destroyed...
  - a by either intense heat or acid
  - b by both intense heat and acid
  - c only by intense heat
- 7 The human brain can continue to live without oxygen for...
  - a nearly two minutes
  - b nearly six minutes
  - c a few hours
- 8 In our solar system,...
  - a neither Pluto nor Neptune are now considered to be planets
  - b both Pluto and Neptune are considered to be planets
  - c Pluto is no longer considered to be a planet
- 9 When we breathe out,...
  - a most of that air is oxygen
  - b none of that air is oxygen
  - c some of that air is oxygen
- 10 An individual blood cell makes a whole circuit of the body in...
  - a nearly 60 seconds
  - b nearly 45 seconds
  - c a few minutes



- d 5 34)) Listen and check.

quantifiers: *all, every, both, etc.*

*all, every, most*

- 1 All animals need food. All fruit contains sugar. **(5 31))**  
All (of) the animals in this zoo look sad.  
The animals all look sad.
- 2 Everybody is here. Everything is very expensive.
- 3 Most people live in cities.  
Most of the people in this class are women.
- 4 All of us work hard and most of us come to class every week.
- 5 Every room has a bathroom. I work every Saturday.

- 1 We use *all* or *all (of) the* + a plural or uncountable noun.  
*All* = in general, *all (of) the* = specific.  
*All* can be used before a main verb (and after *be*).
- 2 We use *everything* / *everybody* (= all things, all people) + singular verb, e.g. *Everything is very expensive.* NOT *All is very expensive.*
- 3 We use *most* to say the majority; *most* = general, *most of* = specific.
- 4 We often use *all* / *most of* + an object pronoun, e.g. *all of us, most of them, all of you, most of it.*
- 5 Use *every* + singular countable noun to mean 'all of a group'.

### every and all + time expressions

Note the difference between *every* and *all* + time expressions.  
*Every day* = Monday to Sunday. *All day* = from morning to night



I usually go running every day.



...but today I'm ill, so I stayed in bed all day.

*no, none, any*

- 1 Is there any milk? **(5 32))**  
Sorry, there's **no** milk. There **isn't any** (milk).
- 2 **A** Is there any food?  
**B** No, **none**. / There's **none**. But **none of us** are hungry.
- 3 Come **any** weekend! **Anyone** can come.

- 1 We use *no* + a noun after a  $\oplus$  verb, or *any* + noun after a  $\ominus$  verb to refer to zero quantity. *Any* can also be used without a noun.
- 2 We use *none* in short answers, or with a  $\oplus$  verb to refer to zero quantity. You can also use *none of* + pronoun / noun.
- 3 We use *any* (and *anything, anyone, etc.*) and a  $\oplus$  verb to mean it doesn't matter what, who, etc.

*both, neither, either*

- 1 **Both** Pierre **and** Marie Curie were scientists. **(5 33))**  
**Neither** Pierre **nor** Marie was (were) aware of the dangers of radiation. Marie Curie wanted to study **either** physics **or** mathematics. In the end she studied **both** at the Sorbonne in Paris.
- 2 She and her husband **both** won Nobel prizes.  
Pierre and Marie were **both** interested in radium.
- 3 **Neither of them** realized how dangerous radium was.

- 1 We use a  $\oplus$  verb with *both* and *neither*. The verb is plural with *both*, and either singular or plural with *neither*.
- 2 When *both* refers to the subject of a clause, it can also be used before a main verb but after *be*.
- 3 We often use *both* / *either* / *neither* + *of* + object pronoun, e.g. *us, them, etc.* or + *of the* + noun.

### a Circle the correct word or phrase.

We've eaten all the / all cake.

- 1 Most of / Most my closest friends live near me.
- 2 You can come round at any / no time on Saturday. We'll be home all day.
- 3 All / Everything is ready for the party. We're just waiting for the guests to arrive.
- 4 Most / Most of people enjoy the summer here, but for some it's too hot.
- 5 Gina goes dancing all / every Friday night.
- 6 We haven't got any / no onions for the soup.
- 7 Any / None of us want to go out tonight. We're all broke.
- 8 Nobody / Anybody can go to the festival. It's free.
- 9 I've got two very close friends, but unfortunately either / neither of them lives near me.
- 10 I'd like to have a bigger table, but there's no / none room in my kitchen.

### b Right (✓) or wrong (✗)? Correct the wrong sentences.

Both Mike and Alan passed the exam. ✓

He neither watches the news or reads a newspaper. ✗  
*He neither watches the news nor reads a newspaper.*

- 1 Both the kitchen and the bathroom needs cleaning.
- 2 The food wasn't cheap nor tasty.
- 3 We can go on holiday either in July or in August.
- 4 Both the journey was long and boring.
- 5 It's or Jane's or Karen's birthday today. I can't remember which.
- 6 My brother has neither the energy nor the stamina to run a marathon.
- 7 Her aunt and her cousin came to visit both.
- 8 We can walk either or take the bus.
- 9 I have two children but neither of them look like me.
- 10 My parents love horses, and both of they ride every day.

◀ p.97

# 10A The dark side of the moon

## 1 GRAMMAR quantifiers: all, every, etc.

a Right (✓) or wrong (✗)? Correct the mistakes in the highlighted phrases.

- I've taken **all luggage** up to our room, OK? ✗ all the luggage
- Everybody were** bad-tempered because it was late. \_\_\_\_\_
- All went wrong** at my last job interview. \_\_\_\_\_
- On Wednesday I spent **all day** revising for my biology exam. \_\_\_\_\_
- All the men** love buying new electronic gadgets. \_\_\_\_\_
- My mum works as a volunteer **at the hospital** every morning. \_\_\_\_\_
- The most people** are against eating genetically modified food. \_\_\_\_\_
- Every classroom** in that school has an interactive whiteboard. \_\_\_\_\_

b Complete the dialogues with *no*, *any*, or *none*.

- A Can I have a biscuit?  
B Sorry, we don't have any.
- A How much homework have you done?  
B           . I don't feel like it right now.
- A How are we going to get home?  
B By taxi. There aren't            buses at this time of night.
- A Did any of your friends pass the exam?  
B No,            of them. It was too difficult.
- A Shall we have dinner in our hotel room?  
B We can't. There's            room service after 9 p.m.
- A When can you come?  
B            day you like. I'm free all week.

c Complete the sentences with a word from the box.

both either neither nor

- Both my brother and my sister have children.
- Dave has two computers, but            of them is working.
- We'd like to go to            Greece or Portugal for our holiday this year.
- Neither my boyfriend            I eat meat.
- of their children are at the same university.
- I can't decide between these two shirts. I like            of them.
- of my parents have ever been abroad.

## 2 VOCABULARY science

a Complete the sentences with a word from the same family as the words in **bold**.

- I always knew, right from the start, that I wanted to be a scientist. **science**
- Factories manufacturing plastics produce a lot of            waste. **chemistry**
- My daughter's best subject at school is           . **biologist**
- One of the most controversial issues of our time is            engineering. **gene**
- is a mystery to me. I failed every exam I ever took. **physicist**

b Match each verb to a suitable noun.

- |             |                 |
|-------------|-----------------|
| 1 be        | a a discovery   |
| 2 carry out | b a theory      |
| 3 make      | c a guinea pig  |
| 4 prove     | d new drugs     |
| 5 test      | e an experiment |

c Complete the sentences with the correct form of a verb phrase from b.

- We carried out an experiment in our chemistry class, but it went horribly wrong!
- The student volunteered to            because he needed the money.
- Researchers            an important            completely by accident last month.
- Companies need to            to make sure they are safe.
- It took a long time for Newton to            his            of gravity.

Look at the highlighted words and phrases in the text and try to work out their meaning. Then use them to complete the sentences.

- After brainstorming solutions to the problem, researchers \_\_\_\_\_ a new idea.
- When companies see \_\_\_\_\_, there is a lot of competition to fill it.
- I couldn't get any more cash out of the machine because I had already \_\_\_\_\_ €250.
- The designers made a lot of \_\_\_\_\_ before they decided on the final version.
- You shouldn't put a drink on your desk because you run the risk of \_\_\_\_\_ it on your computer.
- They have started \_\_\_\_\_ the gadgets to meet the increased demand.
- My grandfather is \_\_\_\_\_ although he is 94 years old.
- Musicians earn \_\_\_\_\_ every time their song is played on the radio.

## PRONUNCIATION changing stress

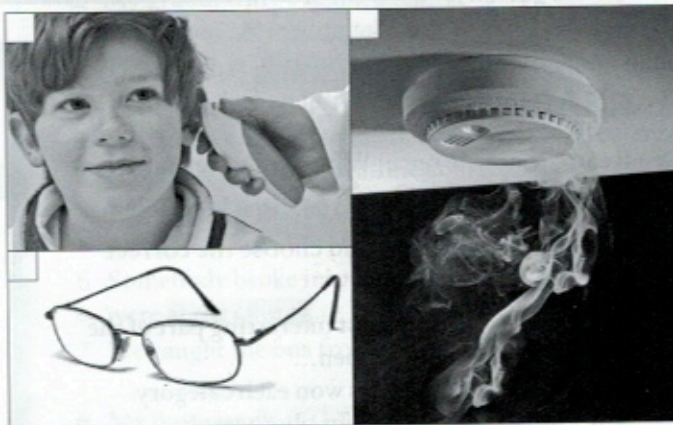
Look at the words. Is the stress on the same syllable? Tick (✓) the correct column. Use your dictionary to help you.

|                                    | same syllable | different syllable |
|------------------------------------|---------------|--------------------|
| 1 bi o lo gy / bi o lo gi cal      | ___           | ✓                  |
| 2 che mist / che mi stry           | ___           | ___                |
| 3 dis co ver / dis co ve ry        | ___           | ___                |
| 4 ex pe ri ment / ex pe ri men tal | ___           | ___                |
| 5 ge ne tic / ge ne ti cist        | ___           | ___                |
| 6 phy sics / phy si cist           | ___           | ___                |
| 7 sci en tist / sci en ti fic      | ___           | ___                |
| 8 theo ry / theo re ti cal         | ___           | ___                |

**iChecker** Listen and check. Mark the stressed syllables. Then listen and repeat the words.

## 5 LISTENING

- a **iChecker** Listen to the radio programme about NASA inventions and number the pictures in the order they are mentioned.



- b Listen again and complete the sentences with between one and three words.

- The first smoke detectors were invented in order to detect a fire or if there were \_\_\_\_\_ on the US space station Skylab.
  - NASA's smoke detector had a new feature which allowed astronauts to adjust the \_\_\_\_\_ to prevent false alarms.
  - The disadvantage of plastic glasses is that they \_\_\_\_\_ easily.
  - NASA developed a \_\_\_\_\_ to protect astronauts' helmets.
  - NASA uses infrared technology to \_\_\_\_\_ of stars.
  - Diatek wanted to \_\_\_\_\_ of time that it took for nurses to take patients' temperatures.
- c Listen again with the audio script on p.76 and try to guess the meaning of any words that you don't know. Then check in your dictionary.

## USEFUL WORDS AND PHRASES

Learn these words and phrases.

- anaesthetic /ænəs'thetɪk/
- blood transfusion /'blʌd trænʃnju:ʒn/
- blood donor /'blʌd dəʊnə/
- inhale (a gas) /ɪn'heɪl/
- lead (poisoning) /led/
- lethal dose /'li:θl dəʊs/
- nuclear bomb /'nju:kliə bɒm/
- radiation /reɪdi'eɪʃn/