POWERED UP!

English for
Electricity and Electronics

Francisco Javier Arrospide Laborda

educàlia editorial

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Primera edición, 2020
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Maquetación: Raquel Garzón Montagut
Edita: Educàlia Editorial
Imprime: Grupo Digital 82, S.L.
ISBN: 978-84-17997-35-9
Depósito legal: V-3680-2019
Printed in Spain/Impreso en España.

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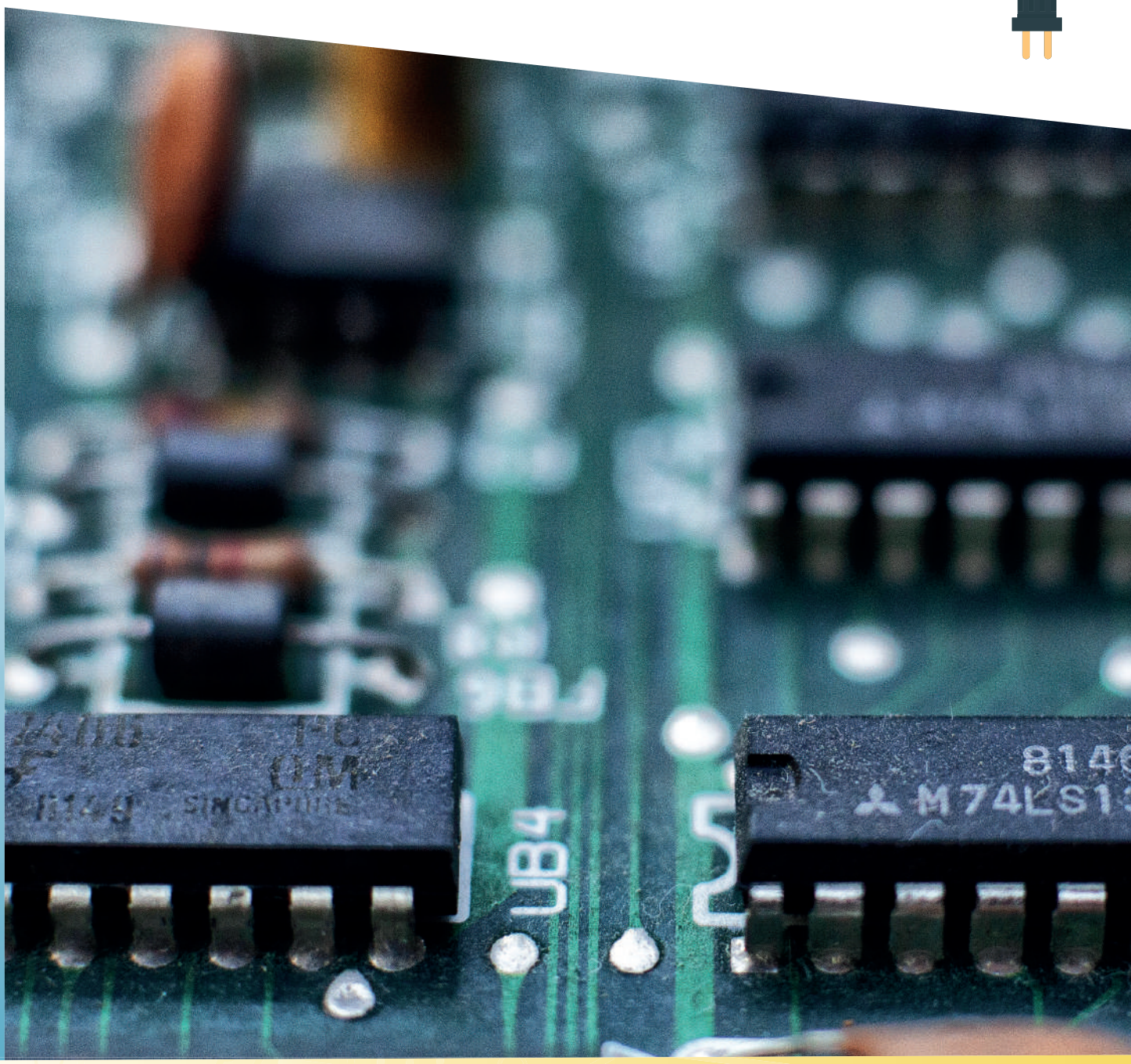
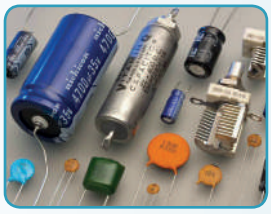
UNIT 1

Electronic Circuits

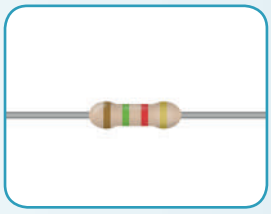


Vocabulary	Grammar	Speaking
Electronic circuit components and symbols	Past simple. Adverbs of frequency	After the exam. Reacting to bad news
Reading	**Listening**	**Writing**
Current vs electron flow. Frankin's mistake?	At the electricity lab	Introducing myself

ELECTRONIC COMPONENTS

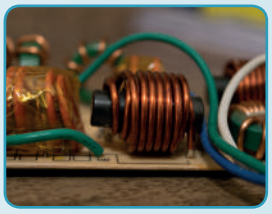


1. .....

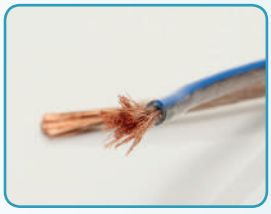


2. .....

3. .....

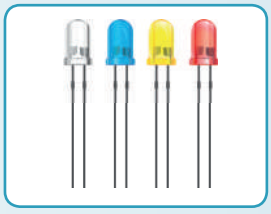


4. .....



5. .....

6. .....



7. .....

8. .....

1. **Components.** How do we call the items above? Use the words from the box.

multimeter	capacitor
wire	inductor
bulb	resistor
diode	power supply

2. **Functions.** Which element does this?

a) Store energy

b) Allow current to go in one direction only

c) Measure multiple electric magnitudes

d) Give voltage to the circuit

3. **Collocations.** Which words go together?

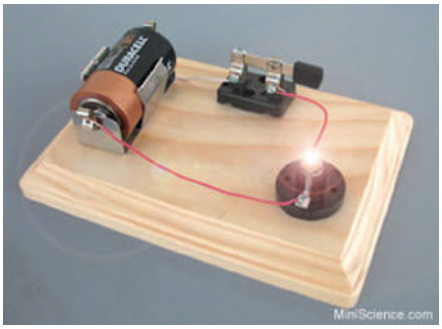
1. copper	a) bulb
2. light	b) unit
3. LED	c) wire
4. power supply	d) diode

4. **Going beyond.** What does each element do?

a) resistor b) bulb

Work in pairs

5. **Real circuits.** Which elements can you name in this circuit?



6. **Names and their meaning.**

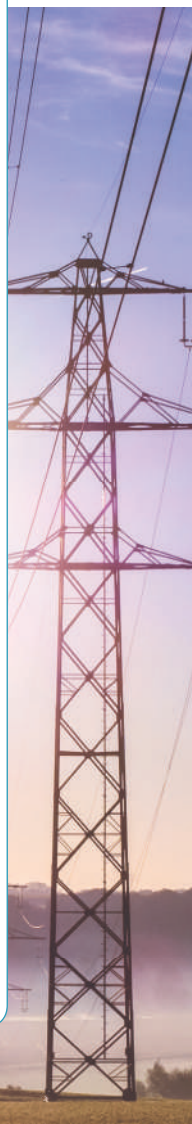
a) The battery in the picture is a *Duracell* battery. Guess the two words this name comes from.

b) Can you think of other brand names that have a meaning in English?

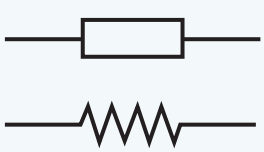
7. **Going beyond.**

a) List other common elements in electric circuits not mentioned in this page.

b) Describe what the elements in the above picture do (see Exercise 2).



ELECTRONIC CIRCUIT SYMBOLS


1. .....


2. .....

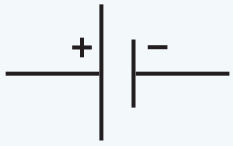

3. .....

4. .....


5. .....

6. .....


7. .....



8. .....

8. **Recognising symbols.** The pictures represent the most common electric circuit symbols. Can you identify them? Use the following words.

voltmeter	capacitor
cell	switch
inductor	resistor
ammeter	lamp

9. **Electric units.** What do these units measure? Match the correct options.

1. Volt (V)	a) current
2. Watt (W)	b) voltage
3. Ampere (A)	c) resistance
4. Ohm (Ω)	d) power

10. **Types of resistors.** Fill in the blanks using the words below. There are two extra words.

thermal	resistance	trimpot
photoresistor	ohm	adjustable

a) A potentiometer is an ..... resistor.

b) A light-dependent resistor is a .....

c) A thermistor is a ..... resistor.

d) A trimming potentiometer is a .....

11. **Multiple meanings.** "Switch" is also a very important verb. It is sometimes used with a preposition. In the following sentences, use the correct preposition from the box.

on **off** **over**

a) I'm on the phone. Can you please switch ..... the music?

b) I always switch ..... the TV when I wake up.

c) My phone company was very expensive, so I switched ..... to a new one.

Going online

12. **Origin of names.** The unit "Volt" comes from the Italian scientist Alessandro Volta. Find 5 more units named after other people, and their nationality. *E.g.*

Unit	Scientist	Nationality
Volt	Alessandro Volta	Italian
....	...	...

13. **More symbols.** What are the electric symbols of these components?

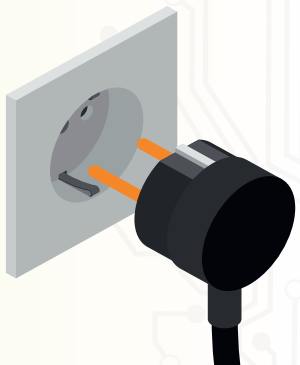
a) potentiometer

b) thermistor

c) photoresistor

d) polarised capacitor

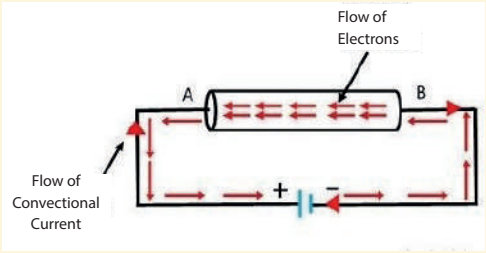
e) transformer



CURRENT VS ELECTRON FLOW: FRANKLIN'S MISTAKE?

To produce an electrical current, we need to connect a battery or cell to a wire. The battery has two terminals of opposite charges. The negative terminal has an excess of electrons. When we connect the wire, electrons flow across the wire from the negative terminal to the positive terminal.

Benjamin Franklin, a famous scientist from the 17th century, decided arbitrarily to define current as the flow from the positive to the negative terminal. But electrons move in the opposite direction, so conventional current does not represent the movement of electrons. In other words, electrons move in the direction opposite to the electric current.



Later, scientists kept this convention. They preferred not to change it. Some people thought this was a mistake and didn't agree, but most people accepted it. Did it matter, really?

Reading Comprehension

1. **Specific information.** Fill in the missing word(s).

   a) Electrons and electric current go in opposite .....

   b) Benjamin Franklin was a ....

   c) Electrons flow from the ..... to the ..... terminal.

   d) The majority of people ..... the convention.

2. **General questions** Answer the following questions.

   a) When did Benjamin Franklin live?

   b) How is electric current produced?

   c) Why is the question "Franklin's mistake?" in the title?

3. **Going beyond.** Create your own two questions from the text. Then, ask them to a partner.

Inspecting the text

4. **Synonyms** Find words in the text that mean the same thing. They should be in the paragraph indicated in parenthesis.

   a) create (P1)

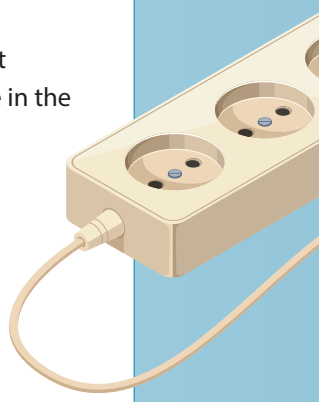
   b) move (P2)

   c) change (P3)

5. **Verbs in the past.**

   a) List all the verbs that are in the past tense in the text.

   b) Classify them in two columns: regular or irregular.



Going beyond

6. **Synonyms (II)** Think of a third synonym for each word in Ex. 3.

7. **Multiple meanings.** "Current" has a different meaning in general English. Guess it from the example and create your own example showing its two meanings:

   E.g. Current scientists accept the conventional direction of current.

PAST SIMPLE AND ADVERBS OF FREQUENCY

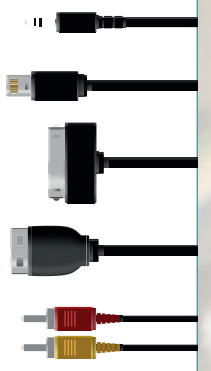
1) My phone company was very expensive, so I switched over to a new one.
2) The unit "Volt" comes from the Italian scientist Alessandro Volta.
3) Did it matter, really?
4) Electrons flow from the positive to the negative terminal.
5) Later, scientists kept this convention.
6) Conventional current does not represent the movement of electrons.
7) Some people thought this was a mistake and didn't agree.
8) Most people accepted it.

1. **Classifying tenses.** From the sentences above, which ones use the past tense?

2. **Irregular verbs.** And from these, which use irregular verbs?

Past Simple. Complete the table.

When	a) To describe an action that happened at a **specific time** in the past. *E.g. Most people accepted it.* b) To talk about **past** ..... and **generalizations.** *E.g. When I ..... a child, I went swimming three times a week.*
How Affirmative	**Regular** verbs: Subj. + verb ending in ..... + rest of sentence *E.g.* ..... **Irregular** verbs: Subj. + verb (column 2) + rest of sentence *E.g.* .....
Negative	Subj. + ... + didn't + verb in base form + rest of sentence *E.g.* .....
Questions	**Yes/No**: ..... + subject + verb in base form + rest of sentence *E.g. Did it matter?* ***Wh- questions***: Wh-word + did + ... + verb in base form + rest *E.g. Where did you put the battery?*



Special case

3. **The verb BE.** Choose the correct option for each sentence:

a) We *didn't be/weren't* sure of the answer.

b) *Was she/Did she be* OK?

From these examples, what is special about the verb "be"? Form two additional sentences using this verb in the past, one negative and one interrogative.

Going beyond

4. **Spelling Issues.** Look at these examples.

a) I *created* a very complex electronic circuit.

b) He *tried* to solve the problem.

c) They *preferred* not to change the convention.

Did we follow the general rule? Why? Can you guess the rule applied?

5. **Past habits.** Order the following frequency adverbs from most frequent to least frequent.

   a) sometimes

   b) never

   c) always

   d) often

   e) rarely

6. **When I was a child...**

   a) Create five sentences that start with "When I was a child" and use the above adverbs. Four of them should be true for you and one, false.

   *E.g. When I was a child, I **often** peed in the street.*

   b) In pairs, try to guess which of each other's sentences is false.

7. **Used to.** Another common formula to talk about past habits is "used to". Write five sentences about your childhood (or about a classmate's childhood, if you know them well) using this phrase.
   E.g. When I was a child, I used to believe in the tooth fairy.
   When I was a child, I didn't use to be a very organised person.

   You can use the following ideas, if you want to:

Santa Claus	favorite games
favorite cartoons	imaginary friend
bedtime	thumb sucking

Going beyond

8. **More frequency adverbs.** Which frequency adverb from ex. 3 means the same as the three below? Create a sentence for each new adverb.

seldom	hardly ever	scarcely

9. **To the present and back.** Convert the eight sentences at the top of the previous page from the past into the present or vice versa. Make all necessary changes.
   E.g. My phone company *is* very expensive, so I *want to switch* over to a new one.

10. **Opposite, but true.** Using the same eight sentences, change the affirmative sentences into negative or vice versa, but make the changes so that the meaning doesn't change.
    E.g. My phone company wasn't very cheap, so I didn't stay with them.
    The unit Volt does not come from the British scientist Michael Faraday.

11. **And the question is...** A classmate of yours just interviewed Rosalía about her childhood. Guess the possible questions:

    a) Yes, I listened to it. I loved, for example, the music by Diego, el Cigala.

    b) I gave my first "concert" to my family when I was 7.

    c) My favorite thing in the world was dancing.

    d) I was born in Sant Esteve Sesrovires, a little village in Barcelona.

    e) I started formally when I was 13. Then, I enrolled at the Superior School of Music of Catalonia.

Going beyond

12. **What do I ask her?** Now, imagine you have the opportunity to interview Rosalía. Prepare three questions for her about her childhood and two about her present life.

13. **Role play.** In pairs, one of you is the interviewer and the other is a famous pop singer (for example, Rosalía). Stage a short interview with the star about their childhood. When finished, change roles.

AT THE ELECTRICITY LAB

1. **First day at the lab.** Listen to Víctor talking about his first day at the Electricity Laboratory. You will hear the recording twice. First, answer questions 1-4. After the second hearing, complete questions 5-8.

Q1. Which day of the week was it?

a) Monday

b) Tuesday

c) Wednesday

Q2. The class worked...

a) in pairs

b) individually

c) in groups of three

Q3. Which of these elements is not mentioned?

a) resistor

b) ammeter

c) lamp

Q4. How much time did they have for the task?

a) 15 minutes

b) 30 minutes

c) 20 minutes

Q5. What was Milu's original name?

Q6. List all the electrical components you hear.

Q7. What kind of circuit did they have to build?

Q8. What does Víctor think to himself at the end?

Creating an ending. In pairs. How do you think this story ended? Create an ending for it. Possible points to discuss are:

- How did Milu react?
- Did they make a good team?
- Did they complete the task?

2. **How it ends.** Now, listen to the ending of the story. You will hear it only once. Then, answer the questions 9-12:

Q9. How did Víctor feel at first?

a) terrified

b) embarrassed

c) scared

Q10. How long did he blank for?

a) 30 seconds

b) 13 seconds

c) 20 seconds

Q11. Did they complete the task?

Q12. What does Víctor tell Milu at the end?

Speaking. In pairs. Do you recognize the final quote? Which film is it from?

Can you think of other famous quotes from films?

SPEAKING

AFTER THE EXAM

In the last exam, the teacher gave two models. Alex received Model A and Barbara, Model B. In one of the exercises, they had to find the net resistance of an electric circuit. This is the conversation they had after the exam:

Alex: Hi, Barbara! How was your exam? Did you do well?

Barbara: Hi Alex! Um... not bad, I think I answered most questions correctly.

Alex: Wow, congrats! I didn't do very well.

Barbara: **I'm sorry to hear that!**

Alex: **It's not a big deal**. I spent too much time on exercise 4.

Barbara: The one of the equivalent resistance?

Alex: Uh-huh, that's it. I got one with 4 resistors. The first two were connected in parallel, and then in series with other two.

Barbara: Oh, mine was different. I had 5 resistors. The first three were connected in series, and then came the last two, connected in parallel.

Alex: Well, I didn't know the equivalent resistance when they are in parallel, so...

Barbara: Oh, it's very easy!

Alex: Oh, well, it's kind of late now for me. Next time, I guess.

1. **Drawing circuits.** Based on the descriptions, draw the circuits that Alex and Barbara got in the exam.

2. **Describing circuits.** Your teacher gave you a circuit. Do not show it to your partner. Based on it, describe it to them and ask them to draw it. Then, exchange roles.

3. **Interjections.** The conversation in ex.1 has several interjections. How many can you find? Match the following interjections with their meaning and with an example.

1. Ugh	a. Expressing agreement	I. I'm sorry. I didn't know it was a secret.
2. Whoops	b. Getting someone's attention	II. That drink was disgusting!
3. Ouch	c. Expressing relief	III. That's exactly what happened.
4. Hey	d. Expressing doubt	IV. I think we were around ten people at the party.
5. Phew	e. Expressing admiration	V. That's my foot under yours!
6. Um	f. Admitting a mistake	VI. I'm talking to you!
7. Wow	g. Expressing pain	VII. Thank God I found the keys.
8. Uh-huh	h. Expressing disgust	VIII. I can't believe you got an A on the test.

4. **Empathising with bad news.** "I'm sorry to hear that" is a very common phrase to say when someone has bad news.

   a) Give three possible answers to that line to show it's not so important. One is in the text.

   b) Your teacher gave you some bad news. Create a dialogue telling your partner about the problem. Your partner will try to show empathy with you as a friend.

5. **Going beyond. Filler words** are words that have no meaning but are used out of habit or to be more expressive. When you take them out, the sentence makes perfect sense. Find a filler in this text and think of more filler words used in everyday language.

INTRODUCING MYSELF

My name is Rohan. I was born in Bangladesh, but I came to Spain when I was 5. Now, I'm 15 years old. I only have one brother, Rafi. He is 17 years old. When I was a child, we spoke in Bengali, the language from Bangladesh, but now we speak in Spanish. I forgot all the Bengali I knew. In my country, my parents were teachers, but here they opened a clothing store.

In the past, I used to play tennis but now I prefer to play football. I play in a team and we train twice a week. My favourite singer is Bad Bunny and my favorite song is Callaíta. I love watching YouTube videos, and my favorite YouTubers are AuronPlay and ElRubius.

I didn't like my school very much. It wasn't practical. Now, I'm studying a vocational training in Electricity and I'm very happy because we do a lot of hands-on activities. I'm very excited about this new year.

1. **Structure.** Identify the main topic covered in each of the paragraphs in Rohan's text using just one word.

2. **Verbs.** Rohan does not only speak about the present. He also uses some verbs in the past. List all of them and find out the base form. *E.g. come - came.*

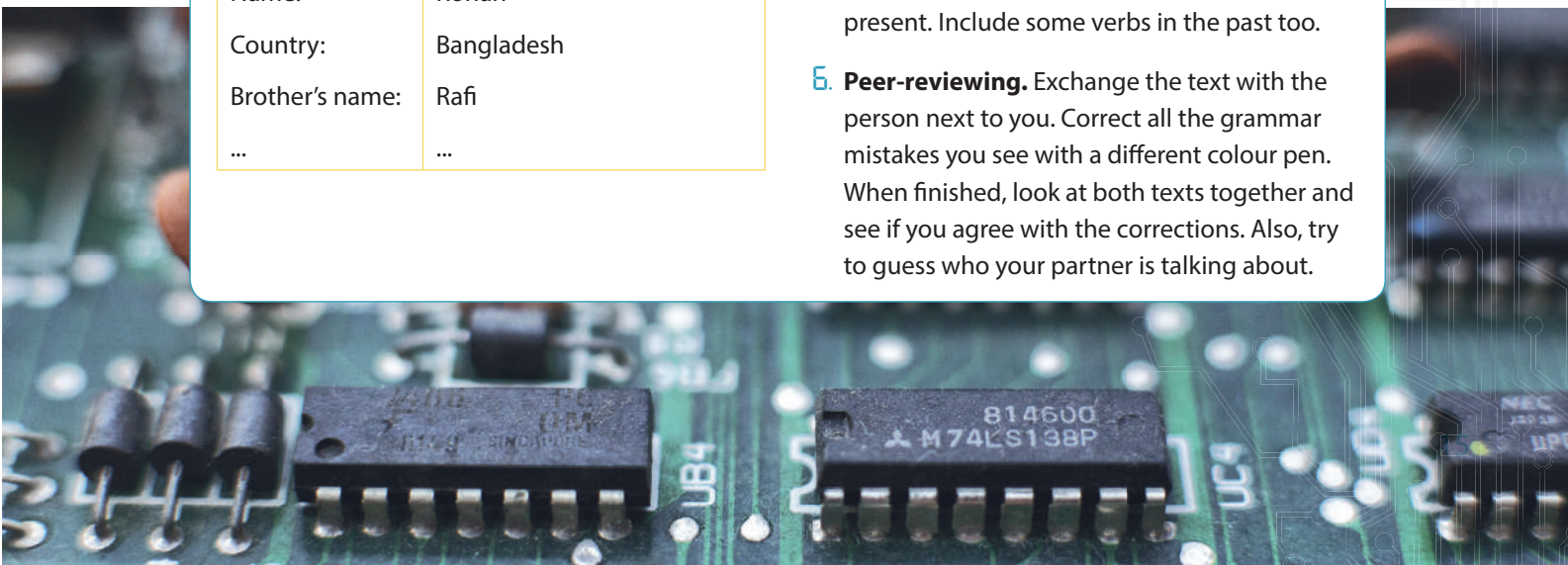
3. **Organising information.** Create a table with Rohan's basic information (at least 10 items), based on the text.

Name:	Rohan
Country:	Bangladesh
Brother's name:	Rafi
...	...

4. **Getting information.** Complete the table above on a separate sheet with your own information and add any information you want your classmates to know about you. Include some information from the past, like Rohan. Then, give it to your teacher. He/She will distribute the sheets randomly.

5. **Introducing your partner.** Using the sheet you received in the previous exercise, write a text similar to Rohan's. Do not write the name of the person. (Start with "He/She was born..."). Be careful with the third person "s" in the present. Include some verbs in the past too.

6. **Peer-reviewing.** Exchange the text with the person next to you. Correct all the grammar mistakes you see with a different colour pen. When finished, look at both texts together and see if you agree with the corrections. Also, try to guess who your partner is talking about.



REVIEW: IN A NUTSHELL

Electronic components

ammeter *amperímetro*
battery *batería*
bulb *bombilla*
capacitor *condensador*
capacitance *capacitancia*
cell *pila*
current *intensidad (de corriente)*
diode *diodo*
inductor *inductor*
inductance *inductancia*
multimeter *multímetro*
photoresistor *fotoresistor*
potential divider *divisor de tensión*
potentiometer *potenciómetro*
resistor *resistor*
switch *interruptor*
thermistor *termistor*
voltage *tensión, voltaje*
voltmeter *voltímetro*

Collocations

copper wire *cable de cobre*
LED diode *diodo LED*
light bulb *bombilla*
power supply unit *fuente de alimentación*

General English

brand *marca*
mistake *equivocación, fallo*
scientist *científico*

current *actual*
following *siguiente*

(to) agree *estar de acuerdo*
(to) flow *fluir*
(to) follow *seguir*
(to) try *intentar*

Phrasal verbs

(to) switch on *encender*
(to) switch off *apagar*
(to) switch over *cambiar*

Irregular verbs

be - was/were - *ser/estar*
forget - forgot - *olvidar*
give - gave - *dar*
go - went - *ir*
keep - kept - *guardar, mantener*
speak - spoke - *hablar*
think - thought - *pensar*

False friends

embarrassed *avergonzado*
disgust *asco*

Frequency adverbs

always *siempre*
often *a menudo*
sometimes *a veces*
rarely *apenas*
scarcely *apenas*
seldom *apenas*
hardly ever *apenas*
never *nunca*

Useful phrases

To express sympathy
I'm sorry to hear that!
¡Cuánto lo siento!

To show a problem is not important
It's not a big deal.
It doesn't matter.
No importa. No pasa nada.
Don't worry.
No te preocupes.

To emphasize a question
What on earth...?
¿Qué demonios?

1. **Organising words.** Do you create vocabulary lists? Look at structure of the lists above and think about the following questions:
   a) Does the Electric component list follow any order?
   b) Do the Frequency adverbs follow the same organization?
   c) Can you think of other ways to learn these words?

2. **Learning words together.** What is a collocation? Can you think of other examples of collocations in English?

3. **Finding patterns.** Many irregular verbs follow a pattern. Look for three other verbs that follow the same pattern as:
   a) keep b) think

4. **Careful with false friends.**
   a) How do you say "Está embarazada"?
   b) Can you think of other false friends between English and Spanish?

5. **Noting down useful phrases.** Can you think of three phrases that people use to greet someone?