

الجمهورية العربية السورية
وزارة التربية
المركز الوطني لتطوير المناهج التربوية

Emar

English Series

For Secondary School
vocational
education

10
11
12

Workbook

Electron

2023 - 2022

حقوق الطّباعَة والتّوزيع محفوظة للمؤسسة العامة للطّباعَة
حقوق التّأليف والنّشر محفوظة للمركز الوطنيّ لتطوير المناهج التّربويّة
وزارة التّربية – الجُمهوريّة العربيّة السّوريّة

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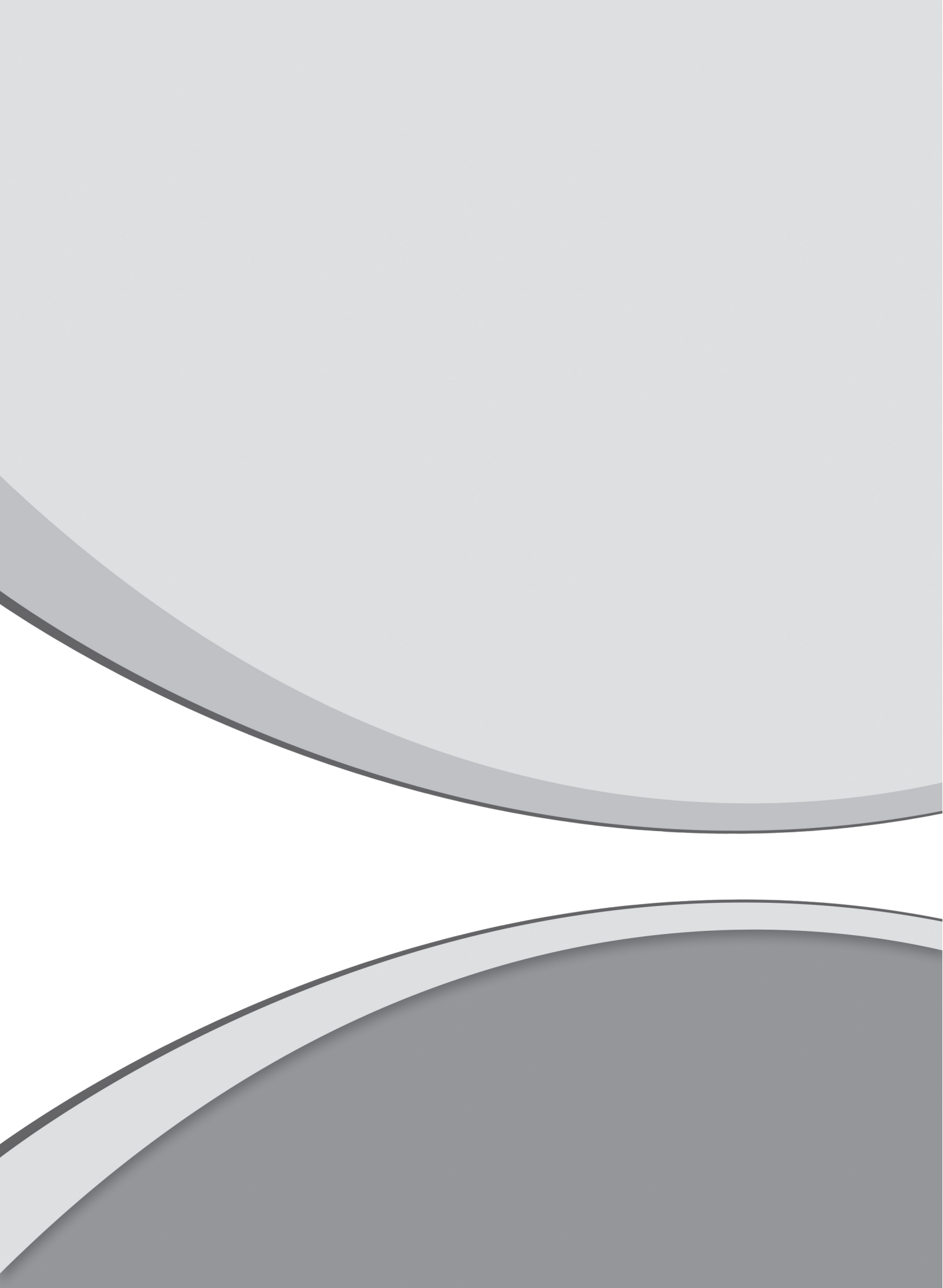
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Electron

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Workbook



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Unit 1



Vocational Learning

Speaking

a look at the following pictures and describe what kind of job they are doing.



b Ask your partner what kind of job does she/ he like to do and why?

A: What kind of job do you like to do?

B: I like to be

A: Why do you want to be.....

B: because.....

Reading

a Read the text, then do the tasks below.

I've Chosen my Job

Moly is a makeup artist who has been **passionate** about art and one of the most **exquisite** expressions of art is makeup. As soon as she finished the 9th grade, she decided to join girl's vocational school, where she learned everything she needed to become

a makeup artist., from basic **fundamentals** to advanced techniques, including celebrity, fashion, bridal and more.

After spending three years of **extensive** training at girl's vocational school, she decided to start her own business. She had her own studio to do the job. She is so thankful to have a career that she loves so dearly. It's not just the artistic aspect of the job that she loves, it's her clients. She also says that it is a **rewarding** job that made her independent, and she entered the labor market right away.



b Match the following words with their definitions.

- | | |
|----------------|-------------------------------------|
| 1. passionate | a. giving a reward of satisfaction. |
| 2. exquisite | b. filled with strong feeling. |
| 3. fundamental | c. very big in amount. |
| 4. extensive | d. pleasing and exceptional. |
| 5. rewarding | e. an essential part. |

c Complete the following sentences with information from the text.

1. Moly has always been
2. At girl's vocational school, she learned
3. After finishing her school, she
4. Moly is thankful because she has.....
5. In addition to her job, she also loves.....

Tips

- Use tools, equipment and machinery properly.
- Report any unsafe conditions.
- Wear all necessary safety equipment.
- Keep your workplace clean and clear.
- Take regular breaks.
- Be aware of your surroundings.
- Remain aware of new safety procedures.



Listening

a Listen to two students talking about their study and do the tasks below. information from the text.

1. Answer these questions.

1. Who are the speakers?
2. What kind of education are they talking about?



2. Listen again and complete with one word.

1. Lana studies at..... school.
a. electronic b. girls' c. medical d. agriculture
2. They learn there.
a. sewing b. cooking c. decorating d. house keeping
3. After graduation they don't need to
a. work b. practice c. train d. earn money
4. They start their job after graduation.
a. soon b. later c. immediately d. during

Grammar

a Put the verbs in the correct form.

1. Earth (go) round the Sun.
2. Vegetarians (not eat) meat.
3. I (get up) at 8 o'clock in the morning.
4. How often you (go) to the dentist?
5. What your father (do)?

b Reorder the words to make sentences or questions in the present simple.

1. The river Amazon - flow - into - the Atlantic Ocean.
.....
2. Ann - not - drink tea very often.
.....
3. What time - the banks - close?
.....
4. Where - Martin - come - from?
.....
5. I - not - drink - coffee.
.....

Writing

a Complete the following dialogue.

A:

B: I choose this vocation because I want to be a professional fashion designer.

A:

B: Yes, I think it is interesting.

A:

B: The labor market needs skillful people.

A:

B: This kind of education lies behind the progress of advanced nations.

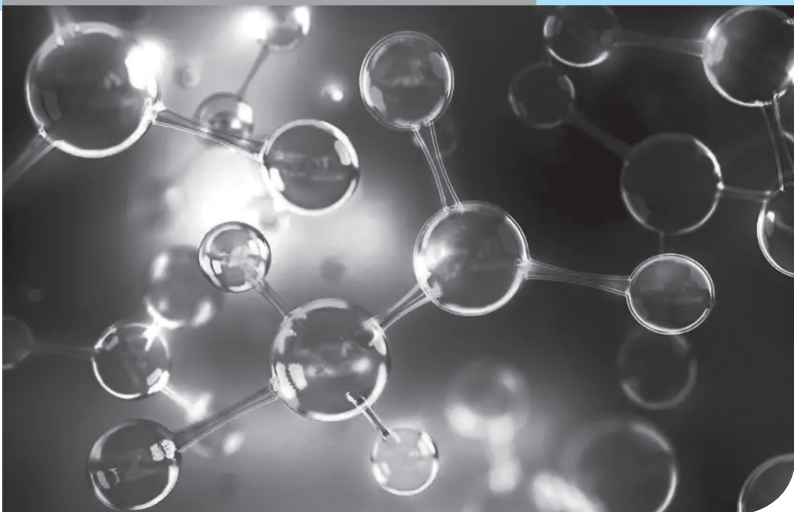
b you are a vocational school graduate; you want to apply for a job. Write a description of your skills to a company you want to work in. The answers of the following questions should be included.

1. What kind of job are you skilled in?

2. Why are you the best for the job?



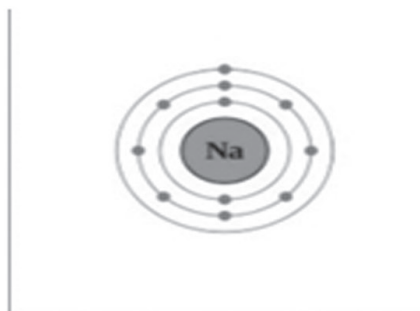
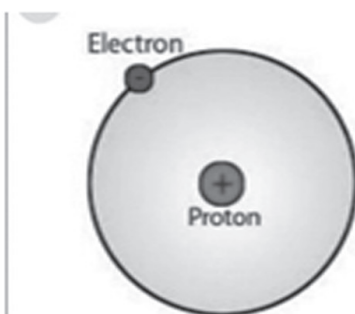
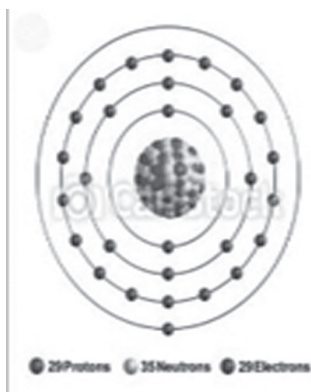
Unit 2



Matter

Speaking

a Look at the picture of different atoms .



Tell your partner

1. the names of the atoms you can see in the picture.
2. the components of each atom. What do you notice?

Reading

a What do you know about atoms?

Read the following text, then do the tasks below

Atoms

Atoms are so small that we cannot see them. The atom consists of a nucleus and a **shell**. The nucleus consists of protons and neutrons. Electrons travel around the

nucleus at high speeds in circular or elliptical orbits, forming a shell around it. Protons and electrons produce electrical **phenomena**. Electrons carry negative charge, and protons carry positive one. The neutron is electrically neutral. All atoms are built up out of the same elementary particles- protons , neutrons and electrons. The difference between elements can only be found in the number of particles included within their respective atoms. The number of electrons in an atom is always **equal** to the number of protons, whereas the number of neutrons is often different from the number of protons.

1.Match the highlighted words with their definition below.

- 1- The same in size, number or amount
- 2- Simple or basic
- 3- The path taken by one body circling around another body
- 4- Something that happens or exists in nature.
- 5- The outer cover of something.

2. Decide if the following sentences are True or False.

- 1- Protons and neutrons travel around the shell.
- 2- Each atom has the same number of electrons and protons
- 3- Electrons are electrically neutral.
- 4- Protons cause the electrical phenomena

Grammar

a

Write the verbs between brackets in present simple tense.

- 1- His brother often ----- (get up) late at the weekend.
- 2- I ----- (not/like) this kind of music.
- 3- My father ----- (not/go) to work by car.
- 4- We ----- (enjoy) watching football matches.

b Look at the table below, then complete the sentences.

	Zuheir	Jameela	Yousef	Bella
Volleyball	☹	☹	☺	☺
Chess	☺	☹	☹	☹
Playing the piano	☹	☺	☺	☺
Taking photos	☺	☺	☹	☹
I				

1. Bella likes (like) playing volleyball. She doesn't like taking photos.
2. Zuheir ----- (play)chess. He (Play) volleyball.
3. Jameela -----(enjoy) playing the piano.
4. Yousef and Bella ----- (like) taking photos.
- 5- I-----



Listening

a Listen to the dialogue between the teacher and Maher, then do the tasks .

b Decide if the sentences are True or False.

1. The lesson is about inert gases.
2. Maher liked to listen to his teacher.
- 3- The teacher suggested to use the Oxygen atom as an example

c Choose the correct answer a, b, c or d

1.The hydrogen atom is the simplest one because

- a- it consists of only one electron and one proton.
- b- it only consists of one electron.

- c- it only consists of one proton.
- d- it doesn't have any electrons or protons

2. In any orbital movement, there is a force acting from-----

- a- outside of the orbit to the center.
- b- the centre of the orbit outwards
- c- one side of the orbit.
- d- there is no force at all

3. If centrifugal force were not balanced by the force of attraction between the nucleus and the electron.

- a- The electron would fly away from the nucleus.
- b- The nucleus would have a negative charge.
- c- The electron would have a positive charge.
- d- The atom would attract new electrons.

Writing

a Complete the paragraph with words from the list .

prevents - force - allows - centre - attraction - centrifugal

As a result of the orbital movement, there is a from the of the orbit outwards. It is known as a force. The force of between the nucleus and electrons electrons from flying away from the nucleus.

b Make a soap-and-water bubble, and place it on a flat surface. Take a ruler, and rub it with a cloth. Bring the ruler closer to the bubble.

- Describe what happens to the bubble.
- Depend on the information you've learned in this unit to give reasons for such movement.

Unit 3

Electric Current

Speaking

a Discuss the following questions with a partner

1. What happens to a wire if a current flows through it?
- 2-Can an electric current be harmful ? how?

Reading

a Before you read look at the picture and answer the questions.



1. What are these wires made of? And what are they used for?
2. What is the cover surrounding these wires made of? What is its function?

b Read the following text then do the tasks below:

Electrical Properties of Materials

Materials play an important role in today's technology. They constitute electrical and electronic devices, such as radio, television, electric lights, etc. They can be solid, liquid or gaseous and are classified by types according to their ability to conduct or resist the electric current. There are generally three types of materials; conductors, insulators and semiconductors.

Conductors are material that allow relatively free movement of electrons. Metals are typical examples of conductors. Copper is the most common choice for wiring due to its high conductivity and low cost. Silver is a great conductor but it tarnishes and it's too expensive to be frequently used.

Insulators prevent the electrons to be able to freely move. They are used to protect against the harmful effects of the electric current. Rubber, glass, plastic and distilled water are common examples of insulators. Rubber, for instance, has been used as an insulator since 1870. Rubber coating on wires and cables provides protection from electric shocks. Air is also a good insulator.

Semiconductors, such as silicon and germanium, are materials that have conductivity falling between conductors and insulators.

1. Decide if the following statements are true or false

- Material are very useful in today's technology.
- Materials can be solid and liquid but never gaseous.
- Insulators resist the electric current.
- Silicon is an example of semiconductors.

2. Classify the following materials according to their types:

Rubber, copper, silicon, glass, silver, germanium, air, plastic

semiconductor	Insulator	conductor

3. Complete the following to make correct statements

- a. Copper is the best choice for wiring because.....
- b. The problem with silver is that
- c. Rubber is used for wire coating to.....



Listening

a Listen to the following dialogue then do the tasks below:

1. Decide if the following statements are true or false

1. The dialogue talks about the effects of electric current.
2. Ahmad has talked about the magnetic effect.
3. Muneer has discussed the physiological effect.
4. The electric current can be used for treatment.

2. Listen again and fill in the spaces with the following words:

magnetic heats light damaging

1. When the current flows through a metal wire it it.
2. If the current is strong enough it emits.....
3. whenever current passes through a conductor it generates a
field around it.
4. The effect of current can be on our bodies.

Grammar

a Rewrite the following words using the adverb between brackets.

- 1- People -use - rubber as an insulator - 1870. (since)
.....
- 2- The teacher -explain- the lesson. (already)
.....
- 3- He - not finish - his project. (yet)
.....
- 4- How long - you -know- him ?
.....

b ▶ Choose the correct form between brackets

- 1- I have (never, ever) been to London.
- 2- I have almost (finish, finished) reading this book.
- 3- (Have,Has) she come yet?
- 4- The match (hasn't, has) started yet

Writing

a ▶ Write a paragraph about the uses of electric current in our everyday life.

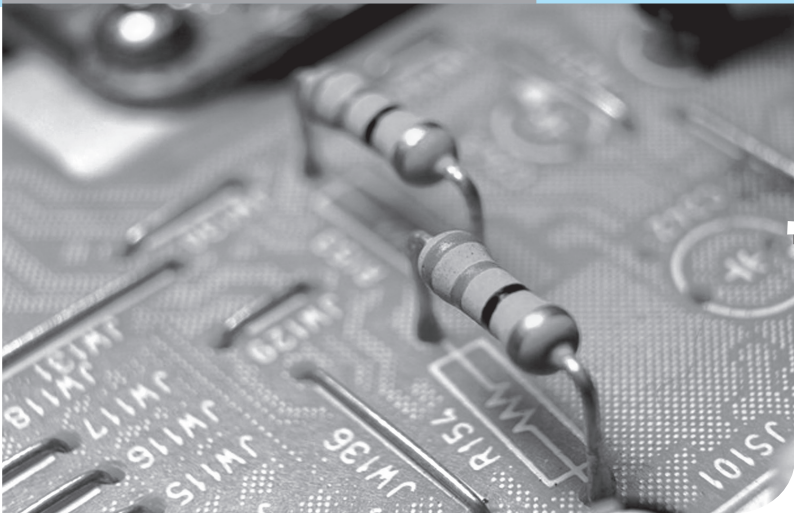
.....

.....

.....

.....

Unit 4



The Electrical Resistance

Speaking

- a With your partner , name some substances that have high resistance to electricity and others that have low resistance.
- b Why are metals good conductors of electricity ? Explain to your classmates.

Reading

- a What are the main factors that affect the electrical resistance?
- b Read the text then do the tasks below.

What affects the electrical resistance?

There are many factors that affect electrical resistance.

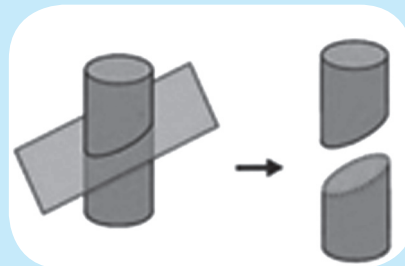
Electrical resistance of a conductor depends on

- . its cross-section.
- . its length
- . the material of which it is comprised .

There are also other things that influence it.

Temperature: the electrical resistance of conductors changes according to the change in their temperature.

For example, the resistance of a wire increases with rising temperature; this is in general for metals. On the other hand, there are substances, called semi-conductors , like Carbon and Silicium; their resistance decreases with increasing temperature .



The resistance of insulators, as well, decreases with increasing temperature. Moreover, **voltage, magnetic field, light and pressure can affect resistance too.** Resistors are also produced whose resistance varies with voltage, magnetic field, light and pressure. For example, the resistance of VDR Voltage dependent resistors falls with increasing voltage.

1- Match the words with their meanings :

- | | |
|-----------------|--|
| 1-vary | a. to consist of ,or to be made up of |
| 2-increase | b. to be different , to change |
| 3-comprise | c. to become larger in amount |
| 4-cross-section | d. something that has been cut in half
so that you can see the inside |

2- Decide if the following statements are True or False :

- 1- The electrical resistance of conductors remains constant even if their temperature changes.
- 2- The resistance of a metal conductor increases with rising temperature.
- 3 - The length of a conductor has an effect on its resistance.
- 4 - The magnetic field doesn't affect the resistance of the conductor .



Listening

a

Listen to this extract then do the tasks :

1- This audio is about

- A. types of resistors
- B. disadvantages of resistors.
- C. the advantages of using resistors .

2- Decide if the following statements are True or False :

- A- The program is presented on TV .
- B- According to the speaker, variable resistors have fixed nominal values .
- C- The speaker mentions two types of resistors.
- D- Slide contacts are the only devices that help to set the levels of resistance.

Grammar

a Choose the correct form of the verbs.

1 - Rana at the moment.

- a . is cooking b. cooks c. have cooked d. cook

2- I dinner in a restaurant this evening.

- a.has b. am having c. have d. has had

3- My brothers action films now .

- a. watch b. are watching c. have watched d. have been watching

4- you a computer game right now ?

- a. Do / play b. Did/ play c. Are / playing d. Were/ playing

5. Leen the museum today.

- a. visit b. were visiting c. have visited d. is visiting

b Put the verbs in the correct form of the present continuous tense.

1 - Mohammad (not work) now.

2- We(study) about electronics this year.

3- Hani(repair) the hair dryer at the moment .

4- Harry up ! I (wait for) you

Writing

a Complete this extract with the following words.

they electricity cold substances

Cold conductors are which conduct

..... better when they are than when they are hot ;

whereas

b Reorder these words to complete the extract above.

Substances / hot / are / which / better / conductors/

Conduct / are / when / they / hot .

Unit 5



computer component

Speaking

a Read and do a similar dialogue with your partner.

Lucy: Hi Mohanad, how are you?

Mohanad: I am fine Lucy, what about you?

Lucy: I am good. So have you seen the new computer laboratory in our school?

Mohanad: Yes, I saw it yesterday. This is very good for our school.

Lucy: Can you tell me about the importance of computers?

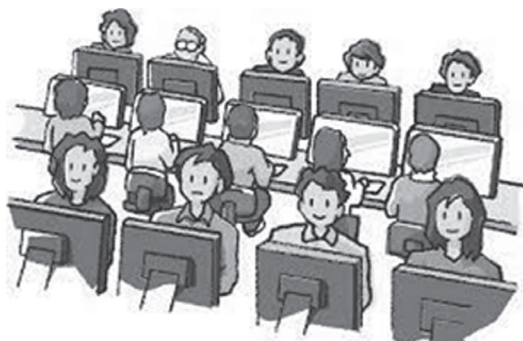
Mohanad: Yes of course. The computer is the best invention of science. Now in every sector, they are using a computer.

Lucy: Is it important for students' life?

Mohanad: Yes of course. You can keep your books saved on your computer and can read them anytime, anywhere. Even with an internet-connected computer, you can access to lots of video lessons for you. On YouTube, there are thousands of videos related to math, English, and science. We can learn our lessons from there.

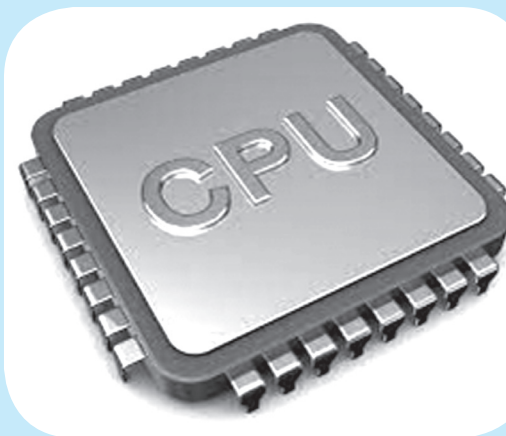
Lucy: it seems so interesting. Good to know. Thank you so much.

Mohanad: It's my pleasure. Take care, see you.

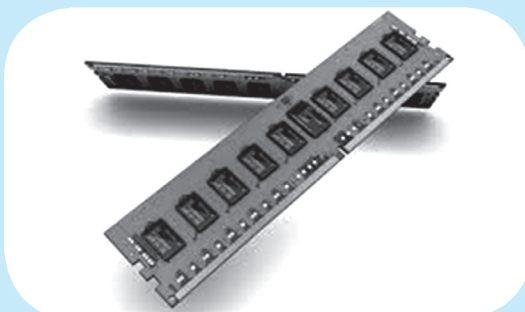


What is a computer?

A computer is an electronic machine which can accept data in a certain form, process the data, and give the results of the processing in a specified format as information. First, data is fed into the computer's memory. When the programme is run, the computer performs a set of instructions and processes the data. Finally, we can see the results (the output) on the screen or in printed form. A computer system consists of two parts: hardware and software. Hardware is any electronic or mechanical part you can see or touch.



Software is a set of instructions, called a programme, which tells the computer what to do. There are three basic hardware sections: the central processing unit (CPU), main memory, and peripherals.



Perhaps the most influential component is the central processing unit. Its function is to execute programme instructions and coordinate the activities of all the other units. In a way, it is the 'brain' of the computer. The main memory (a collection of RAM chips) holds the instructions and

data which are being processed by the CPU. Peripherals are the physical units attached to the computer. They include storage devices and input/output devices.

a Are the following sentences true or false?

1. Computers have two main parts: hardware and software.
2. The data can be saved in the computer's memory.
3. A hardware is a programme telling the computer what to do.
4. A microphone is a kind of peripherals.

b Match the words in column "A" with their definitions in column "B".

1. Software

2. Peripherals 3. Main memory

4. Hardware

5. Central processing unit (CPU)

a. the brain of the computer

b. physical parts that make up a computer system

c. programmes which can be used on a particular computer system

d. input devices attached to the CPU

e. section that holds programmes and data while they are executed or processed



Listening

a Listen and do the tasks below.

1- Choose the correct word

1. Tim is a

a- teacher

b- doctor

c- student

d- technician

2- Liz has a problem with her

a- eyes

b- study

c- desktop computer

d- laptop

3- Tim promised to fix the problem after he would

a- go home

b- get paid

c- take a look

d- ask a friend

2- Listen again and fill in the gaps with words from the box.

right – warnings – slow – pick – rid – fast

1. The problem with the Liz's computer is that it's too
2. She turned off some software because she was annoyed that lots of appeared all the time.
3. Tim hopes he can get of any infection or virus.
4. Tim will call Liz to tell her when she can the computer up.

Grammar

a Choose the correct answer from a, b, c, or d.

1. If world is a stage, then life a game.
a. is b. will be c. would be d. must be
2. If you heat water to 100 C, it
a. boils b. boil c. will boil d. may boil
3. I won't go to the party if she me.
a. invites b. doesn't invite c. will invite d. don't invite
4. I grateful if you keep what I said to yourself.
a. will be b. am c. would be d. may be
5. If this is a good article, I Formula One driver!
a. will be b. am c. would be d. must be

b Put the verbs in the correct forms. Use zero or first conditional sentence structure.

1. If it (rain), the dams (become) full.
2. Ice (melt) if you (heat) it.
3. If Maria (pass) all her exams, she (travel) to Europe next year.
4. They (not / have) a party if they (not / have) enough money.
5. People (die) if they (not / eat) anything.

Writing

a Complete the following with your own words.

- a. I will buy you a new computer if
- b. If she comes today, ...
- c. If you use your mobile a lot, ...

b Write a paragraph about the importance of computers in your studies.



Unit 6



Safety

Speaking

- a** ▶ With a partner, discuss the following
 - 1- when may electric shock happen?
 - 2-First-aid steps for electric shock
- b** ▶ Share your ideas with your classmates.

Reading



Electrical Safety Equipment for Electricians

Electricity is one of the most important innovations of the 19th century. First discovered by Benjamin Franklin in 1752, electricity was connected to power light by Thomas Edison in the 1870s. Since then, electricity has found its way into most homes and businesses across the world. This has led to an increase in those handling electrical currents and the need for electrical safety equipment.

Despite its modern-day importance, electricity can be very dangerous to work with.

Electricians, engineers, and others working closely with electrical currents must be very careful and are often required to wear special electrical safety equipment. Personal Protective Equipment (PPE) can be used across a variety of industries and job applications. However, some PPE is better suited for helping electrical and power workers deal with the dangers of their jobs.

Eyewear

Dielectric safety glasses protect the eyes from electrical arcs that can form when working with electricity and heavy machinery. It can also be useful to welders.

Gloves

Gloves are an important piece of electrical safety equipment. When burns occur, they typically affect the hands and forearms. Not only will gloves protect against burns, but they also provide cut protection reducing the risk of many common injuries.

Head Protection

Electricians and power workers are often up on ladders and even greater heights to make repairs to inspect and maintain power lines and wiring. Proper head protection is important to reduce the risk of fatal falls.

a Answer the following questions

- 1- when was electricity connected to power? By whom?
- 2- Why does the need for electrical safety equipment become more important nowadays?
- 3- Who are required to wear special electrical safety equipment ?

b Complete the following table with information from the text above.

Equipment	Protective part of the body	The reason
1- gloves		When burns occur
2-	The head	
	Eyes	



Listening

a Listen to the following tips for safety, then do the tasks below.

1- Decide if the following sentences are true or false.

- 1- Keep a distance of less than 8-10 metres when power lines are fallen.
- 2- People will declared safety.
- 3- All fallen power lines should be treated as live.

2- Choose the correct word a,b,c or d to complete the sentences.

- 1- The text gives tips about how to stay safe in.....
 - a. Lightning storms
 - b. Car accident
 - c. Power lines have come down
- 2- If you need to get out of burning vehicle keep your feet.....
 - a. close together
 - b. apart from each other
 - c. away from the ground
 - d. dry and not wet.
- 3- if wires are on the ground ,this can reduce the chance of an electric shock.
 - a. Run away
 - b. Jump away
 - c. Keep low
 - d. Stay still

Writing

a Fill in the spaces to complete the following text **Safety tips around the home.**

electrician - protections - plug - areas - electrical - jobs - risk

You can reduce the 1)..... of electric shock in your home by taking a few 2).....

Although you may think it looks easy to do 3) yourself, such as changing power points or switches, always hire a licensed 3) Do not remove a plug from a power point by pulling on the cord, pull the 4) instead. Keep electrical appliances away from wet 5) Electricity and water don't mix, wear rubber or plastic shoes when using 6) appliances.

b Use the information in the text above to give advice about how to keep safe at work.

Electron

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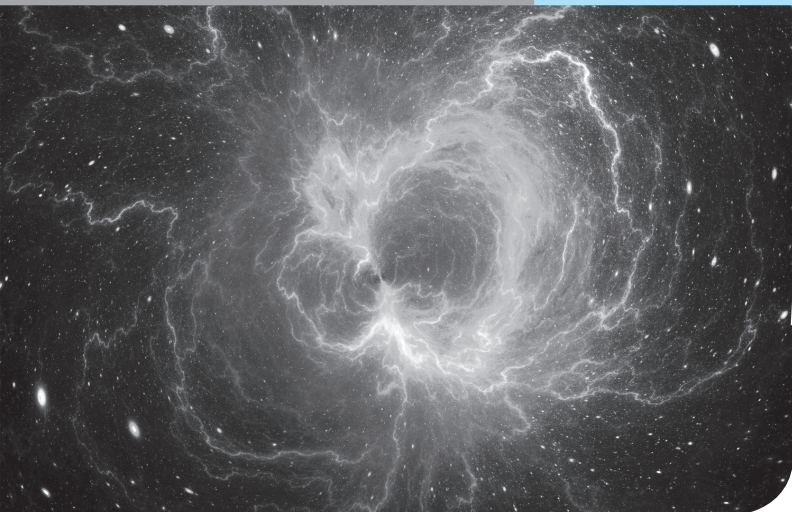
Workbook



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Unit 1

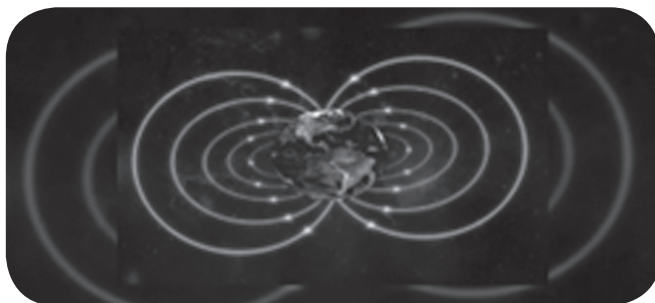
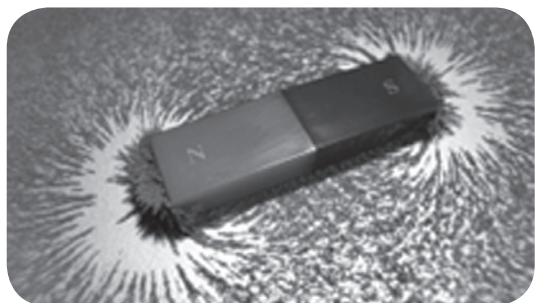


Magnetic field

Speaking

a Look at the picture below, with a partner discuss the following questions.

- 1- What is the main source off magnets?
- 2- How does magnet power function?
- 3- What do you know about Earth as magnetic ball?



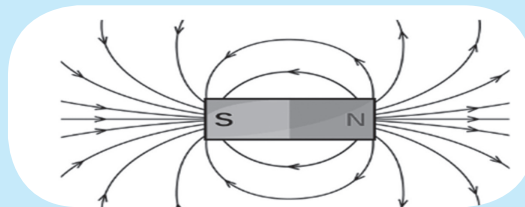
Reading

- a** where is the magnet field exist?
- b** In what way is the magnet power important for life on Earth?
- c** Read the following text and do the text below.

What is a Magnetic field

Magnetism is a force of nature produced by moving electric charges. Sometimes these motions are microscopic and inside of a material known as magnets. Magnets

or the magnetic fields are created by moving electric charges, can attract or repel other magnets, and change the motion of other charged particles. A magnetic field exerts a force on particles known as the Lorentz force. The force acting on an electrically charged particle in a magnetic field depends on the magnitude of the charge, the speed of the particle, and the strength of the magnetic field. The Lorentz force has the abnormal property that it causes particles to move in right angles to their original motion. Some materials, such as iron, are known as permanent magnets, which means that they can sustain a permanent magnetic field. Other materials, such as iron, cobalt and nickel, can be given a temporary magnetic field, but eventually those materials will lose their magnetism. Earth itself is a giant magnet. The planet gets its magnetic field from circulating electric current within the molten metal core.



1- Answer the following questions.

- 1- Define magnetism.
- 2- How are the magnetic fields created?
- 3- What is the Lorentz force?
- 4- what does the force in a magnetic field depend on?

2- Decide if the following sentences are True or false.

- 1- The microscopic motions inside a material are known as magnets.
- 2- The Lorentz force property causes particles to move in left angles to their original motion.
- 3- The molten metal core of earth is the source of magnetic power.



Listening

a

Listen to the following interview and do the tasks below.

1- Choose the correct answer a, b, c, or d

1- The interview is about:

- a- Electric field b- The planet Earth c- Gravity d- Magnet

2- Mr. Sam is a /an at science for the world school

- a- Student b- Professor c- Manager d- owner

3- The magnet field was first discovered by a

- a- scientist b- farmer c- student d- mining company

2- Listen again and decide if the following sentences are True or False.

1- The shepherd name was Carl Friedrich Gauss.

2- The ancient Greeks were the discoverers of magnet.

was measured in 1932 and has been repeatedly measured since then

Grammar

a Complete the following sentences with the correct form of present perfect/ present perfect continuous form.

Linda: where 1) (you/ have / be) ? I haven't seen you for a while ?

Sana: I 2) (have / travel) abroad for a year.

Linda: What 3) (have / do) there?

Sana: I 4) (have / travel) to visit my aunt there.

Linda: How long 5) (she / have / live) there?

Sana: She 6) (have / live) there or ten years.

b Choose the correct word between brackets.

1-The train (hasn't arrived, haven't arrived) yet.

2-They have lived here (since, for) 2000.

3-I can't leave now, I've (just, already) got to work.

4-She (has cooked , hasn't cooked) dinner yet.

Writing

a Fill in the spaces with the following words

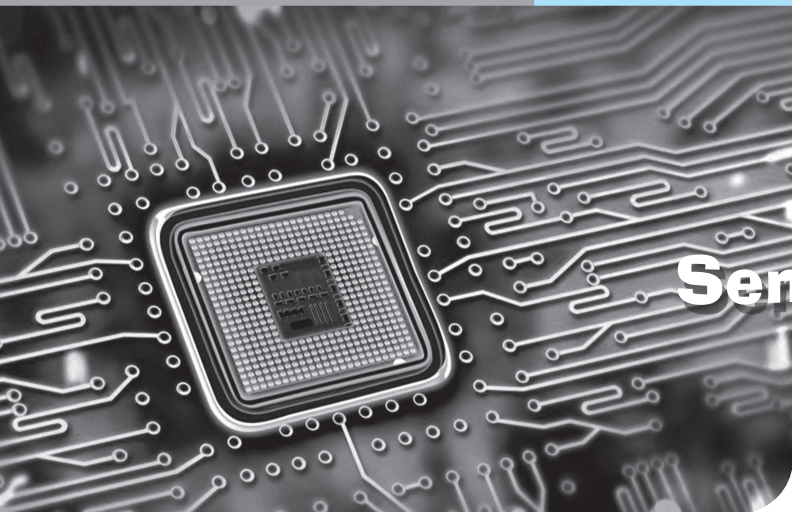
Electrons- opposite- generated- down

HOW MAGNETISM WORKS

Magnetic fields are 1) by the motion of electric charges, known as "spin." Inside atoms, most 2) tend to form pairs in which one of them is "spin up" and the other is "spin 3).....". In this case, the magnetic fields created by those spins point in 4) directions, so they cancel each other.

b Write a paragraph about the uses of magnet in our daily life.

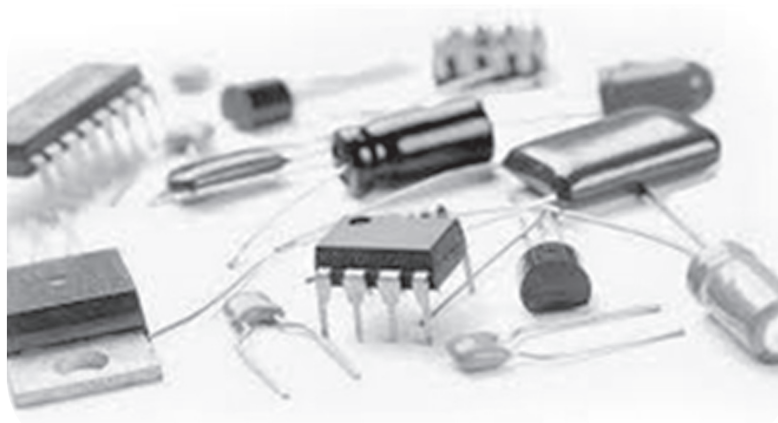
Unit 2



Semiconductors

Speaking

- a** Before you read, look at the following picture and answer the following.



- 1- What can you see? Name two of the items you can see in the photo.
2. Mention some application of such devices.

Vocabulary

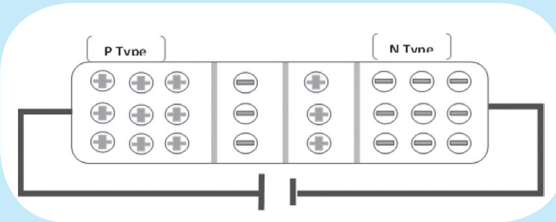
- a** Read the text below to link each one of these terms with its corresponding definition.

1. Junction	a. balance
2. Free holes	b. a reduction in something
3. Equilibrium	c. a place where things meet or join
4. depletion	d. positive charge carriers
5. insulator	e. a material or covering that electricity, heat, or sound cannot go through

Reading

P-N junction diode

The P-N junction diode is a combination of P-type and N-type semiconductors to achieve the practical utility of both. The P-type semiconductor has free holes positively charged, whereas the N-type has free electrons with negative charge.



When joined together, electrons near the P-N junction jump from N to P. Likewise, the holes near the junction jump from P to N. This creates a region where electrons and holes continue moving and shifting places till equilibrium is reached. This gives rise to what is known as “Diffusion current”.

Forward bias happens when a positive pole of a battery is connected to the P region, and the negative terminal of a battery is connected to the N region. The holes and electrons are repelled by the positive and negative terminals towards the junction. This repulsion narrows down the depletion region. This gives us what is known as “Drift current”. The P-N junction becomes an insulator if we reversed the terminals connectivity. It results in the depletion layer to widen up, and the “Reverse bias” occurs.

a Answer the following questions.

1. What is a P-N junction?
2. What is the charge of free holes?
3. Why does the depletion region narrow down in the Forward bias?
4. When does the depletion region widen up?

b Read again, and decide if the following are True or False.

1. P-type semiconductors only make the P-N junction.
2. N-type semiconductors have free electrons.
3. The holes can never jump from P to N.
4. Reverse bias widens up the depletion layer.



Listening

a

Listen to the podcast, then do the tasks below.

1- What is the podcast about?

2- Decide if the following are True or False.

1. The podcast was about types of semiconductors.
2. A diode is a three-terminal electronic component.
3. The current passes in only one direction.
4. There will be a high resistance

3- Listen again, and choose the right answer a, b, c or d.

1. A diode is a Electronic component.
a. moni-terminal b. two-terminal c. terminal d. mini-terminal
2. The current may pass with low resistance in
a. one direction b. two directions c. all directions d. no direction
3. Diodes consist of P-N junction and metallic
a. intact b. impacts c. contracts d. contacts
4. The next podcast will be about
a. cell phone b. silly man c. silicon d. semicolon

Grammar

**** See the rule in the grammar file page**

a

Join the sentences using “When”, “because”, “before” or “after”.

1. The teacher was happy. We finished the project earlier.
2. Fred got to the station. The train left.
3. Jihan saved enough money. She bought a scooter.
4. The electrician came to the workshop. We already fixed the problem.

b

write the correct form of the verb. Use the Past Perfect or the Past Simple.

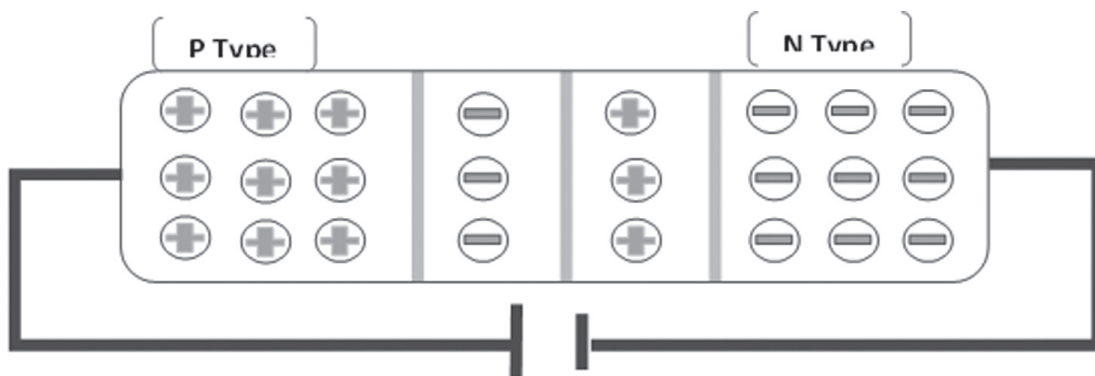
1. My team (win) yesterday.
2. I finally realized I (forget) the keys.
3. We got home and found that someone (break) into the house.
4. Maha was pleased to see that Karam (pass) the IELTS exam.
5. Shadi (feel) ill last night because he (eat) too many cakes.

Writing

a Reorder the following sentences (The first one is done for you).

1. Transistors are made by stacking three different layers of semiconductor material together.
2. A semiconductor material with extra electrons is called an n-type (n for negative because electrons have a negative charge) and a material with electrons removed is called a p-type (for positive).
3. Some of those layers have extra electrons added to them ("doping"), and others have electrons removed (doped with "holes" -- the absence of electrons).
4. Transistors are created by either stacking an n on top of a p on top of an n, or p over n over p.

b Look at the following chart and write a paragraph containing the following information.



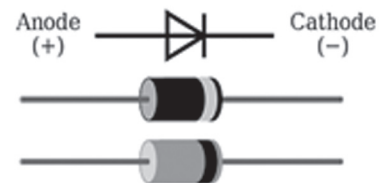
- What type of bias you get from such connectivity.
- Describe the free hole and electrons movement.
- Is it possible for the current to flow here? Why?

Unit 3

Stabilized power supplies

Speaking

- a** Look at these pictures. work with a partner to answer the following questions.



- 1- What are these devices?
- 2- Why do you use them?
- 3- Tell your classmates about these devices.

Reading

- a** What do you know about Thyristors and Triacs.

Thyristors and Triacs

Atriac is an important member of the thyristor family of devices. It is a bidirectional device that can pass the current in both forward and reverse biased conditions and hence it is an AC control device. A triac is an abbreviation for a Triode AC switch. TRI means that the device consisting of three terminals and AC means that it controls the AC power or it can conduct in both directions of alternating current. In power electronics, Thyristors and Triacs are used mainly as converters and for

controlling electrical power. If a voltage is applied to a diode thyristor in the non-conducting direction, only a low off-state current will flow. A four-layer diode behaves like:

* a rectifier diode when an off-state voltage is applied to it or after reaching the breakover point.

* a blocking state region in the forward direction.

A triac works with alternating current, so there will be one part of the wave that is positive and one negative. The positive part of the wave passes through the triac as long as there is a triggering signal on the gate, so the current flows from top to bottom. On the same way, the negative part of the wave passes through the triac as long as the triggering signal is applied to the gate, so the current flows from bottom to top going upwards. In both cases the triggering signal is obtained from the same gate.

b Match between the words in column (A) and their meanings in column (B).

A	B
1-terminal	a- the ability or power to make something happen the way you want.
2- alternate	b- to move in a steady continuous way.
3-converter	c- to happen in a regular way, first one thing happens, then the other.
4- flow	d- one of the points at which you can connect wires.
5-control	e- devices that change something into another.

c Answer the following questions.

- 1- What is a triac?
- 2- What does TRI mean?
- 3- How are Thyristors and Triacs used in power electronics?

d Decide whether the following sentences are True or False.

- 1- TRI means that the device consisting of four terminals.
- 2- A four-layer diode behaves like a blocking state region when an off-state voltage is applied.
- 3- The triac works with alternating current.



Listening

a Listen to the text and do the tasks .

1- Choose the correct answer a, b, c or d.

1- Diodes are very often used to potential damage from unexpected large spikes in voltage.

a- limit b- exceed c- keep

2- Every diode has terminals

a- two b- varied c- three

3- Transient-voltage-suppression diodes are diodes with very power ratings.

a- weak b- small c- large

4- Transient-voltage-suppression diodes are designed to absorb energy when voltages exceed their voltage.

a- breakdown b- forward bias c- reverse bias

2- Listen again and decide if the following sentences are True or False.

1- Every diode has three terminals

2- It's important to mix the connections on a diode up.

3- The positive end of a diode is called the cathode.

Grammar

***see the rule in the grammar file on page-**

a Choose the correct verb between brackets.

1- The children (had already gone , had already been going) to bed when their mother came from work.

2- I was very tired when I arrived home. I(had been working , had worked) hard all day

3- When we got home last night, we found that somebody (had broken , had been breaking) into the flat.

4- She (had been sleeping, had slept) for ten hours when I woke her.

b Write the correct form of the verb between brackets.

- 1- They (live) in Beijing for three years when he lost his job.
- 2- We (eat) all day, so we felt a bit ill.
- 3- I was really tired because I (study).
- 4- She (practice) for three years when she entered the race.
- 5- We (wait) for Nancy for over five years before she arrived yesterday.

Writing

a Complete the sentences with words from the box:

side applies wrong diode be

Ever stick a battery in the 1..... way? Or switch up the red and black power wires? If so, a diode might 2.....to thank for your circuit still being alive. A diode placed in series with the positive 3.....of the power supply is called a reverse protection 4..... It ensures that current can only flow in the positive direction, and the power supply only 5.....a positive voltage to your circuit.

b Write a well- organized paragraph about the way you use to stabilize your current at home.

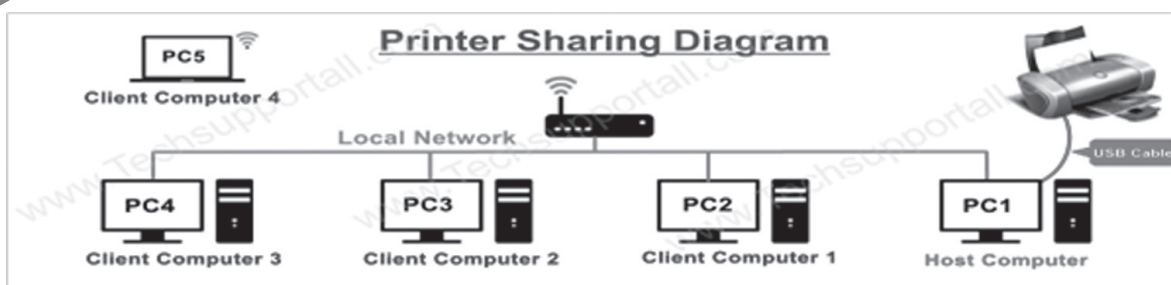
Unit 4



Computer Networks

Speaking

a Describe what you can see in the following pictures.



b Read and do a similar dialogue with your partner.

The student: Is the school going to open a new computer laboratory?

The teacher: Yes because we need more computers since they are becoming very important in our daily life.

The student: Are the computers going to be connected with each other in the new lab?

The teacher: Sure we are going to use a network that connects all the school computers together. They are also going to be connected with the internet network.

The student: What devices can be connected with a computer network?

The teacher: We can connect computers, routers, printers, and other devices.

Do you have any computer network in your house?

The student: Yes I have a computer connected with a printer via wire.

The teacher: That's very good.

Reading

a Read the text and do the tasks below.

Computer Programming Languages

A programming language is any set of rules that converts strings, or graphical program elements in the case of visual programming languages, to various kinds of machine code output. Computer programming languages are used to communicate instructions to a computer. They are based on certain syntactic and semantic rules. Programming languages are used in computer programming to implement algorithms.

There are two types of programming languages.

The first one is closer to the machine's language.

The second one is closer to the human's language.

The computer switch the written language into series from zero (0) to one (1) and starts its work



on this basic. There are about 700 programming languages including the interior markup language. So, programmers use programming languages to develop software programs and scripts and convey instructions on a computer.

1- Read the text and then answer the following questions.

- 1-** What is a computer programming language?
- 2-** How are they used?
- 3-** What are the two types of programming languages?
- 4-** How can programmers use programming languages?

2-Read and decide if the following statements are true (T) or false (F).

- 1- Programming languages can be converted into visual programming languages. ()
- 2- They are no rules that control programming languages. ()
- 3- The computer switches the written language into numbers from 1-4. ()
- 4- There is no interior markup language in the programming language. ()
- 5- All software programs are written in a programming language. ()



Listening

a Choose the correct word.

- 1- Nancy called her brother Jack because she could not use:
a. The computer b. The printer c. The mobile d. The internet
- 2- Nancy could not use the device probably because someone had forgot to put the cable in:
a. The switch b. The router c. The hub d. The computer
- 3- Building a LAN is than building a WAN.
a. more difficult b. more complicated c. easier d. wider

b Listen again and fill in the gaps with words from the box:

Wide - data - close - internet - exchange - connected

1. Computers can be connected with other devices capable of sending and receiving
2. Networks are usually used to share resources, ... files or communicate with other users.
3. We can use a Local Area Network (LAN) to connect computers which are together.
4. The largest Wide Area Network is the

Grammar

a Use the correct form of "be going to" and the verbs in brackets.

1. I (take) some photos at the weekend.
2. They (order) a pizza for dinner.
3. We (not play) football tomorrow.

4. Molly (not buy) a new skirt for the party.

5. (you / start) university next year?

b Change these sentences into the negative form.

1. I am going to visit my cousin next Friday.

.....

2. Sally is going to help her mum today.

.....

3. He is going to surf the Net tonight.

.....

c Change these sentences into the question form.

1. We are going to build a LAN in our school.

.....

2. She is going to call me this evening.

.....

3. They are going to see the new film in the cinema.

.....

Writing

a Define the following in your own words.

a. A network

b. Local Area Networks

c. Wi-Fi

b Write a paragraph about a computer network in your school or in your house.

Unit 5

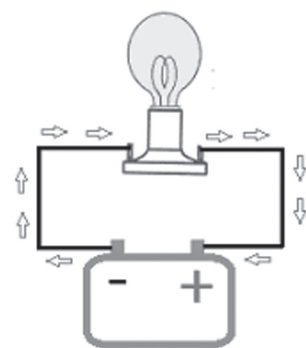
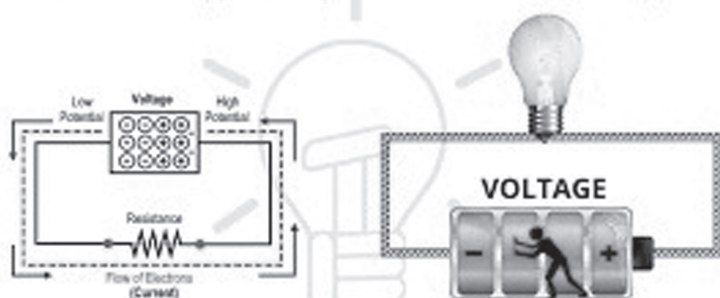
Voltage

Speaking

- a** Work in pairs. Look at these pictures below and discuss the following questions.

WHAT IS VOLTAGE ?

Its Unit, Formula, Types, Properties, Measurement & Application



Flow of electric charge

1. What is the electric current?
2. What causes the movement of charges towards neutralization?
3. What is the relation between current and voltage?

Reading

- a** Read the following text and do the tasks below.

Technically speaking, the current flows from positive (+) terminal to negative (-) terminal. But electrons flow from negative to positive terminals. The flow of electrons is called current. The continuous flow of free electrons constitutes an electric current. The electrical pressure which is used to move the electrons is called voltage. It is

denoted

by the letter "V". The unit of voltage is "Volt" and is measured by voltmeter. To measure a voltage, a voltmeter must be connected in parallel with the component whose voltage you wish to measure.



There are two main types of voltage. DC voltage and AC voltage. The DC voltage (direct current voltage) always has the same polarity (positive or negative) such as in a battery. The AC voltage (alternating current voltage) alternates between positive and negative.

1. Decide if the following sentences True or False. Correct the false ones.

1. The electric current flows from negative terminal to positive one.
2. The flow of electrons is called voltage.
3. A voltmeter is an instrument used for measuring voltage.
4. The AC voltage always has the same polarity.

2. Match the words in column "A" with their definitions in column "B".

A	B
1. terminal	a. to form or to make up something
2. constitute	b. the state of having either a positive or negative electric charge
3. component	c. one of the points at which you can connect wires in an electrical circuit.
4. polarity	d. one of several parts that together make up a machine, system etc



Listening

a Listen to a text about the electric charge and do the tasks below.

1. Decide if the following sentences true or false. Correct the false ones.

1. Repulsive or attractive force results from charging.
2. Charge is that property of matter to which all natural phenomena can be traced.
3. The magnitude of charge is measured in units called volts.
4. Protons are the carriers of positive charge.

2. Answer the following questions.

1. What is charging caused by?
2. How many sorts of charge are there?
3. What are the carriers of negative charge?
4. When does the atom behave as an electrically neutral body?

Grammar

a Complete the following sentences with **will** or the correct form of **be going to**.

1. Next Friday we attend a basketball game.
2. I think the game be at the Olympic arena.
3. My father buy tickets tonight.
4. I lift that heavy box for you.
5. Look at those dark clouds! It rain.
6. My mobile phone is ringing. I answer it.

b Match the beginnings in column A with their endings in column B

A	B
1. In 300 years, people will travel	a. for the test tonight.
2. Next summer John is going to	b. more comfortable in the future.
3. Sally is going to study	c. with flying cars instead of planes.
4. I forgot to buy bread.	d. visit many countries around Europe.
5. I think that life will be	e. I will go back to buy some.

Writing

- a** Complete the following text with words from the list.

Voltage, transformers, resistance, increased, high, low

With AC, it is possible to use 1..... to change voltage levels in a circuit. With transformers, voltages can be 2..... for long-distance transmission. At the receiving end, the 3..... level can decrease to a safer 220V or 110V for business and residential use. We need 4..... voltages for long distances because wire 5..... causes power loss.

- b** Write a paragraph about direct current generators and motors and why alternating current supply systems have replaced direct current ones.

Unit 6



Medical Devices

Speaking

- a** Look at the pictures and discuss with your classmates the following questions



- 1- Where can you find these signs ?
- 2- What do they refer to ?
- 3- Who can enter the clinic or the place where they are put ? and why ?
- 4- Have you ever been to a place in which you have seen these signs? If yes,
Tell your classmates about your experience .

Reading

Radiation Risks

Radioactivity has negative effects on humans and the environment as well. It can cause different types of cancer including thyroid cancer and leukemia, eye diseases and even genetic damages if the body is exposed to a large dose of radiation within a very short period of time. It may also lead to death within a few hours or days.

Moreover, radioactivity can destroy the environment, because it pollutes water, soil and air .

However, there are some solutions to stop or limit the radioactive contamination. Radioactive waste cannot be burned or buried due to the possibility of leakage. Therefore, it must be disposed of by storing it in heavy thick concrete containers labeled with warning signs. Anyway, it is not easy to store and dispose of this kind of waste, so it is better to recycle it or use it for other purposes as fuel, thus protecting the environment.

Vocabulary

a Match the words with their definitions .

- | | |
|-----------------|---|
| 1-recycle. | a. An amount of something. |
| 2-Dose | b. The process of making something dirty. |
| 3-contamination | c. unwanted materials of any type; especially what is left after use. |
| 4-waste | d. to treat something and use it again for a different purpose. |
| 5-dispose | e. To get rid of something by throwing it away. |

b Answer the following questions .

- 1- What diseases may radioactivity cause ?
- 2- How can radioactivity pollute the environment ?
- 3- Why is it not recommended to bury radioactive waste ?
- 4- What is the best way to get benefit from radioactive waste ?

c Decide if the following statements are True or False.

- 1- A person may die immediately if he/she has been exposed to a small amount of radiation.
- 2- Specific kinds of containers must be used to store radioactive waste .
- 3- Radioactive waste can be used as a kind of energy .
- 4- It is not difficult to get rid of radioactive waste in simple ways .



Listening

a Listen to this story then do the tasks .

1- Answer the following question.

- 1- There was explosion in the city.
a. a gas station b. an atomic c. a chemical lab
- 2- The family cleaned their bodies with
a . water and a wet cloth b . a dry cloth c. alcohol
- 3- They drank
a. clean water from the tap b. bottled water c. soft drinks
- 4- John's family had
a. nothing to eat b. a lot of food c. little food
- 5- John contacted to help him.
a. the doctors b. the emergency services c . the police

Grammar

a Choose the correct answer between brackets .

- 1-If he wore a lead apron , radiation (wouldn't hurt / would hurt / hurt) him so badly.
- 2-If I (have / had had / had) enough time , I would visit you.
- 3- If I were you, I (will go / would go / went) to the workshop early.
- 4-Ali (wouldn't fail / failed / would fail) the exam if he studied hard.
- 5- If you reminded me, I (bring / brought / would bring) the tickets.

b Write the correct form of the verbs in brackets .

- 1- Yousef (buy) a new house if he won the lottery.
- 2- If I (be) tall, I would play basketball.
- 3- Marie would tell me if she(want) to come with us.
- 4- Fadi (repair) your car if you asked him .

Writing

a Complete the text with the following words.

keep – ionizing – sink – laboratories – precautions
– alarms – protective – warning

Procedures to protect yourself against the dangers of radiation:

- 1- Wear special clothes and gloves when dealing with radiation.
- 2- away from radioactive sources as possible.
- 3- Keep necessary near the sources of radiation such as
. a water 4-.....
- . 5- light signs that indicate caution from radioactive sources.
- . install 6-..... in a case of someone breaks in the place by mistake.
- . Label "7-..... radiation" on all the radioactive items and the 8-.....
as well.

a Write a well- organized paragraph on the following topic.

Steps to protect yourself from the bad effects of radiation .

You have to mention :

- . The type of clothes .
- . Necessary equipment .
- . Steps to avoid direct contact with radioactive materials.



Electron

12

Workbook



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Unit 1

Integrated Circuits

Speaking

- a ▶ Look at the pictures, and describe what you can see.



- b ▶ What do you know about Motion detectors?

Reading

- a ▶ Read the following text, then do the tasks below.

Motion detectors

In 1950, Samuel Bango invented the first motion sensor under the name of "Burglar Alarm". His invention depends on the basics of radar and ultrasonic waves. His invention, and its variations, are used to detect motion by studying the changes in the frequencies they produce. Most of these devices are equipped with a camera that uses an image sensor and the lens directs light to a specific direction. They are widely used in security systems. Their main purpose is to sense any intruder, and send alerts to the owner's control panel, or sometimes to his/her mobile phone.

There are various types of such devices: PIR, Microwaves, Tomographic, Ultrasound and combined types of them. The passive infrared (PIR) responds to IR radiation by emitting electricity. It will activate the alarm whenever this influx of electricity takes place. Tomographic sensors generate radio waves, and detect any change in these waves. They can notice through walls and objects, and installed in high places to make a radio wave net covers large areas. They are used in warehouses and in commercial applications in need of high security level.

Vocabulary

a Match the words with their definitions.

- | | |
|----------|---|
| invent | a. having the necessary tools, clothes, devices, etc. |
| equipped | b. create |
| burglar | c. to send out a beam, noise, smell or gas.. |
| emit | d. when large number of people or things arriving at the same time. |
| influx | e. thief |

b Choose the correct answer a, b, c or d:

- Burglar Alarm depends on the basics of:
 - biology
 - radar
 - photography
 - control panel
- Alerts are sent to.
 - Mars
 - schools
 - control panel
 - motion sensor
- One of the following is not one of motion sensors' types.
 - PIR
 - Tomographic
 - Microwave
 - Ultraviolet
- PIR stands for.
 - Pacific infrared
 - Passive infrared
 - Positive infrared
 - Passion infrared

c Decide if the following sentences are True or False:

- Samuel Bango created the "burger machine".
- Bango's invention depends on the basics of radar.
- The main purpose of motion sensors is to detect any intrusion, and send alerts.
- Tomographic sensors can't notice through walls and objects.



Listening

a Listen to the following podcast, then do the tasks.

1. What is the main theme of the podcast?
2. What is the main purpose of this device?
3. What are the types mentioned in the podcast?

b Listen again, and choose the correct answer: a, b, c or d.

1. Eng. Tala is talking about:

a. security forces	b. security solutions
c. security cost	d. security laws
2. According to the podcast, what happens when motion is detected.

a. The police come	b. alarms go off
c. notifications are sent	d. nothing
3. Who/What measures the reflection off of moving objects:

a. microwave pulses	b. the user
c. the police	d. microprocessors

Grammar

Present Simple / Present Progressive

** See grammar file on page #*

a Make Present Simple or Present Progressive sentences using the words between brackets.

1. (She / often / speak / to her family / on her way to work).

.....

2. (Wisam / better than / Is / his friend / at chess)?

.....

3. (The Sun Circus / is / us / visiting / month / next).

.....

4. (he / do / What / at the weekends)?

.....

5. (He / think / he / can win the race).

.....

b Read the following sentences, put ✓ if the sentence is correct, and do the needed corrections where needed.

1. Does she knows how to cook?
.....
2. They doesn't play football much.
.....
3. My friends are not meeting tonight.
.....
4. That man leave the bus station now.
.....
5. She is not liking cheesecake.
.....

Writing

a Fill the spaces from information from the box.

surveillance – instantly – monitor – properties – cloud

Outdoor security camera system is a powerful tool to and save your It allows you to see if the mysterious knocks on the door at night are coming from a friend, thief, or an animal. Being able to store video is a nice option, but it is better to do it on the

b In no more than 100 words, write a composition in which you describe one of the motion sensors in the market. What can you add to enhance it?

Include the following in your composition:

- The name / type of the sensor.
- Its importance in our life.
- Your suggestions to enhance the device.

Unit 2



Renewable Energy

Speaking

- a** Discuss the following statement with your partners.
"Renewable energy will one day replace fossil fuel."
- b** Share your ideas.

Reading

Before you read:



- a** Look at the picture above and describe with your partners what these people are doing.
 - 1. How are these solar panels useful?
 - 2. How long do they last?

Solar Energy

The most powerful source of energy the earth receives is the sun. Solar energy is renewable and **inexhaustible**. It is considered to be sustainable because sunlight is available every day of the year, even cloudy days produce some power. Solar energy represents a clean green source of energy. It does not release toxic polluting emissions to the environment. It is quite safe and environment friendly. Besides it reduces dependency on fossil fuels, such as coal and natural gas, which are polluting, finite and difficult to extract and transport.

Solar cells are the smallest units of a solar power device made out of a semiconductor material such as silicon. A solar panel is made up of several solar cells which use the "**photovoltaic** effect" to generate electricity, that's why they are referred to as photovoltaic cells. Solar cells adsorb power from the sun and transform it into energy, like electricity. They are **durable**, **compact** and low maintenance. They are used in many appliances and equipment such as calculators, watches and small lights. Once installed, a rooftop solar panel can help power our homes and reduce the electricity bill. They can also be useful in heating water. Solar cells are also used in transportation. The cells can harness the sun's energy to charge a car, for example, and also used to power space vehicles such as satellites and space stations.

Keywords

Inexhaustible: unlimited, never-ending

Photovoltaic: producing voltage when exposed to sunlight

durable : long lasting

compact: small but solid and strong

b Answer the following questions.

1. Why is solar energy considered to be sustainable?
2. What are solar cells?
3. Give more uses of solar cells that are not mentioned in the text?
4. How do solar cells work in transportation?

c Choose the correct answer a, b, c, or d

1. Solar energy is renewable and.....
a. exhaustible b. exhausted c. inexhaustible d. exhausting
2. Solar energy is a clean and environment friendly source of energy because it..... .

- a. releases toxic emissions to the environment.
 - b. increases the use of fossil fuel.
 - c. does not produce power in cloudy days.
 - d. does not release toxic pollutants to the environment.
3. Solar panels installed on rooftops are.....
- a. strong and long lasting b. in need to be maintained frequently
 - c. easily damaged d. useless
4. Solar cells are made of
- a. batteries b. silicon
 - c. transportation d. calculators and small lights



Listening

a Listen to the following dialogue then do the tasks below.

1. Who are the speakers and what are they talking about?

2. Listen again and write true or false.

- 1. The speaker is thinking of installing solar panels for his office.
- 2. He asks questions about the number of panels, their lifespan and their cost.
- 3. The average cost of panel installation is 25 million S.P.
- 4. At the end, the man decides not to install solar panels because they are costly.

Grammar

future: will / be going to

a Choose the correct answer between brackets.

- 1. I know what you (are going to , won't) say.
- 2. Tom has made his decision he (is going to, will) study medicine.
- 3. The homework is difficult, but I (am going to, will) do it.
- 4. look! He's running very fast. I think he (will, is going to) win.

a Complete the following with the suitable forms of *will* or *be going to*:

- 1. I make this mobile phone work even if I have to stay up all night.
- 2. This boy is interested in fixing electronic devices. He be a skillful technician.

3. Her father.....get her a ticket to attend the movie she is eager to see .
4. Mr. and Mrs. Brown to sell their present house and buy another one next month.

Writing

a Fill in the spaces with the words from the list to complete the following.

durable batteries silicon solar panels photovoltaic maintenance

Solar cars are electric cars that use (1).....cells to absorb sunlight and transform it into electricity. They contain storage (2)..... to power the vehicle when sunlight is not available. The roofs of these cars are flat and massive to accommodate to more (3)..... . The panels are made of a semiconducting material like (4)..... Some of the advantages of solar cars are that they are(5)....., low-(6).....and fossil fuel-free vehicles.

b Write a paragraph about a device that works on solar energy.

The following questions may help you:

- What is the name of the solar device?
- How does it work? (You can mention main parts)
- What is it used for? /How is it important?
- What are its pros and cons?

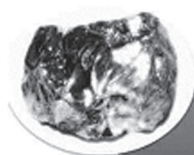
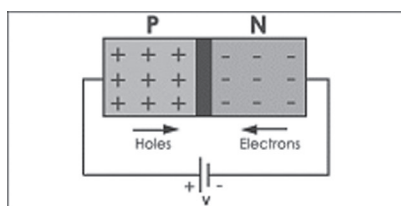
Unit 3



Solar Energy

Speaking

- a What is silicon made from?
- b What is P-N junction? Discuss it with a friend.



Silicon

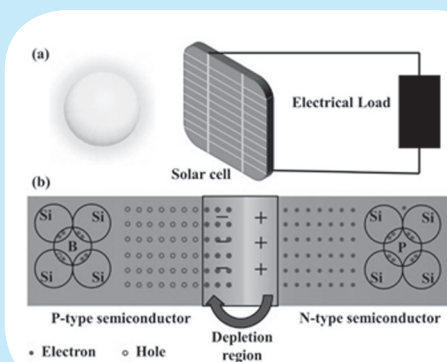
Atomic Number 14
Symbol "Si"

Reading

- a Read the following text, then do the tasks below.

Concentrating solar power

Energy from the sun is the most abundant and freely available energy on Earth. Scientists tried to make use of this energy, and invented solar cells depending on silicon. The silicon wafer is the heart of photo voltaic cells. The silicon atoms are bond together, with no freedom for the electrons. Scientists injected phosphorous atoms with five valence electrons into silicon crystals,



this made one electron free to move. When they applied sufficient energy to the structure, from the sun for example, electrons moved freely, but randomly. They thought of adding a driving force, so they depended on the P-N junction. They injected Boron with three valence electrons into pure silicon. This made one hole for each atom. This is known as P-type doping. To create a direct current, they were joining these two kinds of doped materials together, and exposing the material to the sun light. They noticed that some electrons from the N side were migrating into the P side to fill the holes available there. This made the N side positively charged, and the P side negatively charged. When they applied a load between these two regions, electrons started flowing to recombine with the holes in the P region.

Vocabulary

a Match the words with their definitions.

Wafer	a. enough
Sufficient	b. a very thin piece of a material
Randomly	c. the ability of an atom to combine with other atoms
Valence	d. travel
Migrate	e. done by chance rather than according to a plan.

b Choose the correct answer a, b, c or d.

- The silicon atoms are:
 - bend together
 - bond together
 - blend
 - blond
- The silicon wafer are very important for.
 - human cells
 - stem cells
 - voltaic cells
 - sun light
- Scientists used the P-N junction to have.
 - gravity force
 - magnetic force
 - solar force
 - a driving force
- The direct current flows from.
 - N to P
 - P to N
 - P to P
 - N to N

c Decide if the following sentences are True or False.

- Solar cells industry depends on silicon.
- Silicon crystals have five valence electrons.
- The P side of the junction is negatively charged.
- The N side of the junction contains most of the holes.



Listening

a Listen to the following lecture, then do the tasks.

1. What is the benefit of making a thin N layer?
2. Which of the cell layers is lightly doped?
3. How are the PV cells connected to each other?

b Listen again, and choose the correct answer: a, b, c or d.

1. The P layer of the PV cell is:
a. thin and heavily doped b. thick and heavily doped
c. thin and lightly doped d. thin and heavily doped
2. The depletion region is formed.
a. under the P-N junction b. At the top of the cell
c. between P and N d. At the bottom of the cell
3. PV cells collect electrons in:
a. pockets b. busbars c. micro-batteries d. power tanks

Grammar

Past Simple / Past Progressive

**** See the rule in the grammar file page #**

a Put the verbs into the correct tense (Simple Past or Past Progressive).

1. They (travel) to Spain and (stay) in a small hotel.
2. Fuad (listen) to the radio when Najwa (phone)
3. I (see) an old friend. We (sit) at the same desk in school.
4. She (cook) dinner when her husband (come)
5. I (finish) work early, and (go) home.

b Choose the correct answer between brackets.

1. What (did you do / were you doing) when she (called/was calling) you yesterday?
2. When she (left / was leaving) the school, it (was raining, rained).
3. We (didn't go / weren't going) out because it (rained / was raining).
4. Wisam (took / was taking) photos when Rama (was shopping / shopped).
5. He (sneezed / was sneezing) all night yesterday.

Writing

a ▶ Rearrange the following words / phrases to make meaningful sentences.

1. her mobile / out of / snatched / the thief / her hand.
2. customer services / enhanced / his achievement.
3. most people / on foot / to nearby parks / prefer to go.
4. didn't want / because / Tala / noisy / because / to sit there / it was.

b ▶ Fadi installed a solar energy system containing one solar panel to power his home's lighting, mobile chargers, and smart TV. However, he couldn't power the same devices in winter. Write a well-organised paragraph answering the following questions.

1. Explain the cause of this problem.
2. How can he solve this problem.
3. What if he doesn't want to add extra money?

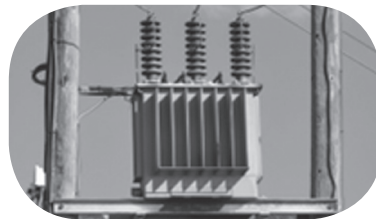
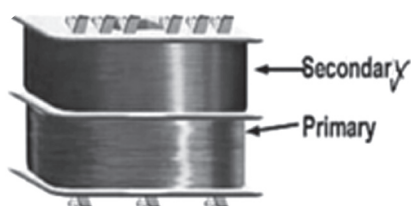
Unit 4



Electrical transformers

Speaking

- a** The following pictures show different types of transformers. Look at them then discuss the following with your partner.



1. Mention the types of transformers that you can recognize.
2. Where are they used ?
3. What are they used for ?

- b** Share your information with your classmates.

Reading

- a** Before you read answer these questions.

1. Are all transformers of the same type?
2. Are they used for the same purpose?

b Read the following text and do the tasks below.

Electrical Transformers

Manufacturers have been developing different types of electrical transformers to improve safety and efficiency of power systems. They can be classified according to the number of phases. A single-phase transformer has two coils of wire, called a primary and a secondary winding, and a magnetic core. It can be used in our homes with devices that need low voltage such as televisions, computers, ...etc, but they are not efficient for the distribution of power to factories and big buildings, so three-phase transformers are better in this case.

Moreover, there have been different types according to the usage, such as current and potential transformers which are classified as instrument (measuring) transformers. Current transformers (CT) reduce the high magnitude current for measuring it with an ammeter, and monitoring the operation of the power grid. On the other hand, potential transformers (PT) lower the high voltage to safer levels to be measured by instruments like voltmeter.

Instrument transformers are also necessary for isolating the control and measurement equipment, connected to their secondary windings, from high voltages of a power system, and supplying the equipment with the appropriate values of current and voltage.

Vocabulary

a Match the words with their meanings.

- | | |
|---------------|--|
| 1. efficiency | a. the central part of an object . |
| 2. core | b. a long piece of wire curled into several circles one above the other |
| 3. isolation | c. the ability to achieve a goal successfully without wasting time or energy |
| 4. coil | d. separation from other things. |

b Decide if the following statements are True (T) or False (F) .

- 1- There are different types of transformers.
- 2- A single-phase transformer has more than one set of windings.
- 3- Small single-phase transformers can be used in computers.
- 4- Potential transformers are mainly designed for household uses
- 5- Current transformers are used for measuring currents in high power lines.
- 6- A voltmeter must be connected to the secondary winding of the transformer.



Listening

a ▶ Listen to the audio then do the tasks below.

1. Decide if the following statements are True (T) or False (F) .

- 1- George is reading a magazine .
- 2- The company offers a job opportunity .
- 3- This company produces all types of electrical devices

2. Choose the correct answer.

- 1- The company provides services like.....
a-selling new products. b-selling and buying electrical devices.
c-repairing old devices d-selling and repairing old products.
- 2-Their products don't include
a-small power transformers b-automatic voltage regulators
c-inverter transformers d- large power transformers
- 3-The phone number of the company is
a-79098 b-78908 c- 79094 d-98797

Grammar

The present perfect simple / The present perfect continuous

a ▶ Choose the correct answer a ,b , c or d .

- 1-We..... just come back from Lattakia.
a.has b. been c. am d. have
- 2-Karim already read the book.
a.is b. have c. has d. was
- 3- They have swimming for two hours.
a.been b. are c. being d. be
- 4-Yousef has had his watch 2002 .
a. for b. since c. just d. yet.
- 5- It raining all day .
a.has b. have been c. will d. has been
- 6-..... you ever to Lebanon?
a.Has/been b. Have/been c. Did /go d. Have /being
- 7-The match hasn't started
a.just b. yet c. all day d. since

b Choose the correct words between brackets.

- 1-Nuha has played the piano (since / for / so far) she was twelve years old.
- 2- Ghunwa has lived in Damascus (since / for / never) three years.
- 3-What have you been doing (recently / ever / since) ?
- 4- Roula hasn't found her keys (just / yet / never) .
- 6-Laila and Lara have been watching TV (all day - for - never) .
- 5-Jill has (since / already / ever) made a cake

Writing

a Complete this passage with the following words .

core - winding - secondary - step-up - ratio - less - mutual.

A single phase transformer consists of two coils of wire (a primary and a
1) winding). They are separated, but they share a magnetic
2) It depends on Faraday's law of 3) inductance.
When the secondary winding has more turns than the primary 4) , it is
called a 5) transformer, whereas when they are 6) than the
primary winding turns, it is called a step-down transformer. The number of winding
turns is very necessary in order to know the 7)..... of transformation.

b Write questions to complete the following dialogue.

1-Lucy :

Dani : I have been to my uncle's house.

2- Lucy :

Dani : I have been repairing their fridge .

3- Lucy :

Dani : They have been using it since 2016 .

4- Lucy :

Dani: No, I haven't seen Linda , but I have met Louis there.

Unit 5

Automatic control systems

Speaking

- a** Work in pairs. Look at the pictures and discuss with your partner the disadvantages of automation.



Reading

- a** Read the following text about robots and do the tasks below.

Robots

Robots are very useful machines. In manufacturing, they are able to produce better work than humans can, as they do not make mistakes and can work continuously faster and more precisely than humans. Also, they can do dangerous jobs, for example working in unhealthy environments or in dark areas. Robots can lift heavy objects. All this helps



protect a human worker from injury. By using robots, firms can save a lot of money, as the robots save time and do not waste expensive materials through human error. Robots have also created more interesting jobs in programming for workers who would otherwise be doing the repetitive or dangerous jobs that are now done by robots. As robotic technology develops, robots will do more and more everyday jobs that we find boring, allowing us to enjoy more free time.

1. Answer the following questions.

1. Why is it better to have robots rather than humans in manufacturing?
2. How do robots save firms money?
3. What kind of jobs can robots do?
4. What does the word "**they**" in bold in the text above refer to?

2. Decide if the following sentences are true (T) or false (F). Correct the false ones.

1. Robots are useless machines.
2. Robots can do dangerous jobs in unhealthy environment.
3. Firms waste a lot of money by using robots.
4. Using robots allows us to enjoy more free time.



Listening

a

Listen to a text about innovations and do the tasks below.



1. Choose the correct answer a, b, c, or d.

1. innovations have brought some change in our life.
 a. A few b. A lot of c. Some d. All

2. Both old and modern innovations derive from the to make life more comfortable.

- a. difference b. need c. mistake d. suggestion

3. The is one of the most important innovations in history.

- a. train b. car c. plane d. ship

4. The verb "to ship" means to goods somewhere so that people can buy or use them.

- a. send b. sell c. display d. get

2. Decide if the following sentences are true (T) or false (F).

1. Innovations don't make any change in our life.
2. Innovations make life easier.
3. The train is the fastest means of transport.

Grammar

past perfect / past perfect continuous

a Choose the correct answer a, b, c, or d.

1. When Anna arrived home, her daughter the birthday cake.

- a. makes b. had made c. has made d. will make

2. Hala had already left by the time her sister there.

- a. had got b. gets c. got d. has got

3. After my friends , I went to bed.

- a. leave b. have left c. had left d. are leaving

4. When we moved to Damascus, my uncle There for ages.

- a. had lived b. had been living c. has lived d. lived

5. They got to the beach after they for hours.

- a. had been walking b. walk c. are walking d. have walked

b Complete the sentences with the correct form of the verbs in brackets.

Use **past perfect** or **past perfect continuous**.

1. Hani was tired because he (work) all day.

2. I (not/see) Sarah for many years, but I recognised her immediately.

3. Carl wanted to fly to Italy. He (never travel) by plane before.

4. Amal's eyes were red. It was obvious she (cry).

Writing

- a** Complete the following text with words from the list.

tasks, make, developed, saves, difficult, change

Control systems have been 1.... to ease human's lives. Many 2.... that people need to do or oversee are too 3.... to control. As a result, control systems 4.... them easier in a short period of time. At the same time, ACS 5.... money and reduces risks.

- b** Write a short paragraph about the importance of automatic control systems, based on What you have learned in this unit.



Unit 6



programming languages

Speaking

a With your partner ask the following questions.

- 1-Can you define the two types of computer components?
- 2-Which one of the types can you touch ?
- 3-Is an operating system software or hardware?

Reading

a Pre-reading

- Does the computer work if there is not an operating system?
- Is it possible to upgrade operating system on your computer?

Operating Systems

An **Operating System (OS)** is a software that acts as an interface between computer hardware components and the user. Every computer system must have at least one operating system to run other programs.

It is not possible for the user to use any computer or mobile device without having an operating system. Operating systems usually come **pre-loaded** on any computer you buy. Most people use the operating system that comes with their computer, but it's possible to upgrade or even change operating systems. The most popular types of Operating Systems are: Disk Operating System (DOS), Windows, , macOS, Linux, Unix.

Disk Operating System

DOS is one of the oldest and widely used operating system. It is a set of computer programs, the major functions of which are file management, allocation of system resources, providing essential features to control hardware devices.

The significant features of DOS are:

- It provides command processing facilities and controls program.
- It manages (computer) files, input and output system, (computer) memory.

Windows Operating System

The operating system window is the extension of the disk operating system.

It can be used by any person who can read and understand basic English.

However, the Windows Operating System requires DOS to run the various application programs initially. Because of this reason, DOS should be installed into the memory and then window can be executed.

There have been many different versions of Windows, but the most recent ones are

Windows 10 (released in 2015).

macOS is a line of operating systems created by Apple. It comes preloaded on all Macintosh computers, or Macs. Many people do prefer the look and feel of macOS over Windows.

Linux is a family of **open-source** operating systems, which means they can be modified and distributed by anyone around the world. The advantages of Linux are that it is **free**, and there are many different versions you can choose from.

Unix Operating System is the earliest operating system developed in 1970s. It is an operating system that has multitasking features. It has multiuser computer operating systems. It runs practically on every sort of hardware and provides stimulus to the open source movement.

b Answer the following questions.

- 1- What must every computer system have to run other programs?
- 2- Is it possible for the user to use any computer or mobile device without having an operating system?
- 3- What usually come pre-loaded on any computer you buy?
- 4- Mention the most popular types of Operating Systems.

C Match these definitions with suitable operating system from the text.

- 1- It manages (computer) files, input and output system, (computer) memory.
- 2- It can be used by any person who can read and understand basic English.
- 3- It is a line of operating systems created by Apple.
- 4- It is a family of open-source operating systems.
- 5- It is the earliest operating system developed in 1970s.

Listening

a Look at the picture, then Listen to the student telling about Windows Operating System.



b Decide if these sentences are True (T) or False (F).

- 1- Microsoft announced Windows 10 in April 2014.
- 2- Microsoft released Windows 10 to the general public in July 2015.
- 3- Window 10 is the new Microsoft Windows Operating System and predecessor to the Windows 8.
- 4- It is a familiar and inflexible computer operating system.

C Match column A to column B to complete the sentences.

- | | |
|---|-------------------------------------|
| 1- One of the best new growth in Windows 10 is that | - a wide range of devices. |
| 2- Windows 10 is also meant to | - it is completely free to upgrade. |
| 3- Windows 10 will run on | - function on tablets. |

Grammar (If sentences)

a Choose the correct answer from the brackets.

- 1-If you (work – worked) hard, you will succeed.
- 2-If you ask him, he (will – would) help you.
- 3-If you (asked – ask) him, he would help you.
- 4-If you studied hard, you(would-would have) pass your exam.
- 5-If you(had invited- invited) them, they would have come.
- 6-If you had asked him, he(would have-will) helped you.

b Complete the following .

- 1-If it rained, ...
- 2-We would change our computer if.....
- 3-If my mobile didn't work.....
- 4-If my father had explained this idea,.....

Writing

a Fill the gaps with suitable words from the box.

muscles function tool mechanics

What Does an Operating System Do?

All computers need an operating system to..... A computer's hardware – its monitor, keyboard, hard drives and memory – are like the bones and..... in your body, which need guidance and direction to function. Your brain – the operating system – provides the direction, coordinating all the..... of your computer to turn this collection of machinery into a functional..... .

b Write a paragraph about one of the most modern operating systems you have in your computer .