Ministerio de Educación

Gobierno de Chile

100 TOP
Electricity
WORDS TP BOOKLET
3° MEDIO

DEG
División Educación General

English Opens Doors Program

División de Educación General - Mineduc

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Get to know your booklet

Lessons


Listening


Reading

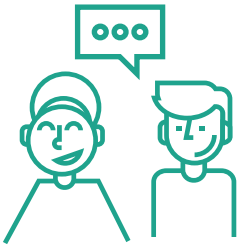

Speaking


Writing


Project

ACTIVITIES


Individual


In pairs


Group Work


Think & discuss

ACTIONS


Read


Write


Watch a video


Speak


Listen

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¡Bienvenido!

Welcome!

ES

A continuación, te presentamos un recurso elaborado para avanzar en uno de nuestros principales objetivos: mejorar la calidad y fortalecer la enseñanza Técnico-Profesional en el país.

La creación de este Booklet responde a la importancia de aprender el idioma inglés en el contexto de cada especialidad técnica, de manera que en el futuro puedas acceder a mayores oportunidades de especialización y en el mundo laboral.

Es por esta razón que creamos este recurso didáctico, donde proponemos tanto a docentes como estudiantes, las 100 palabras más utilizadas en cada especialidad aplicadas en contextos específicos, fundamentales para el dominio del idioma.

Dado que en el mundo de hoy es importante entregar todas las opciones para favorecer el aprendizaje del inglés, el trabajo continuo de las actividades que ofrece cada unidad te permitirá desarrollar habilidades lingüísticas como la lectura, audición, expresión escrita y oral, además de trabajar colaborativamente en los proyectos al término de cada unidad.

Esperamos que este 100 Top Words Booklet sea una contribución para el aprendizaje del idioma en la especialidad que has elegido.

EN

We are pleased to present you with this resource, which was created to advance one of our primary objectives- improving and strengthening the quality of technical professional education in Chile.

The creation of this booklet responds to the importance of learning the English language in the specific context of each technical specialty and aims to provide you with access to greater opportunities in your area of concentration, and in the labor market in general.

With that in mind we have created this educational resource, through which we propose to teachers and students alike – the 100 most commonly used words for specific contexts, fundamental to language mastery in each area of technical specialization.

Given the current importance of providing all possible opportunities to foment English language acquisition, the successive completion of the activities offered in each unit will facilitate the development of your linguistic abilities, including reading comprehension, written and oral expression, as well in collaborative learning projects provided at the end of each unit.

We hope that the "100 Top Words" Booklet will contribute to your English language learning, in the technical professional concentration that you have chosen.

Tus comentarios nos importan: escríbenos a TPenglish@mineduc.cl

Electricity Booklet Glossary

1. 2D (adj.) A two-dimensional form or appearance.

2. 3D (adj.) A three-dimensional form or appearance.

A **3. Abnormal** (adj.) Not normal, average, typical, or usual; deviating from a standard.

4. Advantage (n.) Any state, circumstance, opportunity, or means especially favorable to success, interest, or any desired end.

5. After (adv.) Later in time than, in succession to.

6. Amps (n.) A unit of electrical current. Amps measure the intensity of an electrical current.

7. AutoCAD (n.) A software that allows you to draw and edit digital 2D and 3D designs more quickly and easily than you could by hand.

B **8. Background** (n.) One's origin, education, experience, etc., in relation to one's present character, status, etc.

9. Blueprints (n.) A process of photographic printing, used chiefly in copying architectural and electrical drawings.

10. British thermal unit (BTU) (n.) A unit of heat; it is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

11. Bulb (n.) The glass part of an electric lamp, which gives out light when electricity passes through it.

12. Bulb socket (n.) A device which mechanically supports and provides electrical connections for a compatible electric lamp.

C **13. Chisel** (n.) A long-bladed hand tool with a beveled cutting edge and a handle which is struck with a hammer or mallet, used to cut or shape wood, stone, or metal.

14. Circuit breaker (n.) An automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit.

15. Cooling fan (n.) A component from an electric motor. It facilitates and supports the engine's temperature management.

16. Cover letter (n.) A document sent alongside your CV when applying for jobs. A cover letter is necessary as it gives you the chance to explain to an employer why you are the best candidate for the job.

17. Current (n.) The rate at which electrons flow past a point in a complete electrical circuit.

18. Customer (n.) A person who buys goods or services from a shop or business.

D **19. Dining room** (n.) A room for consuming food.

20. Disadvantage (n.) An unfavorable circumstance or condition that reduces the chances of success or effectiveness.

21. Double plug outlet (n.) An item located on the wall that allows the connection of two plugs to the electrical grid.

22. Duties (n.) A task or action that one is required to perform as part of one's job.

E	**23. Electric bills** (n.)	The bill that a local utility issues to a consumer for the electricity that their home consumes.
	24. Electric motor (n.)	An electrical machine that converts electrical energy into mechanical energy.
	25. Electric shocks (n.)	Electrical energy flows through a portion of the body causing a shock.
	26. Electrical tape (insulating tape) (n.)	A type of pressure-sensitive tape used to insulate electrical.
	27. Electrical technician (n.)	A qualified person who helps create, maintain and repair electric components and equipment.
	28. Energy (n.)	The capacity for doing work. It may exist in potential, kinetic, thermal, electrical, or other various forms.
	29. Equipment (n.)	The necessary items for a particular purpose.
	30. Execution (n.)	The carrying out of a plan, order, or course of action.
F	**31. Facilities** (n.)	A place, amenity, or piece of equipment provided for a particular purpose.
	32. Failure (n.)	Cessation of normal operation; breakdown.
	33. Feasibility (n.)	The state or degree of being easily or conveniently done.
	34. Finally (adv.)	Used to introduce a final point or reason.
G	**35. Green insulated wires** (n.)	They connect to the grounding terminal in an outlet box and run to the ground bar in an electrical panel.
H	**36. Hacksaw** (n.)	A saw with a narrow fine-toothed blade set in a frame, used especially for cutting metal.
	37. Heat (n.)	A condition of being hot.
	38. House wiring diagram (n.)	A wiring diagram for any electric circuit in your home which is drawn directly so that it can easily guide the electrician in case needed.
I	**39. Improve** (v.)	To make or become better.
	40. Indoor (adj.)	Of, located in, or appropriate to the inside of a building.
	41. Inspection (n.)	An examination of a product, process, service, or installation in conformity with specific requirements.
	42. Install (v.)	To set up something (items, systems, etc.)
	43. Installation (n.)	The action of installing something.
	44. Insulation (n.)	It consists of non-conductive material that is resistant to an electric current. It surrounds and protects the wire and cable inside.
K	**45. Kit** (n.)	A set of tools or supplies for a specific purpose.
	46. Kitchen (n.)	A room for cooking and food preparation.
L	**47. Legal** (adj.)	Something permitted and accepted by law.
M	**48. Magnetic field** (n.)	The area around a magnet in which there is magnetic force.
	49. Main shaft (n.)	It receives its power directly from the engine or motor and transmits power to other parts.

50. Maintenance (n.) The process of preserving a condition or situation.

51. Maneuvers (n.) A movement or series of moves requiring skill and care.

52. Manual (n.) A book or booklet that provides instructions or guidelines on how to perform an activity.

53. Marvelous (adj.) Causing great wonder; extraordinary.

54. Measure (v.) To determine the size, amount, or degree of (something) by using an instrument or device marked in standard units.

55. Motor (n.) An electrical machine that converts electrical energy into mechanical energy.

56. Multimeter (n.) A handheld tester used to measure electrical voltage, current (amperage), resistance, and other values.

N

57. Nameplate (n.) It gives information about the electric motor.

58. Normal (adj.) Any behavior or condition which is usual, expected, typical, or conforms to a pre-existing standard.

O

59. Outdoor (n.) Outside a building, in the open air.

60. Overload (v.) To load an excessive amount in or on something.

P

61. Personal protective equipment (PPE) (n.) Equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.

62. Plan (n.) A diagram or list of steps with details of timing and resources, used to achieve an objective to do something.

63. Plug outlet (n.) It allows electrical equipment to connect to the electrical grid.

64. Podcast (n.) An audio program, like Talk Radio, but you subscribe to it on your smartphone and listen to it.

65. Power (n.) The amount of energy transferred.

66. Power surges (n.) They occur when the flow of electricity is interrupted, then started again, or when something sends electricity flowing back into the system.

67. Procedure (n.) It is a series of actions conducted in a certain order or manner.

68. Project (n.) A set of writings, calculations and drawings that are made to develop a work of engineering.

Q

69. Qualified (adj.) Officially recognized as being trained to perform a particular job; certified.

70. Quickly (adv.) At a fast speed; rapidly.

71. Quotation (n.) A formal statement setting out the estimated cost for a particular job or service.

R

72. Regulations (n.) A rule or set of rules made and maintained by an authority.

73. Repair (v.) To restore (something damaged, faulty, or worn) to a good condition.

74. Replace (v.) It implies a filling of a place once occupied by something lost, destroyed, or no longer usable or adequate.

75. Requirements (n.) A quality or qualification that you must have in order to be allowed to do something or to be suitable for something.

76. Resume (n.) A written compilation of your education, work experience, credentials, and accomplishments.

S **77. Safety** (n.) The condition of being protected from or unlikely to cause danger, risk, or injury.

78. Screwdriver (n.) A tool with a flattened or cross-shaped tip that fits into the head of a screw to turn it.

79. Signature (n.) A person's name written in a distinctive way as a form of identification in authorizing a document.

80. Software (n.) A set of instructions, data or programs used to operate computers and execute specific tasks.

81. Spanner (n.) A tool with a shaped opening or jaws for gripping and turning a nut or bolt.

82. Stator (n.) The stationary part of a rotary system, found in electric generators, electric motors, etc.

83. Studio (n.) A room where an artist, photographer, sculptor, etc. works.

84. Switch (n.) A device for making and breaking the connection in an electric circuit.

85. System (n.) A set of things working together as parts of a mechanism or an interconnecting network.

T **86. Technical service** (n.) A place where someone can check, repair or replace devices, equipment, machinery, etc.

87. Terminal board (n.) Used to connect the power within the electric motor

88. Then (adv.) After that; next; afterwards.

89. Thermal (adj.) Caused by or related to heat or temperature.

90. Tool (n.) A device or implement, especially one held in the hand, used to carry out a particular function.

91. Triple plug outlet (n.) An item located on the wall that allows three plugs to connect to the electrical grid.

92. Tubing (n.) A process to insulate wires, providing abrasion resistance and environmental protection for stranded and solid wire conductors, connections, joints and terminals in electrical work.

93. Turn off (v.) To stop the operation or flow of something by means of a tap, switch, or button.

94. Turn on (v.) To start the operation or flow of something by means of a tap, switch, or button.

U **95. Update** (v.) To make (something) more modern or up to date.

V **96. Voltage** (n.) The pressure from an electrical circuit's power source that pushes charged electrons (current) through a conducting loop, enabling them to do work such as illuminating a light.

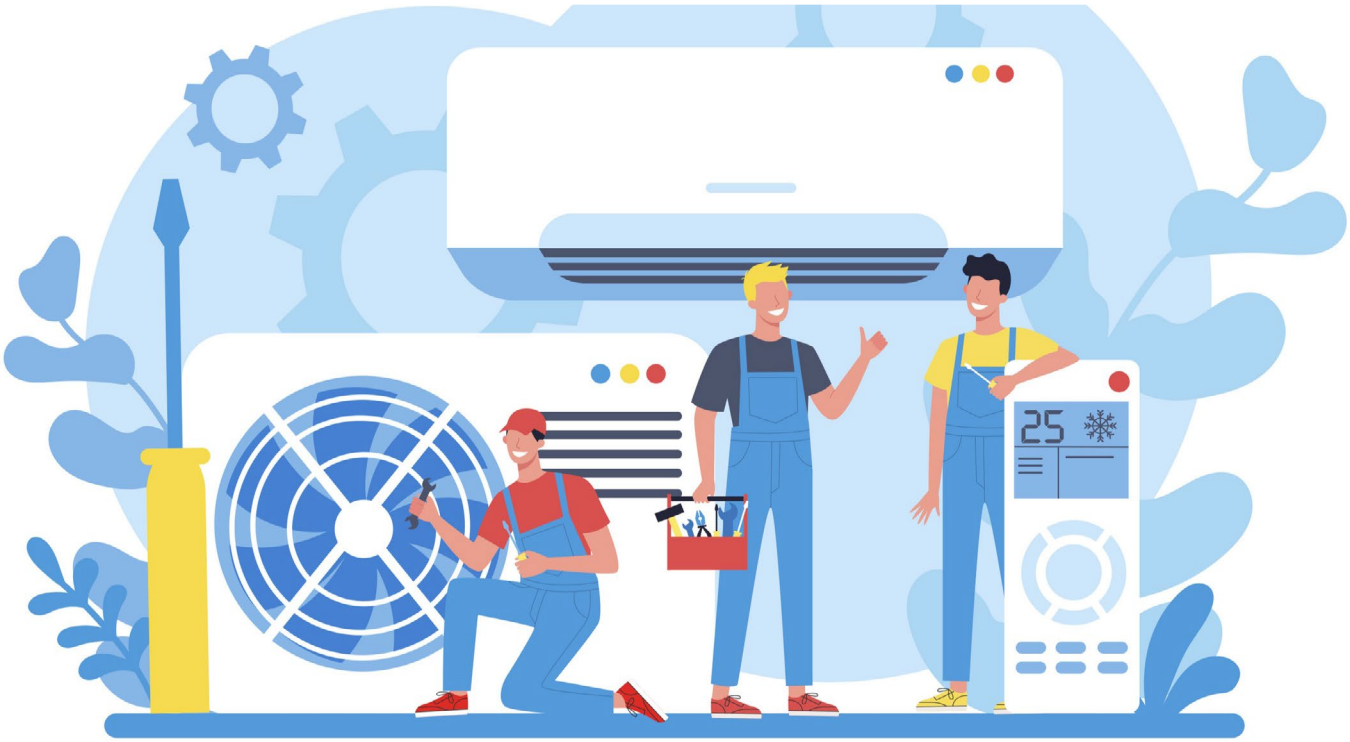
W **97. Wire** (n.) A metal drawn out into the form of a thin flexible thread or rod.

98. Wire strippers (n.) A small, hand-held device used to strip the electrical insulation from electric wires.

99. Wiring diagram (n.) A simple visual representation of the physical connections and physical layout of an electrical system or circuit.

100. Wiring diagram symbol (n.) A pictogram used to represent various electrical devices or functions, such as wires, batteries, resistors, and transistors, in a schematic diagram of an electrical or electronic circuit.

Unit I: Installation of electric motors and heating equipment.



Goal: Comprehend general and specific information in oral and written texts related to the installation of electric motors and heating equipment.

Skills: Listening, Reading, Speaking, Writing

Project: The best air conditioner ever

☆ 18 KEY WORDS

British thermal unit (n.)
Burn out (v.)
Cooling fan (n.)
Customer (n.)
Main shaft (n.)
Electric motor (n.)
Electrical technician (n.)
Failure (n.)
Feasibility (n.)
Magnetic field (n.)
Nameplate (n.)
Overload (n.)
Quotation (n.)
Stator (n.)
Technical service (n.)
Terminal board (n.)
Tubing (n.)
Wires (n.)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

A. Look at the picture below and read people's comments. Circle the correct comments.

The electrical technician is repairing an electric motor.

Electric fans, air conditioners and drills have electric motors.

Any person is certified to repair electric motors.

Electric motors do not use energy.

B. Compare your answers with a classmate. Correct and rewrite the incorrect information in your English notebook.

WHILE YOU LISTEN

Click here to listen:

C. Listen to the audio and select the most suitable description. Circle one of the alternatives below.

a. The woman is repairing an electric motor and the man is a customer.

b. The man is an electrical technician and he explains to a customer what the problem with the electric motor was.

c. The woman explains to the man what the problem with the electric motor was.

D. Listen again and match the parts of an electric motor to their descriptions. Use the numbers from the left column.

1.	Stator	_____	It gives information about the electric motor
2.	Terminal board	_____	It cools down the motor
3.	Nameplate	_____	It makes a mechanical movement
4.	Cooling fan	_____	It makes the magnetic field
5.	Main shaft	_____	It connects wires to the power (electricity)

AFTER YOU LISTEN

E. Look at the chart and complete with the missing information. Compare your answers with a classmate.

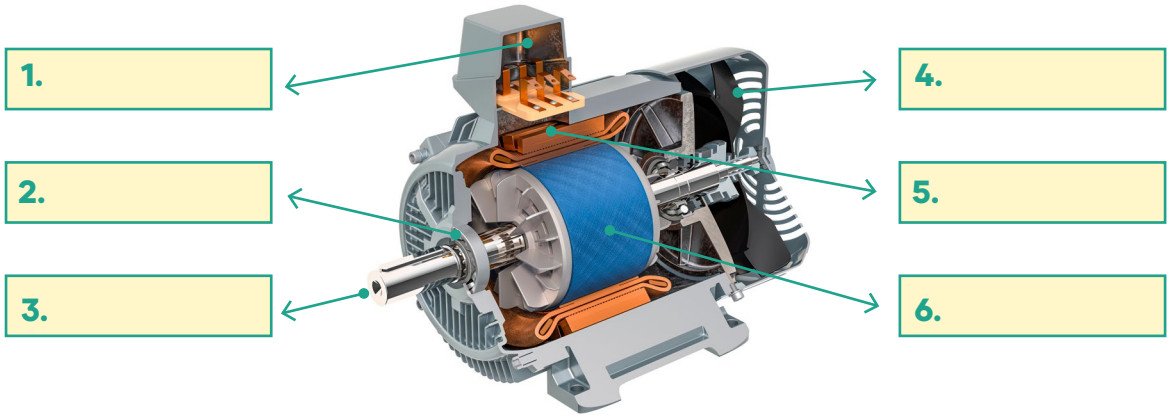
Electrical technician's name:	Customer's name:	Type of shop/store:
Name of the shop/store:	The problem:	The cause of the problem/ diagnosis:

Lesson II: Reading Comprehension

BEFORE YOU READ

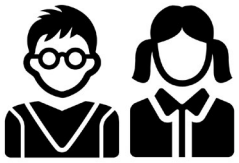
A. Look at the picture and label the electrical motor. Use the words from the box.

cooling fan / rotor / bearings / main shaft / stator / terminal box



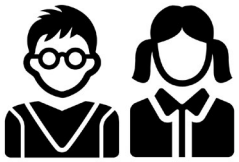
B. Look at the picture above and discuss the questions with a classmate. Use the "sentence starters" to share your ideas.

1. **What do you know about electric motors?**



Electric motors are...
Electric motors have...
Electric motors are used...

2. **What will the text be about?**



The text will be about...
The text will describe...
I think the text will explain...

C. Read the text below and write the underlined words in your notebook as a vocabulary list. Look them up in your dictionary to find out their meanings. Then, compare with a classmate.

D. Read your vocabulary and discuss the following questions with a classmate. Brainstorm your ideas in your notebooks.

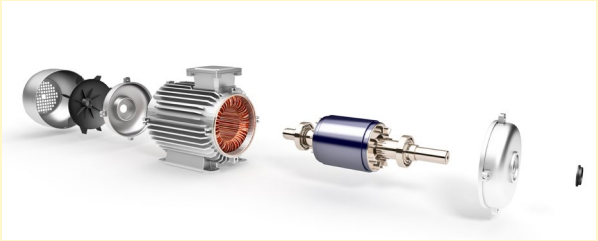
1. What do the underlined words have in common? Are they objects, actions, or characteristics?
2. What is the relationship between the underlined words and their meanings in Spanish?
3. What challenges could you face when learning cognate words? What do you understand by "false cognates"?

E. Read the text quickly and highlight the concepts and words that relate to electric motors. Then, read and answer the following questions in your English notebooks.

1. How many words did you highlight?
2. Are there difficult words? Which ones? What makes them difficult?
3. How can you expand your vocabulary?

WHAT IS AN ELECTRIC MOTOR?

An electric motor is a device that serves to convert electrical energy into motion energy. Power tools, for example, contain electric motors. Electric motors utilize magnetic pull force in order to drive a shaft. When two magnets with the same poles are brought together, the two magnets move away. Conversely, if the magnetic poles are different then they will attract each other. This is the basic principle of electric motors.



Simple motor parts and their function

1. Stator: The stator is the stationary part of the motor's electromagnetic circuit and usually consists of either windings or permanent magnets. The function of the stator is to generate a magnetic field around the rotor.
2. Rotor: It's the moving part in an electric motor, which turns the shaft to deliver the mechanical power. The rotor usually has conductors inside that carry currents, which interact with the magnetic field of the stator to generate the forces that turn the shaft.
3. Main shaft: The main shaft (a.k.a drive shaft) is a metal component that extends as a place to attach other components, such as the rotor and the drive pulley. Generally, the main shaft is made of anti-rust aluminum. Besides, this component must also be stable at high rotation and temperature.
4. Brush: The brush is an electrical contact that conducts current between stationary wires and moving parts. As the shaft goes around, the brush has contact with the rotor and transmits an electrical current to it.
5. Bearing: The rotor is supported by bearings, which allow the rotor to turn on its axis. The bearings are in turn supported by the motor housing. The motor shaft extends through the bearings to the outside of the motor, where the load is applied.
6. Pulley Drive: This component is located at the outer end of the main shaft. Its function is to transfer motor rotation to other components.
7. Commutator: A commutator is a mechanism used to switch the input of most DC machines and certain AC machines. It consists of slip-ring segments insulated from each other and the shaft. The motor's armature current is supplied through stationary brushes in contact with the revolving commutator, which causes required current reversal, and applies power to the machine in an optimal manner as the rotor rotates from pole to pole. In absence of such a current reversal, the motor would brake to a stop. In light of improved technologies in the electronic-controller, sensorless-control, induction-motor, and permanent-magnet-motor fields, externally-commutated induction and permanent-magnet motors are displacing electromechanically-commutated motors.
8. Motor Housing: This is used to protect all parts of the electric motor, as well as to protect the users of the motor.

Adapted from:
Muchta, A. (2017). *7 Parts Of Simple Electric Motor And Function - AutoExpose.* Autoexpose.org
https://www.autoexpose.org/2017/05/parts-of-simple-electric-motor.html

F. Read the text again. Match the parts of an electric motor to their functions. Use numbers.

A		B	
1	Stator		It is the moving part of the motor, which turns the shaft.
2	Brush		It transfers motor rotation to other components.
3	Pulley drive		It protects all parts of the electric motor.
4	Rotor	**1**	It generates a magnetic field around the rotor.
5	Motor housing		It transmits electrical current to the rotor.

G. Read the text again and answer the following questions. Then compare your answers with a classmate. Check and compare examples.

1. **What happens if the stator is not working?**

   Example 1: If the stator is not working, there will not be a magnetic field around the rotor.
   Example 2: There will not be a magnetic field around the rotor if the stator is not working.

2. **What happens if the rotor is not working?**

3. **What happens if the pulley drive is not working?**

4. **What happens if the motor housing is broken?**

AFTER YOU READ

H. Read the text again and complete the following chart. Write 5 hashtags for each item.

What is a hashtag? A hashtag is a label for content. It helps others who are interested in a certain topic to quickly find content on that same topic. In a few words, hashtags are keywords that help find content online.

ITEMS		HASHTAGS
1	Electric motor	#tool #convert #energy #MagneticForce #MagneticPoles
2	Stator	
3	Rotor	
4	Main shaft	
5	Brush	
6	Bearing	
7	Pulley drive	
8	Commutator	

Lesson III: Speaking

WARM UP

A. Look at the pictures and choose the correct alternatives.

1. What are the electrical technicians doing?

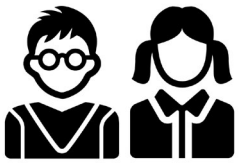
a) They are disassembling an electric motor.
b) They are installing an air conditioner.
c) They are repairing a main shaft.

2. Which equipment/components are presented in the pictures?

a) Air conditioner components (indoor and outdoor units).
b) Personal protective equipment (head protection, hand protection, etc.).
c) Air conditioner components and personal protective equipment.

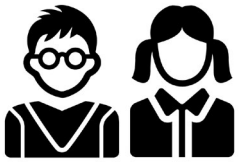
B. Read and discuss the following questions with a classmate. Use the "sentence starters" to share your ideas.

1. **What do you know about air conditioners?**



Air conditioners ***are/have...***
Air conditioners are used ***to/for...***

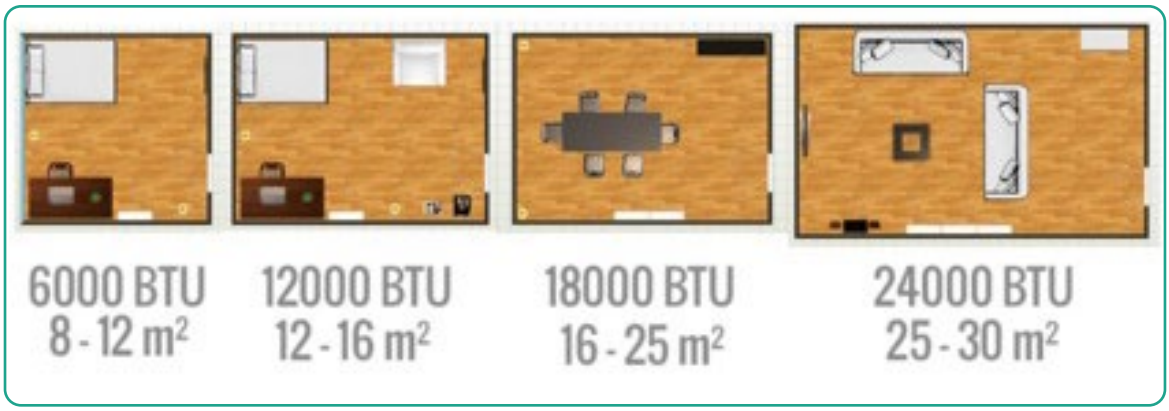
2. **What are the differences between both pictures?**



In the first picture, you ***can/can't see...***
On the other hand, the second picture ***shows/doesn't show...***

INPUT

C. Look at the room pictures and read the following dialogue between an electric technician and a customer.



Context of the dialogue: Tamara is a customer and she wants to buy a new air conditioner. Carla is an electrical technician.

Good morning. My name is Carla. Welcome to "Cool and warm air conditioners Chile". How can I help you?.

Good morning Carla. I'm Tamara. I need to buy a new air conditioner.

Okay, could you tell me how big the room is?

It's for my living room. It's 20 m2.

You will need a 25-square-meters air of 18,000 BTU. Unfortunately, 12,000 BTU is not enough for your room size.

Don't worry! That sounds great for me.

Fantastic! I need you to fill out this form so we can visit you and check feasibility. You will receive an e-mail from us after we visit you.

Marvelous! Do you have a pen? ...

CONTROLLED PRACTICE

D. Discuss the following questions with a classmate. Write your answers in your English notebook.

1. What are the differences among the room pictures above? How many items can you name in English?

2. What is the importance of the room size when installing an air conditioner?

E. Each student will choose a character to roleplay the dialogue (i.e.: student A is the technician, and student B is the customer)

F. Now switch the roles and repeat the dialogue again.

FREER PRACTICE

G. Create a similar dialogue with your classmate. Change the following information.

- Names of the characters
- Name of the air conditioner store
- Room size (i.e.: 10m2, 15m2 or 26m2)

WRAP-UP

H. Gather in groups of 4. Imagine you have to install an air conditioner in a 55m2 living room. Write a brief proposal and then share your ideas with the rest of the class. Consider the following questions to guide your work.

- How big is the room? *The room is...*
- How many BTU units will you need? *We will need...*
- How many air conditioners will you need according to the BTU units? *We will need...*
- Which air conditioners will you use? *We will use...*
- What will be the proposal? *Our proposal will be to install...*

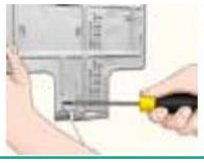
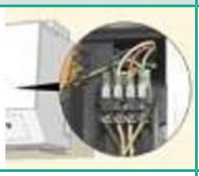
Write your proposal here:

Lesson IV: Writing

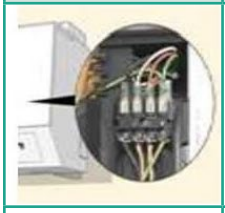
WARM UP

A. Imagine you have to install the indoor and outdoor units of a split air conditioner. Look at the pictures and number the steps in the correct sequence for each unit.

INDOOR UNIT

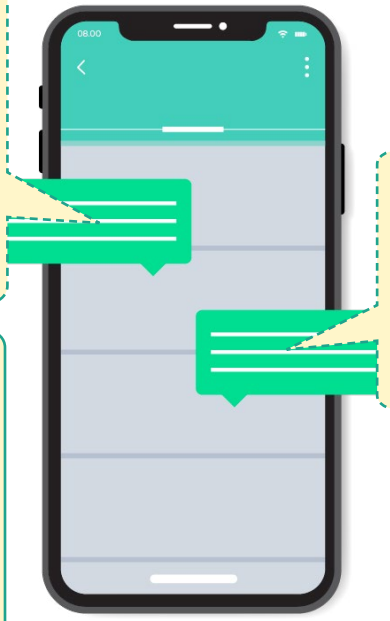
A	B	C	D	E	F
					
First, select a location on your interior wall to mount the indoor unit.	Run the pipes and cables through the hole in the wall, then connect them to the unit.	Second, secure the mounting plate to the interior wall.	Finally, secure the indoor unit to the mounting plate.	Then, drill a 7.6 cm hole through the wall so you can feed the pipes outside.	After drilling the 7.6 cm hole, check the electrical connections on the indoor unit.

OUTDOOR UNIT

A	B	C	D	E	F
					
After connecting the pipes, bleed the air and humidity from the refrigerant circuit.	Finally, turn on the unit and enjoy the cool air!	Second, check the electrical wiring in the outdoor unit.	Seal up the hole in the wall using expanding polyurethane foam.	Third, connect the piping and cable to the outdoor unit.	First, Position the outdoor unit away from any heavily trafficked, dusty, or hot areas.

B. Read the following text messages on WhatsApp and discuss the following questions with a classmate. Use the suggested sentence starters.

Dear Teresa, It's Catalina. How are you? Look, I haven't received any emails regarding the quotation I asked on the website. I have to buy an air conditioner for a 14m2 bedroom. Could you help me? Thanks. Have a good day!



Dear Catalina, thanks for writing. I'm doing excellent. We had some issues with our website. Give me 15 minutes and you'll get your quotation on your inbox.

-Why did Catalina write to Teresa?

She wrote to Catalina because...

-Why didn't Teresa reply to Catalina?

She did not reply because ...

-What kind of information do you think Catalina will find on the quotation e-mail?

I think she will find...

C. Read the quotation e-mail from Teresa and check your predictions.

Dear Catalina, ← **SALUTATION**

INTRODUCTION ↓

First of all, I would like to introduce myself. My name is Teresa Carter and I am from "Cool and warm air conditioners Chile". You recently filled out a form on our website requesting our services and a quotation. According to the information you provided, you want to install an air conditioner in your bedroom. We are pleased to submit the following quotation:

INFORMATION CHART ↓

Place	**Size**	**9000 BTU (12-15 m2)**	**12000 BTU (16 – 22 m2)**	**18000 BTU (22 – 28 m2)**
Bedroom	14 m2	**$ 299.990**	$ 329.990	$ 579.990

According to room size, you will need a 9000 BTU air conditioner. Here is our new brand model:

PRODUCT CHARACTERISTICS

General characteristics

Brand: Samsung
Model: AR09TSFZAWKZS
Panel: No panel
Security System: yes
BTU:9000

Plan information:
Coverage: Up to 15 m2
Measurements:
Height: 82 cm.
Width:29.9 cm.
Depth: 21.5 cm.
Material:
Material Indoor unit: Plastic
Outdoor unit: Metal
Weight: 9 Kg.
Power:
Cool Power: 840W
Heat: 879W
Consumption:
Energy Consumption:25.2 kWh/month
efficiency
Energy: A type
Product type: Split Air conditioners
Ignition Type: Electric

INSTALLATION

Installation: One of our certified electrical technicians will install our new brand product after setting up a visit with you. There is a brief step-by-step installation sequence below for you to keep in mind. All these steps must be performed by a certified professional and we have the best ones.

1) Set Up the Condenser.
2) Run Wires and Tubing.
3) Install the Evaporator Coil.
4) Install Refrigerant Lines.
5) Connect High Voltage.
6) Connect Low Voltage.
7) Install Drain Tubing.

SPECIAL OFFER

If you decide to buy our product, call us before Friday to get your air conditioner installation for free!
If you have any queries, do not hesitate and write me back.

Cordially,
Teresa Carter

SIGNATURE

D. Read the e-mail again and discuss the following questions with a classmate.

1. Why did Teresa suggest the customer to buy a 9.000 BTU air conditioner instead of 12.000 or 18.000 BTU?

2. Review the e-mail structure. What challenges could you face when writing a quotation? Is language easy or difficult for you to create your own e-mail?

DRAFTING

E. Write the draft of a different quotation e-mail in your notebook.

Use the following information:

- Place: Living room
- Room size: 20 or 25 m2
- Installation: Use at least 7 steps from the pre-writing section.

Change the following information:

- Names
- Company name
- Air conditioner model
- Product characteristics
- Prices
- Special offer (% discounts)

REVISING

F. Use the following checklist to assess your classmate's draft. Once finished, return the draft and comments.

E-MAIL STRUCTURE	TICK IF COMPLETED	COMMENTS AND SUGGESTIONS (*)
Salutation		
Introduction		
Information chart		
Product characteristics		
Installation		
Special offer		
Signature		

(*) Comments and suggestions may provide reference to specific missing information, grammar, sentence structure, word choice, punctuation, capitalization & spelling errors.

EDITING

G. Re-write your email using the following layout. Use your classmate's feedback to improve your final draft (check the criteria established on the previous checklist).

E-MAIL STRUCTURE	E-MAIL CONTENT
Salutation	
Introduction	
Information chart	
Product characteristics	
Installation	
Special offer	
Signature	

PUBLISHING

H. Now submit your final version to your teacher.

Project: The best air conditioner ever

Name of the Project:	The best air conditioner ever: Prepare an oral presentation in groups of four and persuade the audience to buy a new air conditioner, The best air conditioner ever!
Level:	Elementary to intermediate
Time:	90-135 minutes
General aim:	Students will give an oral presentation and persuade the audience to buy a new air conditioner (from Lesson IV: Writing)
Language aim(s):	Students will practice and improve all four language skills, with a main focus on productive skills (speaking and writing)
Resources / Materials:	Presentation: Powerpoints, pictures, etc. Posters: Cardboards, colored pencils/markers, pictures, glue, scissors.
Teacher's role:	Present and explain the assessment criteria (rubric). Describe and model the project. Describe roles within each group (i.e.: reporter, checker, materials manager, etc.). Collect information about air conditioners so students can pick one. Explain the structure of the oral presentation: salutation, introduction, information chart, air conditioner characteristics, installation procedure, special offer and conclusions. Provide feedback to students during the preparation process and presentation.
Students' roles:	Research the main features of the layer assigned, and discriminate sources to include only reliable information. Groups should assign roles to each member, such as a timekeeper to meet the deadline, language facilitator, review grammar structure, material keeper to store work properly, and a leader to supervise overall presentation.

PROCEDURE	
1. Gather in groups of four. Choose a role within your group: Reporter: Shares summary of the group with the class. Speaks for the group, not just personal view. Materials manager: Picks up, distributes, collects, turns in, or puts away materials. Facilitator: Keeps group on task and verifies that all contribute. Checker: Checks for accuracy and clarity of thinking during discussions. **2.** Discuss the project characteristics, instructions and assessment criteria (rubric) within your group before you start. Ask questions to your teacher when necessary. **3.** Do research to choose one air conditioner for your project. **4.** Analyze the e-mail to organize your oral presentation. Use its structure; salutation, introduction, product characteristics, installation steps, special offer and closing. **5.** Prepare visual aids to support your oral presentation; posters, charts, drawings, etc. **6.** Practice your oral presentation. Use the rubric to guide and assess your own progress. **7.** Give your oral presentation to the class.	
FOLLOW UP	Teacher and other groups can provide feedback about presentations. They can focus on the air conditioner quality and performance, explanations, special offers, etc.
VARIATION	Each group takes notes and assesses whether they will buy the product or not. Students give at least two reasons for supporting their choice. They can also ask questions or bargain.
RUBRIC	Rubric to assess the oral presentation.

Unit II: Home electrical installations

Goals: Comprehend general and specific information in oral and written texts related to home electrical installations.

Skills: Listening, Reading, Speaking, Writing

Project: Wiring tutorial

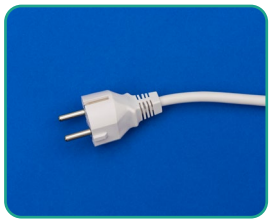
☆ 18 KEY WORDS

Bulb (n.)
Bulb socket (n.)
Circuit breaker (n.)
Dining room (n.)
Double plug outlet (n.)
Green insulated wires (n.)
House wiring diagram (n.)
Kitchen (n.)
Plug (n.) (v.)
Software (n.)
Studio (n.)
Switch (n.)
Triple plug outlet (n.)
Turn off (v.)
Turn on (v.)
Voltage (n.)
Wire (n.)
Wiring diagram symbols (n.)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

A. Look at the pictures below and match the numbers to the words. Use your dictionary.



1

2

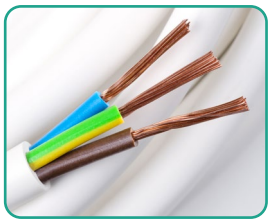
3

4

5

6

7



8

a		Plug	**e**		Circuit breaker
b		Double plug socket	**f**		Bulb
c		Switch(es)	**g**		Wire(s)
d		Bulb socket	**h**		Triple plug outlet

BEFORE YOU LISTEN

B. Look at the picture and tick the correct statements. Share your answers with a classmate.

- ☐ The electrical technician is doing electrical home installations.
- ☐ She is installing a bulb socket.
- ☐ The electrical technician is wearing protective personal equipment (PPE).
- ☐ She is installing a double or triple outlet.
- ☐ The power has to be on while the electrician is installing or replacing plug outlets. It is safe.

WHILE YOU LISTEN

Click here to listen:

C. Listen to the conversation and write the sequence. Use numbers (1/6)

1. _____ Finally, Cristina paid using her credit card.

2. _____ After that, Manuel told Cristina the materials she needed.

3. _____ Then, Cristina said that she had lost her shopping list.

4. _____ Next, Manuel saw the drawing.

5. _____ First, Manuel and Cristina greeted each other.

6. _____ Then, they talked about the rooms.

D. Listen to the conversation again and write True or False. Correct and rewrite the incorrect sentences in your notebook.

1. _____ Cristina used a shopping list to buy at the store.

2. _____ Cristina built two extra rooms in her house.

3. _____ Manuel did not understand the drawing.

4. _____ The newborn baby's room required more circuits and connections.

5. _____ Cristina lost her shopping list.

E. Multiple choice. Listen to the conversation again and circle the correct alternative.

1. What is Cristina building in her house?

a) A kitchen and a studio
b) A bedroom and a kitchen
c) A bedroom and a studio

2. Which room is bigger than the other one?

a) The studio
b) The bedroom
c) The dining room

3. How much will Cristina have to pay?

a) 58,990
b) 13,990
c) 38,990

4. What payment method did Cristina use?

a) Cash
b) Credit card
c) Debit card

F. Listen to the conversation one more time and complete the list with the items needed for this home electrical installation.

Click here to listen:

ET: Ok, you will need the following items:
_____double plug _____,
four _____ outlets,
three _____,
three bulb _____,
50 _____ of red wire,
_____ meters of white _____,
50 meters of green insulated _____.

This is what you need for the two new bedrooms.

AFTER LISTENING

G. Draw both rooms and the electrical circuits including the materials the customer bought. Make your drawing in your English notebook. Consider the following information:

- The name of each room.
- The size of the rooms.
- Items and circuits.

Lesson II: Reading Comprehension

BEFORE YOU READ

A. Look at the picture below and choose the correct alternative regarding house wiring diagrams.

1. What is a house wiring diagram?

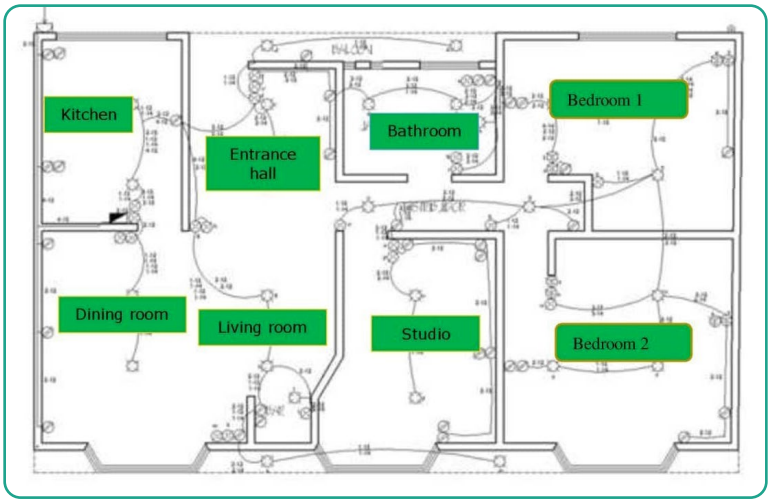
a) It's a visual representation of an electric circuit.

b) It's a drawing that shows furniture and devices.

2. Why are there symbols? What do they mean?

a) There are symbols because they represent different rooms from the house. Symbols have different meanings; kitchen, entrance, bedrooms, etc.

b) There are symbols because they represent different items from a house wiring circuit. Symbols depict different items such as switches, circuit breakers, bulb sockets, etc.



WHILE YOU READ

B. Take a quick look at the text below. Read and answer the questions in your English notebook.

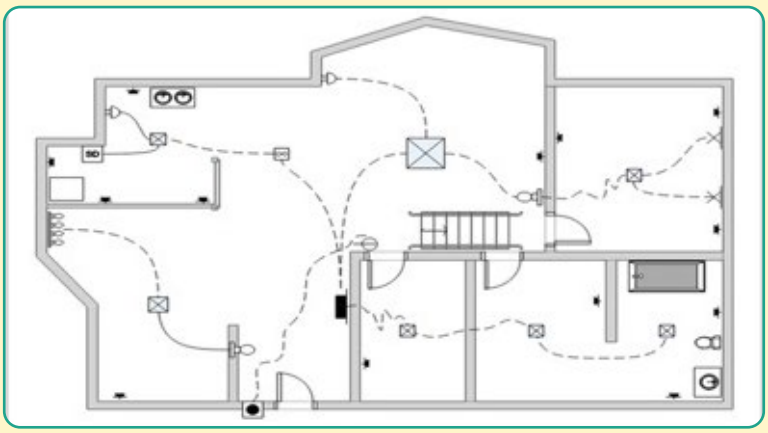
a. What will the text be about? The text will be about...

b. What do you know about this topic? I know that...

c. Which concepts are familiar for you? Some concepts that are familiar for me are...

What is a House Wiring Diagram?

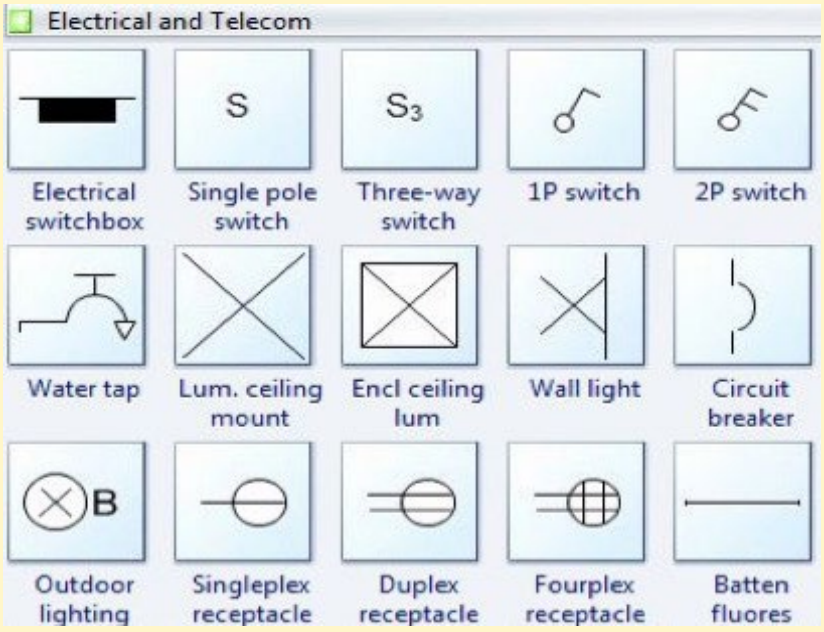
A wiring diagram is a pictorial representation of an electric circuit, where the elements of the loop and the signal connections between devices and the power source are shown in the conventional methods as simplified shapes.



It is the visual representation or design of the entire electrical wiring system or circuit of a house (or room) that helps in creating the system. The system distributes energy that can be used to power the various appliances and equipment around the house. This house wiring design and the assistance from a qualified electrical technician will ensure a proper installation and operation of the different elements included in the design such as electrical outlets, meter base, switches and breakers, and more.

Standard Home Wiring Diagram Symbols

Wiring diagrams use an array of special symbols that represent various circuit elements like switches, bulbs, electric outlets, breakers, smoke detectors, and many more.



Some principles of a House Wiring Diagram

While creating a house wiring diagram, one must always keep in mind a few principles.

- Understand the foundations of electricity, how it flows, the positive and negative terminals of a battery and the circuit itself.
- Try to use CAD software such as AutoCAD and SolidWorks to draw and design the diagram. It makes it easy and quick to draw up the planning.
- You need to know what the standard voltages are (220v/50Hz).
- You need to understand the meanings of the various symbols in order to place them accurately in your diagram.
- You need to specify the length and brand of the wires to be used.

Adapted from:

House Wiring Diagram - Anything You Need to Know | EdrawMax Online. Edrawmax.com.

https://www.edrawmax.com/house-wiring-diagram/

C. Read and write the missing words. You can underline key words to find your answers.

1. _____ is a software program that can be used to draw and design diagrams.

2. When creating a house wiring diagram, you need to specify the _____ and _____of the wires to be used.

3. A wiring system distributes _____that can be used to power the various _____and _____around the house.

D. Read the questions and find the answers using the underlined key words.

1. What is a house wiring diagram?

_____

2. Which principles must be considered in a diagram?

_____

3. Which software should you try to use in order to draw a diagram?

_____

E. Read and answer the questions. Underline key words to find your answers, as in the exercise above.

1. Why do you need to understand the meanings of the symbols?

_____

2. Which elements are part of the design in a house wiring diagram?

_____

3. How will you ensure a proper installation?

_____

AFTER YOU READ

F. Read the WhatsApp message and help Gaston create a house wiring diagram. Draw the diagram and symbology in your English notebook.

Hello! We are the Navarro family! We have a new kitchen and we need your help. Could you create a house wiring diagram four our new kitchen? Our kitchen is 22 m2. We need four triple plug outlets, one in each wall. We also need three bulb sockets withe their corresponding switches. Thank you very much Ashley! The Navarro family!

Hey Gaston! Don't Worry I will help you. greetings to Selma.

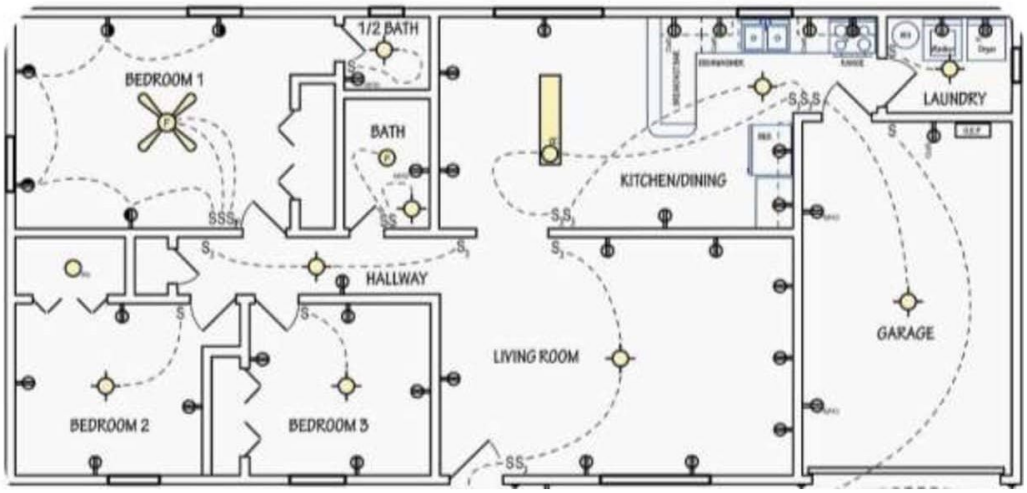
G. Share your house wiring diagram with a classmate. Use the sentence starters to express your ideas.

I placed the **triple plug outlets** here because...
I decided to place **the bulb socket(s)** here because...
This **triple plug outlet** was placed here because...
This **bulb socket** looks great here because...
This **kitchen** looks fantastic because...

Lesson III: Speaking

WARM UP

A. Look at the picture and read the descriptions. Then, circle the correct alternatives.



1. This room has four double plug outlets (duplex receptacle), a socket bulb and a single pole switch.

a) Laundry

b) Bedroom 2

2. This room has eight double plug outlets (duplex receptacle), a socket bulb, a single pole switch and two three-way switches.

a) Bedroom 1

b) Living room

B. Discuss the following questions with a classmate. Use the sentence starters to express your ideas.

a. Was the symbology easy or difficult to understand? Why?

The symbology was _____ to understand because _____ ,

b. How can you learn more symbols?

I can learn more symbols by _____

INPUT AND ELICITING

C. Look at the picture below and label the parts of the house. Label as many objects as possible. Compare your answers with a classmate.

D. Read the conversation below

Context: Miss Contreras called Mr. Vasquez, who is an electrical technician. She wants to change some plug outlets. Mister Vasquez has just arrived at Miss Contreras' home.

Good afternoon and thank you for coming. Mister Vasquez!

Don't worry, Miss Contreras! What can I do for you?

We need to change this plug outlet in the living room next to the entrance because we bought a new home theater. We will need more plug outlets because a single plug outlet is not enough.

We have to change it for a triple plug outlet. A triple plug outlet will provide more connections to the power. Your new home theater will look astonishing in front of the living room and the dining area.

Is it possible to change another plug outlet in the biggest bedroom? We only have a single plug outlet to connect the TV but I got a new lamp as a gift that I would like to plug in near the TV rack.

Absolutely, would you need a double or triple plug outlet for that one?

I don't know. What do you think?

I think that another triple plug outlet will be perfect in case you get another lamp as a gift.

Perfect idea, thank you.

CONTROLLED PRACTICE

E. Each student will choose a character to roleplay the dialogue (i.e.: student A is the technician, and student B is the customer).

F. Now switch roles and repeat the dialogue.

FREER PRACTICE

G. Fill in the gaps. Complete the following dialogue using **different information** from the previous dialogue. Use the picture of the house in exercise D to describe your changes.

Good afternoon and thank you for coming. _____!

Don't worry, _____! What can I do for you?

We need to change this plug outlet in the _____ next to the _____ because we bought a _____. We will need more plug outlets because a single plug outlet is not enough.

We have to change it for a _____ plug outlet. A _____ plug outlet will provide more connections to the power. Your new _____ will look astonishing in _____

Is it possible to change another plug outlet in _____? We only have a single plug outlet to connect the _____ but I got a new _____ as a gift that I would like to plug in near the _____.

Absolutely, would you need a double or triple plug outlet for that one?

I think a _____ would be a great idea.

Excellent!

Perfect idea, thank you.

H. Each student will choose a character to roleplay the dialogue (i.e.: student A is the technician, and student B is the customer).

I. Switch roles and repeat the dialogue.

WRAP UP

J. Group work. Read the following statements and choose one. Then, write five sentences to support your choice.

1. Drawing a house wiring diagram is the most challenging task an electrical technician must do.
2. Drawing a house wiring diagram is the easiest task an electrical technician must do.
3. Replacing circuit elements is the safest activity an electrical technician must do.
4. Replacing circuit elements is the most dangerous task an electrical technician must do.
5. Every electrical technician must know house wiring diagram symbology.

K. Share your sentences with the class.

Lesson IV: Writing

PRE-WRITING

A. Read and tick the electrical technicians' responsibilities and duties.

1		Install, maintain, and repair electrical wiring, equipment, and fixtures.
2		Install street lights, intercom systems, or electrical control systems.
3		Make wiring diagrams.
4		Design devices such as cellphones and computers.
5		Connect wires to circuit breakers, transformers, or other components.
6		Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, using testing devices, such as ohmmeters, voltmeters, or oscilloscopes, to ensure compatibility and safety of the system.
7		Create a software.
8		Use a variety of tools or equipment, such as power construction equipment, measuring devices, power tools.
9		Design smart technology such as smart TVs, smart phones, etc.
10		Test equipment using tools such as oscilloscopes, ammeters, or test lamps.
11		Inspect electrical systems, equipment, or components to identify hazards, defects, or the need for adjustment or repair.
12		Diagnose malfunctioning systems, apparatus, or components, using test equipment and hand tools to locate the cause of a breakdown and correct the problem.

B. Read the following flyer and circle the unknown words. Then, look them up in your dictionary. Write the vocabulary in your notebook.

2 Services and products: It is a list of products and/or services provided by the company.

1 Company name and logo: The logo is the face of the company. It has to be original and memorable.

3 Visual aids: They include a picture to catch people's attention.

4 About us: It has a brief description of the company so readers know more about it.

5 Emergency call: It's a phone number you can call in case of emergency.

6 Special offer: It is a discount to benefit customers. Its purpose is sell a service/product under specific conditions.

C. Read and discuss the following questions with a partner.

a. Was the text easy or difficult to understand? Why?

b. What is the structure of the text?

DRAFTING

D. Write the draft of a new flyer in your notebook.

- Create a new company and design a logo.
- Write at least 7 sentences regarding the services provided by your company. Use the "electrical technicians' responsibilities and duties" text to write your sentences.
- Review the structure of the flyer to guide your design and research.
- Look for images to support your text.

REVISING

E. Use the following checklist to assess your classmate's draft. Once finished, return the draft and comments.

FLYER STRUCTURE	TICK IF COMPLETED	COMMENTS AND SUGGESTIONS (*)
Company name and logo		
List of products and services		
Visual aids		
About us		
Emergency call		
Special offer		

(*) Comments and suggestions may provide reference to specific missing information, grammar, sentence structure, word choice, punctuation, capitalization & spelling errors.

EDITING

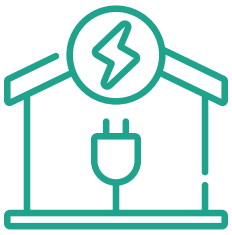
F. Use the following layout and your classmate's feedback to improve your final draft.

FLYER STRUCTURE	FLYER TEXT
Company name and logo	
List of products and services	
Visual aids	
About us	
Emergency call	
Special offer	

PUBLISHING

G. Now hand in your final version to your teacher.

Project: A dream-house wiring diagram


Name of the project:	A dream-house wiring diagram: Prepare an oral presentation in groups of four and describe a dream-house wiring diagram.
Level:	Elementary to intermediate.
Time:	90-135 minutes.
General aim:	Students will give an oral presentation and describe a dream-house wiring diagram.
Language aim (s):	Students will practice and improve all four language skills, with a main focus on productive skills (speaking and writing).
Resources / Materials:	Presentation: pictures, etc. Posters and diagrams: cardboards, colored pencils, pens, markers, eraser, ruler, etc.
Teacher's role:	Present and explain the assessment criteria (rubric). Describe and model the project. Describe roles within each group (i.e.: reporter, checker, materials manager, etc.). Explain the structure of the oral presentation: Title, salutation, introduction, house wiring diagram presentation/description and conclusions (closing). Provide feedback to students during the preparation process and presentation.
Students' roles:	Collect material needed to create an oral presentation and a house wiring diagram. Use contents from the unit in order to organize ideas for the oral presentation, create a house wiring diagram and describe the final product to the class.

PROCEDURE	
1. Gather in groups of four. Choose a role within your group: Reporter: Shares summary of group with the class. Speaks for the group, not just personal view. Materials manager: Picks up, distributes, collects, turns in, or puts away materials. Facilitator: Keeps group on task and verifies that all contribute. Checker: Checks for accuracy and clarity of thinking during discussions. **2.** Discuss the project characteristics, instructions and assessment criteria (rubric) within your groups before you start. Ask questions to your teacher when necessary. **3.** Use the following structure to organize your oral presentation; Title, salutation, introduction, house wiring diagram presentation/description and conclusions (closing). **4.** Prepare visual aids to support your oral presentation; posters, charts, drawings, etc. **5.** Practice your oral presentation. Use the rubric to guide and assess your own progress. **6.** Give your oral presentation to the class.	
FOLLOW UP	Teacher and other groups can provide feedback about presentations. They can focus on the house wiring diagram, performance, explanations, etc.
VARIATION	Each group takes notes and assesses whether the house wiring diagram is feasible or not.
RUBRIC	Rubric to assess the oral presentation.

Unit III: Electrical project management

Goal: Comprehend general and specific information in oral and written texts related to the development of electrical projects.

Skills: Listening, Reading, Speaking, Writing

Project: The greatest electrical technician classroom.

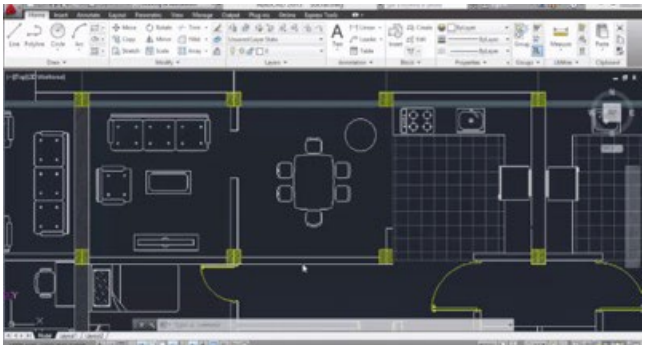
☆ 20 KEY WORDS

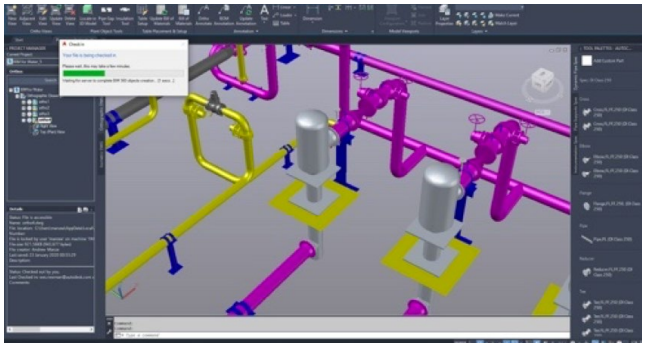
2D (adj.)
3D (adj.)
Aid (n.) (v.)
AutoCAD (n.)
Background (n.)
Blueprints (n.)
Execution (n.)
Inspection (n.)
Installation (n.)
Legal (adj.)
Manual (n.)
Personal protective equipment (n.)
Plan (n.) (v.)
Podcast (n.)
Procedure (n.)
Project (n.) (v.)
Qualified (adj.)
Resume (v.)
Signature (n.)
Updates (n.)

Lesson I: Listening Comprehension

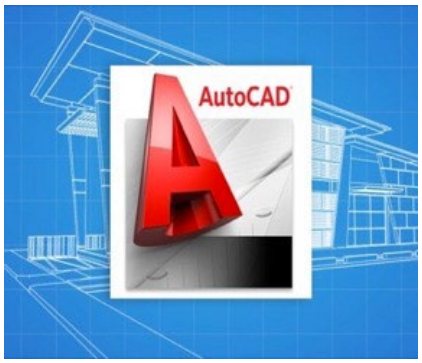
BEFORE YOU LISTEN

A. Look at the pictures below and read the statements from the AutoCAD software checklist. Circle yes or no according to whether they are correct or not. Share your answers with a classmate.





1. AutoCAD is a software.
2. CAD stands for computer-aided design.
3. AutoCAD is only used to draw 2D objects, not 3D.
4. AutoCAD is used to design blueprints and wiring diagrams.
5. You can save time and money. The software does the job.
6. You can calculate material quantities for productions.
7. You can identify design problems.
8. AutoCAD full version is for free.
9. The software needs a strong computer processing power.



B. Read the statements above and complete the chart using relevant information and/or keywords from the text. Write your chart in your English notebook.

AutoCAD is...	AutoCAD is used to draw...
AUTOCAD	
Some advantages of AutoCAD are...	Some disadvantages of AutoCAD are...

WHILE YOU LISTEN

Click here to listen:

C. Listen and complete the missing parts of the conversation. Use the words from the box.

~~Electrical~~ - free - software - designers - 3D - updates
technician - stands - 2D - expensive - engineers

Mr Fuentes, I am the new electrical _____ .

Hi, you must be Mrs Marileo. How are you?

I am great. Just a little bit nervous. I am highly motivated by this new challenge. AutoCAD is such a fascinating _____ . I really want to learn how it works.

Great! Let's start then! CAD _____ for computer-aided design. AutoCAD is a well-known software that has been around for a very long time. Over the years it has become better and it has covered a wider range of uses to satisfy the needs of and _____ in many fields. Created in December 1982, AutoCAD is a multidisciplinary technical drawing software in _____ and al so _____ .

AutoCAD is very old. Is it free? What about _____ _____ ?

AutoCAD is not _____ . It is very _____ . It is updated every year to offer users more features and a better experience.

D. Listen to the conversation again. Write T for true or F for false.

1		AutoCAD is a technical drawing software in 2D and 3D.
2		AutoCAD stands for computer-aided design.
3		AutoCAD is useless in the field of electricity.
4		For electrical engineering, AutoCAD is very important in the design of diagrams to use for manufacturing, installations and repair of electronic gadgets.
5		The full version of AutoCAD is free.

E. Listen again and number these statements as you hear them in the audio. (1-6)

A		Mrs Marileo said that she had a list of suggestions.
B		Mr Fuentes said that it would take time and effort to understand AutoCAD.
C		Mrs Marileo told Mr Fuentes that she was nervous.
D		Mrs Marileo said that the software was old.
E		Mr Fuentes said that AutoCAD was expensive.
F		Mr Fuentes told Mrs Marileo to visit his office if she had doubts.

AFTER YOU LISTEN

F. Imagine you are Alvaro. Write Alvaro's list of 6 suggestions for Mrs Marileo to learn how to use AutoCAD. Match words from column A to the appropriate segment in column B. Check the example.

COLUMN A	COLUMN B
Read	AutoCAD videos on YouTube.
Watch	to podcasts regarding the use of AutoCAD.
Practice	the software manual.
Listen	a mentor.
Interview	side projects to immerse yourself in the world of AutoCAD.
Work on	and find support from an AutoCAD expert.
Find	procedures regarding AutoCAD functions.

Read the software manual.

G. Group work. Share your ideas with the rest of the class.

Lesson II: Reading Comprehension

BEFORE YOU READ

A. Look at the pictures and read the lists for each picture. Tick items/components presented in each picture.

	Electrical technicians and/or engineers.		People are checking a plan.
	Blueprints or wiring diagrams.		Blueprints or wiring diagrams.
	Construction site.		Construction site.
	Personal protective equipment.		Personal protective equipment.
	Documentation.		Documentation.

B. Read and complete the chart. Write your predictions about some concepts from the text.

What is a project?	**STAGES OF AN ELECTRICAL INSTALLATION PROJECT**		What's the final stage?
Who is responsible for a project?	What is a technical study?	What is the explanatory memory?	What is a blueprint?

C. Share your answers with a classmate.

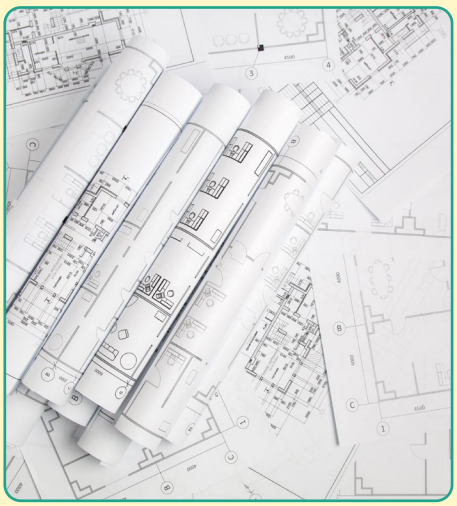
WHILE YOU READ

D. Read the following text to check your predictions.

"STAGES OF AN ELECTRICAL INSTALLATION PROJECT"

A project is a set of writings, calculations, and drawings that are made to develop a work of engineering. To start a project, it is important to consider technical and economic aspects such as needs assessment, technical feasibility, and cost estimation. For those who are doing an electrical project for the first time, they are faced with various questions; Where to start? How to plan the project? What are the stages? What is the cost of the project?
Each electrical installation project must ensure that the resulting installation is regulated, without risks for its users, provides good service, allows easy and adequate maintenance, has the necessary flexibility to allow extensions, is efficient and its exploitation is economically viable.

All electrical installation projects must be carried out by an authorized electrical installer. To obtain a license, the installer must fit into one of the following categories:
• Graduate of Electrical Engineering.
• Electrical Technician whose study program is approved by the **SEC** for this purpose. SEC stands for Superintendencia de Electricidad y Combustibles. SEC oversees compliance with the legal, regulatory, and normative provisions on generation, production, storage, transportation and distribution of liquid fuels, gas, and electricity.
• Graduate of a technical high school with a technical major, whose study programs have been approved using an exempt resolution from the SEC.
Those professionals will be solely responsible for the installation project.



TECHNICAL STUDY

The technical study of an electrical installation project must include at least the following parts:
a) The **EXPLANATORY MEMORY**: This consists of describing the work (purpose of the installation, geographic location, description of its operation), carrying out justified calculations of the installation, determining the cost of the project, quantifying materials used according to their volumes, and establishing technical specifications.
b) The **PREPARATION OF BLUEPRINTS** and technical specifications: This stage consists of transferring all the accumulated information to the drawing using the symbols established by the standard and on an appropriate scale.

EXECUTION

This stage begins after the technical study and here is where the necessary procedures are carried out to guarantee that the electrical installation project is successful. All installation procedures must be considered and carried out by accredited professionals. Testing and implementation consists of various actions that must be made for the project; verification of adjustments, mechanical calibrations, checking of pressures, leaks, checking of screws, support structures, foundations, anchors, leveling, alignments between poles, visual inspection of personal protective equipment, measurement, control cabinets, structures, ground connections, angular displacement, etc., which allow to establish with full certainty that the equipment is in optimal conditions to initiate individual tests and verify their full operation.
Finally, the professional in charge of the project must do the paperwork and deliver the project.

Adapted from:
Henriquez Santana, D. (2015). *Diseño, presupuesto y programación de proyectos eléctricos.*

E. Scan the text and select the correct answer to each question. Choose the correct answers.

1. What is a project?

A. It's the cost estimation that is made to develop a work of engineering.
B. It is a set of writings, calculations and drawings that are made to develop a work of engineering.

2. What must each electrical installation project ensure?

A. Each electrical installation project must ensure that the resulting installation is neglected, allows difficult and inadequate maintenance, has the necessary rigidity to avoid extensions, is inefficient and its exploitation is economically unreasonable.
B. Each electrical installation project must ensure that the resulting installation is regulated, allows easy and adequate maintenance, has the necessary flexibility to allow extensions, is efficient and its exploitation is economically unfeasible.

3. Who can carry out electrical installation projects?

A. Any person.
B. Authorized electrical installers.

4. Which are the two parts a technical study of an electrical installation project must include?

A. Explanatory memory and preparation of blueprints.
B. Explanatory memory and preparation of execution.

F. Read and match the concepts to their descriptions/definitions.

	CONCEPTS
1	Explanatory memory
2	Execution
3	Qualified professional
4	Preparation of blueprints
5	Technical study

	DESCRIPTIONS/DEFINITIONS
	It consists of the explanatory memory and preparation of blueprints.
	Transferring the information to a drawing using symbols.
	It's a person who graduated with a technical major from a technical high school.
	It describes the work, cost, materials, etc.
	The necessary procedures that are carried out to guarantee that the electrical installation project is successful.

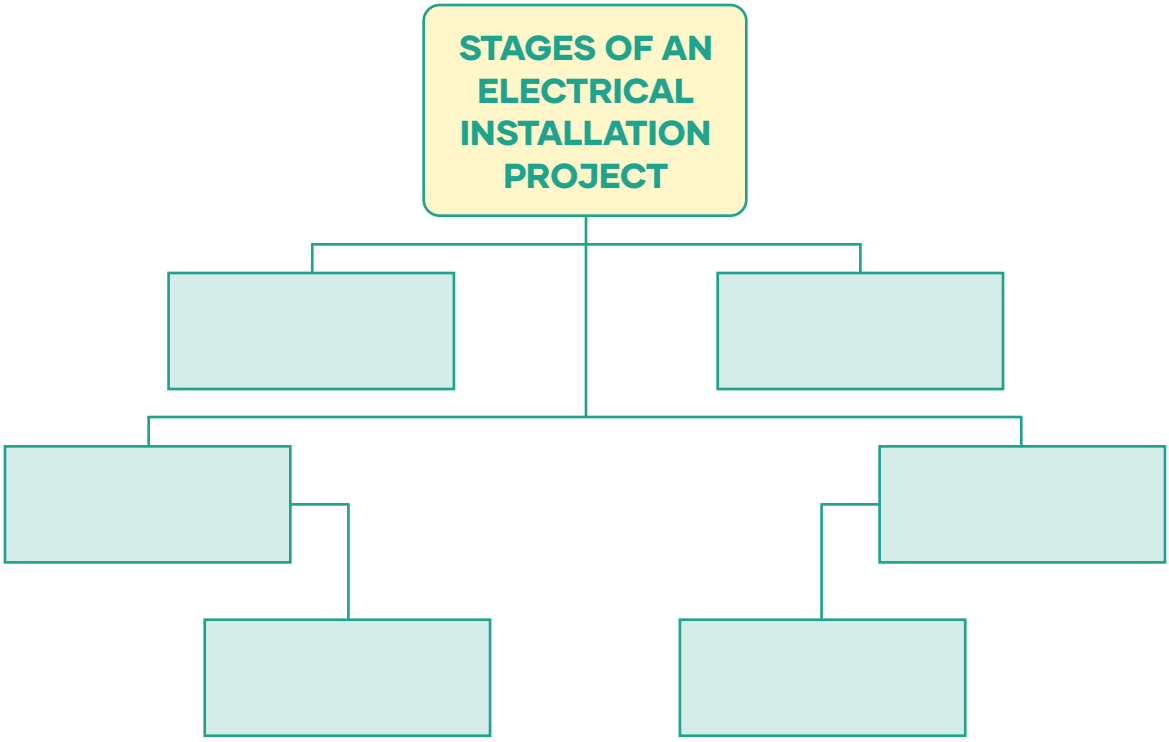
G. Name and write six more actions that guarantee that the electrical installation project is successful.

1	Checking of screws
2	
3	
4	
5	
6	
7	

AFTER YOU READ

G. Use the information from the text and create a mind map in order to describe the stages of an electrical installation project. Use sentences and keywords from the text. You can use a different mind map layout from the one provided.

Include:
- Authorized electrical installers/professionals.
- Technical study (both parts)
- Execution (examples)



H. Share your mind map with the rest of the class.

Lesson III: Speaking

WARM UP

A. Look at the declaration form extract and write a tick beside the statements that are presented in this form. Share your answers with a classmate.

SEC

DECLARACIÓN DE INSTALACIÓN ELÉCTRICA INTERIOR **TE1**

1 .- Antecedentes Instalador o Profesional que Declara

RUT	-	Nombre Completo	
Domicilio Particular			
Comuna		Región	Clase Licencia / Título Profesional
Teléfono Fijo		Teléfono Celular	Correo Electrónico

2.- Antecedentes de la Instalación

Dirección			
Región	Comuna	Rol (opcional	-

Instalación para suministro provisorio (*)		Tiempo de Suministro Provisorio (días)	Instalación (*)		Proyecto de vivienda social (*)		Tipo de Instalación (según N.S. [N°9283])
SI			Nueva		SI		
NO			Ampliación		NO		

Nota (*): Marcar con una "x" donde corresponda

Destino de la Propiedad (*)	Industrial		Tipo de Construcción (*)	Casa Individual		Potencia Total Declarada (kW) (**)
	Comercial			Edificio		
	Habitacional			Conjunto		Potencia Total Instalada (kW)
	Educacional					
	Otros					
Indicar giro específico (***)						

Nota:
(*) Marcar con una "x" donde corresponda
(**) Detalle de instalaciones en reverso de este formulario
(***) Se debe indicar giro específico, actividad o tipo para cualquier destino de la propiedad seleccionado.

Detalle de la Instalación Declarada			Cantidad de Instalaciones	
Potencia de Fuerza		kW		
Potencia de Alumbrado		kW		
Potencia de Climatización o Calefacción		kW		
Potencia de Computación		kW		
Potencia de Subestación		kVA	Declara Instalaciones Exteriores (*)	
Grupo Electrógeno		kVA	SI	
Longitud de Alimentador		m	NO	

3 .- Antecedentes del Propietario y/o Representante Legal

Propietario

RUT	-	Nombre Completo o Razón Social			
Dirección Particular/Comercial					
Comuna/Ciudad		Región	Teléfono Fijo		Teléfono Celular (opcional)
Correo Electrónico (opcional)					

Representante Legal

RUT	-	Nombre Representante Legal			
Dirección Particular/Comercial					
Comuna		Región			
Teléfono Fijo		Teléfono Celular (opcional)		Correo Electrónico (opcional)	

4.- Firmas de responsabilidad

1. El instalador o profesional de la instalación que se inscribe, declara que se ha ejecutado conforme al proyecto que se adjunta y que cumple con los decretos y cuerpos normativos que corresponden con esta instalación — Firma Instalador

2. El propietario o representante legal de la instalación que se inscribe declara conocer el artículo 148° del DFL 1 de 1982, del Ministerio de Minería, y asume la responsabilidad de mantenerla cumpliendo con las normas de seguridad correspondientes en vigencia. — Firma Propietario

3. USO EXCLUSIVO DE SEC
N° de FOLIO : _____ FECHA: _____ — Firma Funcionario

Esta inscripción no constituye aprobación por parte de SEC.
La modificación de las condiciones originales de la instalación dejan sin efecto el presente documento.
El presente documento sirve para solicitar el suministro a la Empresa Eléctrica y para los trámites Municipales correspondientes

Este formulario continúa al reverso

Archivo	TE1FORMULARIO	Fecha	04/09/2006	DTIE/SEC

	TICK	STATEMENTS
1	√	Professional background (personal information)
2		Signatures
3		Installation details regarding power
4		Owner or legal representative background (personal information)
5		Quotation

B. Read the following statements and discuss whether you agree or disagree. Share your answers with a classmate.

The superintendencia de electricidad y combustibles (SEC) is the entity in charge of regulating electrical installations and projects.

Electrical installations and projects carried out in Chile must comply with all relevant legal and quality standards – NCh Elec. 4 2003 among others.

When non-certified materials are used (i.e.: low cost imported conductors with no clear source), the project capacity is put at risk. All materials must have a SEC seal.

INPUT

C. Read the following phone conversation between an electrical technician and the city hall secretary.

Context: Aaron is the electrical technician and Henry is the secretary. Aaron wants to know the final requirements to deliver his electrical installation project.

Good morning! My name is Aaron. I am an electrical technician.

Good morning Aaron! My name is Henry. How can I help you?

I would like to know about the official papers I need to deliver after finishing an electrical installation project.

You have to deliver the final project documentation of the executed installation, which will have to meet the current requirements for electrical projects, and especially the standard NCH Elec. 2/84.

Ok, Thank you very much! Is that everything?

Yes! That's everything!

What about the electrical installation declaration by a certified professional? It's important that an authorized professional validates the project, the execution and the tests that have been carried out in accordance with the legal requirements.

Oh yes! I am so sorry! I forgot that one. The project has to comply with all the legal requirements and regulations, and especially with the NCH 4/2003 standard.

Ok, Thank you so much for your help. Have a great day!

Have a great day, too! Bye bye.

CONTROLLED PRACTICE

D. Each student will choose a character to roleplay the phone conversation (i.e.: student A is the technician, and student B is the secretary).

E. Switch the roles and repeat the dialogue again.

FREER PRACTICE

F. Look at the chart and read the meanings of each word. Write the words in bold from the phone conversation in activity C with its synonym.

	MEANINGS	WORD	SYNONYM FROM ACTIVITY C
1	Be in accordance with requirements	Meet	
2	To carry and turn over to the person receiving	Hand in	
3	A piece of written, printed, or electronic matter that provides information or evidence or that serves as an official record.	Documents	
4	Something imposed as an obligation.	Demands	

G. Practice the phone conversation again. Change the words in bold for the synonyms. Switch the roles and practice the conversation.

Good morning! My name is Aaron. I am an electrical technician.

Good morning Aaron! My name is Henry. How can I help you?

I would like to know about the _____ I need to deliver after finishing an electrical installation project.

You have to _____the final project documentation of the executed installation, which will have to meet the current _____ for electrical projects, and especially the standard NCH Elec. 2/84.

Ok, Thank you very much! Is that everything?

Yes! That's everything!

What about the electrical installation declaration by a certified professional? It's important that an authorized professional validates the project, the execution and the tests that have been carried out _____the legal requirements.

Oh yes! I am so sorry! I forgot that one. The project has to _____ all the legal requirements and regulations, and especially with the NCH 4/2003 standard.

Ok, Thank you so much for your help. Have a great day!

Have a great day, too! Bye bye.

WRAP UP

H Group work. Look at the "Electrical installation declaration" and create a brief form in English. Include the following information:

- Professional background; ID number, full name, address, phone, city, region, etc.
- Installation background; address, city, region, property registration number, etc.
- Owner or legal representative background; ID number, full name, address, phone, city, region, etc.
- Managers' signatures; descriptions and signatures.

Example:

ELECTRICAL INSTALLATION DECLARATION

PROFESSIONAL BACKGROUND

ID NUMBER:	**12.345.678-9**
FULL NAME:	**NOEMA YOLANDA JARAMILLO ROJAS**
ADDRESS:	ALAMEDA AVENUE # 2020
PHONE:	9-8765 4321
CITY:	PUNTA ARENAS
REGION:	MAGALLANES

I. Share your form with the rest of the class.

Lesson IV: Writing

PRE WRITING

A. Look at the picture and choose the correct options.

1. What type of text is it?

A. It's an electrical installation declaration

B. It's a cover letter

C. It's a resume

2. What information is in the text?

A. Contact and professional information.

B. Working experience and educational information.

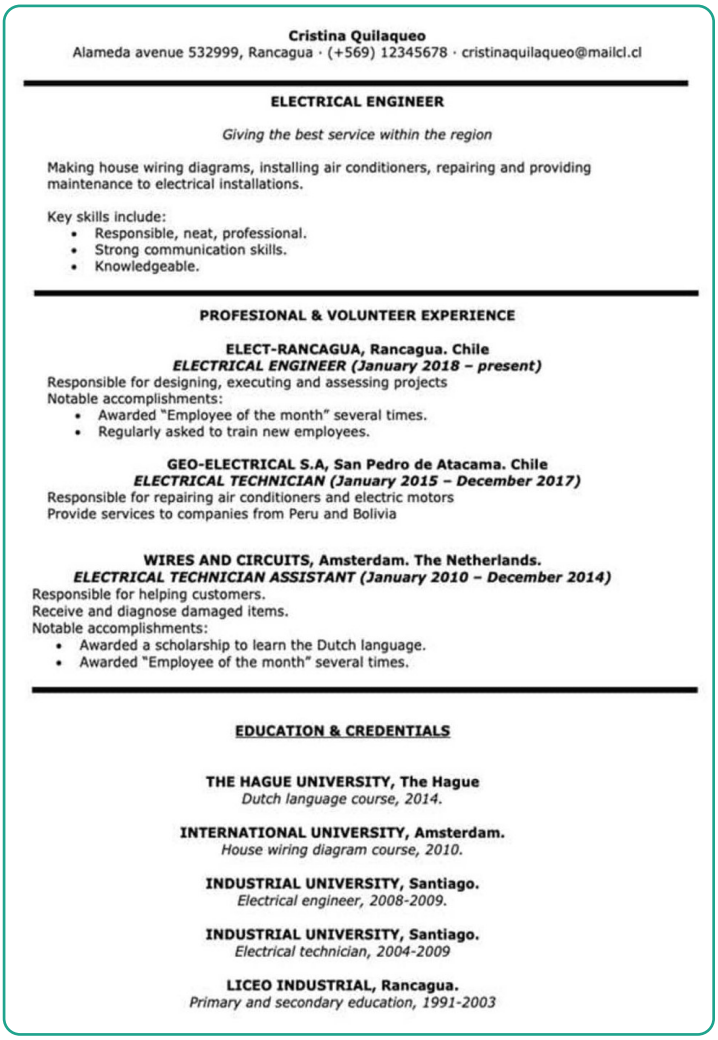
C. Both a) and b).

3. What is the purpose of the text?

A. Gather information to apply for a new wiring project.

B. Gather information to apply for a job.

C. Gather information to create a new house wiring diagram.



Cristina Quilaqueo
Alameda avenue 532999, Rancagua · (+569) 12345678 · cristinaquilaqueo@mailcl.cl

ELECTRICAL ENGINEER

Giving the best service within the region

Making house wiring diagrams, installing air conditioners, repairing and providing maintenance to electrical installations.

Key skills include:
- Responsible, neat, professional.
- Strong communication skills.
- Knowledgeable.

PROFESIONAL & VOLUNTEER EXPERIENCE

ELECT-RANCAGUA, Rancagua. Chile
ELECTRICAL ENGINEER (January 2018 – present)
Responsible for designing, executing and assessing projects
Notable accomplishments:
- Awarded "Employee of the month" several times.
- Regularly asked to train new employees.

GEO-ELECTRICAL S.A, San Pedro de Atacama. Chile
ELECTRICAL TECHNICIAN (January 2015 – December 2017)
Responsible for repairing air conditioners and electric motors
Provide services to companies from Peru and Bolivia

WIRES AND CIRCUITS, Amsterdam. The Netherlands.
ELECTRICAL TECHNICIAN ASSISTANT (January 2010 – December 2014)
Responsible for helping customers.
Receive and diagnose damaged items.
Notable accomplishments:
- Awarded a scholarship to learn the Dutch language.
- Awarded "Employee of the month" several times.

EDUCATION & CREDENTIALS

THE HAGUE UNIVERSITY, The Hague
Dutch language course, 2014.

INTERNATIONAL UNIVERSITY, Amsterdam.
House wiring diagram course, 2010.

INDUSTRIAL UNIVERSITY, Santiago.
Electrical engineer, 2008-2009.

INDUSTRIAL UNIVERSITY, Santiago.
Electrical technician, 2004-2009

LICEO INDUSTRIAL, Rancagua.
Primary and secondary education, 1991-2003

B. Read the following resume and circle the words you do not know. Then, look them up in your dictionary. Write the vocabulary in your notebook.

CONTACT SECTION

Cristina Quilaqueo
Alameda avenue 532999, Rancagua · (+569) 12345678 · cristinaquilaqueo@mailcl.cl

SUMMARY OF YOUR SKILLS

ELECTRICAL ENGINEER

Giving the best service within the region

Making house wiring diagrams, installing air conditioners, repairing and providing maintenance to electrical installations.

Key skills include:
- Responsible, neat, professional.
- Strong communication skills.
- Knowledgeable.

EXPERIENCE SECTION

PROFESIONAL & VOLUNTEER EXPERIENCE

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Electrical engineer, 2008-2009.

INDUSTRIAL UNIVERSITY, Santiago.
Electrical technician, 2004-2009

LICEO INDUSTRIAL, Rancagua.
Primary and secondary education, 1991-2003

C. Read and discuss the following questions with a partner.

a) Was the text easy or difficult to understand? Why?

b) What is the structure of the text?

DRAFTING

D. Write the draft of a new resume in your notebook.

- Imagine you have already become an electrical technician or an electrical engineer. Use fictitious information to create your draft.
- Review the structure of the resume to guide your research.
- Use your dictionary to find the words you do not know.

REVISING

E. Use the following checklist to assess your classmate's draft. Once finished, return the draft and comments.

RESUME STRUCTURE	TICK IF COMPLETED	COMMENTS AND SUGGESTIONS (*)
Contact section		
Summary of your skills		
Experience section		
Education section		

(*) Comments and suggestions may provide reference to specific missing information, grammar, sentence structure, word choice, punctuation, capitalization & spelling errors.

EDITING

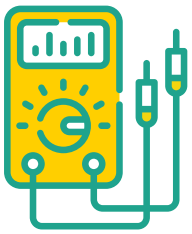
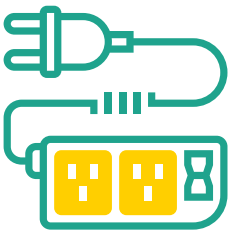
F. Re-write your resume using the following layout. Use your classmate's feedback to improve your final draft (check the criteria established in the previous checklist).

RESUME STRUCTURE	TICK IF COMPLETED
Contact section	
Summary of your skills	
Experience section	
Education section	

PUBLISHING

G. Hand in your final version to your teacher.

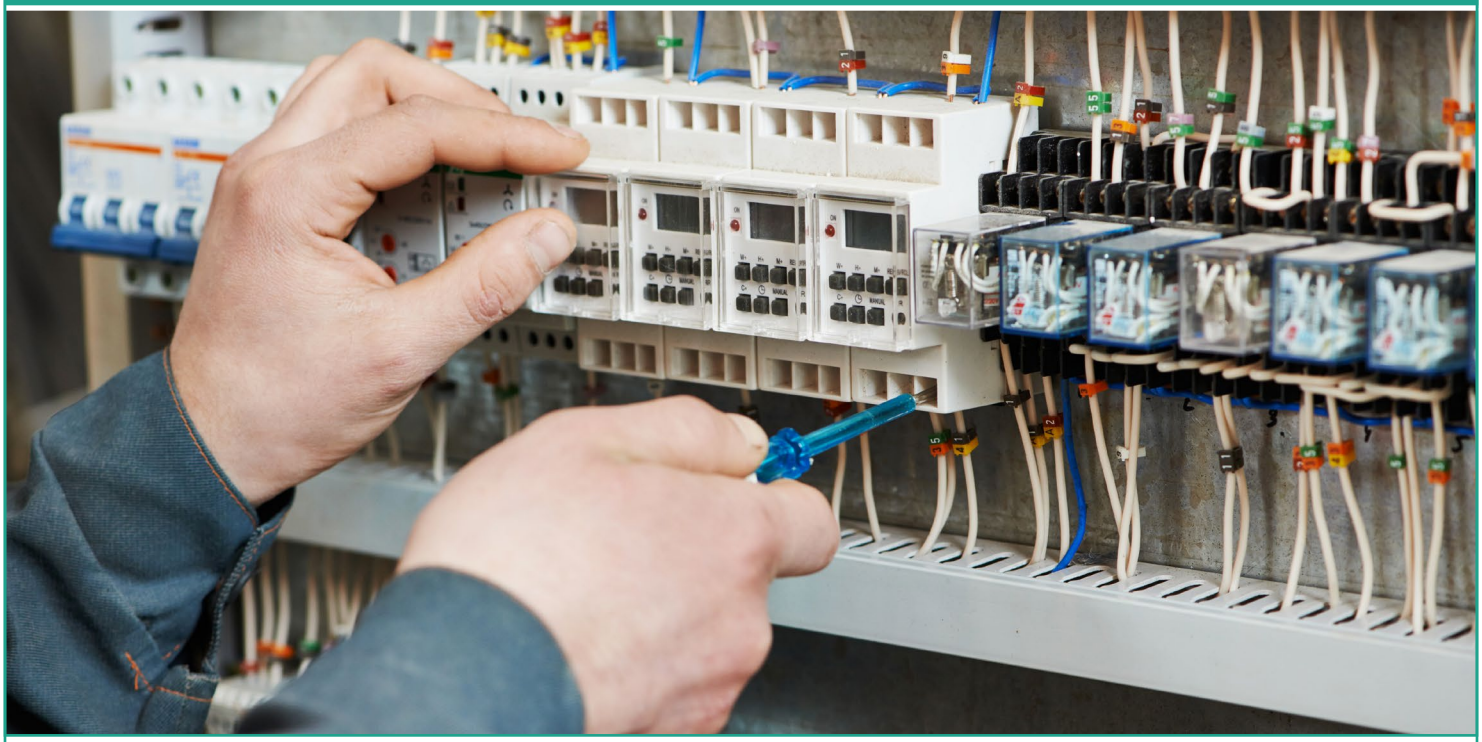
Project: The greatest electrical technician classroom


Name of the Project:	The greatest electrical technician classroom: Create the greatest electrical technician classroom in groups of four and give an oral presentation to share your project with the class. You can modify the electrical system of your classroom and add items in order to improve it.
Level:	Elementary to intermediate
Time:	90-135 minutes
General aims:	Students will give an oral presentation in order to share their projects.
Language aims:	Students will practice and improve all four language skills, with a main focus on productive skills (speaking and writing).
Resources / Materials:	Presentation: Power points, pictures, etc. Posters: Cardboards, colored pencils/markers, pictures, glue, scissors.
Teacher's role:	Present and explain the assessment criteria (rubric). Describe and model the project. Describe roles within each group (i.e.: reporter, checker, materials manager, etc.). Collect information regarding items related to the field of electricity that students might need in order to develop their skills in that field. Explain the structure of the oral presentation: salutation, introduction, classroom improvements, blueprint or wiring diagram explanations (symbology) and conclusions. Provide feedback to students during the preparation process and presentation.
Students' roles:	Make groups of four and choose a role. Organize ideas and plan the oral presentation. Do research regarding items related to the field of electricity that they might need in order to develop their skills in that field. Collect material needed to create the oral presentation; pictures, information, posters, PPT presentation, blueprints or wiring diagram, symbology, etc.

PROCEDURE	
1. Gather in groups of four. Choose a role within your group: Reporter: Shares summary of group with the class. Speaks for the group, not just personal view. Materials manager: Picks up, distributes, collects, turns in, or puts away materials. Facilitator: Keeps group on task and verifies that all contribute. Checker: Checks for accuracy and clarity of thinking during discussions. **2.** Discuss the project characteristics, instructions and assessment criteria (rubric) within your groups before you start. Ask your teacher questions when necessary. **3.** Do research regarding items related to the field of electricity that you might need in order to develop skills as an electrical technician. **4.** Prepare visual aids to support your oral presentation; posters, charts, drawings, wiring diagrams, etc. **5.** Practice your oral presentation. Use the rubric to guide and assess your own progress. **6.** Present to the class.	
FOLLOW UP	Teacher and other groups can provide feedback about presentations. They can focus on the classroom improvements, performance, explanations, visual aids, etc.
VARIATION	Each group takes notes and assesses whether the project depicts the greatest electrical technician classroom. Students can ask questions and/or give suggestions.
RUBRIC	Rubric to assess the presentations.

Unit IV: Machines, equipment and electrical systems maintenance



Goals: Comprehend general and specific information in oral and written texts related to maintenance of machines, equipment and electrical systems.

Skills: Listening, Reading, Speaking, Writing.

Project: "The electrical technicians' music festival"

☆ 22 KEY WORDS

Abnormal (adj.)
Arise (v.)
Avoid (v.)
Cover letter (n.)
Current (n.) (ad.j)
Electric bills (n.)
Electric shocks (n.)
Facilities (n.)
Improve (v.)
Increase (v.)
Kit (n.)
Maintenance (n.)
Maneuvers (n.)
Measure (v.)
Normal (adj.)
Overload (v.)
Power surges (n.)
Regulations (n.)
Repair (v.)
Requirements (n.)
Thermal (adj.)
Tool (n.)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

A. Look at and label the pictures using the words from the box.

Earth and resistivity tester pack - ~~Micro Ohmmeter~~
Thermographic camera - Multifunction installation tester - Multimeter Motor drive analyzer - Clamp meter - Insulation multimeter

							
1	Micro Ohmmeter	2		3		4	
							
5		6		7		8	

B. Read the comments from different electrical technicians and make predictions. What tool are they talking about? Write the names in each bubble. Share your answers with a classmate.

It measures parameters of motor drives, such as voltage.

_____

This camera measures invisible thermal activity (heat).

_____

It's an integrated tool for maintaining motor systems.

_____

It allows technicians to clamp the jaws around a wire, then measure current in that circuit without disconnecting it.

_____

WHILE YOU LISTEN

Click here to listen:

C. Listen to the conversation again and sequence Tim's plans for the morning. Use numbers (1-5).

A		Tim and Selma are going to see each other at midday.
B		Tim is going to run a ground resistance and soil resistivity test in Mr Fuentes' house.
C		Tim is going to visit Mr Marilaf to run a thermographic camera test.
D		Tim is going to visit Mrs Nunes to measure voltages, current and resistance.
E		Tim is going to review his route and check the tools he is going to need to run tests.
F		Mr Fuentes told Mrs Marileo to visit his office if she had doubts.

D. Listen to the conversation and label each definition with the words from the box.

~~Multifunction installation tester~~ - Multimeter

Earth and resistivity test – Thermographic camera - Micro Ohmmeter

1. *Multifunction installation tester* : It is an entry-level instrument for testing low voltage in electrical installations.

2. _____: It is a test tool used to measure two or more electrical values—principally voltage (volts), current (amps) and resistance (ohms).

3. _____: This tool performs ground resistance and soil resistivity tests.

4. _____: This tool is a rugged, low resistance tester designed for both plant maintenance and field use.

5. _____: This tool allows us to see invisible thermal activity in order to prevent damage before it occurs.

AFTER YOU LISTEN

E. Read the statements and give a piece of advice regarding tools to run tests. Use different suggestion sentences/questions. Share your answers with a classmate.

I am going to run a ground resistance test.
Option 1: **How about** using an earth and resistivity test?
Option 2: **Why don't you** use an earth and resistivity test?
Option 3: **I suggest that you** use an earth and resistivity test.
She is going to run a ground resistance test
Why doesn't she use an earth and resistivity test?
They are going to run a ground resistance test.
I suggest that they use an earth and resistivity test.

1. What type of text is it?

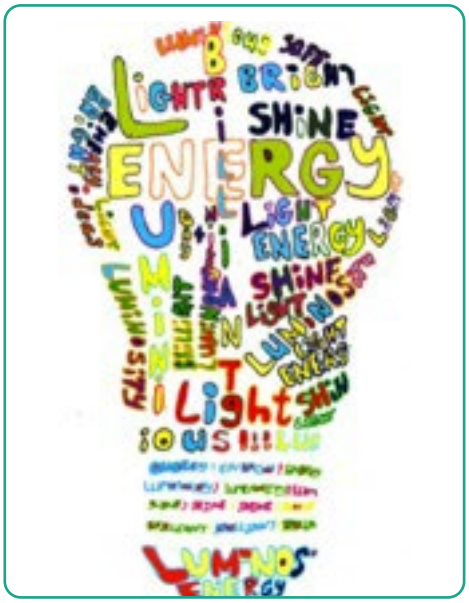
2. What information is in the text?

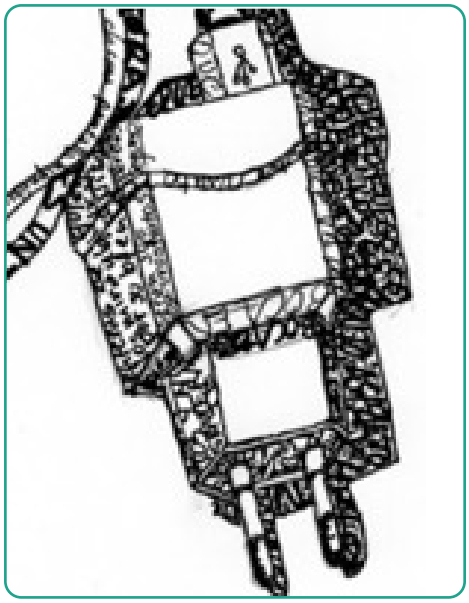
3. What is the purpose of the text?

F. Use the vocabulary from this lesson to create a calligram. Check the examples to get inspiration. Work in your English notebook.

A calligram is a poem in which the calligraphy, the formation of the letters or the font selected, represents an aspect of the poem's subject, as in: thin (written in a very thin font), ancient (looking crumbling and old) or growth (with each letter written in a progressively larger font size).


ELECTRICAL ENGINEERING
POWER EXPERIMENT
MECHANICAL ENGINEERING


BRIGHT
SHINE
ENERGY
LIGHT
ENERGY
SHINE
Light

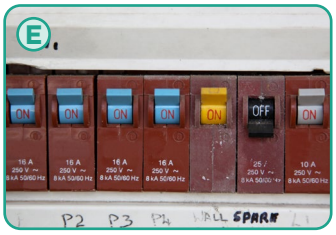


Lesson II: Reading Comprehension

BEFORE YOU READ

A. Read the problems related to electricity and match them with the pictures.

1		Circuit overload.
2		Light bulbs burning out.
3		High electric bills.
4		Electric shocks.
5		Circuit breaker tripping frequently.
6		Power surges.



B. Read the following statement from an electrical technician. Do you agree or disagree? Why? Use vocabulary from activity A to complement your answers. Share your answers with a classmate.

Electrical preventive **maintenance** and testing is one of the most **important** functions to be performed to maintain the reliability and integrity of **electrical** distribution systems, as well as for the protection of equipment and personnel.

I agree with the electrical technician because you can prevent **power surges**.

I disagree with the electrical technician because it is not possible to prevent **electric shocks**.

The maintenance of electrical installations is an important process which increases the safety of people and facilities, as well as the availability of equipment and/or machines, helps avoid failures, and increases productivity of each of the electrical systems.

Currently, all production processes in industries involve the use of electrical energy, so it is absolutely necessary to periodically perform maintenance task on the corresponding electrical system. Maintenance tests are standards and procedures used to detect deficiencies in facilities and equipment before they fail while in service. Routine maintenance tests must be carried out in each type of installation, according to its characteristics (low, medium or high voltage).

Any electrical installation can have two operating states:
I) Normal: A condition that establishes that the electrical parameters are within the permissible limits (voltage, current, frequency, impedance).
II) Abnormal: A condition that establishes that the electrical parameters are outside the permissible limits for a certain time.

An abnormal condition could be affected by disturbances and faults. Disturbances can be evidenced as harmonic distortion, flickers or transients, while the faults would be overloads, short circuits and isolation. An electrical fault is a low impedance fault between two points of different potential. Among its characteristics, we can state that they are the creation of an electric arc, electrodynamic stresses, and thermal stresses. Disturbances and electrical faults are conditions that endanger the facility and users. So, when a problem arises, the protection system can detect the problem and isolate it in order to avoid damage to people and/or equipment, but the only way to know if it works, before it is needed, is through a test.
Through simulations of different failure modes with non-destructive test methods, deficiencies in the system can be located and corrected. So, when the system is put into operation under faulty conditions, the maintenance test of the electrical installations helps to ensure that it works safely and properly.

ELECTRICAL INSTALLATION MAINTENANCE REQUIREMENTS

• Identify the maneuvers of different systems and installations, electrical networks in low, medium and high voltage, describing their main components and applications.
• Apply current regulations of a technical and functional safety nature to the operation and maneuvering of installations in low, medium and high voltage electrical networks.
• Identify and differentiate the indicated aspects of the NFPA 70B (National Fire Protection Association) standard, latest edition [2016], such as recommended practices for the maintenance of electrical equipment and systems.
• Know the main requirements and advantages of NFPA 70B in the maintenance of electrical equipment and systems.
• Recognize the main factors to determine the maintenance of electrical equipment and systems, its consequences and control measures.
• List the main requirements of a Reliability Centered Maintenance (RCM).

Adapted from:
Henriquez Santana, D. (2015). *Diseño, presupuesto y programación de proyectos eléctricos.*

C. Read and choose the best title for the text.

1. The keys for maintaining electrical installations.
2. Types of operating states.
3. Electrical installation requirements.

D. Read the statements and write true or false. Correct and rewrite the false statements in your English notebook.

1		The maintenance of electrical installations is an important process because it helps decrease the safety of people, facilities and equipment and/or machines.
2		Maintenance tests are standards and procedures used to detect failures in facilities and equipment before they fail while in service
3		Any electrical installation can have two operating states: normal and abnormal.
4		An abnormal condition establishes that the electrical parameters are within the permissible limits.
5		NFPA stands for National Failure Protection Association.

E. Read and answer the questions in your English notebook. Use key words from the questions to find the answers.

1. Why is maintenance of electrical installations important?
2. What is a normal operating state?
3. What is an abnormal operating state?
4. What would you do If a system is put into operation under fault conditions?
5. What would you do if there is a problem in an electrical system?

F. Read and complete the text. Use synonyms to substitute the underlined words.

systems - several - requisites - elements - distinguish - suggested

• Identify the maneuvers of _____ systems and installations, electrical networks in low, medium and high voltage, describing their main _____ and applications.
• Apply current regulations of a technical and functional safety nature to the operation and maneuvering of installations in low, medium and high voltage electrical _____ .
• Identify and _____ the indicated aspects of the NFPA 70B (National Fire Protection Association) standard, latest edition [2016], such as _____ practices for the maintenance of electrical equipment and systems.
• Know the main _____ and advantages of NFPA 70B in the maintenance of electrical equipment and systems.

AFTER YOU READ

G. Read the text and complete the acrostic. Use sentences related to electrical maintenance. Share your acrostic with the rest of the class.

M	Maintenance tests are standards and procedures used to detect deficiencies in facilities and equipment before they fail while in service.
A	
I	
N	
T	
E	
N	
A	
N	
C	
E	

Lesson III: Speaking

WARM UP

A. Look at the picture and tick the statements you agree with.

1		The picture shows an electrician's toolkit/set.
2		This toolkit has wire strippers, cable cutters, a voltage tester, etc.
3		These tools help electricians to carry out maintenance.
4		Every electrician must have a toolkit for repairing and maintaining electrical systems.
5		While repairing and maintaining electrical systems electricians shouldn't wear personal protective equipment.

B. Compare and discuss your answers with a classmate.

INPUT

C. Look at the pictures below and complete the missing words from the toolkit list. Use the words from the box.

~~Insulated pliers~~ - Torch - Insulated screwdrivers
Cable cutters - Claw Hammer - Wire strippers
Electrical tape - Voltage tester

TOOL KIT items	
1	
2	*Insulated pliers*
3	
4	
5	Hacksaws
6	
7	Spanners
8	
9	Safety knife
10	Hex keys
11	
12	Chisel
13	

D. Read the conversation below.

Context: Mr Barrera is an electrical technician. He went to Mr Navarro's house to carry out maintenance on the electrical system. He has just finished the electrical maintenance.

Mr. Navarro, I've just finished your electrical maintenance.

Thank you, Mr. Barrera. Was it very complicated? You must have used the whole toolkit.

Not at all. I only used my cable cutters and electrical tape.

Really? What did you do? Was it too difficult?

Not at all. I had to cut wires and put insulated tape on just for prevention.

Wow! Where did you find the problem?

I found it in the basement. Everything is perfect now.

Great! I am glad that you came.

Mr Navarro, It is very responsible of you to check your electrical system once in a while. Anything you need, give me a call!

Thank you very much! Have a great day!

Have a great day, too!

CONTROLLED PRACTICE

E. Each student will choose a character to roleplay the dialogue (i.e: student A is the technician and student B is the costumer).

F. Switch roles and repeat the dialogue.

FREER PRACTICE

G. Fill in the gaps. Complete the following dialogue using different information from the previous dialogue.

_____ , I've just finished your electrical maintenance.

Thank you,_____. Was it very complicated? You must have used the whole toolkit.

Not at all. I only used my _____and _____.

Really? What did you do? Was it too difficult?

Not at all. I had to _____ and _____ just for prevention.

Wow! Where did you find the problem?

I found it in the _____. Everything is perfect now.

Great! I am glad that you came.

_____, It is very responsible of you to check your electrical system once in a while. Anything you need, give me a call!

Thank you very much! Have a great day!

Have a great day, too!

H. Each student will choose a character to roleplay the dialogue (i.e.: student A is the technician, and student B is the customer).

I. Switch roles and repeat the dialogue.

WRAP-UP

J. Choose three items from the toolkit and write as many descriptions as you can for each tool.

1.	2.	3.

K. Play the "guessing game". Choose a name for your team.

Instructions:

- Team members give clues/descriptions related to the item selected.
- As one team is giving the clues, the other teams will have one opportunity to guess the item.
- The team that guesses the most items is the winner.

Lesson IV: Writing

PRE-WRITING

A. Read the following definition of a cover letter and choose the correct response to each question.

A cover letter is a single-page letter written to the person or organization offering the job you're applying for. A well-written cover letter should introduce you and encourage the person reading it to check your resume afterwards.
Writing a cover letter should be part of every job application you make, unless there are clear instructions not to send one.
In this lesson, you will write your own cover letter.

1. What is the purpose of a cover letter?

A. The purpose is to quit a job you had.

B. The purpose is to apply for a job.

2. What should a well-written cover letter have?

A. A well-written cover letter should introduce you and motivate the person reading it.

B. A well-written cover letter should introduce you and demotivate the person to check your resume.

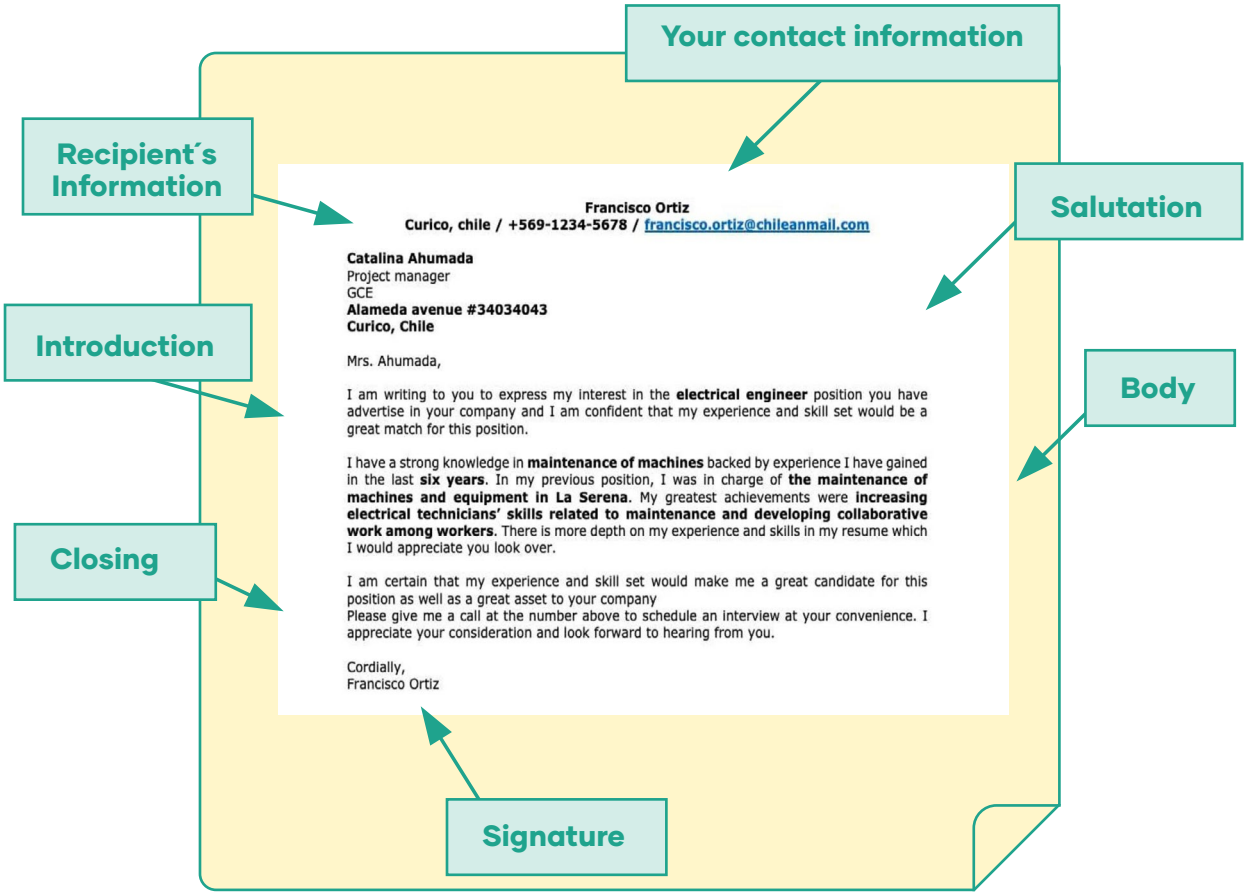
3. When are you going to write your own cover letter?

A. You are going to write your own cover letter when you apply for a job.

B. You are going to write your own cover letter in this lesson.

C. Both A) and B).

B. Read the cover letter below and circle the unknown words. Then, look them up in your dictionary. Write the vocabulary in your notebook..



C. Read and discuss the following questions with a partner.

A. Was the cover letter easy or difficult to understand? Why?

B. What is the structure of the cover letter?

DRAFTING

A. Write the draft of a new cover letter in your notebook.

- Imagine you have already become an electrical technician or an electrical engineer. Use fictitious information to create your draft.
- Review the structure of the cover letter to guide your research.
- Use your dictionary to find words you do not know.

REVISING

B. Use the following checklist to check your classmate's draft. Once finished, return the draft and comments.

COVER LETTER STRUCTURE	TICK IF COMPLETED	COMMENTS AND SUGGESTIONS (*)
Contact information		
Recipient's information		
Salutation		
Introduction		
Body		
Closing		
Signature		

(*) Comments and suggestions may provide reference to specific missing information, grammar, sentence structure, word choice, punctuation, capitalization & spelling errors.

EDITING

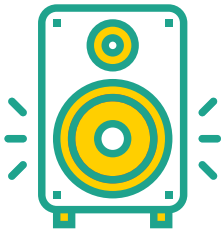
C. Use the following layout to rewrite your cover letter. Use your classmate's feedback to improve your final draft (check the criteria established in the previous checklist).

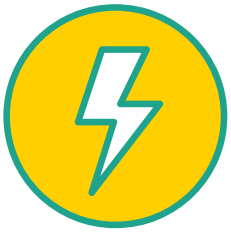
COVER LETTER STRUCTURE		RESUME CONTENT / TEXT
Contact information		
Recipient's information		
Salutation		
Introduction		
Body		
Closing		
Signature		

PUBLISHING

D. Now deliver your final version to your teacher.

Project: The electrical technicians' music festival

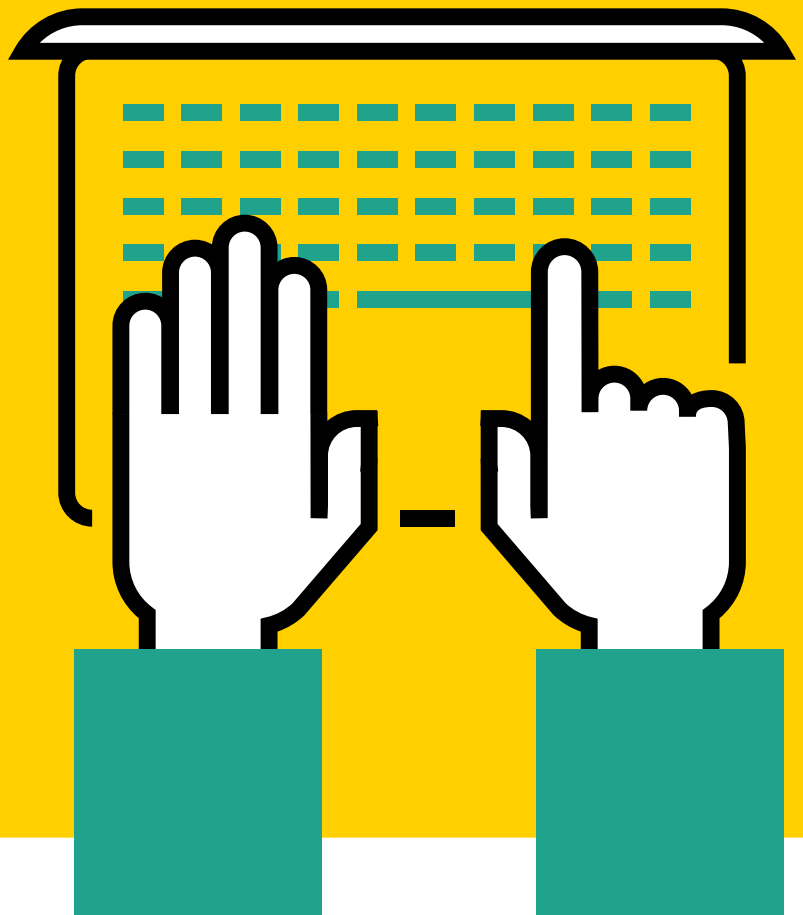




Name of the Project	The electrical technicians' music festival: Write a song in groups of four and perform it in front of your class.
Level	Elementary to intermediate
Time	90-135 minutes
General aims	Students will write a song and perform it in front of the class.
Language aims	Students will practice and improve all four language skills, with a main focus on productive skills (speaking and writing)
Resources / Materials	Presentation: PPT presentation including the lyrics of the song Performance: clothes, band logo, music instruments, etc.
Teacher's role	Present and explain the assessment criteria (rubric). Describe and model the project. Describe roles within each group (i.e.: reporter, checker, materials manager, etc.). Collect information and content for students to write a song. Provide a wide range of options regarding no-copyright instrumental songs (YouTube). Explain the structure of the performance: salutation, introduction, brief explanation of song content, performance and conclusions. Provide feedback to students during the preparation process and presentation.
Students' roles	Make groups of four and choose a role. Choose a no-copyright instrumental song; rap, hip hop, rock, pop, electronic, trap, cumbia, etc. Gather information to write your song and plan your performance. Collect material needed for your presentation; PPT with lyrics, clothes, musical instruments, etc.

PROCEDURE	
1. Gather in groups of four. Choose a role within your group: Reporter: Shares summary of group with the class. Speaks for the group, not just personal view. Materials manager: Picks up, distributes, collects, turns in, or puts away materials. Facilitator: Keeps group on task and verifies that all contribute. Checker: Checks for accuracy and clarity of thinking during discussions. **2.** Discuss the project characteristics, instructions and assessment criteria (rubric) within your groups before you start. Ask questions to your teacher when necessary. **3.** Do research to choose a no-copyright instrumental song; rap, hip hop, rock, pop, electronic, trap, cumbia, etc. **4.** Do research and use your creativity to be songwriters. Focus on contents from this unit. You can also use vocabulary from previous units. **5.** Rehearse your performance. **6.** Prepare visual aids, musical instruments and PPT with lyrics to support your performance **7.** Practice your performance. Use the rubric to guide and evaluate your own progress **8.** Present to the class.	
FOLLOW UP	Teacher and other groups can provide feedback about performances. They can focus on the lyrics and performance.
VARIATION	Each group takes notes and gives feedback to the bands regarding performance and lyrics.
RUBRIC	Rubric to assess the oral presentation.

Appendix



ANSWER KEY UNIT I

LESSON I

Activity A:

-The electrical technician is repairing an electric motor.
-Electric fans, air conditioners and drills have electric motors.

Activity B:

~~Any person is certified to repair electric motors.~~ Electrical engineers and technicians are certified to repair electric motors.
~~Electric motors do not use energy~~. Electric motors use energy.

Activity C:

Answer: b.

Activity D:

Answers: 3, 4, 5, 1, 2

Activity E:

Answers:

Electrical technician's name: Matias
Name of the shop/store: Wires and circuits
Customer's name: Jocelyn/Joselyn
The problem: Electric motor burned out from overload
Type of shop/store: Technical service
The cause of the problem/ diagnosis: Stator burned.

LESSON II

Activity A:

Answers: 1. Terminal box, 2. Bearings, 3. Main shaft, 4. Cooling fan, 5. Stator, 6. Rotor

Activity F:

Answers: 4, 3, 5, 1, 2

Activity G:

Answers:
b. If the rotor is not working, it will not turn the shaft.
c. If the pulley drive is not working, it will not transfer motor rotation to other components.
d. If the motor housing is broken, it will not protect all parts of the electric motor.

LESSON III

Activity A:

Answers: 1. b), 2. c)

LESSON IV

Activity A:

Indoor unit: 1, 5, 2, 6, 3, 4.
Outdoor unit: 4, 6, 2, 5, 3, 1.

Activity B:

Answers:
She wrote to Catalina because she wanted a quotation.
She did not reply because they had some issues with their website.
Multiple answers

Activity D:

Answers:
She suggested a 9.000 BTU air conditioner because of the room size.
Multiple answers

ANSWER KEY UNIT II

LESSON I

Activity A:
Answer: 1, 6, 3, 5, 4, 2, 8, 7.

Activity B:
Answer: 1, 3, 4

Activity C:
Answer: 6, 4, 2, 3, 1, 5

Activity D:
Answer: F, T, F, F, T

Activity E:
Answer: C, A, C, B

Activity F:
Answers: Five, outlets, triple, switches, sockets, meters, fifty, wire, wire

LESSON II

Activity A:
Answers:
1. A
2. B

Activity C:
Answers: SolidWorks, length, brand, energy, appliances, equipment.

Activity D:
Answers:
a. It is the visual representation or design of the entire electrical wiring system or circuit of a house.
b. Understand the foundations of electricity, use a CAD software to draw and design the diagram, know the standard voltages, understand symbols, specify the length and brand of the wires to be used.

Activity E:
Answers:
a. You need to understand the meanings of the various symbols in order to place them accurately in your diagram.

b. Electrical outlets, meter base, switches and breakers and more.

c. I will ensure a proper installation through the house wiring design and a qualified electrical technician's assistance.

LESSON III

Activity A:
Answers: 1. b), 2. b)

LESSON IV

Activity A:
Answers: 1, 2, 3, 5, 6, 8, 10, 11.

ANSWER KEYS UNIT III:

LESSON I

Activity A:
3. AutoCAD is used to draw in 2D and 3D.
8. AutoCAD is a paid software.

Activity C:
technician
software
stands
designers
engineers
2D
3D
updates
free
expensive

Activity D:
T, T, F, T, F

Activity E:
5, 4, 1, 2, 3, 6

Activity F:
- **Read** the sofware manual.
- **Watch** AutoCAD videos on YouTube.
- **Practice** procedures regarding . AutoCAD functions.
- **Listen** to poscasts regarding the use of AutoCAD.
- **Interview** and find support from an AutoCAD expert.
- **Work** on side projects to immerse yourself into the world of AutoCAD.
- **Find** a mentor.

LESSON II

Activity A:
√ Electrical technicians and/or engineers.
√ Construction site.
√ Personal protective equipment.
√ People are checking a plan.
√ Blueprints or wiring diagrams.
√ Documentation

Activity E:
1. B, 2. B, 3. B, 4. A.

Activity F:
5, 4, 3, 1, 2.

LESSON III

Activity A:
√ Professional background (personal information)
√ Signatures
√ Installation details regarding power.
√ Owner or legal representative background (personal information)

Activity F:
1. Comply with
2. Deliver
3. Official papers
4. Requirements

LESSON IV

Activity A:
1. C, 2. C, 3. B

ANSWER KEY UNIT IV

LESSON I

Activity A:
Answers: Micro-Ohmmeter – clamp meter – thermographic camera - insulation multimeter – multifunction installation tester – Earth and resistivity tester pack – Multimeter – Motor drive analyzer

Activity B:
Answers: motor drive analyzer, thermographic camera, insulation multimeter, clamp meter.

Activity C:
Answers: 5, 3, 4, 2, 1

Activity D:
Answers: multifunction installation tester, multimeter, Earth and resistivity test, Micro-Ohmmeter, thermographic camera.

LESSON II

Activity A:
Answers; F, D, C, B, E, A

Activity C:
Answer: 1

Activity D:
Answers: false, true, true, false, false.

Activity E:
Answers:
The maintenance of electrical installations is an important process which increases the safety of people and facilities, as well as the availability of equipment and/or machines, helps avoid failures, and increases productivity of each of the electrical systems.
It's a condition that establishes that the electrical parameters are within the permissible limits (voltage, current, frequency, impedance).

It's a condition that establishes that the electrical parameters are outside the permissible limits for a certain time.
When the system is put into operation under fault conditions, the maintenance test of the electrical installations helps to ensure that it works safely and properly.

Multiple answers:
-Run different tests to identify the problem and solve it.
-When a problem arises, the protection system can detect the problem and isolate it in order to avoid damage to people and/or equipment, (but the only way to know if it works, before it is necessary, is through a test.)

Activity F:
Answers: Several – elements – systems – distinguish – suggested – requisites

LESSON III

Activity A:
Answers: All of them are correct, except number 5.

Activity C:
Answers:
1. Wire strippers
3. Insulated screwdrivers
4. Electrical tape
6. Cable cutters
8. Voltage tester
11. Claw Hammer
13. Torch

LESSON IV

Activity A:
Answers: 1. B, 2. A, 3. B.

PROJECT RUBRIC UNIT I: THE BEST AIR CONDITIONER EVER

CRITERIA	EXCELLENT	GOOD	FAIR	NEEDS IMPROVEMENT	SCORE
Format / Appearance	Visual aids support the content presented (i.e.: Include pictures, charts, product characteristics, installation steps, special offer, etc)	Visual aids support part of the content presented (i.e.: include charts, product characteristics or installation process)	Visual aids are presented but they do not support the content presented.	Presentation does not include visual support.	
Presentation organization	Presentation includes all formal aspects (i.e.: Title, salutation, introduction, information chart, installation steps, special offer, etc).	Presentation includes most formal aspects.	Presentation includes some formal aspects.	Presentation does not include an organization. Its structure does not support comprehension.	
Content / information	All information needed about the air conditioner (i.e.: characteristics, quotation bid, special offer, installation process and conclusions). Correct use of punctuation and grammar.	Most information needed about the air conditioner is presented. A few errors related to punctuation and/or grammar.	Some information needed about the air conditioner is presented. Some errors related to punctuation and grammar.	Lack of information. Incorrect use of grammar, punctuation and spelling. Errors interfere with meaning.	
TOTAL					

PROJECT RUBRIC UNIT II: A DREAM-HOUSE WIRING DIAGRAM

CRITERIA	EXCELLENT	GOOD	FAIR	NEEDS IMPROVEMENT	SCORE
Format / Appearance	Visual aids support the content presented (i.e.: Include PPT, pictures, house wiring diagram, etc).	Visual aids support part of the content presented (i.e.: include a house wiring diagram or PPT).	Visual aids are presented but they do not support the content presented..	Presentation does not include visual support.	
Presentation organization	Presentation includes all formal aspects (i.e.: Title, salutation, introduction, house wiring diagram presentation / description and conclusions, closing, etc).	Presentation includes most formal aspects.	Presentation includes some formal aspects.	Presentation contains no formal aspects of organization. Its structure does not support comprehension.	
Content / information	All required information about the house wiring diagram is presented (i.e.: introduction, diagram description, conclusions). Correct use of grammar, punctuation and spelling.	Most required information about the house wiring diagram is presented. A few errors related to grammar, punctuation and/or spelling.	Some required information about the house wiring diagram is presented. Some errors related to grammar, punctuation and spelling.	Lack of information. Incorrect use of grammar, punctuation and/or spelling. Errors interfere with meaning.	
TOTAL					

PROJECT RUBRIC UNIT III: THE GREATEST ELECTRICAL TECHNICIAN CLASSROOM

CRITERIA	EXCELLENT	GOOD	FAIR	NEEDS IMPROVEMENT	SCORE
Format / Appearance	Visual aids support the content presented (i.e.: include pictures, blueprints (wiring diagrams) and symbology, classroom characteristics, etc).	Visual aids support part of the content presented (i.e.: include pictures, blueprints (wiring diagrams), symbology or classroom characteristics).	Visual aids are presented but they do not support the content presented.	Presentation does not include visual support.	
Presentation organization	Presentation includes all formal aspects (i.e.: salutation, introduction, classroom improvements, blueprint or wiring diagram explanation and conclusions.)	Presentation includes most formal aspects.	Presentation includes some formal aspects.	Presentation is not organized. Its structure does not support comprehension.	
Content / information	All information needed about the classroom improvements (i.e.: blueprint or wiring diagram explanation, symbology and conclusions) is presented. Correct use of punctuation and grammar.	Most information needed about the classroom improvements is presented. A few mistakes related to punctuation and/or grammar.	Some information needed about the classroom improvements is presented. Some mistakes related to punctuation and grammar.	Lack of information. Incorrect use of grammar, punctuation and spelling. Mistakes interfere with meaning.	
TOTAL					

PROJECT RUBRIC UNIT IV: THE ELECTRICAL TECHNICIANS' MUSIC FESTIVAL

CRITERIA	EXCELLENT	GOOD	FAIR	NEEDS IMPROVEMENT	SCORE
Format / Appearance	Visual aids support the content presented (i.e.: include band name/logo, lyrics, musical instruments, characterization).	Visual aids support part of the content presented (i.e.: include band name/logo, lyrics, musical instruments, characterization).	Visual aids are presented but they do not support the content presented.	Presentation does not include visual support.	
Presentation organization	Presentation includes all formal aspects (i.e.: salutation, introduction, song content brief explanation, performance and conclusions).	Presentation includes most formal aspects.	Presentation includes some formal aspects.	Presentation is not organized. Its structure does not support comprehension.	
Content / information	Lyrics are entirely related to the contents from this unit. Correct use of punctuation, spelling and grammar.	Lyrics are mostly related to the contents from this unit. A few errors related to punctuation and/or grammar.	Lyrics are barely related to the contents from this unit or electricity. Some errors related to punctuation and grammar.	Lack of information related to electricity. Incorrect use of grammar, punctuation and spelling. Errors interfere with meaning.	
TOTAL					

SCRIPTS

SCRIPT UNIT I

Joselyn	Good morning
Technician	Good morning. Welcome to "Wires and circuits" technical service. My name is Matias. I am the electrical technician. What can I do for you?
Joselyn	Thank you, Matias. I'm here to pick up an electric motor that I left a few weeks ago.
Technician	I see. Give me your service number to check the status of your electric motor.
Joselyn	154-326
Technician	Are you Joselyn Lopez?
Joselyn	Yes, that's me
Technician	Your electric motor is in perfect condition. Let me get it for you.
Joselyn	Thank you very much
Technician	Here is your electric motor. It was difficult to repair it, very challenging but it's working now.
Joselyn	What was the problem with my electric motor?
Technician	Your electric motor burned out from overload. The problem was that the stator that makes the magnetic field inside the motor were burned. Besides that, the cooling fan stopped so the motor got very hot. All these problems caused failures in the main shaft so there was no mechanical movement.
Joselyn	I see. I thought it was something different. My cousin who is an electrical technician told me it might have problems in its terminal plate or something like that.
Technician	I think you are referring to the nameplate and the terminal board? The nameplate only gives information about the motor and the terminal board is used to connect the power. Neither of them were the cause of the problem. Anyways, your electric motor is like new. Here you are.
Joselyn	Thank you very much for your help and for the lesson. Have a nice afternoon.
Technician	Have a nice afternoon, too.

SCRIPTS

SCRIPT UNIT II

ET	Good morning! Welcome to "Wires and circuits". My name is Manuel. How can I help you?
C	Good morning Manuel, I'm Cristina. I am building two extra rooms in my house but I lost the shopping list the electrician gave to me, but I brought a drawing. Can you figure out what I need?
ET	Can I see it?
C	Yes, you can. Here you are.
ET	Ok, you will need the following items: five double plug outlets, four triple plug outlets, three switches, three bulb sockets, 50 meters of red wire, 50 meters of white wire, 50 meters of green insulated wire. This is what you need for the two new bedrooms.
C	Actually, one of them will be a bedroom and the other one will be a studio for my husband.
ET	I see, which one is the biggest, the bedroom or the studio?
C	The studio is bigger than the bedroom. We need more switches, lights and plug outlets in my husband's studio. The bedroom is for my newborn baby.
ET	That's why there are three double plug outlets, two triple plug outlets and two switches with two bulb sockets in the biggest room. The studio requires a lot of circuits and connections.
C	Yes, my husband was all over the house with his computers and devices. The living room, the kitchen and even our tiny dining room were full of his stuff. Now he will have his mess in one place, his studio.
ET	Very wise! Here you are. It's 38.990 pesos.
C	Here is my credit card. Thanks.

SCRIPTS

SCRIPT UNIT III

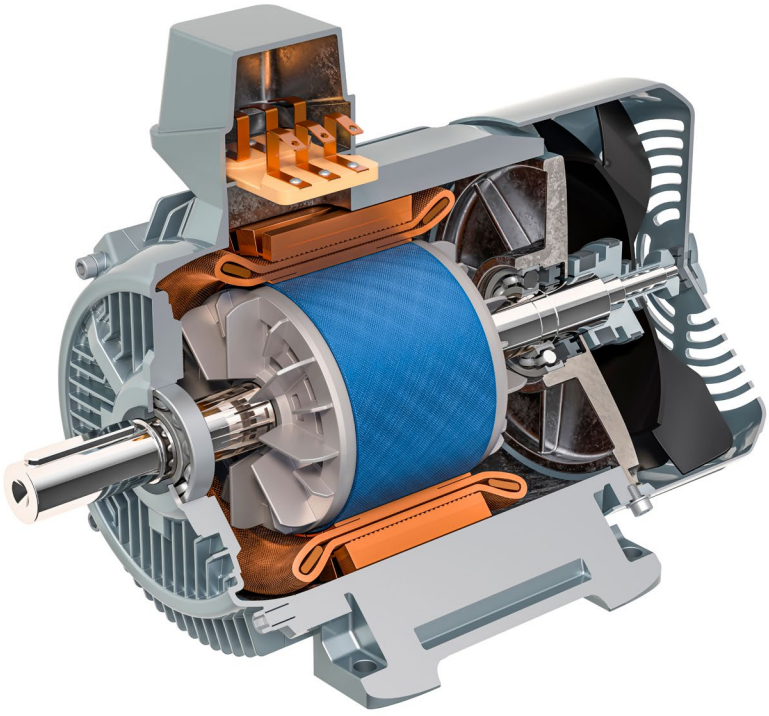
ET	Mr Fuentes, I am the new electrical technician.
EE	Hi, you must be Mrs Marileo. How are you?
ET	I am great. Just a little bit nervous. I am highly motivated by this new challenge. AutoCAD is such a fascinating software. I really want to learn how it works.
EE	Great! Let's start then! CAD stands for computer-aided design. AutoCAD is a well-known software that has been around for a very long time. Over the years it has become better and it has covered a wider range of uses to satisfy the needs of designers and engineers in many fields. Created in December 1982, AutoCAD is a multidisciplinary technical drawing software in 2D and also 3D.
ET	AutoCAD is very old. Is it free? What about updates?
EE	AutoCAD is not free. It is very expensive. It is updated every year to offer users more features and a better experience.
ET	Nice! I know that this software can save time and money when developing electricity projects because it has many easy-to-use features. How else can we use AutoCAD in the field of electricity?
EE	Good question! AutoCAD is a recognized software in the field of architecture and construction. It is also recognized for space planning and interior design, thanks to its 3D tools and many other resources that the software offers to users.
ET	I see, it helps us create interior designs in order to make house wiring diagrams. According to what I read before, it must be very handy for calculating material quantities for productions and even identifying design problems.
EE	That's true! AutoCAD is also an essential tool for electrical design professionals. They can prepare wiring diagrams for use in the manufacturing, installation, and maintenance of electrical gadgets.
ET	Sure! Those drawings facilitate the installation of cables since everything is thought out beforehand in the smallest detail.
EE	Some people pick up CAD software faster than others, but it will take time and effort to master it.
ET	Don't worry! I will explore the software in order to improve my skills. This is a very interesting challenge. Alvaro, who is the company manager, gave me a list of suggestions for using AutoCAD. I will use that list to explore the software.
EE	Great! That's the spirit! Come to my office if you have any questions.
ET	Thank you, Mr Fuentes!

SCRIPTS UNIT IV

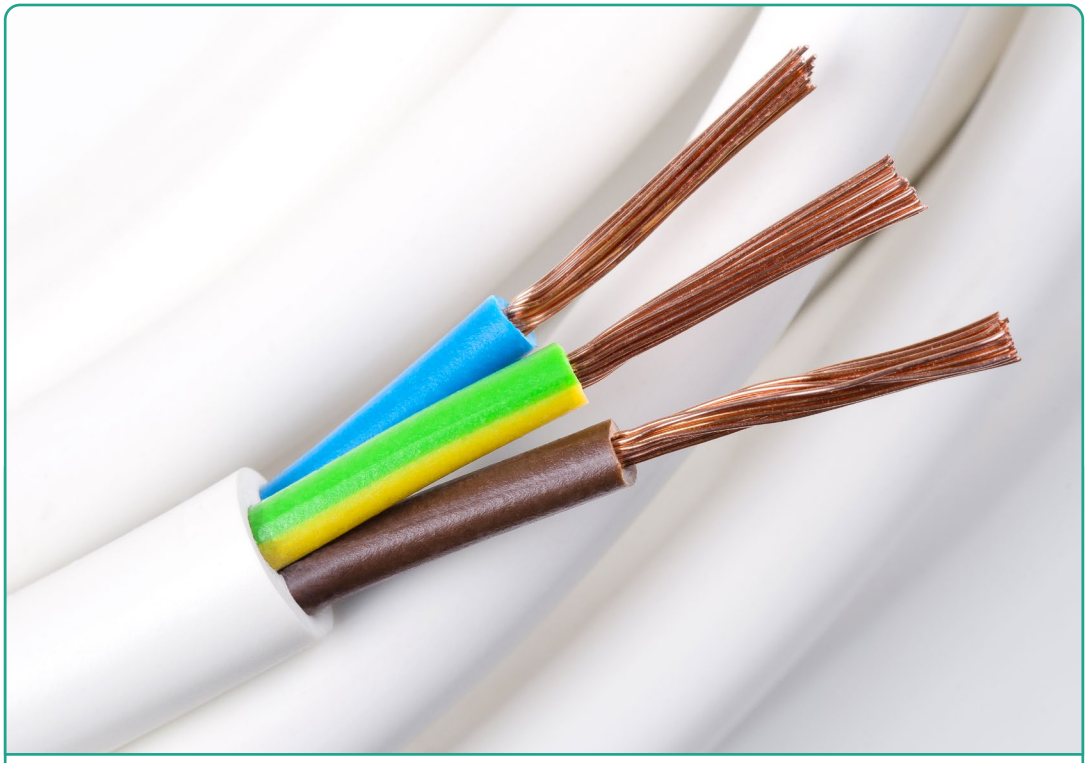
EE	Good morning Tim! Are you ready for your first day at work?
ET	Good morning Selma! Yes, I am ready to start this new and amazing morning!
EE	Great Tim! Let's review your tasks for today! What are you going to do first?
ET	First, I am going to review my route and check I have all the tools I need.
EE	Marvelous! Where are you going first?
ET	I am going to visit Mrs Nunes. I have to measure voltages, current and resistance.
EE	What are you going to use to check them?
ET	I am going to use a multimeter.
EE	Excellent! Remember that you have to fill out a form regarding problems within the electrical system.
ET	Yes, I know. I already have the forms in my backpack.
EE	What's next?
ET	I am going to visit Mr Fuentes to run a ground resistance and soil resistivity test.
EE	What tool are you going to use to run a ground resistance test?
ET	I am going to use an earth and resistivity test. After that, I am going to fill out a diagnosis form.
EE	Fantastic! What are you going to do afterwards?
ET	I am going to visit Mr Marilaf. He has problems with some plug outlets near a chimney so I think that heat might be causing those issues. I am going to use a thermographic camera to check invisible thermal activity before damage occurs. Finally, I am going to fill out a diagnosis form in order to confirm or discard possible issues.
EE	Great job Tim! You are so prepared for your new role as an electrical technician. Make sure you take the Micro-Ohmmeter in case you have to test low resistance for both plant maintenance and field use.
ET	That's a great idea. Thank you.
EE	Why don't you take a multifunction installation tester with you?
ET	That's a good piece of advice, too. I can test low voltage in most electrical installations with this multifunctional tool. Thanks!
EE	You're welcome! I think you are doing a great job. Enjoy your first day. See you this afternoon.
ET	Thank you, have a great day, too. Bye bye!

Flashcards

AIR CONDITIONER



ELECTRIC MOTOR

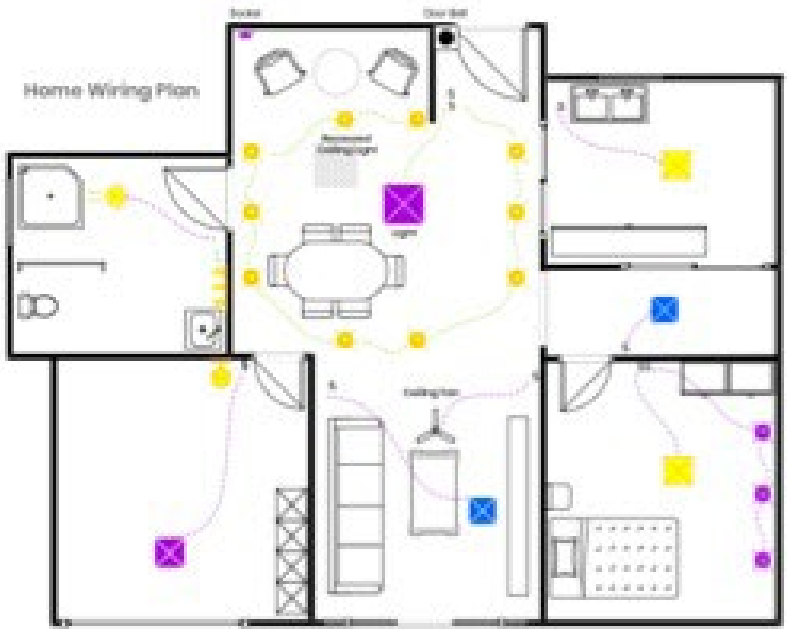


WIRES

ELECTRICAL TECHNICIAN

CUSTOMER

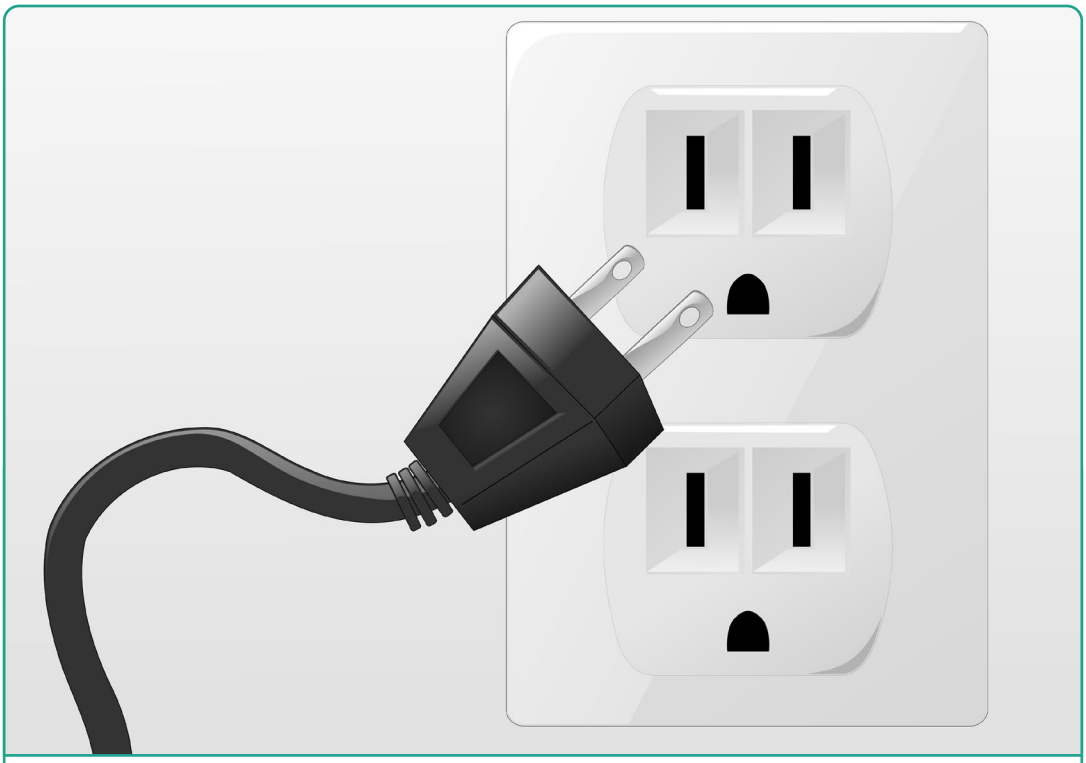
BULB SOCKET



HOUSE WIRING DIAGRAM

LIGHT BULB

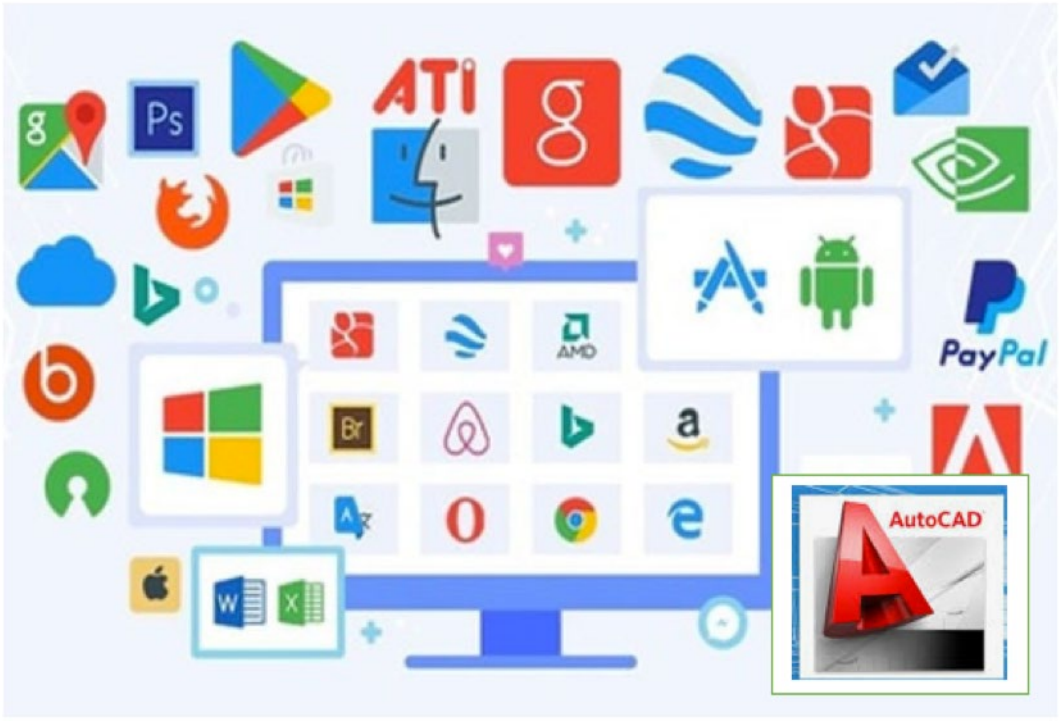
CIRCUIT BREAKER



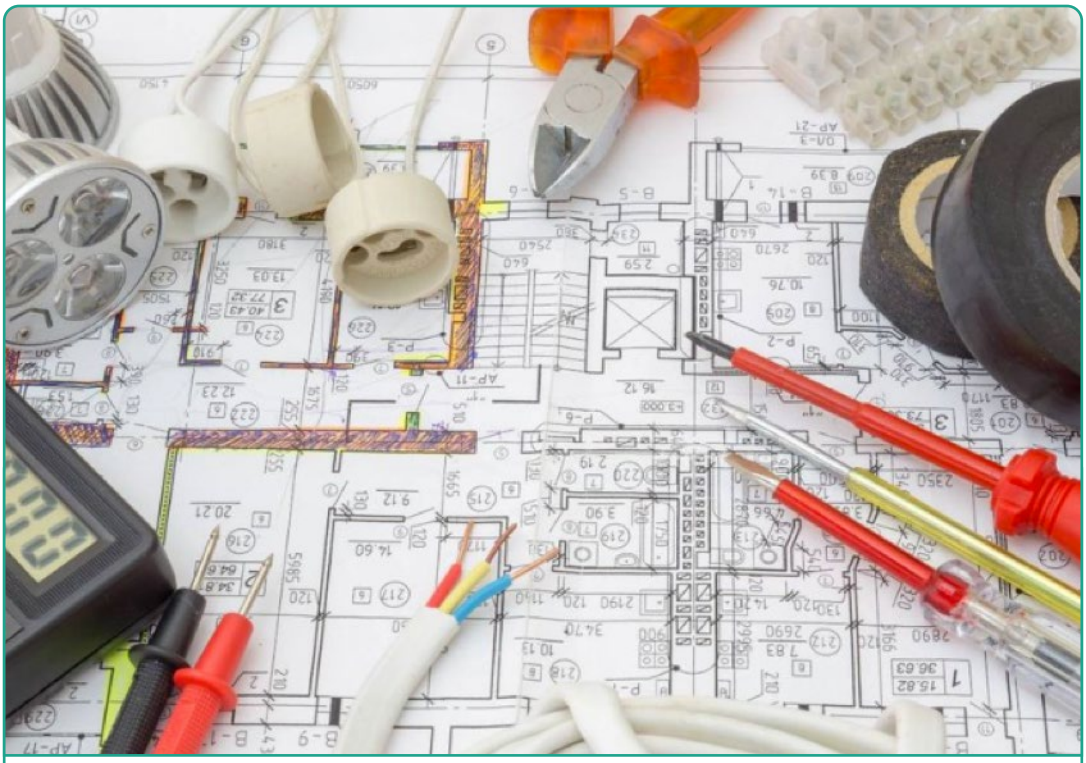
PLUG OUTLET AND PLUG

PERSONAL PROTECTIVE EQUIPMENT

ELECTRICIANS



SOFTWARE



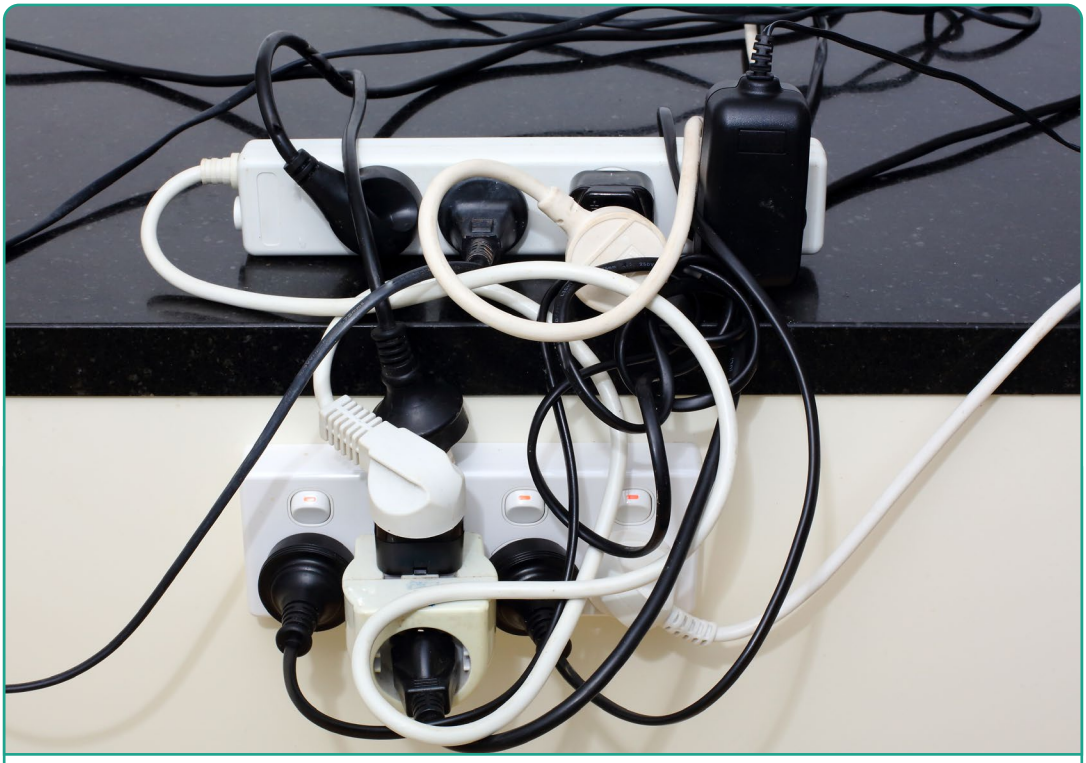
ELECTRICAL PROJECT

ELECTRIC BILL

TOOL KIT

MULTIMETER

ELECTRICAL TAPE



POWER SURGES

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