Ministerio de Educación

Gobierno de Chile

100 TOP
Geology
WORDS TP BOOKLET
3° MEDIO

DEG
División Educación General

English Opens Doors Program

Division de Educación General - Mineduc

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Isabel Fraile Díaz

División de Educación General
Ministerio de Educación
Av. Libertador Bernardo O´Higgins 1371,
Santiago de Chile

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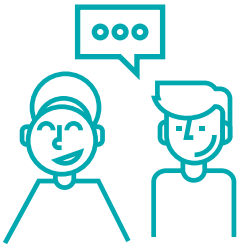
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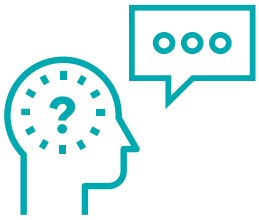
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¡Bienvenido!

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

Geology Booklet Glossary

(A)

1. Agent (n) — A person who acts for or represents another.

2. Atom (n) — The smallest unit of any chemical element, consisting of a positive nucleus surrounded by negative electrons. Atoms can combine to form a molecule.

(B)

3. Barefoot (adj.) — Not wearing any shoes or socks.

(C)

4. Carbonate (n) — A salt containing carbon and oxygen together with another chemical.

5. Chisel (n) — A tool with long, metal blade that has a sharp edge for cutting esp. wood or stone.

6. Cleavage (n) — The tendency of a mineral (hard substance obtained from the earth) to break in a particular way because of its structure.

7. Cluster (v) — To form a close group.

8. Coal (n) — A hard, black substance that is dug from the earth in pieces, and can be burned to produce heat or power, or a single piece of this.

9. Compass (n) — A device for finding direction with a needle that can move easily and that always points to magnetic north.

10. Compulsory (adj.) — (of something) that must be done; necessary by law or a rule.

11. Contour interval (n) — The vertical distance between the elevations represented by adjacent contour lines on a map.

12. Contour line (n) — A line (as on a map) connecting the points on a land surface that have the same elevation.

13. Copper (n) — An element, a metal of a brownish-red colour.

14. Countryside (n) — Land not in towns, cities, or industrial areas that is either used for farming or left in its natural condition.

15. Cross section — A diagram or drawing that shows the downward projection of surficial geology along a vertical plane, for example, a portion of a stream bed drawn at right angles to the mean direction of the flow of the stream.

16. Crust (n) — The outer layer of the earth.

(D)

17. Danger (n) — The possibility of harm or death to someone.

18. Darkness (n) — The quality of being without light, or a situation in which there is little or no light.

19. Debris (n) — Broken or torn pieces of something larger.

20. Degree dial (n) — It is the twistable dial surrounding the compass housing that displays all 360 degrees of the circle.

21. Depression (n) — Part of a surface that is slightly lower than the rest.

22. Dust (n) — Dry dirt in the form of powder that covers surfaces inside a building, or very small dry pieces of earth, sand, or other substances.

(E)

23. Earthquake (n) — A sudden violent movement of the earth's surface, sometimes causing great damage.

24. Ergonomic (adj) Ergonomic furniture or equipment is designed in a way that makes it comfortable and effective for people who use it for their work.

25. Evolve (v) To develop gradually, or to cause something or someone to develop gradually.

26. Extrusive (adj) (Of igneous rocks) formed from magma issuing from volcanoes or cracks in the earth's crust.

F **27. Facility** (n) Something such as a place, building, or equipment used for a particular purpose or activity.

28. Fault (n) A crack in the earth's surface where the rock has divided into two parts that move against each other.

29. Feldspar(n) A common type of mineral found especially in igneous rocks such as granite.

30. Field gear (n) Field clothing, field garments.

31. First-aid Kit (n) A small box containing items such as bandages, plasters, and antiseptic wipes for use in giving help to a sick or injured person until full medical treatment is available.

32. Flood (n) A large amount of water covering an area that is usually dry.

33.Fold (n) A bend in a layer of rock under the earth's surface caused by movement there.

34. Foresee (v) To know about something before it happens.

35. Fossil (n) The shape of a bone, a shell, or a plant or animal that has been preserved in rock for a very long period.

36. Framework (n) A supporting structure around which something can be built.

37. Frayed electrical cord A cord that is worn-out at a point, thereby exposing the live wires in the cable.

38. Geological map (n) A map showing the geological features of an area, especially the type of rock on or under the earth's surface; including nature and distribution of rocks units, and the occurrence of structural features, mineral deposits, and fossil localities.

G

39. Geo-photography (n) It is a subfield of geology that involves the use of photography or other imaging techniques in the visible or near-visible (e.g. ultraviolet, infrared) spectrum to realistically record objects, features, and processes of geological significance.

40. Geothermal energy (n) Energy produced by using the heat below the earth's surface.

H **41. Halide** (n) A binary compound containing a halogen atom or ion in combination with a more electropositive element.

42. Hammer (n) A tool consisting of a piece of metal with a flat end that is fixed onto the end of a long, thin, usually wooden handle, used for hitting things.

43. Hand lens (n) A magnifying glass with a handle.

44. Hardness (n) — One of several measures of resistance to indentation, deformation, or abrasion Mohs' scale, Brinell hardness number.

45. Hazard (n) — Something that is dangerous and likely to cause damage.

46. Helmet (n) — A hard hat that covers and protects the head.

47. Heritage (n) — The history, traditions, practices, etc. of a particular country, society, or company that exist from the past and continue to be important.

48. Height (n) — The distance from the bottom to the top of something, or the quality of being tall.

I

49. Igneous rock (n) — In geology, igneous rocks are rocks that were once so hot that they were liquid.

50. Impaired (adj) — Damaged or weakened.

51. Index contour line (n) — A contour line accentuated by a heavier line weight to distinguish it from intermediate contour lines. They are usually shown as every fifth contour with their assigned value to facilitate reading elevation.

52. Intrusive (adj) — (Of hot melted rock) flowing into layers or cracks of rocks that already exist.

53. Ion(n) — An atom or small group of atoms that has an electrical charge because it has added or lost one or more electrons.

L

54. Landslide (n) — A mass of rock and earth moving suddenly and quickly down a steep slope.

55. Law (n) — A rule, usually made by a government, that is used to order the way in which a society behaves.

56. Limestone (n) — A gray rock formed from the shells of sea animals, used in buildings and making cement.

57. Lustre (n) — The brightness that a shiny surface has.

M

58. Magnetic Arrow (n) — A piece of magnetized steel used as an indicator on the dial of a compass and in magnetic and electrical apparatus.

59. Map legend (n) — It is a description, explanation, or table of symbols printed on a map or chart to permit a better understanding or interpretation of it.

60. Marble (n) — A type of very hard rock that has a pattern of lines going through it, feels cold, and can be polished to become smooth and shiny

61. Matter (n) — A substance of a particular kind.

62. Measure (n) — A unit used for stating the size, weight, etc. of something, or a way of measuring.

63. Metamorphic rock (n) — Metamorphic rocks form when rocks are subjected to high heat, high pressure, hot mineral-rich fluids or, more commonly, some combination of these factors.

64. Mohs'scale (n) A scale of hardness used in mineralogy. Its degrees, in increasing hardness, are: talc 1; gypsum 2; calcite 3; fluorite 4; apatite 5; feldspar 6; quartz 7; topaz 8; sapphire 9; diamond 10. Abbreviation: MSH

65. Molecule (n) The simplest unit of a chemical substance, usually a group of two or more atoms.

66. Molten (adj.) Molten metal or rock is in a liquid state because of great heat

N **67. Non-silicates** (n) Minerals that do not include the silicon-oxigen units characteristic of silicate.

O **68. Outcrop** (n) A large area of rock sticking out of the ground.

69. Overall (n) A loose-fitting coat or one-piece garment worn over ordinary clothes for protection against dirt or heavy wear.

70. Overflow (n) An amount of liquid or number of people that cannot fit in a space.

P **71. Peak** (n) The pointed top of a mountain, or the mountain itself.

72. Permit (n) An official document that allows you to do something.

73. Pet rocks (n) A special type of rock or stone, designed to be kept as a pet and care for, but for people related to geology it is a subject of study.

74. Plutonic (adj.) Pertaining to rocks formed at a great depth. Also known as abyssal; deep-seated; plutonian.

75. Poisonous (adj.) Very harmful and able to cause illness or death.

76. Prevention (n) The act of stopping something from happening or of stopping someone from doing something.

Q **77. Quarry** (n) A large artificial hole in the ground where stone, sand, etc. is dug for use as building material.

R **78. Record** (v) To keep information for the future, by writing it down or storing it on a computer.

79. Research (n) A detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding.

80. Risk (n) The possibility of something bad happening.

S **81. Scrape** (n) A slight injury caused by having your skin rubbed against something rough.

82. Seatbelt (n) A belt that fastens around you when you are travelling in a vehicle or aircraft and holds you in your seat, in order to reduce the risk of being injured in an accident.

83. Sedimentary rocks (n) They are one of three main types of rocks, along with igneous and metamorphic. They are formed on or near the Earth's surface from the compression of ocean sediments or other processes. They are one of three main types of rocks, along with igneous and metamorphic.

84. Shale (n) Type of sedimentary rock.

85. Silicate (n) Any of a large number of common minerals formed of silica, oxygen, and one or more other elements.

86. Slope (n) (Part of) the side of a hill or mountain.

87. Splinter (n) A small, sharp piece of wood, glass, etc., that has broken from a large piece.

88. Stereoscope (n) A device by which two photographs of the same object taken at slightly different angles are viewed together, creating an impression of depth and solidity.

89. Sticking plaster (n) An adhesive strip for covering a small wound.

90. Streak (n) A long, irregular mark or stripe.

91. Strike and dip (n) They are measurements of the orientation and slope of a rock.

(T) **92. Talc** (n) A whitish, greenish, or grayish hydrated magnesium silicate mineral crystallizing in the monoclinic system; it is extremely soft (hardness is 1 on Mohs' scale).

93. Technical pen (n) It is a specialized instrument used by an engineer, architect, or drafter to make lines of constant width for architectural, engineering, or technical drawings.

94. Tent (n) A movable shelter made of canvas or other material, supported by poles or a frame and fastened to the ground with ropes and pegs.

95. Topographic map (n) A map intermediate between a general map and a plan on a scale large enough to show roads plans of towns, and contour lines.

96. Trip (n) An occasion when you travel to visit a place for a short time and come back again.

(W) **97. Waterproof** (adj.) Impermeable.

98. Whistle (n) A small, simple instrument that makes a high sound when you blow through it.

99. Wilderness (n) An area of land that has not been used to grow crops or had towns and roads built on it, especially because it is difficult to live in as a result of its extremely cold or hot weather or poor soil.

100. Wildlife (n) Animals, birds, etc. in the place where they live; Fauna.

Unit I: Preparation and setting up of camps

Goal: Comprehend general information in oral and written texts in contexts related to students' interests and concerns

Skills: Listening, Reading, Speaking, Writing

Project: "A successful camp!"

☆ 25 KEY WORDS

- Blister(n)
- Bruise (n)
- Compass (n)
- Cross sections (n)
- Facilities (n)
- Field gear (n)
- First-aid kit (n)
- Flood (n)
- Hammer (n)
- Hand lens (n)
- Notebook (n)
- Outcrop (n)
- Permit (n)
- Poisonous (adj.)
- Prevention (n)
- Research (n)
- Risk (n)
- Scrape (n)
- Strike and dip (n)
- Technical pens (n)
- Tent (n)
- Trip (n)
- Waterproof (adj.)
- Whistle (n)
- Wildlife (n)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

1. Discuss and answer these questions in pairs.

A. Have you ever been to a field camp?
If your answer is "yes", share you experience with your classmate. If the answer is "No", what do you expect on your first field camp?

B. Do you feel ready for this new challenge?

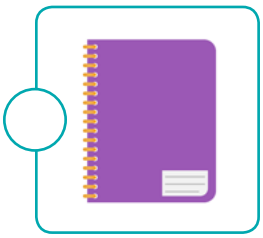
2. Work in pairs. Look at these pictures; describe and compare them.

Examples:
There are many people in picture 1, but there are only two people in picture 2.

People are having fun in picture 1, but people...

3. Which of the above pictures do you think the listening text will be related to?

4. Match the words below with the pictures.






a hammer
b compass
c first-aid kit
d hand lens
e notebook
f technical pens

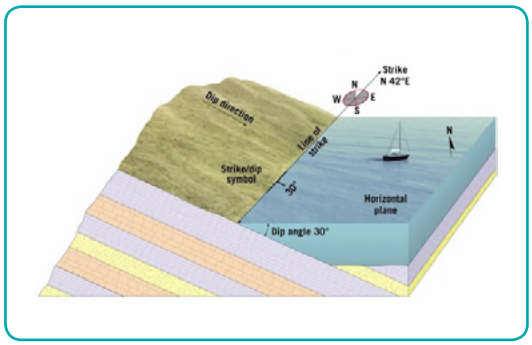
5. Listen to your teacher and repeat these words. Check meanings in a dictionary and complete the chart. Then add two more words to each category.

field boots - first-aid kit - showers - hand lens - waste disposal - field notebooks - exploration - sun screen - transportation - water bottles - kitchen - camping

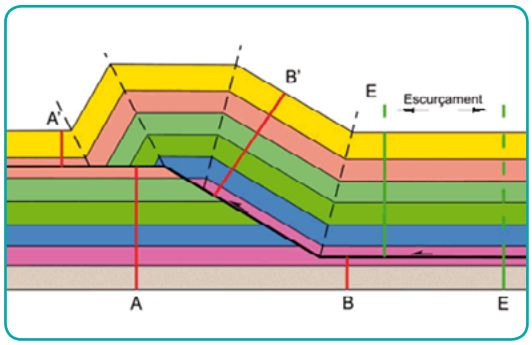
Facilities	Permits for	Field gear	Personal gear
kitchen	camping	hand lens	sun screen

6. Read, study and practice the following useful words and phrases.

An **outcrop** is any rock formation that is visible on the surface.



Strike and Dip. **Strike** is the direction of the line formed by the intersection of a rock surface with a horizontal plane. **Dip** is the accute angle that a rock surface makes with a horizontal plane.



Geological cross sections are graphical representations of vertical planes through the earth. They are valuable tools for visualizing structures.

WHILE YOU LISTEN

Click here to listen

7. Daniela, a geology assistant student invited Mr. John Reed, a geologist, to his class for an interview. Listen to the interview and check your prediction in Activity 3.

8. Listen again and tick (✓) the question Daniela asks.

a	_____	What advice can you give us once we leave our camp?
b	✓	What is the most important gear?
c	_____	Is there anything else that we need to pack?
d	_____	What should we do to prepare for field camp?
e	_____	What kind of permits do we need?
f	_____	Is there anything else you'd like to add?

AFTER YOU LISTEN

9. Choose the best advice for someone who is going to a field camp. Then compare with a partner.

LANGUAGE NOTE MODALS FOR NECESSITY AND SUGGESTIONS	
Describing necessity	Giving suggestions
You must concentrate on cardiovascular conditioning	You must concentrate on cardiovascular conditioning
You need to make your field geology equipment checklist	You need to make your field geology equipment checklist
You have to prepare psychologically	You have to prepare psychologically
You don't have to bring an individual tent	You don't have to bring an individual tent

a. You **must** pack the first-aid at the top of your backpack. (must/ ~~ought to~~).

b. You _____ take the stairs in tall buildings, and hiking over rough terrain to be fit for hard work. (need to / 'd better)

c. You _____ pack too many clothes. You want have room to bring back pet rocks. (don't have to/ shouldn't)

d. You _____ retain your field notes. You may need them later. (need to / ought to)

e. You _____ dress appropriately taking into account the weather conditions and your assignments. (have to / should).

(f) You_____to be aware of physical hazards. There might be dangerous animals and poison ivy and plants. (must / ought to)

(g) If you take medications regularly, you_____ to bring an adequate supply for our three weeks trip. (need to / should)

(h) You _____to cook during our stay in the camp. We hired a cook to prepare the meals. (don't have to / ought not to)

10. Write a checklist with the 10 most important items you should pack for a field trip. Then, compare your checklist with a partner.

1. _____ **6.** _____

2. _____ **7.** _____

3. _____ **8.** _____

4. _____ **9.** _____

5. _____ **10.** _____

Lesson II: Reading Comprehension

BEFORE YOU READ

1. You will read some articles from a geology magazine. The sentences bellows are the titles of the articles. What do you think each article is about?

	Titles	Your Predictions
(a)	All things considered	_____
(b)	Alive and well	_____
(c)	Look after yourself	_____
(d)	Free of danger behind the wheel	_____
(e)	Get ready for climatic conditions	_____
(f)	Reduce your footprint and go green	_____

2. Odd one out. Check these words in a dictionary and circle the word which does not correspond to the group.

a) injury - scrape - supply - blister - bruise

b) enhance - tripping - falling - risk - poisonous

c) flood - vegetation - oil - brimmed - water

d) dry - waste - freezing - shade - cloudless

WHILE YOU READ

3. Read the articles (I to VI). Choose from the titles in Activity 1 (a - f) in this lesson and write them on the corresponding article

PIECES OF ADVICE

I. GET READY FOR ALL KIND OF CLIMATIC CONDITIONS

It can be hot to cold, daytime temperatures as high as 95°F are common, whereas nights may fall below freezing and very dry. Skies are often cloudless and sites commonly have little or no shade. Thus, we are exposed to the sun all day long and skin must be covered with clothing or repeated applications of sun screen. Participants should wear high-quality UV-filtering sunglasses and full brimmed hats. UV-protecting clothing is also recommended.

II.

Field work entails unavoidable risks like tripping and falling. In addition to wild animals that might be dangerous and poisonous ivy or other plants. Participants must remain vigilant and should avoid distractions to maximize awareness and must be sufficiently physically fit and in good health to maintain strenuous physical activity.

The staff in charge has to ensure the use of safety equipment in people who carry out activities with accident risk.

III.

The installation area must be free of waste and in similar conditions to the original one, and depending on the soil capacity to keep a vegetation cover, it is recommended that the soil compacted by regular use and transit, be treated to enhance natural vegetation restoring.

IV.

Camps are generally best located in dry, sunny, well drained sites with sufficient elevation to avoid potential flooding or a negative environmental impact on local water resources. The camp should be near a fresh water supply but far from water courses, archaeological areas, troughs or local fauna.

V.

All field participants will be required to supply his/her own first-aid kit for the care and prevention of minor injuries, such as blisters, scrapes, minor cuts, and bruises, or to care for more serious problems. Besides, one of the field camp leaders must have current certified basic first-aid skills and need to be aware of the location of the nearest medical facility.

VI.

Passengers, cargo and machinery vehicles for supplies and people transportation must comply with all applicable regulations (licenses, emissions, maximum load, permits, and others) respect road signs, and speed limits to reduce the emission of particulate matter and prevent accidents.

Adapted from Sociedad Nacional de Minería.(1999, Agosto). Manual de Prácticas Ambientales Exploración Mineral.
https://www.sonami.cl/v2/publicaciones/manual-de-practicas-ambientales/

AFTER YOU READ

4. Read again and answer the following questions. Work with a partner.

A. What kind of hazards may you find in the field?

I may find wild animal that might be dangerous and poisonous plants.

B. What should you do to protect yourself from harmful hot weather?

C. What recommendations are given for minimizing risks?

D. What regulations must we comply?

E. How can you enhance natural vegetation recovery?

F. Why is it advisable to set up a camp on a sloping land?

5. Work with a partner. Read these statements and match them with the articles. Compare your answers with your group and explain your choices.

(a) Field workers should go to lower elevations during thunderstorms in order to avoid throwing rocks from the cliffs to protect people below.

Article II

Explanation: I chose this article because it refers to accident prevention.

(b) Campers should make as little impact as possible on the environment and ensure that all trash is disposed of properly and carried out effectively.

(c) Wet and cold climate can upset a field schedule seriously. Therefore, the participants should be prepared with appropriate waterproof breathable jacket as well as waterproof hiking boots.

(d) Camps should be well-organized with a clear set of objectives.

(e) During the camp, it is highly recommended to eat balanced meals, get enough sleep and stay hydrated.

(f) Planners should always consider reviewing together with the drivers the route to and from the destination.

Lesson III: Speaking

WARM UP

1. Word Association

A. Work in group. Choose one of the following topics:

food, clothing, weather, camping, nature, tools and gadgets

B. Take turns in saying 1 word that associates with this topic.

For example: Dangerous Animals

Tiger! Lion!
Snake! Spider! Etc.

C. You have a maximum of three seconds to say a word. If you don't say it in this period of time you are out of the game. The last student who keeps saying words is the winner.

INPUT

2. Look at the pictures, listen to your teacher and repeat after him/her.

ELASTIC BANDAGE

BIODEGRADABLE SOAP

SPOON

SCOURING PAD

SAFETY PIN

BOWL

PAPER TOWELS

PLATE

TRIANGULAR BANDAGE

WET WIPES

MUG

STICKING PLASTER

FORK

STERILE GAUZE

HAND SANITIZER

KNIFE

DISPOSABLE STERILE GLOVES

BROOM AND DUSTPAN

3. Work with a partner. Talk about things you may bring, need, use, wrap, etc. .Use vocabulary from the chart above.

For example:

A: What should I bring to **clean** my hands? B: You ought to bring **biodegradable soap**

LANGUAGE NOTE **MODALS FOR NECESSITY AND SUGGESTIONS**		
Permission	Obligation	Prohibition
You **can** camp here	You **have to** camphere	You **can`t** camp here
You**'re allowed** to take photographs	You'**ve got to** take photographs	You **aren`t allowed** to take photographs

4. Match these camping rules with the pictures.

1 2 3 4 5 6

A. Never go barefoot 4

B. Plant a flag to identify your camp _____

C. No petting the wildlife _____

D. Listen to music with earphones _____

E. Keep the camp clean _____

F. Always take your whistle _____

5. What do you think these signs mean? Use the language in the grammar box to take turns talking about each sign. Examples:


1ST


2ND


3RD


4TH


5TH


6TH


7TH

For example:

A: This first sign means you aren't allowed eating or drinking in the meeting room.
B: Yes, I think you're right. And the second one means you can ...

CONTROLLED PRACTICE

6. Read the following dialogue between Mark, a camper, and Alfred, a park ranger. Then Work with a partner and practice the dialogue.

Alfred: Good morning. My name is **Alfred Forest** and I'm the park ranger.
Mark: Good morning, Sir, I'm **Mark.** What can I do for you?
Alfred: Well, I'm afraid you **can't camp here.**
Mark: What do you mean?
Alfred: Exactly what you've just heard. Do you see that sign over there? It means you **aren't allowed to set your tent** here. This **area is too close to the lake.**
Mark: Oh! I'm so sorry. What can I do?
Alfred: Walk along this **trail** and you'll see a sign with **a tent,** this one means you **are allowed to camp over there.**
Mark: Ok! Thank you Sir.
Alfred: You are welcome! And don't forget to **keep the camp clean and use biodegradable soap to wash your stuff.**

7. Now switch roles and repeat the dialogue again.

FREER PRACTICE

8. Work with a partner. Create a similar dialogue changing the information in bold in the dialogue in activity 6. Change the following information:

- Name of characters.
- Name of occupation or profession
- Activities as ride a bike, eat, swim, etc.
- Look at the Language Note to choose the appropriate expression for permission, obligation or prohibition and you can select sings from activity 5.

9. Present your dialogue to the class.

WRAP UP

10. Work in pairs. Ask and answer the following questions:

a) What are some vocabulary words you learned today?

_____

_____

_____

_____

b) What things did we talk about?

_____

_____

_____

_____

11. Compare your answers with your group.

Lesson IV: Writing

PRE WRITING

1. Playing with Adjectives. Play this game in group.

1	**A**	
	B	
	C	
2	**A** _____	article
	B _____	bus
	C _____	camp
3	**A** amazing	article
	B old	bus
	C interesting	camp

Instructions

1. First, write the letters of the alphabet down the side of a sheet of lined paper.

2. Next, leave a blank space and write a noun that begins with each letter.

3. Finally, add an adjective in front of each noun.

- Give yourself a point for each adjective and noun and add an extra point for using the letter of the alphabet for both the noun and the adjective.

2. Read and study the language note. Then, match the sentences from Column A and Column B.

LANGUAGE NOTE LINKING WORDS HELP YOU TO CONNECT IDEAS AND SENTENCES		
Consequence	**Thus**	Most of the evidence was destroyed in the fire. Thus, it would be almost impossible to prove him guilty.
	So	I know you are tired, so I'll let you rest.
Contrast:	**However**	It was hard to work in the field; however, it was completely worthy.
	But	I need to finish this project but I don't have enough time.
	Although	Unfortunately nobody is listening now, although this is very important.
Adding Ideas:	**In addition to**	In addition to planning the activities, we have to supervise them.
	Besides	I should stay home and do work. Besides, it's cold.
Purpose:	**In order to**	In order to ensure food safety, the whole food chain must be supervised.
Condition:	**Provided that**	We will hike up that mountain provided that it doesn't rain.
Explaining	**Because**	He couldn't finish the trek because he was hurt.
	Since	We turned up the heat since it was getting cold.

COLUMN A			COLUMN B
A	In order to do a good job,		**1.** so he needs to do it again.
B	I have to set up my tent but		**2.** it is not healthy.
C	Andrew didn't pass his driving test,		**3.** because it is going to rain.
D	In addition to field gear,		**4.** Thus, we must improve the activity program.
E	The camp leader is not satisfied.	**A**	**5.** we must plan and organize in advance.
F	You'd got to put on your waterproof jacket		**6.** we need to bring the camping and personal stuff.
G	She will help me provided that		**7.** I didn't bring the stakes.
H	I love fast-food although		**8.** I clean up her room.

3. Read the articles in page number 20 again and answer these questions.

A. What other themes could the writer have included in the article?

B. What would you advise to someone going to a field trip?

4. Share the answers in your group and explain and support your answers.

5. You are going to write an article. Use as an example the articles in the reading Lesson: "Pieces of advice". Choose a topic for your "piece of advice".

BRAINSTORMING:

6. Write down a few ideas.

DRAFTING

7. Write a draft of your advice article using an outline.

REVISING

8. After writing, ask a partner or your teacher to check grammar, vocabulary, format and spelling.

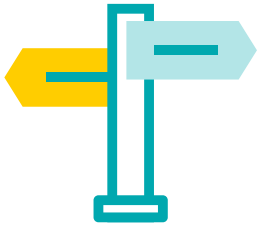
WRITING

9. Write a final version of your advice article with an appealing heading.

PUBLISHING

10. Print some copies of your advice article and deliver it to your teacher and classmates or publish it in your class social network.

Project: "A Successful Camp!"



Name of the project	"A Successful Camp!"
Level	Pre-intermediate
Time	3 hours
General aims	Students will be able to prepare and plan all the aspect involved in the preparation and setting up a camp Students will be able to: a. ask for and give advice b. set rules c. use modals for suggestion, necessity, permission, obligation and prohibition. d. use the grammar and vocabulary of the unit. e. gather information.
Resources/ Materials	Paperboard, paper, coloured pencils, paint, computer, camera.
Teacher's role	Guide and help students to practice and apply their skills and solve problems.
Students' role	Collect all the material and information to plan, organize and create a camp.

1. Look at the pictures A and B and answer the questions.

PICTURE A

PICTURE B

A. Who are in the pictures?
B. What are they doing?
C. What do you think they are talking about?

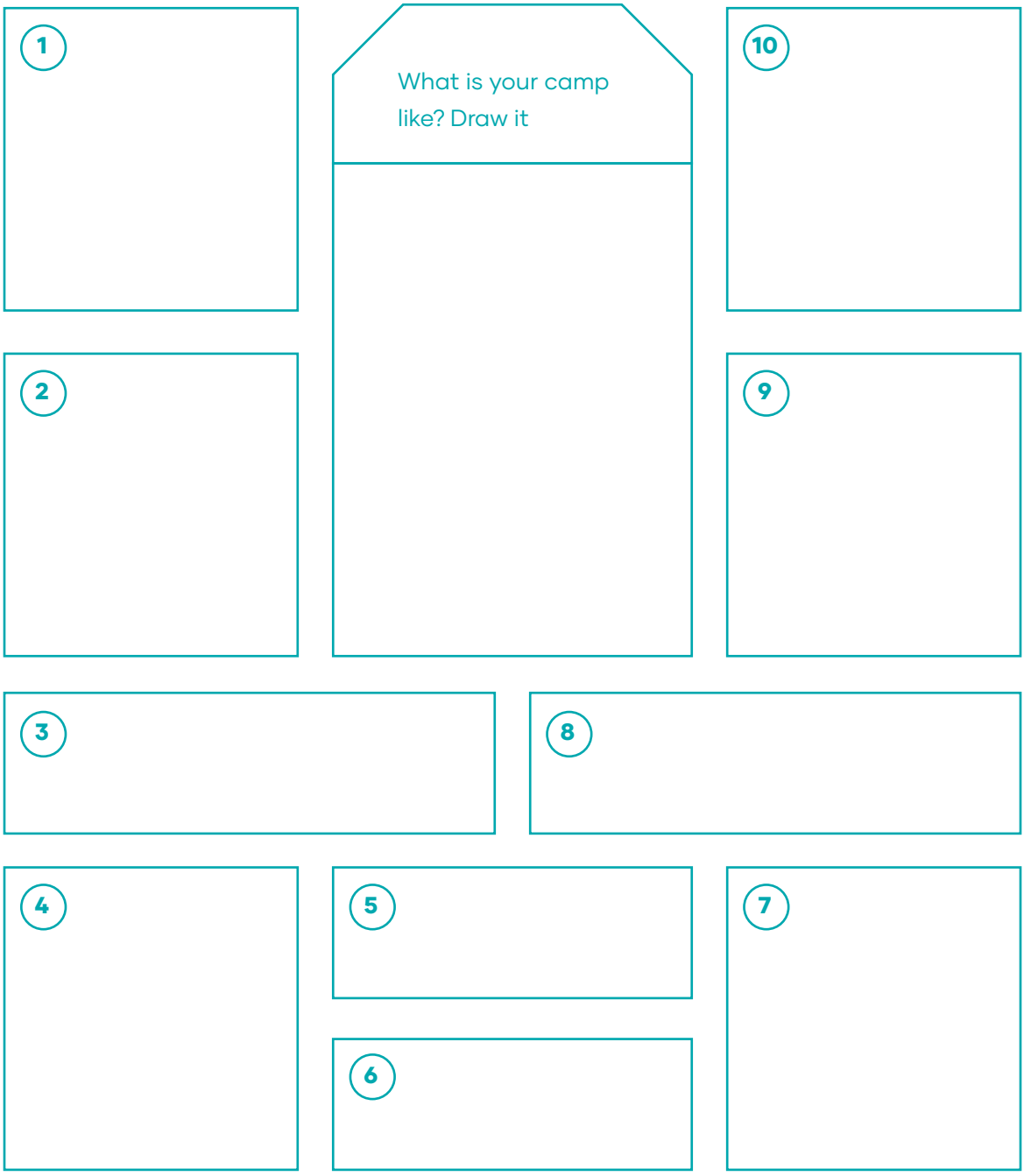
2. You will plan a camp. In group of 4 read the following questions and activities, and discuss the order they should be carried out.

A. Who is in your team? Write the full name, address, telephone, family contact details of each team member.
B. Write a list of rules for your camp, including rules for the setting-up stage, during the stay, and departure.
C. Make a list of any health problems and special needs among the group. (These do not have to be true: you don't have to disclose your personal health information if you don't want to).
D. Where are you going to set up the camp? Think about the location, characteristics, photos, maps, route, means of transportation, etc.
E. Make a check list including; field and personal gears, permits and all required documents.
F. What staff do you need to run the camp? Assign chores and roles to each member of your team.

3. Summarize the activities carried out in ten steps and complete the chart bellow. You can write questions and statements.

Example: 1. Who is in my team? (Write the names of your team members)

Project Organization Chart



3. Check the material you will use like: paperboard, colored pencils or paint, scissors, pictures, notebook, printer, paper and add any other appropriate material that you required.

4. Prepare your Project presentation.

- **A.** Distribute the ten steps written on your organization chart among the four members of your group. Each member must speak for a maximum of three minutes.
- **B.** Write a transcript or outline of the pc. Follow these stages for the presentation: greeting, introduction, main points in order of importance, conclusion.
- **D.** Revise key language
- **E.** Focus on linking and signaling words ('Next...', 'Now I'd like you to look at...', etc.).
- **F.** Prepare visual aids; organization chart, pictures, check list, documents, etc. (You can create poster boards or infographics to display during the presentation.
- **G.** Practice your part in the presentation.
- **H.** Deliver the presentations in front of the class.

Unit II: Legal Framework and security in Geology

Goal: Produce short and clear oral and written texts in contexts related to students' interests and concerns, in order to express a critical personal posture with respect to others' positions

Skills: Listening, Reading, Speaking, Writing

Project: "How much do we care for our security?"

☆ 25 KEY WORDS

Agent (n)
Coal (n)
Compulsory (adj.)
Danger (n)
Darkness (n)
Debris(n)
Degree dial (n)
Dust(n)
Duty(n)
Frayed electrical cord (n)
Ergonomic (adj.)
Foresee (v)
Framework (n)
Hazard (n)
Helmet (n)
Heritage (n)
Impaired (adj.)
Law (n)
Locator beacon (n)
Magnetic arrow (n)
Quarry (n)
Risk (n)
Seatbelt (n)
Slope (n)
Splinter (n)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

1. Read the following situation: A man tells a friend he has just returned from fieldwork.

2. Write three questions you will hear in this conversation and then discuss your notes with a classmate.

A. _____

_____?

B. _____

_____?

C. _____

_____?

3. Work in pairs. Look at the pictures below and talk about them.

A. Describe the situations in each picture.

B. What are the similarities and differences between the two pictures? Please explain.

C. How would you feel in each situation shown in the pictures? Explain why.

WHILE YOU LISTEN

Click here to listen

4. Listen to the presentation and check your prediction notes you wrote for activity 1.

5. Read the following extracts from the presentation script. Listen again and number the extracts from 1 to 7 in the order you hear them.

a	_____	... because of forceful or repetitive work...
b	_____	... it is crucial to take into account ...
c	_____	... comes from the environmental factors...
d	1	... A chemical, physical or a biological agent possesses a risk ...
e	_____	... injury or illness like stress ...
f	_____	... that has the potential to possess a threat to human health ...
g	_____	... poorly designed tools or workplace ...

AFTER YOU LISTEN

6. Read each statement (a - e). Listen again and circle T for true and F for false.

a	T	F	A risk is the chance or probability that a hazard causes harm or damage only to people.
b	T	F	A chemical hazard comes from a solid, liquid or gas element.
c	T	F	Vibration, constant loud noise or a frayed electrical cord are examples of biological hazards.
d	T	F	Blood and body fluids might be a hazard for your health.
e	T	F	We can prevent risks if we are aware of the hazards.

7. Classified the following situations. Write **H** for Hazard and **R** for Risk

a	R	Driving in a dark and stormy night.
b	_____	Riding a bike.
c	_____	Using a hair dryer.
d	_____	Driving on the highway.
e	_____	Using a hair dryer in the bath-tub.
f	_____	Riding a bike in a busy street.

8. Look at the pictures and write the agent and the hazard each image is related to.

HAZARDS				
		Biological		
				
		Bacteria		
AGENTS				

Lesson II: Reading Comprehension

BEFORE YOU READ

1. Work with a partner. Discuss the questions below. Remember to support your answers!

Examples:

Do you think mountain climbing is extremely dangerous? Why / Why not?

- Yes, I do because loose rocks fall off and can hit me or someone else.
- No, I don't. Climbing is relative safe, especially compared with other outdoor activities like diving and skiing.

Have you ever climbed to the top of a tree? If yes: when and why? If not; tell about someone else.

- Yes, I have. I was flying a kite and it got caught in a tall tree so I had to go for it. I was just 10 years old at that time.
- No, I haven't. But my brother was flying a kite and it got caught in a tall tree so he had to go for it. He was just 10 years old at that time.

A. Do you take a lot of risks? Why /Why not?

B. Are risks sometimes necessary? If yes: when and why? If not; tell about someone else.

C. Have you ever felt that your life was in danger? If yes: when and why? If not; tell about someone else

2. Work in group. Look at these pictures and answer the questions.

A. What are the people doing?
B. Where are they?
C. What are their working conditions like?
D. What's the weather like?
E. What are they wearing?

PICTURE A

PICTURE B

PICTURE C

PICTURE D

3. Work with a partner. Look at the pictures and the words. Then, write the words next to the corresponding definition.

DARKNESS

CLIFF

IMPAIRED

QUARRY

SEATBELT

SLOPE

(a) **quarry** — Open hole in the ground, from which building stones are obtained

(b) _____ — A steep rock face, especially at the edge of the sea

(c) _____ — Absence or deficiency of light

(d) _____ — Functioning diminished, deficient, weakened or inadequately

(e) _____ — A belt or strap worn in a vehicle to keep the person safely

(f) _____ — Ground that has a natural inclination, as the side of a hill

WHILE YOU READ

4. Read the article. Then tick (✓) the statement you think will be the main idea.

- ◯ Certain activities might cause a fall.
- ◯ Certain activities might affect your safety.

THE TOP FIVE CRITICAL RISKS

Working in the field should be a safe, enjoyable and very gratifying experience, on the condition that a few basic and reasonable precautions are taken. Geological fieldwork is an activity which includes some risks and hazards and the ability to overcome alone or in a small group. You are responsible for your own safety in the field, however there are some simple precautions you can take to prevent problems and minimize risks.

The top five critical risks are associated to the following activities:

1. Operating a vehicle is one of the most dangerous risks. Prevent accidents; use your seatbelt, concentrate and never operate a vehicle while you're distracted or impaired.

2. Working outside may expose people to hazards such as heat, extreme cold, coal dust and UV-rays which in the short or long-term might cause illness and even death. Check the weather forecast for the area before you go out for the day, wear adequate clothing and footwear for the type of weather and terrain that you might encounter and return if the weather deteriorates.

3. Working in remote areas can be a risky business for many workers. Before going into the field, be sure to leave a note and preferably a map showing expected location of study, route, and time of return. It's necessary to know what to do in case of an emergency like accident, illness, bad weather or darkness. Make sure to carry at all times a small first-aid kit, some emergency food and always have at hand high-quality equipment for two-way communication and a personal locator beacon in addition to a whistle, torch, map, compass and watch. Don't forget to wear a safety helmet when visiting old quarries, cliffs, scree slopes, etc., or wherever there is a risk from falling objects. It is obligatory to do so when visiting working quarries, mines and building sites. Remember to wear safety glasses for protection against flying splinters when hammering rocks or using chisels. Try not to hammer near another person or look towards another person who is hammering. Be sure not to leave rock debris on the roadway or borders. Remember to avoid hammering where possible; be a conservationist and have a sympathetic consideration for the countryside and great outdoors, and for the people, animals and plants that live there.

4. Falling could be very dangerous even from low heights; be aware of your situation; stay clear of the edge, don't work on unstable platforms or in dangerous places.

5. Working with or near other people seems challenging; we often work in other people's workplaces or public spaces this can involve simultaneous operations conflicting the use of the same place at the same time; without good planning one party can injure another. Try to consult and identify in conjunction hazardous activities and all people that might be operating in the workplace.

Don't forget to coordinate and arrange who's doing what, where and when and make sure to share information about workplace risks and safety. Remember you're never more in danger than when you're unaware of it; being aware of these hazards could save your life.

Retrieved from http://www.geologyin.com/2014/10/safety-in-field-and-general-guidance.html

5. Find the words in bold in the article. Then match each word or phrase with its meaning.

1	g	**coal**
2	_____	**debris**
3	_____	**dust**
4	_____	**locator beacon**
5	_____	**risky business**
6	_____	**safety helmet**
7	_____	**scree**
8	_____	**splinter**

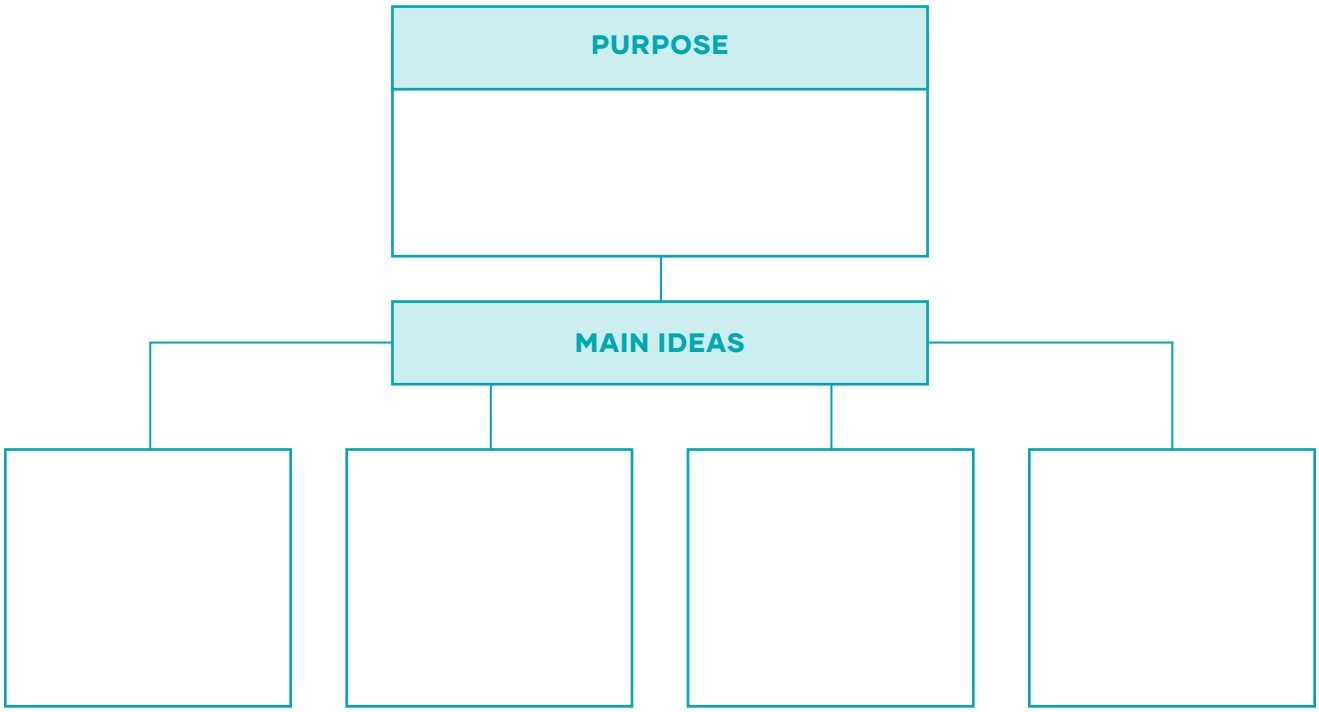
a	An accumulation of loose rock, of a similar size on a steep slope
b	A situation or activity that involves the possibility of being hurt
c	A small, thin, sharp piece of wood, glass, or similar material broken off from a larger piece
d	A hard covering to protect the head from accidental injury
e	A battery powered radio transmitter, used to find people in problems
f	A fine powdered form which is created by crushing or pulverizing
g	A hard black or dark brown rock which can be burned as fuel.
h	The remains of anything broken down or destroyed like ruins

AFTER YOU READ

6. Fill in the diagram below with the purpose of the text and the main ideas; choose from the alternatives given.

A. Purpose:
I. to entertain
II. to inform
III. to persuade

B. Main ideas:
I. To give advice for taking prevention measures
II. To talk about accidents
II: To keep good relationship with people
IV. To foresee unexpected outcomes
V. To be prepared for facing difficult situations



LANGUAGE NOTE IMPERATIVE AND INFINITIVES FOR GIVING SUGGESTIONS	
Try to consult and identify hazardous activities.	Make sure to carry at all times a small first-aid kit.
Try not to hammer near another person.	Be sure not to leave rock debris on the roadway.
Don't forget to wear a safety helmet.	Remember to avoid hammering where possible.

7. Read these suggestions. Which ones refer to a hand lens (HL)? a Chisel (CH)? a Compass (CO)?

a	HL	Be sure to bring the specimen very close to it until it comes into sharp focus.
b	_____	Try to hold it flat on your outspread hand in front of your chest.
c	_____	Try not to tap it with the hammer so hard, use moderate force.
d	_____	Make sure to have contact between the hand holding it and your cheek.
e	_____	Don't forget to hold it perpendicular to the rock's surface.
f	_____	Remember to turn the degree dial so that the orienting arrow lines up with the magnetic arrow.

Lesson III: Speaking

WARM UP

1. Weekend Plans

A. Work in group. Interview your classmates about what they are going to do this weekend and complete the chart.

Example:

A: Andrew, what are you going to do this weekend?
B: I'm going to meet some friends on Sunday.
A: Where are you going to meet?
B: We are going to meet at the park.

Name	Plans	More Information
Andrew	meet friends	meet at the park

B. Who is going to have fun? relax? exercise? work?

CONTROLLED PRACTICE

2. Work with a partner. Read and practice the following conversation.

A: I'm so excited! We have a long weekend! What are you going to do?

B: I'm not sure. I guess I'll just stay home. Maybe I'll watch some movies. What about you? Any plans?

A: Yeah, I'm going to go on a camping trip to La Campana National Park with some friends.

B: Going away from the city seems relaxing.

A: That's right! And we are going to do some hiking in the mornings. I want to reach the top of the hill and that means some climbing too.

B: Sounds like fun and adventurous! Be sure to wear hiking boots and try not to expose yourselves so much to the sun.

A: Yes, I know. Say, why don't you come with us?

B: Are you serious? I'd love to! I'll bring my guitar to play some music in the evening...

FREER PRACTICE

3. Work with a partner. Take turns to ask and answer questions to complete the chart below.

Example: You: Where are you going?
Your partner: I'm going to the beach.

Questions	Example	You	Your partner
Where?	...to the beach		
When?	... in February		
Who...with?	... with my family		
How ...travel?	... by car		
What.... do?	...swimming... collecting sea shells		
What ...take?	...swimming suit, sunglasses...		
Other			

4. Think about some suggestions for your partner according to his/her answers. Look at the "Language note" in the reading section.

Example: Your partner: I'm going to go by car.
You: Make sure to bring your driving license.

5. With your partner, create a dialogue about vacation plans using as a model the dialogue in activity 2 and the information you wrote in the chart above.

6. Practice your dialogue and present it to the class.

WRAP UP

7. You will leave the classroom when you:

A. Give an opinion or a suggestion of today's lesson.
B. Say three new words you've learnt during the lesson.
C. Say what you are going to do after the class.

Lesson IV: Writing

PRE WRITING

1. Odd word out. Underline the unknown words and look them up in a dictionary to find out their meaning. Then, circle the word which does not correspond to the group.

a) measure - law - purpose - regulation
b) liability - duty - facilities - compulsory
c) fund - insurance - procedure - heritage
d) agreement - environment - damage - pollution
e) integrity - assessment - suffering - faith
f) entitled - right - infrastructure - permission

2. Read the texts below and underline the words from the texts that appear in Activity 1.

LAW 16,744 WORK ACCIDENT AND OCCUPATIONAL DISEASE INSURANCE.

It is the law that establishes the Compulsory Social Security against Occupational Accidents and Occupational Diseases, created in 1968, and of which the IST, Instituto de Seguridad del Tabajo (Work Safety Institute) is an Administrative Body. This law establishes the medical and economic services to which workers protected by this work accident insurance are entitled in case of suffering a work accident or occupational disease.

LAW 19.300, GENERAL ENVIRONMENTAL FRAMEWORK LAW

The law establishes a general framework for the regulation of the right to live in an environment free of pollution, environmental protection, nature preservation and environmental heritage conservation. Likewise, this law regulates environmental management instruments such as Strategic Environmental Assessment, Environmental Impact Assessment System and Access to Environmental Information, Liability for Environmental Damage, Supervision of Environmental regulatory compliance, Environmental Protection Fund and Chile's environmental institutions.

DECREE 132 MINING SAFETY REGULATION

The purpose of this regulation is to establish the general regulatory framework to which the tasks of the National Mining Extractive Industry must be submitted to:

A. Protect people's lives and their physical integrity of those who work in this industry and the ones that under specific and defined circumstances are linked to it.

B. Protect the facilities and infrastructure that make mining operations possible, and therefore, the continuity of their processes.

WHAT DOES THIS AGREEMENT MEAN FOR CHILE?

ILO Convention 169 establishes among others the duty for the State of Chile to consult the legislative and administrative measures that may directly affect indigenous peoples, through their representative institutions and appropriate procedures, in accordance with their socio-cultural characteristics, this process must be carried out in good faith and in order to reach an agreement or obtain consent about the proposed measures.

3. Work with a partner. Read the text above again and answer the following questions. Compare your answer with your class.

A. What's the purpose of the regulations in each text?

B. Who benefits from these laws and regulations?

C. Which institutions, entities or organizations are mentioned in the texts?

Example: Law 16.744	**Law N 19.300**
A. To protect workers in case of accidents and deceases.	**A.**
B. Workers.	**B.**
C. IST, Instituto de Seguridad del Tabajo (Work Safety Institute)	**C.**
Decree N 132	**ILO Convention 169**
A.	**A.**
B.	**B.**
C.	**C.**

4. Choose one institution or activity like a school, a charity organization, an art gallery, a study field trip, sport competition, etc.

5. You will write a Regulation Document for the institution you have selected.

BRAINSTORMING:

A. Think about needs, problems, benefits, environment, etc, which must be regulated.

- Review assignments and discussion questions, and notes.
- Determine what you already know and what you still need to learn.

DRAFTING

B. Write down some notes about the institution or activity chosen.

- Summarize the regulation's purpose.
- State the persons whom these regulations affect.
- Organize your information.
- Order your information logically and to suit your readers – not yourself.
- Develop your topic with enough detail for your readers and purpose.
- Use language and vocabulary from the unit.
- Try to use some technical words from activity 1 and 2 in this lesson.

REVISING

C. Share your text with a classmate. Ask him or her to revise it then listen to his or her comments.

- Write the final version of your Regulation Document.

EDITING

D. Check grammar, sentence structure, word choice, punctuation, capitalization, spelling, citation and document format.

PUBLISHING

E. Print your document and deliver to your teacher and classmates.

Project: "How much do we care for our security?"

Name of the project	"How much do we care for our security?"
Level	Pre-intermediate
Time	3 hours
General aims	Students will be able to: a. Practice and consolidate vocabulary b. Revise Yes/ No and Wh - questions in Simple Present. c. Practice new grammar; Going to and will, Imperative for suggestions, and Gerund as subject. c. Speaking: to give controlled oral practice.
Resources/ Materials	Cardboard, paper, coloured pencils, paint, computer
Teacher's role	Guide and help students to practice and apply their skills and solve problems.
Students' role	Collect all the material and information to plan, organize, create and carry out a survey as well as interpret the data collected and use graphs to organize the information.

PROCEDURE

1. Look at the chart below and tick (✓) the text type.

○ A survey: an activity where you ask the same questions to different people.

○ An article: a text that informs people about a certain topic.

ENVIRONMENTAL SURVEY

1. Taking care of the environment is the need of the hour				
	Respondent 1	Respondent 2	Respondent 3	Respondent 4
A. Strongly agree			✓	
B. Agree	✓			✓
C. Disagree		✓		
D. Strongly disagree				
2. Are you aware of your country's laws to reduce environmental pollution?				
	Respondent 1	Respondent 2	Respondent 3	Respondent 4
A. Yes	✓			✓
B. No		✓	✓	
3. Who are the worst polluters?				
	Respondent 1	Respondent 2	Respondent 3	Respondent 4
A. Industries	✓		✓	✓
B. Governments		✓		
C. Individual people				
4. The future generations will have a healthy environment if:				
	Respondent 1	Respondent 2	Respondent 3	Respondent 4
A. The polluting industries shut Down, even if people lose Their jobs			✓	
B. New technologies can be Found to solve our problems	✓			
C. People learn to live with less And be more efficient users of Energy and materials		✓		✓

2. Read the survey in activity 1 and circle T (True) or F (False).

a. There are questions and possible answer in a survey. **T**

b. The respondents ask the questions in a survey. _____

c. You write the answers in complete sentences. _____

3. Work in groups of 4. Create and carry out a survey.

A. Choose a topic for your survey.

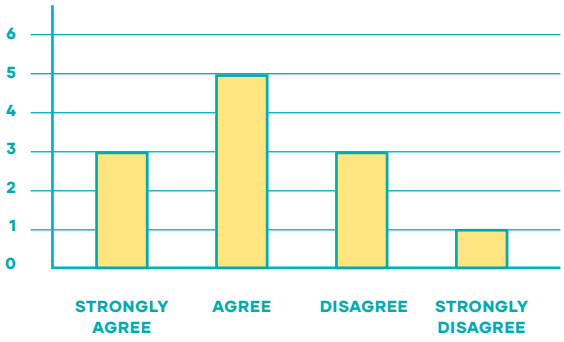
- Law and regulations at work.
- Hazards awareness at work
- Accident Prevention at work
- Health care at work

B. Write four questions or statements and write the possible answers or alternatives. Use as model the questions and answers in the "Environmental Survey", activity 1 in this lesson.

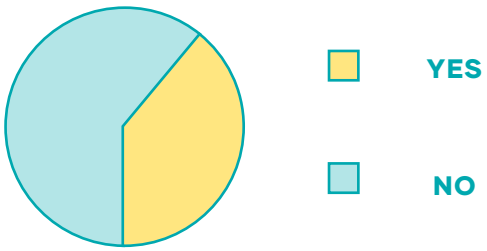
C. Each member of the group interviews four different people. Ask the questions and record the answers.

D. Gather the data collected with the survey and use graphs to organize the information.

Q1. Taking care of the environment is the need of the hour



Q2. Are you aware of your country's laws to reduce environmental pollution?



4. Write a report to summarize your findings.

5. Present the results of your survey to the class.

6. Compare surveys and reports, and vote for your favourites.

Unit III: Classification of rocks and minerals

Goal: Comprehend general information in oral and written texts in contexts related to students' interests and concerns.

Skills: Listening, Reading, Speaking, Writing

Project: "A classroom museum"

☆ 25 KEY WORDS

- Atoms (n)
- Carbonates (n)
- Cleavage (n)
- Crust (n)
- Extrusive (adj.)
- Feldspar (n)
- Halides (n)
- Hardness (n)
- Igneous rock (n)
- Intrusive (adj.)
- Ion (n)
- Limestone (n)
- Lustre (n)
- Marble (n)
- Matter (n)
- Metamorphic rock (n)
- Mohs' scale (n)
- Molecule (n)
- Molten (adj.)
- Non-silicate (n)
- Plutonic (adj.)
- Sedimentary rock (n)
- Shale (n)
- Silicates (n)
- Streak (n)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

1. Answer these questions in group.

A. What observations can you make about the pictures below? Discuss and take notes about their characteristics.

Example:
Rock 1 is round with a greyish-white colour and has numerous holes and cavities.

B. Which of them do you like best and why?

1 

2 

3 

2. What do these words mean? Use a dictionary and complete the word map. Add two more words to each category.

rough - round - ~~intrusive~~ - large - flat - light - porous - ~~sharp~~
metamorphic - deep - ~~wide~~ - igneous - smooth - steep - heavy
extrusive - ~~hard~~ - sedimentary - oval - dense

CHARACTERISTICS

SIZE	SHAPE	TEXTURE	OTHER
wide	sharp	hard	intrusive

3. You are going to listen to a presentation. What do you think it might be about?

A. minerals **B.** rocks **C.** volcanoes

4. Which one is a rock? Use a dictionary and circle the name of a rock.

a plate - wind - obsidian - crystalline
b bottom - shale - hard - melted
c slate - layer - fossil - piece
d surface - magma - intrusive - quartzite
e crust - sediment - limestone - shades
f rough - granite - sharp - lava
g marble - molten - steep - cementing
h glue - mineral - source - sandstone
i firm - grain - diorite - particle
j erode - pile - wide - basalt

WHILE YOU LISTEN

Click here to listen

5. Listen to the presentation and check your prediction in Exercise 4.

6. Read the sentences below then listen to the presentation again and match the words written in bold with their synonym from the box below.

◯ fragment ◯ plutonic (3) **liquid** ◯ volcanic

A. When lava comes to the earth's surface forms **(1) extrusive** igneous rock.

B. Sedimentary rocks are made of small **(2) pieces** like sand, mud or organic particles.

C. Igneous rocks are formed when rock is under extreme heat and becomes **(3) molten.**

D. **(4) Intrusive** igneous rocks are formed when magma cools slowly below the earth's surface.

7. Listen to the presentation again and order the sentences as they are mentioned.

_____	Sediments are deposited in layers.
_____	Igneous rocks begin to erode.
_____	Form magma, starting the cycle all over again.
_____	Sedimentary rocks are formed.
_____	Small fragments of rock are carried away as sediment.
1	The rock cycle begins with magma.
_____	They are exposed to heat and pressure.
_____	They change into metamorphic rocks.
_____	Magma becomes crystallized and gives origin to igneous rocks.
_____	Sedimentary rocks are pushed below the surface due to tectonic activity.

AFTER YOU LISTEN

8. Listen to the presentation again and order the pictures and their description as they are mentioned.

GRANITE

OBSIDIAN

MARBLE

SLATE

LIMESTONE

SHALE

SHALE

I'm a fine-grained rock made from compacted mud and clay. I easily break into thin layers. I'm usually black and grey but you can find me in a wide range of colours that includes red, brown, green, grey, and black. I'm the most common Sedimentary rock.

I'm a member of the Sedimentary rock group. I'm white or almost white. Because of impurities, such as clay, sand, organic remains, iron oxide and other materials, I exhibit different colours, especially on weathered surfaces and I may be crystalline, clastic, granular, or dense.

I'm an extrusive or volcanic igneous rock. My colour varies from dark green to dark brown and black, I can also show sheens of gold or green, yellow, blue and/or purple colouration. I'm translucent when my size is large.

I'm an intrusive or plutonic igneous rock and I'm composed mainly of quartz and feldspar. I can be red, pink, grey, or white with large grains that you can see throughout my body.

I'm a member of the Metamorphic rock group. I usually have a light-coloured rock and when I'm formed from a limestone with very few impurities, I'm white with a crystalline and sugary appearance and when I contain impurities such as clay, I can be bluish, grey, pink, yellow, or black.

I belong to the Metamorphic rock group. I come from shale or mudstone. I'm grey in colour but I range in a continuum of shades from light to dark grey. You can also find me in shades of green, red, black, purple, and brown. My colour is often determined by the amount and type of iron and organic material that are present in my body.

Retrieved from https://geology.com/rocks/

9. Work with a partner and answer the questions.

(a) What type of rocks contains large crystals? **Intrusive Igneous Rocks**

(b) What type of rocks might contain evidence of past life? _____

(c) What type of rocks has visible layers? _____

(d) What type of rocks changes by extreme heat and pressure? _____

(e) What type of rocks contains small crystals? _____

(f) What type of rocks comes from liquid rock material? _____

(g) What type of rocks is crystalline and often has a layered or banded texture? _____

10. Work with a partner. Use the following terms to complete the Rock Cycle chart:

Sedimentary rocks - Melting - Tectonic burial
Igneous rocks - Erosion - ~~Magma~~ - Metamorphic rocks
Crystallization - Sedimentary rocks

1. Magma

2. _____

3. _____

4. _____

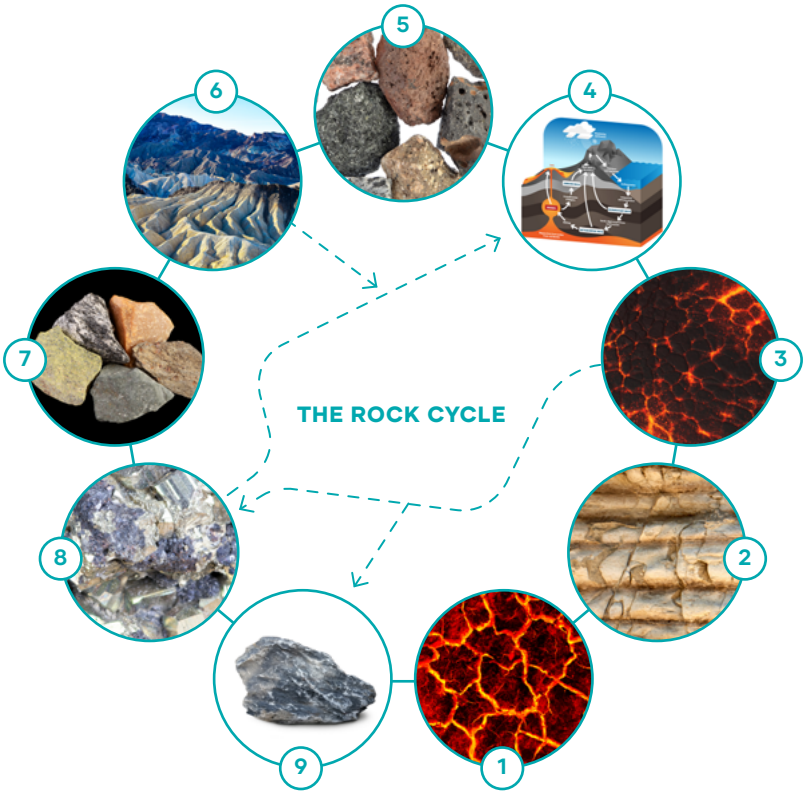
5. _____

6. _____

7. _____

8. _____

9. _____



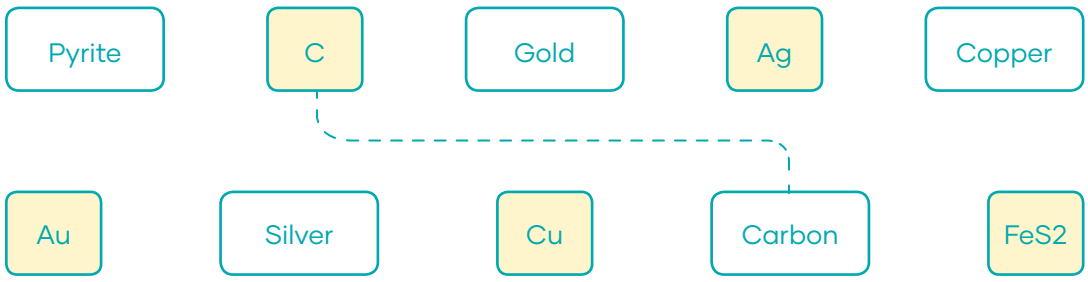
Lesson II: Reading Comprehension

BEFORE YOU READ

1. Look up the meaning of these words. Then, circle the ones you think you could find in a text about minerals.

feldspar - graphic - halides - welding - hardness
pyroxene - ion - oxides - cleavage - atom
olivine - graphite - blister - streak

2. Match the chemical symbols and compounds with the corresponding mineral.



3. "Word Drawing" Look at these "word drawings" and guess the meaning of them. Then, look them up in a dictionary.

WHILE YOU READ

4. Read the text and check your prediction in activity 1, lesson II.

5. Read the text and write the following questions in the corresponding paragraph.

- What are the physical properties of minerals?
- What are types of minerals?
- What is the difference between a mineral and a rock?
- ~~**What are Minerals?**~~
- What are minerals made of?

THE BUILDING BLOCKS OF EVERYTHING IN THE WORLD.

A. What are minerals_____?

Minerals are usually solid, inorganic and naturally formed substances which have a definite chemical composition and an internal structure characterized by an orderly arrangement of atoms, ions, or molecules. Our planet is made up of thousands of different minerals.

B._____?

Minerals have a specific chemical structure which is the same in the entire mineral. Rocks, on the other hand, are composed of a variety of different minerals and are not uniform in their structure.

C._____?

Minerals are made from elements. An element is a pure substance that is made from a single atom and it cannot be broken down into a simpler substance. Each kind of atom is represented by a symbol. Gold (Au), silver (Ag), copper (Cu), and carbon (C) are minerals made of one element while others are made of two or more, they are chemical compound like pyrite (FeS2) which is a combination of iron and sulphur. When atoms get together they form molecules making patterns that cause minerals to make shapes called crystals. When minerals have time and space they can grow into beautiful forms or shapes.

D._____?

There are approximately 4000 different minerals, and each of those minerals has a unique set of physical properties which are useful for identifying minerals. These include:

- **Lustre:** It describes how well a mineral reflects light. Examples of lustre include glassy, metallic, brilliant, and dull.

- **Hardness:** It describes how easy it is to scratch the surface of a mineral. Scientists often use the Mohs' scale to describe hardness. Using the Mohs' scale, a "1" is the softest mineral and a "10" is the hardest. Diamond has a hardness of 10 because it is the hardest of all the minerals.

- **Streak:** It is the colour of the mineral in powdered form. One way to determine the streak is to rub the mineral across a piece of unglazed porcelain known as a "streak plate."

- **Cleavage:** It describes how a mineral breaks up into pieces. Minerals that break into pieces with flat sides have good cleavage. Other minerals show fracture.

- **Colour:** Although colour is often used to describe a mineral, it sometimes isn't the best way to tell one mineral from another as one type of mineral can come in several different colours.

E._____?

There are many different types of minerals, but they are often divided into two main groups: silicates and non-silicates. Silicates are minerals that contain silicon and oxygen like quartz, feldspar, amphibole, pyroxene, and olivine. Over 90% of the Earth's crust is made up of silicates. The rest of the minerals are into a group called non-silicates which do not include the silicon-oxygen. They may contain oxygen, but not in combination with silicon. There are six classes of non-silicate minerals:

Native elements minerals such as copper, gold, diamond, graphite, and sulphur can be thought of as a third group of minerals. These naturally-occurring minerals are composed of a single element (uncombined with other elements) and have distinct structures.

Retrieved from https://www.ducksters.com/science/earth_science/minerals.php

AFTER YOU READ

6. Work with a partner. Read the chart and check the meaning of the minerals in a dictionary.

MOHS' HARDNESS SCALE

Mohs' Hardness Scale of minerals is one of the most important tests for identifying mineral specimens. This test compares the resistance of a mineral which is scratched by ten reference minerals. This scale ranges from a value of 1 for talc to 10 for diamond. It was created in 1812 by the German geologist and mineralogist Friedrich Mohs.

1. TALC

2. GYPSUM

3. CALCITE

4. FLOURITE

5. APATITE

6. FELDSPAR

7. QUARTZ

8. TOPAZ

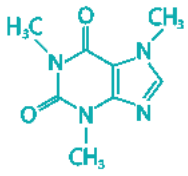
9. CORUNDUM

10. DIAMOND

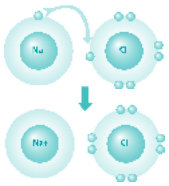
Adapted from https://geology.com/minerals/mohs-hardness-scale.shtml

7. Look at the pictures and the definitions. Then, write the corresponding words on the lines and compare your answers with a partner.

Atom _____ is a particle of matter that uniquely defines a chemical element. It consists of a central nucleus that is usually surrounded by one or more electrons. Each electron is negatively charged.



_____ is a group of atoms bonded together, representing the smallest fundamental unit of a chemical compound that can take part in a chemical reaction.



_____ is an atom or atom group that is electrically charged by the loss or gain of electrons, represented by a plus or a minus sign, as Na+, Ca++, or Cl-.

8. Read the questions and circle the correct alternative.

I. Which of the following is a characteristic of a mineral?

A. They are usually solid
B. They occur naturally
C. They are inorganic
D. They have a definite chemical composition
E. All of the above

II. What does the mineral property of lustre measure or describe?

A. The colour of the mineral in powdered form
B. Describes how easy it is to scratch the surface of a mineral
C. Describes how well a mineral reflects light
D. Describes how a mineral breaks into pieces
E. Al of the above

III. What does the mineral property of hardness measure or describe?

A. The colour of the mineral in powdered form
B. Describes how easy it is to scratch the surface of a mineral
C. Describes how well a mineral reflects light
D. Describes how a mineral breaks into pieces
E. All of the above

IV. What does the mineral property of cleavage measure or describe?

A. The colour of the mineral in powdered form
B. Describes how easy it is to scratch the surface of a mineral
C. Describes how well a mineral reflects light
D. Describes how a mineral breaks into pieces
E. All of the above

V. What does the mineral property of streak measure or describe?

A. The colour of the mineral in powdered form
B. Describes how easy it is to scratch the surface of a mineral
C. Describes how well a mineral reflects light
D. Describes how a mineral breaks into pieces
E. All of the above

VI. Which is one of the ways to determine the streak of a mineral?

A. To observe how light reflects
B. To scratch the surface of a mineral
C. To break up the mineral into small pieces
D. To rub the mineral across an unglazed porcelain.
E. All of the above

VII. What are the two main elements that make up silicate minerals?

A. Carbon and Oxygen
B. Silicon and Oxygen
C. Silicon and hydrogen
D. Silicon and Carbon
E. All of the above

VIII. Which of the following is not a non-silicate mineral class?

A. Carbonates and Sulphates
B. Halides and Oxides
C. Cleavage and Streak
D. Sulphides and Phosphates
E. All of the above

IX. What is the Mohs' Scale used for?

A. Measuring the hardness of the mineral?
B. Measuring the lustre of the mineral?
C. Measuring the cleavage of the mineral?
D. Measuring the streak of the mineral?
E. All the above

X. Which of the following is not a native element mineral?

A. Copper
B. Diamond
C. Sulphur
D. Amphibole
E. Graphite

Lesson III: Speaking

WARM UP

1. Work with a partner. Each of you should select a common object. Take turns to say facts about your object for 1 minute. The student who says more statement is the winner.

For example:

- A pencil-Pencils are made from wood and graphite
- I can use a pencil for writing
- A pencil is longer than an eraser
- I have a technical pen

INPUT

LANGUAGE NOTE

- Which mineral is the hardest, gold, copper or diamond?
  Diamond is the **hardest**
- Which river is longer, the Nile or the Amazon?
  The Nile is **larger** than the Amazon
- Which is the most expensive mineral?
  I'm not sure. I guess, platinum is **the most expensive**

Adjectives	Comparative	Superlative
Large	Larger	The largest
Hard	Harder	The hardest
Heavy	Heavier	The heaviest
Dry	Drier	The driest
Expensive	More expensive	The most expensive
Crystalline	More crystalline	The most crystalline
Good	Better	The best
Bad	Worse	The worst

2. Complete questions a to c with comparatives and d to f with superlatives. Then ask and answer the questions.

a. Which mount is ___**higher**___, mount Everest or mount Aconcagua? (high)

b. Which language is_____ to learn, English or German? (difficult)

c. What is _____ for your health, juice or water? (good)

d. Which city is_____: Antofagasta, Valparaíso, or Valdivia? (dry)

e. What is _____ ocean : the Pacific or the Atlantic? (deep)

f. Which is _____ sport in South America: tennis, football or basketball? (popular)

CONTROLLED PRACTICE

3. Read the following dialogue between Catty and Paul . Then, work with a partner. Choose a role and practice the dialogue.

Catty: Look! Here is a geology quiz in the newspaper.
Paul: Oh! I love geology. Ask me the questions.
Catty: Ok, Question number one: Which mineral is the hardest: gold, copper or diamond?
Paul: I know. Diamond is the hardest
Catty: Well done! Question number two: What kind of rock is pumice? Is it igneous, sedimentary, or metamorphic?
Paul: Let' me see. I think it's igneous, a plutonic igneous rock.
Catty: That's correct. Question number three: Which is heavier, a pound of gold or a pound of copper?
Paul: Both weight the same.
Catty: That's right. Now, this is a difficult one. Around 99% of minerals in the Earth's crust are made up of: ten, eight or 5 elements?
Paul: Hmm, I'm not sure. I guess 10 elements
Catty: Sorry! But you've failed in this one. The right answer is 8 elements.

4. Now switch roles and repeat the dialogue again.

FREER PRACTICE

5. Work with a partner. Choose and adjective from the box to complete the chart according to the example. Then, add four more groups of words and appropriate adjectives.

bright - expensive - large - beautiful - smooth - fast

Group of words			Adjectives	Comparative	Superlative
atom	molecule	electron	**large**	**larger than**	**the largest**
silver	copper	gold			
marble	shale	limestone			
airplane	bus	train			

6. With your partner, take turns asking and answering questions with information from the chart

Example:

Student A: Which is larger, an atom or an electron?
Student B: An atom is larger than an electron.
Student A: Which is the largest, an atom, a molecule or an electron?
Student B: The molecule is the largest.

7. With your partner, take turns asking the questions to your class using the information you added to the chart.

WRAP UP

8. Name one important thing you learned in class today.

Lesson IV: Writing

PRE WRITING

- You are going to write a description of rocks meaning. Then, circle the word which does not correspond to the group.

- Choose two rocks. Describe and compare them.
- Read the description of rocks in activity 9, lesson I and use them as a model.
- Brainstorm using graphic organization; create a cluster, diagram or conceptual map.
- Determine the "who, what, where, when, why, and how" of your topic.
- Determine what you already know and what you need to learn.

DRAFTING

- Start drafting and keep referring back to your notes and the plan you determined in the previous stage.

- Concentrate on getting your ideas on paper, organizing your ideas logically.

REVISING

- Write down some questions to check if you have achieved your purpose. For example:

- Is my pupose clearly for the reader?
- Do I clearly maintain that purpose thoughout the document?
- Does all my supporting information clearly related to my purpose?
- Do I organize my ideas to best fulfill my pupose?

EDITING

- Focus on grammar, sentence structure, word choice, puntuation, capitalization, spelling, citation and document format.

PUBLISHING

- Turn your writing in paper to your teacher and you may also post it in internet.

Project: "A Museum in the Classroom"



Name of the project	"A Museum in the Classroom"
Level	Pre-intermediate
Time	3 hours
General aims	Talk about rocks and minerals origin and characteristics
Language Aim(s)	Students will be able to: a. Practice and consolidate vocabulary about rocks and minerals. b. Use comparative and Superlative forms of adjectives c. Review Parts of Speech.
Resources/Materials	Cardboard, paper, coloured pencils, paint, computer, samples of rocks and minerals, computer, camera.
Teacher's role	Guide and help students to practice and apply their skills and solve problems.
Students' role	Collect all the material and information to plan, organize, create and set up a rock museum in their classroom.

1. Look at the pictures A and B and answer the questions

PICTURE A

PICTURE B

A. What do you see in each picture?
B. Where do you see these exhibits?

2. You will create a rock and mineral museum in your classroom. Work in group. Read the following steps to plan organize and carry out your exhibition.

Pre- planning:
- Brainstorm ideas for an exhibition.
- Take a tour at a virtual museum or watch some videos. See these links:

https://ricenorthwestmuseum.org/virtual-tour-2/
http://bangkokmuseums.com/rock-and-mineral-museum/item/212-rock-and-mineral-museum-360-degrees-virtual-reality-vr
https://virtual-museum.soils.wisc.edu/
https://www.youtube.com/watch?v=QKfZmux7NkU

1. Planning:
- Choose at least four samples of rocks and four of minerals.
- Assign roles among the group.
- Each member of the group must present orally a description of a rock and a mineral.
- All the group leaders must meet to make the exhibit map.
- Make a checklist with all the activities you need to carry out and make a timeline.

2. Researching your theme:

- Gather information about your samples for the exhibition and presentation.
- Include: descriptions, interesting facts, history, uses, rock cycle, etc.
- Brainstorm some questions the visitor (your other classmate) might ask you about your samples and get ready to answer them in English.

3. Creating the Displays:

- Get real samples if posible.
- Create posters, use photos, drawings, charts, etc.
- Show videos, slides about your topic.
- Build up your exhibition stand with tables, shelves, card boxes, etc.

4. Bringing your exhibition to life

- Set up your exhibition stand and display your samples, and all the materials you have prepared and give your speech about your rocks and minerals.

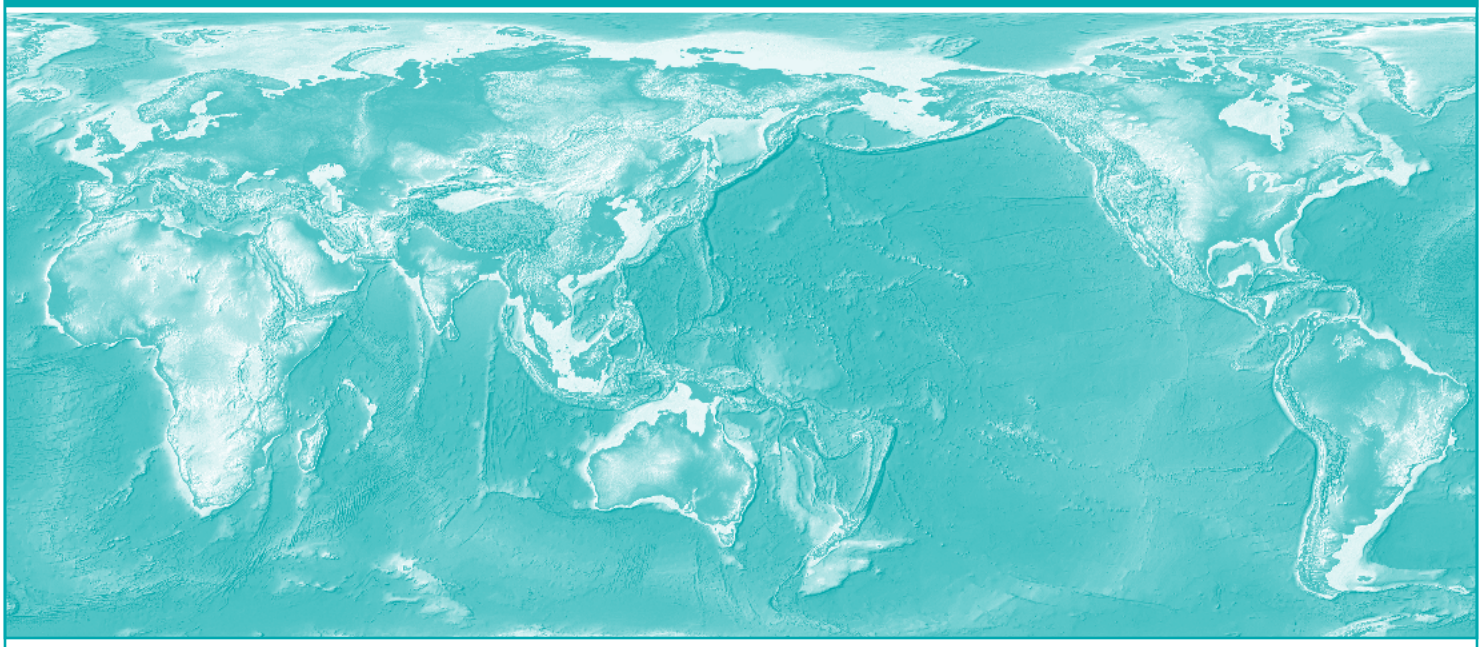
FOLLOW UP

Imagine that a member of your class has been absent for the preceding lesson. Write a letter to the absent student to fill him/her in on the activities and contents that he/she has missed.

VARIATIONS

Depending on the level of proficiency, other groups can take notes during oral presentations and ask questions after presentation is finished in order to gather more specific information.

Unit IV: Reading and elaboration of topographic and geological maps



Goal: Fluently produce and understand short and clear oral and written texts in communicative situations that involve differing points of view, in order to interact and become aware of one's own identity.

Skills: Listening, Reading, Speaking, Writing

Project: "Building a Mountain"

☆ 25 KEY WORDS

- Cluster (v)
- Contacts (n)
- Contour interval (n)
- Contour line (n)
- Countryside (n)
- Depression (n)
- Earthquake (n)
- Elevation (n)
- Evolve v)
- Fault (n)
- Fold (n)
- Geological map (n)
- Geo-photography (n)
- Geothermal energy (n)
- Index contour line (n)
- Landslide (n)
- Map legend (n)
- Measure (n)
- Overall (n)
- Overflow (n)
- Peak (n)
- Record (v)
- Stereoscope (n)
- Topographic map (n)
- Wilderness (n)

Lesson I: Listening Comprehension

BEFORE YOU LISTEN

1. Work with a partner. Look at the maps below and compare them.

Example: Map 2 has many lines and curves and Map 3 has less lines but more shapes, and Map 1 has very few lines ...

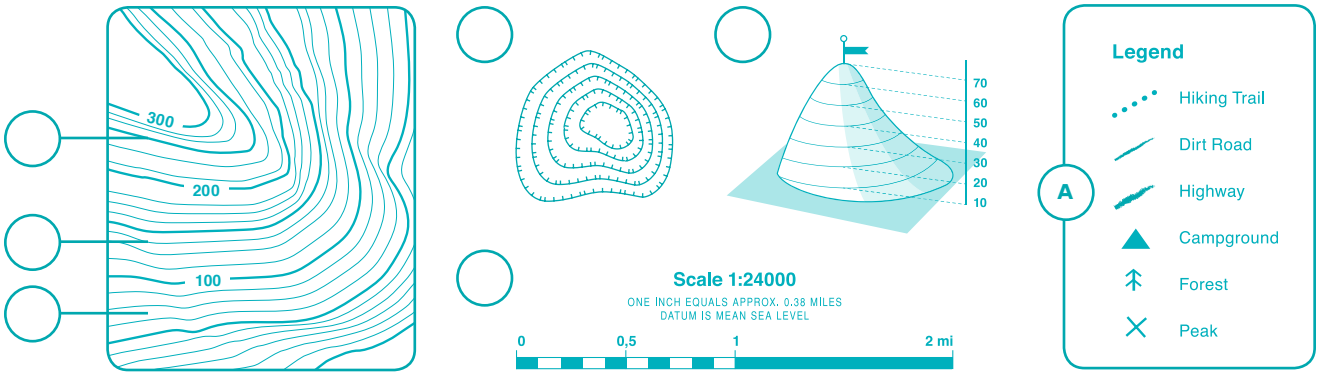
MAP 1

MAP 2

MAP 3

2. Which of the above maps might be mentioned in the listening activity?

3. Read and study the definitions, then match them with the corresponding picture.



A. A map legend or key is a visual explanation of the symbols used on a map.
B. A map scale is the relationship between distance on a map and distance on the ground.
C. Contour interval is the change in elevation between adjacent contour lines.
D. Contour line is a line connecting points of equal elevation on a map.
E. Depression is a contour line with hachure marks to indicate a depression or hollow.
F. Elevation is the height of a location above a fixed reference point, usually sea level.
G. Index contour line is a contour line that includes an elevation label.

4. Work with a partner. Discover what each group of words has in common.

a	three - feet - sheet	**They have a common sound**
b	peak - ground - slope	
c	flat - gentle - scant	
d	label - measure - organize	
e	fifth - date - meters	
f	string - streams - step	

WHILE YOU LISTEN

Click here to listen

5. Listen to Carla, Tony and Laura talking and check your prediction in activity 2.

6. Which is the main topic of the listening activity? Circle the correct answer.

A. Route maps **B.** Geological maps **C.** Topographic maps **D.** Physical maps

AFTER YOU LISTEN

7. Look at the pictures and answer the question. Then compare with a partner.

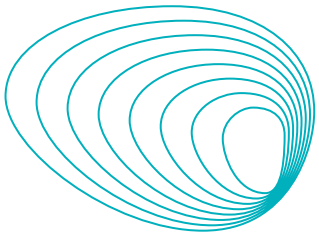
I. Which land is the flattest? **D**

II. Which land is the highest? _____

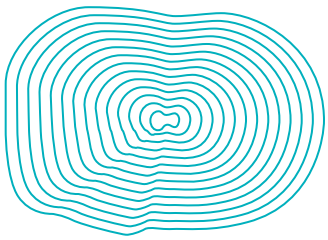
III. Which land is the deepest? _____

IV. Which land is the steepest? _____

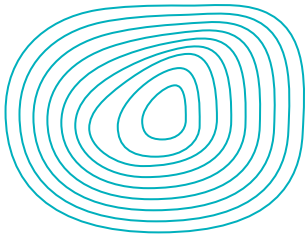
A



B



C



D

8. Read the sentences and write T for true and F for false and correct the false statement

A. A large scale map covers a large area with many details. F

B. Contour lines in a river, valley or stream are often V-shaped.

C. Topographic maps do not show the location of things; like roads and trails.

D. When the lines form concentric circles they might be showing a hill.

E. When contour lines are close together they indicate a flatter terrain

F. Each fifth contour line appears thinner and labelled with numerical elevation.

G. Topographic maps help you to visualize a three-dimensional terrain.

H. The map legend is loaded with clues for reading the map .

Lesson II: Reading Comprehension

BEFORE YOU READ

1. Work with a partner. Match the definitions below with the pictures

A

A. **Contact** is the surface along which one rock touches another. They may be either Depositional, Intrusive, of Fault contacts.

B. A **fault** is a planar fracture or discontinuity in a volume of rock, across which there has been significant displacement as a result of rock-mass...

C. An **overflow** is a large amount of water beyond its normal limits, especially over what is normally dry land.

D. **Earthquake** is any sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks.

E. **Landslide** is also called landslip, the movement down slope of a mass of rock, debris, earth, or soil.

F. **Stereoscope** is an optical instrument for viewing two dimensional pictures which gives an illusion of depth and relief.

WHILE YOU READ

2. Read the article. Write the number of the paragraph where each sentence could go.

____ **A.** Geological maps are the primary source of information for various aspects of land-use planning, including the sitting of buildings and transportation systems.

____ **B.** Many colors used on maps have a relationship to a natural or man-made object or feature on the ground.

1 **C.** When we look at mountains, rivers and forests or hike in the countryside, we have the feeling that the landscape around us is unchanging.

____ **D.** The position of rocks (strike and dip) and geological structure elements have to be measured.

____ **E.** With the initial study geologists can determine which points must be observed directly in the field.

"DRAWING THE EARTH"

1 We live on an evolving planet which has been transforming for millions of years and it continues; therefore what we see on the planet's surface is just a small part of the whole. A wide variety of geological materials; rocks, sediments, minerals, and more, are under our feet and their presence, composition, characteristics and formation is what geologists study and their graphic representation is what is known as a geological map.

2 A geological map takes a deep look at which materials crop up on the Earth's surface and how each of these elements is set up, in other words, the map is a representation of the geological architecture of above-ground and underground. They provide vital information about mineral and energy sources like coal and oil; it also helps us to locate the water that is filtered into aquifers and to use geothermal energy. In addition geological maps are important for guiding agricultural activities and thanks to geological studies that are supported by maps we can establish where natural processes might occur including landslides, earthquakes, floods and volcanic eruptions minimizing the consequences of natural disasters.

3 Making a geological map is a hard job. First, any existing work that covers the area you want to map has be analyzed and studied and a general view of the terrain and any variations in elevation have to be obtained by means of pairs of aerial photos which are partially superimposed and with the help of a stereoscope you can have a three-dimensional view of the surface of the study area. Geo-photography is used in less complicated zones with scant vegetation to create a preliminary map.

4 Contacts, strikes and dips, faults and folds as well must be marked with precision. Samples of rocks, sediments and fossils must be collected, studied and carefully labelled and the exact date and location are recorded to represent them on the map.

5 All of the information on the geologic map is won from the countryside by the hard work and trained eyes of geologists. But the real beauty of geologic maps—not just the information they represent—is in their colours. You could have a geologic map without using colours, just lines and letter, symbols in black and white. But it would be user-unfriendly. Then, what colours to use for the different ages of rocks? Dark colours are often used for igneous rocks, light shades for sedimentary. Igneous rocks cluster around red colours, and plutonic rocks use lighter shades plus aleatory patterns of polygonal shapes, and both darken with age. Metamorphic rocks use rich, secondary colours as well as oriented, linear patterns. All of this complexity makes geologic map design a specialized art.

Retrieved from https://www.youtube.com/watch?v=qdz9DN74ukY

AFTER YOU READ

3. These sentences are false. Correct each one to make it true.

a) Geo-photography is used in less complicated zones with ~~abundant~~ scant vegetation.

b) Geological maps are important for guiding tourists.

c) Dark colours are often used for sedimentary rocks.

d) An approximate date and location are recorded to represent them on the map.

e) Topographic maps provide vital information about mineral and energy sources.

Lesson III: Speaking

WARM UP

1. Memory game. Work in group. Choose an object and complete the sentence as in the example. The student who doesn't say the complete sentence during his/her turn is out of the game.

I can use a_____ **for**_____

For example:

Student A: I can use a map for planning my trip

Student B: I can use a map for planning my trip and determining distances

Student C: I can use a map for planning my trip, determining distances and searching a place

Student D: I can use a map for planning my trip, determining distances, searching a place and ...

INPUT

LANGUAGE NOTE: INFINITIVES AND GERUNDS FOR USES AND PURPOSES	
Infinitives	**Gerunds**
I use a compass to navigate	I use a compass for navigating
A compass is used to find the way	A compass is used for navigating

2. Match column A with Column B. Then compare with a partner (more than one answer is possible)

	A		B
D	A locator beacon is used to	**A.**	read the news
	I use graphs for ...	**B.**	produce a magnified image of an object
	You can use a technical pen for ...	**C.**	making lines of constant width
	People use the internet to ...	**D.**	find a person in distress who is away from emergency services
	Hand-held clinometers are used for ...	**E.**	presenting data that are too numerous
	A hand lens is used to ...	**F.**	measuring a slope or the height of a tree.

CONTROLLED PRACTICE

3. Read the dialogue and check any word you don't know. Then, practice the dialogue with a partner and switch roles

Ely: Hi! Alex, what are all these things?
Alex: My gear for a field trip.
Ely: Mmm, and why do you have these strange glasses?
Alex: Oh! They are not glasses. It's a stereoscope.
Ely: A stereoscope! What is it used for?
Alex: It's an instrument that geologists use for watching aerial photos.
Ely: Aerial photos? What do you mean?
Alex: Look! These are aerial photos. They are taken from an airplane or other flying objects.
Ely: And how ...
Alex: I'm sorry my little sister. I don't have time for more questions.

FREER PRACTICE

4. Work with a partner. Choose and adjective from the box to complete the chart according to the example. Then, add four more groups of words and appropriate adjectives.

bright - ~~watch~~ - wet wipes - whistle - broom - compass - chisel
handheld GPS - knife - soap - ~~hammer~~ - torch - ~~scouring pad~~

Items Chart			Your own category
Tools or Instruments	Gadgets	Cleaning supplies	
hammer	watch	wet wipes	

5. With your partner, create a dialogue with the information from "your own category" using as a model the dialogue in activity 2.

6. Practice and present your dialogue to the class.

WRAP UP

7. Say what your favourite item is and what you use it for.

Lesson IV: Writing

PRE WRITING

- You are going to write an article comparing a Topographic and a Geological Map

  - Review lesson I and II of this unit for ideas, vocabulary and grammar you might need to write your article.
  - Brainstorm using graphic organization; create a cluster, diagram or conceptual map.
  - Determine what you already know and what you need to learn.
  - Research for differences and similarities between both maps, purposes, who are the ones who use these maps, etc
  - You can start like this:

    Example:
    Topographic maps are three-dimensional representations... that use contour lines to... while geological maps are special purpose maps that show...

DRAFTING

- Start drafting and keep referring back to your notes and the plan you determined in the previous stage.

  - Concentrate on getting your ideas on paper, organizing your ideas logically.

REVISING

- Write down some questions to check if you have achieved your purpose. For example:

  - Is my pupose clearly for the reader?
  - Do I clearly maintain that purpose thoughout the document?
  - Does all my supporting information clearly related to my purpose?
  - Do I organize my ideas to best fulfill my pupose?
  - Do I hace the appropiate information?

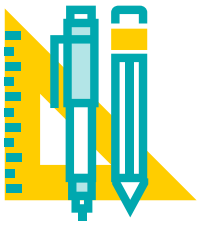
EDITING

- Focus on grammar, sentence structure, word choice, puntuation, capitalization, spelling, citation and document format.

PUBLISHING

- Turn your writing in paper to your teacher and you may also post it in internet

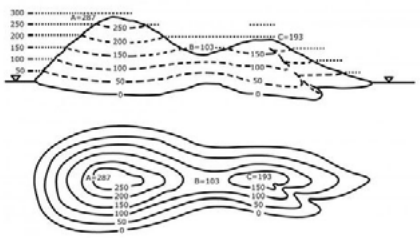
Project: "Building a mountain"



Name of the project	"Building a mountain"
Level	Pre-intermediate
Time	3 hours
General aims	Understand and describe a process
Language Aim(s)	Students will be able to: a. Practice and consolidate vocabulary of topographic and geological maps. b. Use infinitives and gerunds to describe a process c. Review comparative and superlative adjectives
Resources/Materials	Scissors, glue, a pen or marker, foam paper, cardboard, card stock, etc. Anything that will be able to show shape and elevation.
Teacher's role	Guide and help students to practice and apply their skills and solve problems.
Students' role	Collect all the material and information to plan, organize and make a Topographic model

PROCEDURE

1. Work with a partner. Look at these pictures and discuss the questions.



_____	_____	_____	_____

A. What do you see in the pictures?

B. What is it being built?

C. Label the pictures. Choose the sentences from the chart below.

add the legend and symbols - glue all together - trace the map
cut the layers in the middle - cut out the map - get or draw a Topo map

2. Work in group of four. You are going to make a Topographic Model.

Pre- planning:
- Brainstorm ideas for your Topo model.
- Look at some pictures or videos about map models

1. Planning:
- Assign roles among the group
- Select the material you want to use to build up the model
- Write down all the steps, materials and activities necessary to make your model
- Prepare a full report about the Topo map you'll use for the project
- Each group have to give an oral report about the project

2. Researching : • Get information about the Topo map you'll use in your project, type of rocks and minerals, location, number of a contour lines, distance of contour intervals, elevation, etc.

3. Hands on work:

A. Get or draw a Topo Map
B. Cut out the Topo map and trace the first elevation layer on foam paper (or other material) to show the elevation.
C. After tracing your 1st contour line on the foam paper, cut it out.
D. Cut out the 2nd counter line, trace it on the foam paper and cut it. Now you have two layers for your Topo model
E. Repeat steps c and d until you have all the layers on foam paper.
F. Glue all the layers together to build your model.

4. Present the model and the report

• Show your model and give an oral report about your project

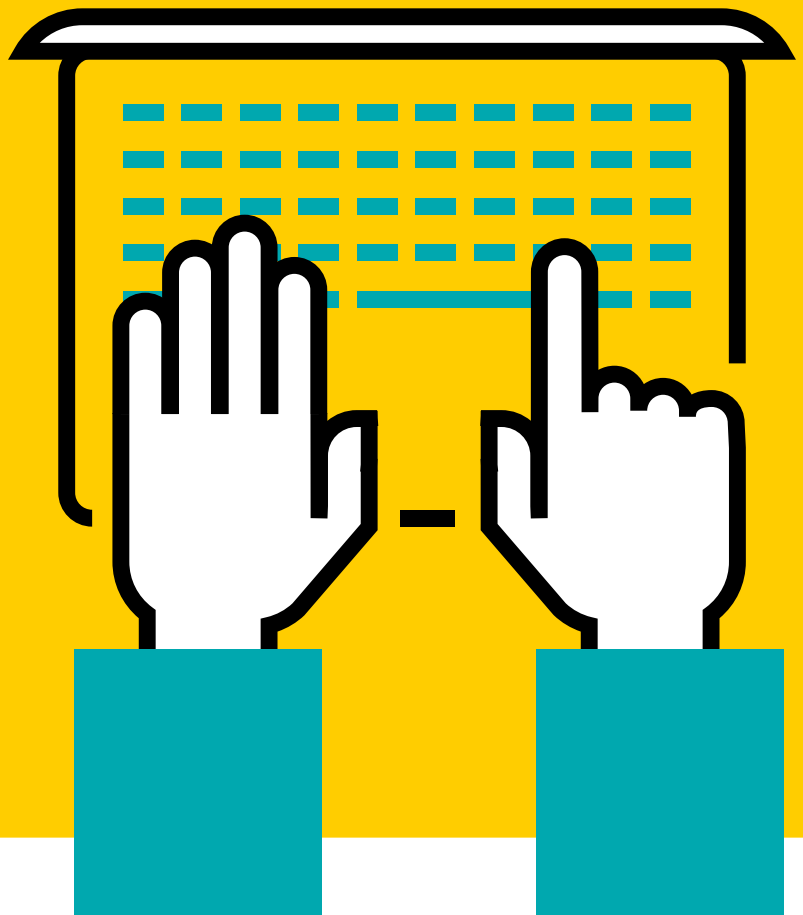
FOLLOW UP

Write a report about the preparation of the project and how it was carried out.

VARIATIONS

Depending on the level of proficiency, other groups can take notes during the oral report and ask questions and give suggestions at the end of the oral report.

Appendix



ANSWER KEY UNIT I

UNIT I: "PREPARATION AND SETTING UP OF CAMPS"

Lesson I: Listening Comprehension

1. A. Answer will vary

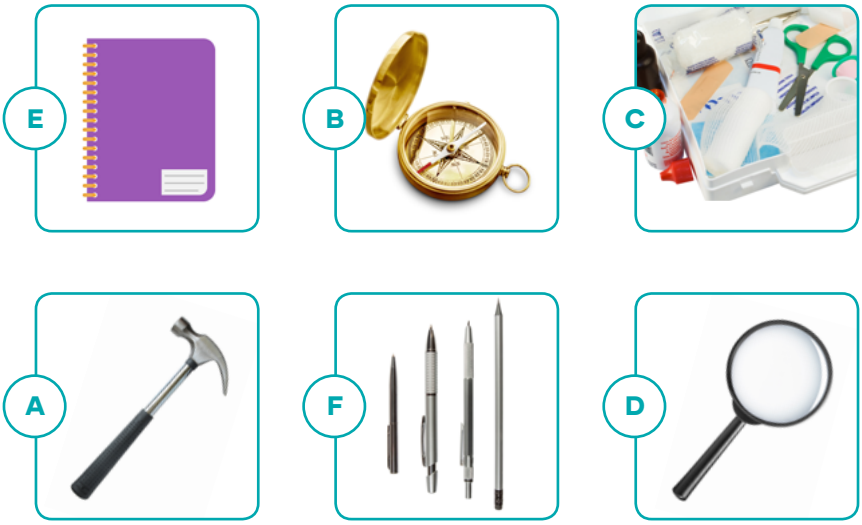
   B. Answer will vary

2. Answers will vary. Possible answers:

- Example: There are many people in picture 1, but there are only two people in picture 2
- People are having fun in picture 1, but people are working in picture 2
- There is a lake or river and trees in picture 1 , while there is a van on the road loaded with things in picture 2.

3. Picture B

4.



5.

Facilities	Permits for	Field gear	Personal gear
kitchen	**camping**	**hand lens**	**sun screen**
showers	exploration	first-aid kit	field boots
waste disposal	transportation	field notebooks	water bottle

6. Self study

7. Picture B

8. B; D; F

9. A. must; B. 'd better; C. shouldn't; D. ought to; E. have to; F. must; G. need to; H. don't have to

10. Answers may vary. Possible answers:

1. Field boots; 2. Compass; 3. Maps; 4. Hand lens; 5. Rock hammer; 6. Notebook; 7. Technical pens; 8. Colour pencils; 9. Sun hat; 10. Sun glasses.

Lesson II: Reading Comprehension

1. A. Set up a field camp; B. Health; C. Safety; D. Transportation; E. Weather; F. Abandonment and restoration

2. A. Supply B. Enhance C. Brimmed D. Waste

3. I. Get ready for all kind of climatic conditions
II. Look after yourself
III. Reduce your footprint and go green
IV. All things considered
V. Alive and well
VI. Free of danger behind the wheel

4. Possible answers:

A. I may find wild animal that might be dangerous and poisonous plants.
B. I must cover my skin with clothing or with repeated applications of sun screen. I also should wear high-quality UV-filtering sunglasses and full brimmed hats.
C. It is recommended to remain vigilant, avoid distractions, be sufficiently physically fit and in good health and wear safety equipment in case of risky activities.
D. We must comply with all applicable transport regulations like licenses, emissions, maximum load, permits, road signs and speed limits.
E. I can treat the soil compacted by regular use and transit.
F. It's advisable to set up a camp on a sloping land because of potential flooding or a negative environmental impact on local water resources

5. Possible answers:

A. Article N II. Explanation: I chose this article because it refers to accident prevention.
B. Article N III. I chose this article because it refers to the care of the environment.
C. Article N I. I chose this article because it refers to the weather
D. Article N IV. I chose this article because it gives advice about setting a camp.
E. Article N V I chose this article because it recommends how to keep healthy.
F. Article N VI. I chose this article because it tells about transportation issues.

Lesson III: Speaking

1. Answers will vary

2. Practice activity

3. Answers will vary

4. A. 4 B. 3 C. 5 D. 6 E. 1 F. 2

5. Possible answers:

1st This first sign means you aren`t allowed eating or drinking in the meeting room.
2nd The second sign means you can swim.
3rd The third sign means you aren`t allowed to make fire.
4th The fourth sign means you've got to put on sunscreen.
5th The fifth sign means you can`t throw waste.
6th The sixth sign means you aren't allowed to swim.
7th The seventh sign means you can climb there.
8th The eighth sign means you have to wear a brimmed hat.

6. Practice activity

7. Practice activity

8. Practice activity

9. Practice activity

10. Answers will vary

11. Answer will vary

Lesson IV: Writing

1. Practice activity

2. a. 5 b. 7 c. 1 d. 6 e. 4 f.3 g. 8 h.2

3. Answers will vary

4. Practice activity.

5. Practice activity

6. Practice activity

7. Practice activity

8. Practice activity

9. Practice activity

10. Practice activity

Lesson V: Project A Successful Camp!

1. Answer will vary. Possible answers

A. There are only two people; a man and a woman in picture A and there are many people in picture B.

B. People are looking at a map in picture A and people are setting up a camp in picture B.

C. Answers will vary

.

2. Answers will vary

3. Hands-on activity

4. Practice activity

UNIT II: "LEGAL FRAMEWORK AND SECURITY IN GEOLOGY"

Lesson I: Listening Comprehension

1. Answers will vary.

2. Answers will vary.

3. Practice activity.

4. Picture A : Hazard Picture B: Risk

5. A. 4; B. 6; C. 2; D. 1; E. 7; F. 3; G. 5

6. A. F; B. T; C. F; D. T; E. T

7. Possible answers

A. Hazard is something that has the potential to cause harm while risk is the chance or probability that hazard cause

8.

HAZARDS				
Physical	Chemical	Biological	Ergonomic	Psychological
				
Electricity	Acid	Bacteria	Repetitive Noise	Stress
AGENTS				

Lesson II: Reading Comprehension

1. Answers will vary.

2. Answers will vary. Probable answers:

Picture A: A man is working outdoors. Although, the place looks beautiful, it is not safe because he is in a rocky area and could suffer an accident. The weather is nice, sunny and warm. He is wearing a T-shirt, jeans and a hat.

Picture B: The people are in an extremely cold area; probably in the Arctic or the Antarctic region. They are carrying heavy boxes. Their working conditions seem to be very dangerous because of the snow. They are wearing waterproof insulated jackets and pants, gloves and warm hats.

Picture C: People are in a rocky and dry area. They are collecting rock samples. It doesn't look like a comfortable place to work. The weather seems to be fine but cold. They are wearing safety equipment.

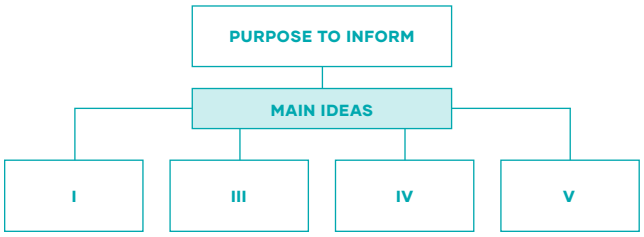
Picture D: A man is standing on a narrow board that crosses a river. He is probably looking for something and it's cold and wet. He is wearing waterproof jacket with a hood.

3. 1. Quarry 2. Cliff 3. Darkness 4. Impaired 5. Seatbelt 6. Slope.

4. (√) Certain activities might affect your safety.

5. 1. G; 2. H; 3. F; 4. E; 5. B; 6. D; 7. A; 8. C

6.



7. A. HL B. CO C. Ch D. HL E. Ch F. CO

Lesson III: Speaking

1. Answers will vary

2. Practice activity

3. Practice activity. Answers will vary

4. Answers will vary

5. Practice activity

6. Practice activity

7. Answers will vary

Lesson IV: Writing

1. A. Purpose B. Facilities C. Procedure D. Agreement E. Assessment F. Infrastructure

2. Practice activity.

3. Possible answers:

• Law 16.744

A. To protect workers in case of accidents and deceases.

B. workers

C. IST, Instituto de Seguridad del Tabajo (Work Safety Institute)

• Law N 19.300

A. To protect the environment

B. People, nature and heritage.

C. No one is mentioned

• Decree N 132

A. To protect people's life, facilities and infrastructures involved in mining activities.

B. Workers, facilities and infrastructure involved in mining activities.

C. National Mining Extractive Industry

• ILO Convention 169

A. To protect indigenous people

B. Indigenous people

C. The State of Chile

4. Answers will vary

5. Practice activity

Lesson V: Project: How much do we care for our security?

1. √ A survey: an activity where you ask the same questions to different people.

2. A. T B. F C. F

3. Practice activity

4. Practice activity

5. Answers will vary.

6. Practice activity.

UNIT III: "CLASSIFICATION OF ROCKS AND MINERALS"

Lesson I: Listening Comprehension

1. A. Answers will vary.
   B. Answers will vary.

2. Shape: Sharp, flat, steep, oval, round
   Size: wide, large, deep, light, heavy
   Texture: hard, rough, porous, smooth, dense
   Others: intrusive, metamorphic, igneous, extrusive, sedimentary,

3. A. and B.

4. A. Obsidian; B. Shale; C. Slate; D. Quartzite; E. Limestone; F. Granite; G. Marble; H. Sandstone; I. Diorite; J. Basalt

5. A. and B.

6. (2) Fragments; (3) Liquid; (4) Plutonic; (1) Volcanic

7. 1. The rock cycle begins with magma
   2. Magma becomes crystallized and gives origin to igneous rocks.
   3. Igneous rocks begin to erode
   4. Small fragments of rock are carried away as sediment
   5. Sediments are deposited in layers
   6. Sedimentary rocks are formed
   7. Sedimentary rocks are pushed below the surface due to tectonic activity

8. They are exposed to heat and pressure.

9. They change into metamorphic rocks.

10. If the metamorphic rocks are buried even deeper, they may melt and form magma, starting the cycle all over again.

8. A. Shale; B. Limestone; C. Obsidian; D. Granite; E. Marble; F. Slate

9. A. Intrusive or plutonic igneous rocks; B. Sedimentary rocks; C. Sedimentary rocks; D. Metamorphic rocks; E. Extrusive or volcanic igneous rocks; F. Igneous rocks; G. Metamorphic rocks

10. 1. Magma; 2. Crystallization; 3. Igneous rocks; 4. Erosion; 5. sedimentation, 6. Sedimentary rocks; 7. Tectonic burial; 8. Metamorphic rocks; 9. Melting

Lesson II: Reading Comprehension

1. Practice activity

2. Pyrate FeS2; Gold Au; Copper Cu; Silver Ag; Carbon C.

3. Scratch: Score or mark a surface of (something) with a sharp or pointed object.
   Rub: Apply firm pressure to the surface of (something) using a repeated back and forth motion.

4. Feldspar; Halides; Pyroxene; Ion; Oxides; Atom; Olivine; Graphite

5. A. What are minerals?

B. What is the difference between a mineral and a rock?

C. What are minerals made of?

D. What are the physical properties of minerals?

E. What are types of minerals?

6. Self study

7. A. Atom B. Molecule C. Ion

8. I. E; II. C; III. B; IV. D; V. A; VI. C; VII. B; VIII. C; IX. A; X. D

Lesson III: Speaking

1. Answers will vary.

2. A. Higher; B. More difficult; C. Better; D. Driest; E. Deepest

F. Most popular

3. Self study

4. Practice activity

5. Answers will vary. Practice activity

6. Practice activity

7. Practice activity

Lesson IV Writing

Practice activities

Lesson V: Project

1. Answers will vary. Possible answers:

A. Picture A: There is a display of an ancient animal skeleton.

Picture B: There is a display of rocks and mineral samples.

B. At a museum

2. Practice and hands-on activity

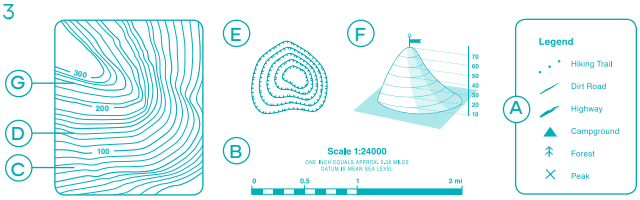
UNIT IV: "READING AND ELABORATION OF TOPOGRAPHIC AND GEOLOGICAL MAPS"

Lesson I: Listening Comprehension

1. Answers will vary.

2. Answers will vary.

3



4. Answers will vary. Possible answers:

A. They have a common sound /i:/

B. They all refer to earth's surface features

C. They are all adjectives d. They all are used for classification / they are all verbs

E. They all include numbers.

F. They all have a letter "s" at the beginning

5. Map 2

6. C. Topographic maps

7. I. D; II. A; III. C; IV. B

8. A. T; B. F; C. T; D. F; E. F; F. T; G. F; H. T

Lesson II: Reading Comprehension

1.

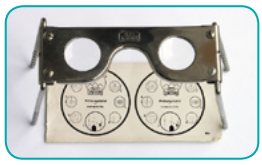
B 

D 

C 

E 

A 

F 

2. A. 2; B. 5; C. 1; D. 4; E. 3

3. A. ~~Abundant~~ → Scant; B. ~~Tourists~~ →Agricultural activities
C. ~~Sedimentary~~ → Igneous; D. ~~Approximate~~ → Exact;
E. ~~Topographic~~ → Geological

1. First, Publications or public documents about previous geological works carried out in the area are searched.
2. Next, the characteristics of the area to map must be studied.
3. Then, field trips for searching rock outcrops are organized.
4. Once an out crop is found, it is placed on the topographic map.
5. After that, the rock and fossils must be identified.
6. Then, outlines of the geometry of the layers are made in a field notebook.

Lesson III: Speaking

1. Answers will vary.

2. 1. D; 2. E; 3.C; 4. A; 5. F; 6. B

3. Practice activity.

4. Practice activity.

5. Practice activity.

6. Answers will vary.

Lesson IV: Writing

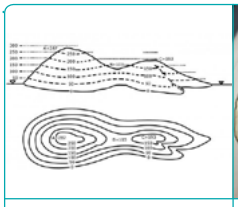
Practice activities.

Lesson V: Project

1. A. Answer will vary. Possible answer: A topographic map and map cutouts.

B. A topographic model

C.

			
get or draw a topo map...	trace the map	cut the layers	glue all together

2. Hands-on and practice activity.

Evaluate your performance:

4: Excellent
3: Good
2: Average
1: Poor

PROJECT: DESIGN CAMP RUBRIC		SCORE
Planning	My plan is organized and includes information showing how I will complete the project.	
Research	My project has information from good primary sources; that is original documents such as diaries, speeches, letters, interviews and autobiographies My plan is organized and includes information showing how I will complete the project., and secondary sources, which refers to publications as textbooks, magazine articles and reports. I have a variety of resources in my notes that support my research and it has a project bibliography.	
Content	My project relates to the topic and includes accurate facts, supporting details, clear and logical sequence and high quality examples.	
Writing	My writing is organized and fluent. I express my ideas using proper vocabulary, spelling, grammar and conventions	
Design	My project is creative and original and has information that is organized and easy to read.	
Oral Presentation	My presentation will demonstrate my knowledge of the subject matter. All of the material in my presentation relates to the topic. I will use the correct words to talk about my topic.	
Teamwork	I participated in discussions and contributed ideas about the project I know what needs to be done and when it is due. I will do what is necessary to help my team meet our goal. I cooperated with my team by listening, sharing ideas and tasks.	
	FINAL SCORE:	

Evaluate your performance:

4: Excellent
3: Good
2: Average
1: Poor

PROJECT: HOW MUCH DO WE CARE FOR OUR SECURITY?		SCORE
Content	My project demonstrated my own interpretation and expression of research material. I used graphs, charts, and visual aids to display information.	
Design	The content was well organized with headings and subheadings. Text and graphics were neatly organized and made the project easy to read.	
Oral Presentation	My presentation demonstrated my knowledge of the subject matter. All of the material in my presentation relates to the topic. I used the correct words to talk about my topic.	
Graphics	I used colorful and consistent backgrounds that enhanced the mood of the project. Graphics helped to clarify, explain, and support content.	
Writing	My writing is organized and fluent. I express my ideas using proper vocabulary, spelling, and grammar.	
Teamwork	I listened carefully to what others said. I shared ideas and resources freely. I talked about problems and found useful solutions. I knew what work needed to be done.	
	FINAL SCORE:	

Evaluate your performance:

4: Excellent
3: Good
2: Average
1: Poor

PROJECT: A MUSEUM IN THE CLASSROOM		SCORE
Planning	My plan is organized and includes information showing how I will complete the project.	
Research	I included facts, conclusions, and opinions from reliable sources.	
Content	All content directly related to the topic. Content was thoroughly developed and demonstrated detailed knowledge of the topic. Opinions were supported by fact wherever possible.	
Design	All visual aids are of exceptional quality. All components, such as scale, maps, posters, pictures and appropriate symbols, were included. All features were identifiable and properly labelled.	
Graphics	I used colourful and consistent backgrounds that enhanced the mood of the project. Graphics helped to clarify, explain, and support content.	
Oral Presentation	All information was clear and came from reputable sources. Extensive details and relevant examples were used to support the content.	
Writing	My writing is organized and fluent. I express my ideas using proper vocabulary, spelling, and grammar.	
Teamwork	I actively participated in all group discussions and activities. I shared ideas freely. I kept a clear record of all project requirements and deadlines and completed individual tasks on time and worked to help the team meet deadlines.	
	FINAL SCORE:	

RUBRICS, PROJECT UNIT IV

Evaluate your performance:

4: Excellent
3: Good
2: Average
1: Poor

PROJECT: BUILDING A MOUNTAIN		SCORE
Planning	My plan is organized and includes information showing how I will complete the project.	
Research	I included facts, conclusions, and opinions from reliable sources.	
Map and Model	Key or legend was complete. All necessary symbols were neatly represented. Features were neatly labelled. All features were labelled correctly..	
Team work	I actively participated in all group discussions and activities. I shared ideas freely.	
Oral Presentation	Demonstrated a thorough knowledge of the subject matter. Able to use audience questions to further demonstrate understanding of the topic. Appeared to be an expert on the subject being presented.	
	FINAL SCORE:	

SCRIPTS

UNIT I: PREPARATION AND SETTING-UP OF CAMPS

Lesson I: Listening (Script)

Daniela, a geology student assistant invited Mr. John Reed, a geologist, to her class for an interview. Listen to his advice and tips.

Daniela: What should we do to prepare for field camp?

Geologist: First of all, before you depart you have to prepare psychologically. It will consist of long hours of hard work but it will be rewarding as you'll work in beautiful, intellectually stimulating environments, feeling the depth of your geo-science knowledge expanding, and you'll return as a confident geology technician. In addition, you'd better get in shape; field camp will be physically rigorous. You must concentrate on cardiovascular conditioning by using the stair-stepper apparatus, taking the stairs in tall buildings, and hiking over rough terrain.

Daniela: Are there any other activities we should carry out prior to departure?

Geologist: Absolutely! Good planning must precede field camp. Careful attention should be given to the planning stage, appropriate follow-up, and evaluation. You should plan every single thing; number of participants, assignment of functions and roles, camp facilities like a kitchen, toilet and showers, permits; and check all permission slips the day before the field trip. You need to make your geology field equipment checklist; including field gear and personal gear.

Daniela: What is the most important gear?

Geologist: I consider essential field gear a compass, maps, a 10x hand lens, a rock hammer, two field notebooks, two technical pens, a set of coloured pencils, and a small first-aid kit. For essential personal gear you ought to pack field clothing, field boots, water bottles, a waterproof, breathable parka, a sun hat, sunglasses, sunscreen (SPF 30 or higher), a wrist or pocket watch or a phone, a field backpack, and a field belt – to carry your compass, hammer and other equipment.

Daniela: Do we need to study or review some contents to be better prepared for field experience?

Geologist: Yes! Don't forget to refresh your skills; in field camp you will need to be able to do some things more or less automatically such as use a compass and understand the concepts of strike and dip, read topographic maps, identify common minerals in hand samples, identify common sedimentary structures in outcrops, and construct 1:1 scale cross-sections.

Daniela: What advice can you give us for once we are at the field camp?

Geologist: Dress appropriately; a hat and good shoes are essential. In arid regions, a loose-fitting, woven, long-sleeved shirt to wick perspiration away and keep the sun off is also essential – cotton is good. You must be mindful of physical hazards including flash-floods, dangerous animals and bad weather conditions.

Daniela: Is there anything else you'd like to add?

Geologist: Oh, yes! Take your camera and start your image collection. And you shouldn't pack things you don't need! Leave room for pet rocks and retain your field notes. You may use them later in research or teaching. Finally, have fun and work hard!

UNIT II: LEGAL FRAMEWORK AND SAFETY IN GEOLOGY

Listening. Where do they hide?
Listen to a presentation about hazards and risks

We all hear these terms on a daily basis. A chemical, physical or biological agent poses a risk; one or another product is a hazard or behaves in an unsafe way.

A lot of the time "hazard" and "risk" are freely used to mean the same thing. However they are not.
Hazard is something that has the potential to cause harm to people, property, or the environment.
Risk is the chance or probability that a hazard causes harm or damage to people, property or the environment in defined circumstances.

Therefore we can prevent risks if we are aware of the hazards.
Hazards are classified as: physical, chemical, biological, ergonomic and psychological.
Let's see now what these hazards consist of...

First, a physical hazard comes from environmental factors like vibration, constant loud noise or a frayed electrical cord.

Second, a chemical hazard comes from a solid, liquid or gas element that could cause health problems or pollution. We are surrounded by these elements such as cleaning products, pesticides, welding fumes and many others.

Third, what is a biological hazard?

Well, it is a living or once-living organism that has the potential to pose a threat to human health; in particular, blood or other body fluids, fungi and bacteria.

Fourth, an ergonomic hazard can create physical and psychological stress because of forceful or repetitive work, improper work techniques, poorly designed tools or a poorly designed workplace, for example repetitive motion, poor posture and poor lighting.

Fifth, it is crucial to take into account the psychological hazards related to work environments and the way that work is organised. This hazard may cause psychiatric and/ or physical injury or illness like stress.

Therefore, watch out and find the hidden hazards!

UNIT III: "CLASSIFICATION OF ROCKS AND MINERALS"

Listening Script

Listen to Mark, a student, giving a presentation about rocks and the rock cycle to his class.

Rocks are everywhere! They are large and small, heavy or light, porous or dense, rough or smooth, hard, firm, sharp, oval, round, etc. Rocks are the mountains and the bottom of the ocean. They are everywhere on earth in a wide variety of shapes and sizes. Different types of rock are formed in different ways. There are three main types of rock: Igneous, Sedimentary and Metamorphic.

Igneous rocks are formed when rock is heated to extreme temperatures and becomes molten or liquid. Sometimes magma cools slowly below the earth's surface, forming intrusive or plutonic igneous rock. Most intrusive rocks have large, well-formed crystals. Two examples are granite and diorite. Other times lava cools when it comes to the surface in a volcanic eruption, forming extrusive igneous rock. Most extrusive or volcanic rocks have small crystals. Examples include obsidian and basalt. Igneous rocks make up about 95% of the earth's crust.

Sedimentary rocks are made of small pieces like sand, mud or organic particles, called sediments, that pile into layers at the bottom of water or land areas. As pressure on the sediment increases over time, minerals act like glue, cementing them into solid rock. The colour of sedimentary rocks is determined by the environment where they are deposited. Red rocks form where oxygen is present. Darker sediments form when the environment is oxygen-poor. Sedimentary rocks play a major role in the reconstruction of Earth's history. Fossils may be found in these types of rock. Some examples of sedimentary rock are limestone, shale, and sandstone.

Metamorphic rocks are rocks that have been changed under extreme heat, pressure and time. They can be formed by being deep under the earth, where pressure and temperatures are high, or when rock near the surface is heated up by the movement of tectonic plates or magma. They can be of many colours. It often depends on the chemical makeup of the source rock which was metamorphosed. Metamorphic rocks are crystalline and often have a layered or banded texture. The original rock can be sedimentary, igneous or even metamorphic which is changed into something new. For example; shale becomes slate, sandstone becomes quartzite, and limestone becomes marble.

Rocks are slowly but constantly changing in something known as the **"rock cycle".** The rock cycle begins with magma, or hot melted rock, deep beneath the earth's surface. This magma becomes crystallised, becoming igneous rock. These rocks begin to erode, or break down into small pieces because of wind, water, or other forces. The small fragments of rock are carried away as sediment when water passes over them and are deposited in layers which eventually become sedimentary rocks. Then, some sedimentary rocks are pushed below the surface due to tectonic activity, where they are exposed to heat and pressure, transforming them into metamorphic rocks. If the rocks are buried even deeper, they may melt and form magma, starting the cycle all over again. Of course, sedimentary and metamorphic rocks can be eroded into sediment, and igneous rock can become metamorphic rock or lava, but one way or another, rocks all over the world keep changing from one form to the next.

UNIT IV: READING AND ELABORATION OF A TOPOGRAPHIC AND GEOLOGICAL MAP

Listening Script

Listen to Carla, Tony and Laura talking. Which topic is each person talking about? Number the photos from 1 to 3.

Carla

Topographic maps are a little different from the average map not only they show the location of things; like roads and trails but they go further and give us the power to visualize three-dimensional terrain on a flat sheet of paper. Contour lines are what really make topographic maps something special. These lines connect points that share the same elevation and they never intersect. Contour lines that are close together indicate a steep slope, where the elevation changes quickly over a short distance but if they are separated, the elevation changes slowly, indicating a gentle slope. Contour lines can also help you visualize the shape of the terrain, for example: When the lines form concentric circles they're probably showing you a hill or mountain. Each fifth contour line appears thicker and labeled with numerical elevation in feet or meters listed at intervals along the line. The contour lines next to one another are separated by a constant difference in elevation. This difference between contour lines is called the counter interval. The map legend gives all the specific details about the contour intervals and index lines. Studying a topographic map of a familiar area is a great way to learn how to match terrain characteristics with the contour lines on a map.

Tony

Map scale refers to the relationship between distance on a map and the corresponding distance on the ground. In order to represent distances you have measured in the field on a piece of paper, you need to scale them down. This means that you must reduce the size of the distances proportionally according to a scale. The scale of the map tells you how detailed the map is. For example, a 1:2000 scale map means that 1cm on the map equals 20 meters (or 2000 centimeters) on the ground. Another map of the same region with a smaller scale covers a larger area but with less details. The important thing is that the map with a larger scale will show a smaller area but with more details. Understanding the level of details on your map is useful when planning your route but it isn't much help if you want to calculate distances efficiently that's why maps also have a small representative scale near their legend. This scale shows you the relative distance of a mile or a kilometer on your map and you can use the edge of a compass or even a piece of string to help you to know just how far away a specific place is.

Laura

One of the first things to look for on any new map is the legend. The legend is like the user's guide for your map. It is loaded with clues for reading the map and the data for its use. It's where the various lines, colors and symbols are defined. In relation to the colors on the map, the idea is that the darker the color the denser the vegetation, as you get closer to the top of a peak you'll notice that the colors get lighter as the forest disappears. And of course streams and lakes are represented in blue. Alongside the list of symbols there are a few other important pieces of information like details about the contour lines and the date of the maps most recent revision. This is also where you'll find the magnetic declination for the region which you'll use to set up your compass when you combine your understanding of contour line, scale and your maps symbols and colors you can almost visualize your whole trip before you go.

Flashcards

CAMPING

CLIFF

COMPASS

FIRST-AID KIT

FOSSIL

HAMMER

HELMET

ROCK

TECHNICAL PENS

TENT

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