

**Ministry of National Education,
Youth and Sports**

**National Center for Educational
Research and Development**



Evaluation Teacher's Guide

Life Science

October 1999

**Ministry of National Education,
Youth and Sports
National Center for Educational Research
and Development**

**EVALUATION: TEACHER'S GUIDE
MATERIAL: LIFE SCIENCE**

October 1999

A self-evident tenet of curricula design is that such projects must encompass all the essential curricula elements, that is, the objectives, the contents, and teaching strategies and evaluation. Since the new published curricula did not initially include any evaluation, an evaluation system based upon continuous testing had to be added later, starting at the Basic Education level (excluding the Secondary cycle). However, upon trying out that system, a diversity of problems arose which drove a large majority of teachers to give up on it.

This reality led the Center for Educational Research and Development to take up a new challenge at the beginning of Year Two of the three-year period allowed for introducing the new programs i.e. eight out of the twelve years structured within the new educative system. It seems illogical and unacceptable to proceed to the implementation of new curricula while holding on to a traditional evaluation system exclusively devoted to memorizing information, in total disregard of a considerable part of the objectives introduced by the new curricula. To bridge the gap, a new commission has been charged with the task of developing the relevant evaluation system, as well as designing evaluation sheets, based on ideas and recommendations obtained during the teachers training sessions of summer 1999. Moreover, it is proposed that the sheets in their final form be distributed to all the schools at the beginning of the school year.

At this stage, we should particularly draw the teachers' attention to the difference between grading assessment and evaluation. Assessment focuses on the grade itself, which represents in this case the only indicator to appraise the student's achievement. Evaluation, on the other hand, goes beyond the grade which becomes only one of many elements taken into account to gauge the acquisition of the skills aimed at in the lesson and the wider scope of the subject being handled. Additionally, evaluation even examines attitudes relevant to certain situations.

Therefore it is of utmost importance to consider teaching and evaluation as two inseparable complementary entities to the extent that evaluation becomes an essential aspect of the learning/teaching process. It is of course essential that the

teacher be fully aware of the required skills – and that he informs the student of them – in order to select relevant work techniques for us in the teaching plan.

The teacher may resort to a series of techniques in order to evaluate the learning of the student. For example: direct knowledge is often gauged through an Objective Test while progress in the acquisition of competencies is evaluated through application, analysis and matching. We can thus say that evaluation is a comprehensive operation, which requires the use of various types of precision and estimation procedures. Furthermore, this operation is not limited to the grade, but involves numerous activities, which help the teacher appraise the student's work. Nevertheless, evaluation does not necessarily depend on pen-and-paper tests, but rather on the execution of definite tasks and activities as well as the observation of conducts. After collecting information through the evaluation of the student's work, the teacher will make use of it to reach two goals: on the one hand, to reassess continuously the teaching operation in order to improve it; and on the other, to make the student aware of his strengths and of his weaknesses.

We can point out that the introduction of such an evaluation system is a significant step forward in the development of our new curricula. It does not merely assess information – despite the importance of such information – but goes beyond that to use information and invest it for further building knowledge and attaining the required competencies.

Finally let us bear in mind that we do not claim that our work is perfect, which is why we urge all institutions and teachers, after trying out this evaluation system, to provide us with their opinions and comments which will be used for further reexamination and evaluation of the system.

**President, Center for Educational
Research and Development**

Nemer FRAYHA

Summary

Material : LIFE SCIENCE

	Pages
- Introduction: -----	9
- Table of competencies: Basic Education - grade 7 -----	10
- Samples of evaluation sheets: Basic Education - grade 7 -----	11
- Table of competencies: Basic Education - grade 8 -----	23
- Samples of evaluation sheets: Basic Education - grade 8 -----	24
- Table of competencies: First Year Secondary -----	43
- Samples of evaluation sheets: First Year Secondary -----	44
- Table of competencies: Second Year Secondary (sciences section) -----	52
- Samples of evaluation sheets: Second Year Secondary (sciences section) -----	53
- Table of competencies: Second Year Secondary (Humanities section) -----	59
- Samples of evaluation sheets: Second Year Secondary (Humanities section) -----	60

EVALUATION: **TEACHER'S GUIDE**
MATERIAL: **LIFE SCIENCE**
Third Cycle of Basic Education
and
Secondary Education

Introduction

In this publication, the tables listing the domains, competencies, and exercises represent two indispensable and complementary forms of evaluation: formative and summative. They allow the teacher to better visualize his goal and the student to understand what is required of him.

Following this form of evaluation, the teacher clarifies the goal, means, and requirements of evaluation and the student, knowing what to expect (how he is going to be evaluated? and for what purpose?), performs progressively and does the necessary effort to perform before being certified.

The four domains of competencies selected for the third and secondary cycles relate to different aspects of learning (cognition, methodology, techniques, and linguistics) and include:

Using knowledge i.e. determine, identify and employ knowledge and skills already learnt. This domain assesses the capability of the student to understand and retain the notions being explained and his ability to use this knowledge in other situations. In this domain, the evaluation setting is similar to the learning setting. (1/3 of the grade)

Applying the steps of the scientific method i.e. the student is able to observe objects or scientific representations (drawing, picture, table, graph, etc.). This domain assesses the capability of the student to collect useful information, apply the steps of the scientific method in new situations and critique in order to make decisions. In this domain, the evaluation setting is different from the learning setting. (1/3 of the grade)

Mastering experimental techniques i.e. using manual or psychomotor skills specific and essential to the discipline. This domain assesses the capability of the student to use observation and laboratory instruments (optics and dissection, etc.) and perform experiments to verify a hypothesis.

Communicating scientifically i.e. mastering the techniques of the translation from one language to another. This domain assesses the capability of the student to express himself correctly and scientifically and to explicate the mental processes that he adopted to resolve the problem at hand. This helps facilitate the evaluation process and remedy the weaknesses.
(N.B. 1/3 of the grade is designated for the last two domains).

The proposed exercises should not be considered as a model but rather as an example that should be adapted, modified, and improved according to the theme at hand, the level of the students, and the instructional objectives.

Domain	Competencies
Using knowledge	<ul style="list-style-type: none"> - Apply knowledge in a similar situation concerning two vital functions (reproduction and nutrition) and the interdependence of living things. - Relate knowledge to new givens (the mode of reproduction to the ecosystem...) - Classify according to one or more criteria (classify animals according to their food diet...)
Applying the steps of the scientific method	<ul style="list-style-type: none"> - Pick information by analyzing texts or scientific representations (table, graphs, diagram, chart, drawing, etc.) concerning reproduction, nutrition, and interdependence. - Interrelate new knowledge: cause and effect, complementarities, etc. (relate pollution to certain actions of humans...). - Pose a problem (what happens to food inside an organism's body, depletion of natural resources...). - Formulate a hypothesis (what happens to the stored nutritive material in a grain, the mode of consumption of a snake...). - Prove a hypothesis by planning an experiment (verify the role of absorbent hair...) or do a research (the mode of reproduction in whales..., negative effect of human actions on nature...). - Deduce by interpreting results (concerning the liquefaction of food in the digestive tract, the experiments of Spallanzani about reproduction...). - Synthesize (nutrition in plants, reproduction in birds, natural equilibrium...). - Critique by supporting with evidence a certain experiment or behavior (humans' behavior towards the environment).
Mastering experimental techniques	<ul style="list-style-type: none"> - Performing an experiment or a dissection by following certain steps (prepares for microscopic observations, dissecting a fish...). - Raises or cultivates animals and plants to observe their mode of reproduction (rabbit, incubator...).
Communicating scientifically	<ul style="list-style-type: none"> - Compose a text or do a display to communicate the results of a research or group work... (Explain the cycle of matter, pollination...) - Use a suitable scientific language: Trace a curve (variation of the internal temperature of animals in terms of the external temperature...); make a drawing, diagram, or chart (about the path of air inside the organism, cycle of matter...), construct a table (regrouping the characteristics of a beehive inhabitant...)

Evaluation Exercises**Domains:**

- Using knowledge
- Applying the steps of the scientific method

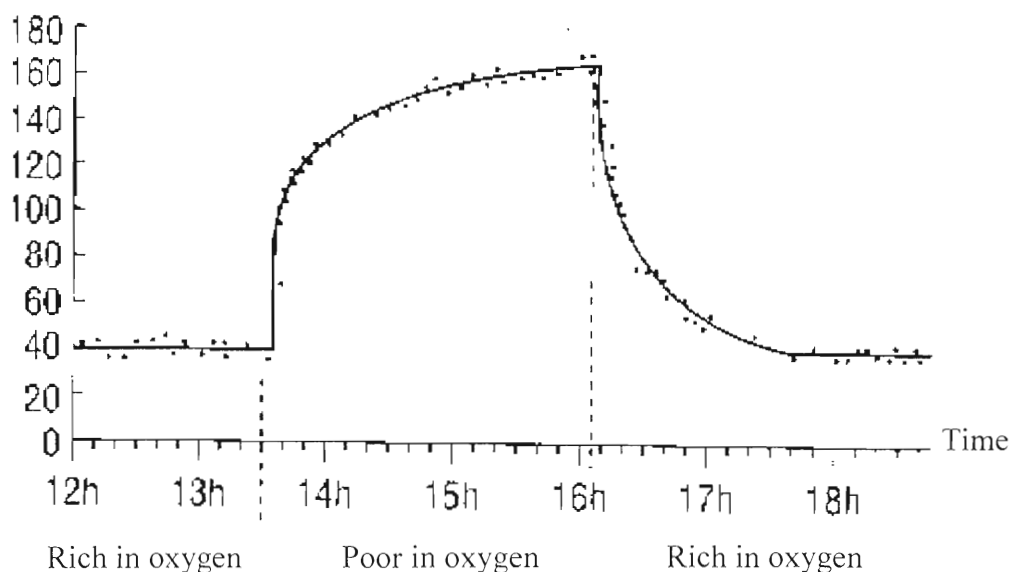
Competencies:

- Apply knowledge relating to nutrition: respiration.
- Pick information by analyzing a text or a graph about respiration.
- Interrelate information about respiration.

Removing the carapace of crayfish (aquatic animal) uncovers gills that are rich in blood vessels even though the animal does not show respiratory movements.

When we look at the crayfish, we observe rhythmic beats of two small sheets located at the base of the jaws.

Frequency of the movement of the sheets.



- § What gas exchange takes place at the level of the gills of the crayfish? Justify your answer.
- § By referring to the curve, analyze the variation of the frequency of the movement of the sheets in relation to oxygen.

To evaluate the acquisition of the competencies, the following points should be taken into consideration.

Competency: Pick information by analyzing a text or a graph about respiration.

Pick information by analyzing a graph.

Find the function studied.

Determine the scale and the indicated units.

Separates the curve into homogenous sequences by graphing the main points.

Describe the noticeable variations.

Draw a conclusion relating to the studied factors and the experimental conditions.

Write correctly.

Competency: Interrelate information about respiration.

Recall the collected information.

Pick out the information.

Write the relation(s) identified.

Respect the grammatical rules.

Domain: - Using Knowledge
- Applying the steps of the scientific method

Competency: - Apply knowledge concerning nutrition: respiration.
- Pick information by analyzing texts or scientific representations.

- § During a study concerning the surface of respiratory exchange in different animals:
- § “We crack the last ring of the dead snail shell, we notice that the “roof” of the lung is a thin wall, always humid, and rich in blood vessels”.
- § “We dissect an earthworm, we see any lungs, gills, or a trachea. On the other hand, we notice very soft skin that is rich blood vessels. The skin ensures its humidity by certain secretions”.
- What is the mode of reproduction in each of the animals mentioned above?
 - Pick from the texts the characteristics of the surface of respiratory exchange in each of the animals.

To evaluate the acquisition of the competencies, we have to take the following points into consideration.

Apply knowledge concerning nutrition: respiration.

Determine the topic at hand.

Identify the problem

Pick out the knowledge appropriate to the topic.

Adapt the knowledge to the context.

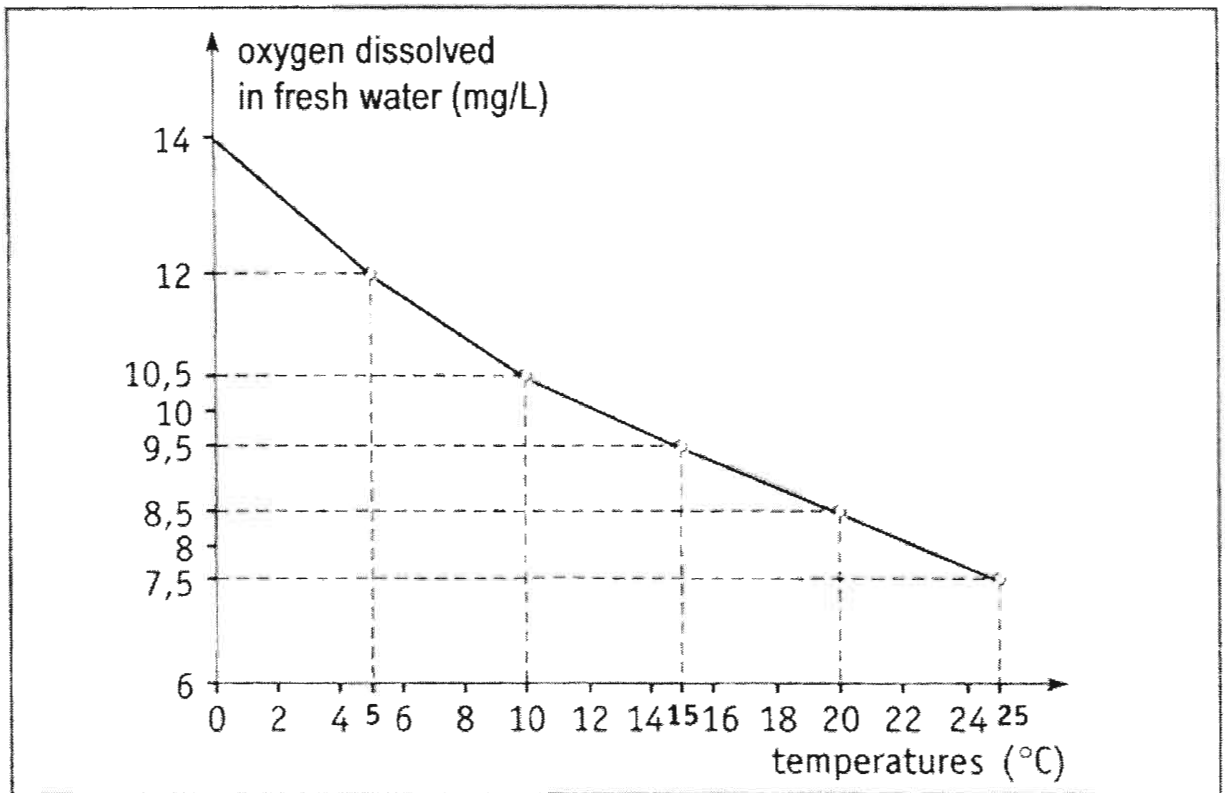
Write correctly.

Domain: Applying the steps of the scientific method.

Competencies: - Pick information by analyzing texts or graphs relating to respiration and photosynthesis.

- Synthesize in relation to factors that modify the oxygen content in freshwater.

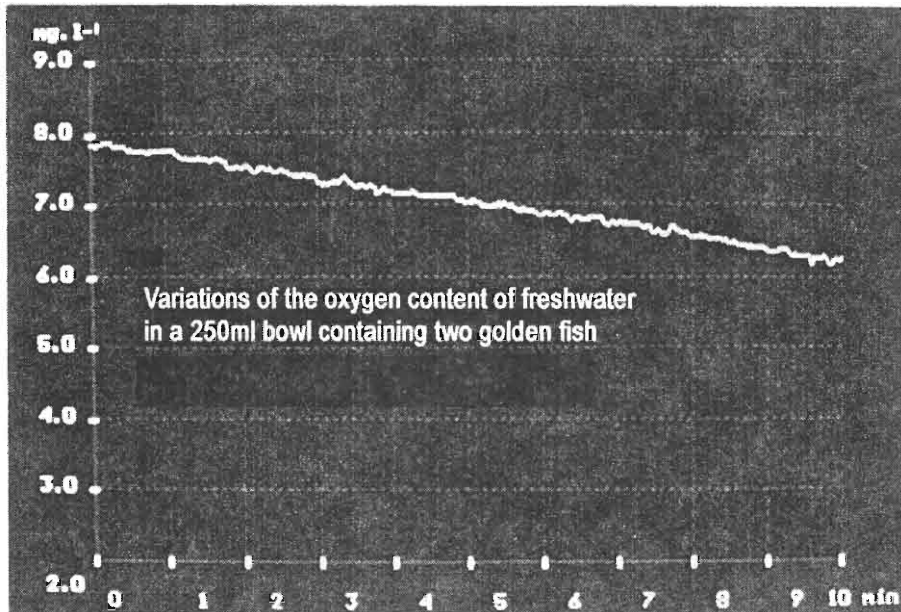
During a study about the influence of certain factors on the oxygen content that is dissolved in freshwater, several experiments were performed. Following are the results of these experiments. Graph 1 represents the maximal oxygen content dissolved in freshwater at different temperatures:



Graph 1

During the summer sunny days, we can notice the presence of gas bubbles imprisoned within the little trenches of green algae in a lake. The gas produced by the algae, if collected, flames up a glowing wooden splint. It is also noticed that the number of bubbles diminishes if the ecosystem is not as lit.

Graph 2 represents the variation of oxygen content of water inside a pot. The pot has small dimensions and is full of water. It is also hermetically closed by a lid and contains two golden fish:



Graph 2

1. Determine the factors that influence the oxygen content of water? And how?
 2. Synthesize in relation to factors that modify the oxygen content in freshwater.
- To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Pick information by analyzing texts or graphs relating to respiration and photosynthesis.

Pick information by analyzing a graph.

Find the function studied.

Determine the scale and the indicated units.

Separates the curve into homogenous sequences by graphing the main points.

Describe the noticeable variations.

Draw a conclusion relating to the studied factors and the experimental conditions.

Write correctly.

Pick information by analyzing a text related to photosynthesis.

Identify the nature of the text (experiment, description of an object or an action, ...)

Pick out the information related to the topic.

Identify the factors and the experimental results studied.

Relate the information.

Draw a conclusion relating to the topic.

Write correctly

Competency: Synthesize in relation to factors that modify the oxygen content in freshwater.

Identify the topic studied.

Sort out the collected information relating to the topic.

Draw a conclusion from each of the information relating to each experiment.

Find a link between the conclusions drawn.

Choose the knowledge that relates to the topic.

Bridge the previous knowledge with the new information.

Relate all selected conclusions.

Generalize.

Write correctly.

Domains: - Mastering experimental techniques.
- Communicating scientifically.

Competencies: - Perform an experiment relating to respiration by following a procedure
- Compose a text to communicate the results of an experiment about respiration.

Set up the experiment, as instructed below, concerning the variation of the rhythmic respiratory movements of fish in relation to the surrounding temperature and report your findings:

Place a fish in a saucer containing cold water at 5 C.

Measure the temperature of water using a thermometer.

Count the number of respiratory movements of the fish during a given time:10 minutes for example.

Heat the saucer gradually.

Measure the temperature again and count the number of respiratory movements during the same period of time as before.

Repeat the experiment by successively increasing the temperature of water up to 30 C in order not to kill the fish.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Perform an experiment relating to respiration by following a procedure

Read what is required (purpose of the experiment, the necessary time, the needed material...).

Locate and choose the appropriate material.

Use accurately the equipment needed for the experiment (measure the temperature accurately, regulate the Bunsen burner, chronometer...)

Follow the indicated steps by respecting the given chronological order.

Obtain a quality result.

Records the results accurately and with precision.

Respects the security rules.

Respects the cleanliness rules.

Competency: Compose a text or do a display to communicate the results of an experiment about respiration.

Recall the posed question, the issued hypotheses, and the retained hypotheses.

Name the experiment under manipulation.

Describe, using a text and or scientific representations appropriate, the materials used and the steps followed during the experiment.

List the results obtained in the form of a text and/or appropriate scientific representations (Curve, drawing, diagram, table...)

Employs the collected information.

Analyze the experimental results.

Interrelate the information that is essential for the studied topic.

Conclude by responding to posed questions.

Use adequate and correct linguistic means.

Domains: - Communicating Scientifically

- Applying the steps of the scientific method

Competencies: - Use a scientific language adapted to respiration: A curve.

- **Deduce by interpreting results concerning respiration.**
- **Formulates a hypothesis relating to the influence of temperature on respiration.**

During a study about the influence of certain external factors on respiration, the following experiment was done: A dragonfly_larva was placed in a saucer containing_cold water. The water was heated gradually and the respiratory movements were counted for a period of 10 minutes at different temperatures. The obtained results were represented in the table below.

Water temperature (in °C)	5	10	15	20	25	30
Number of respiratory movements (in 10 minutes)	10	30	50	76	90	110

Trace the variation curve of the larva's respiratory movement in relation to the water temperature. What conclusion can you draw from the results of this experiment?

Formulate a hypothesis to explain this variation.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Use a scientific language adapted to respiration: A curve.

Trace two perpendicular axes.

Indicate the corresponding variables on the axes.

Choose a scale in relation to the information.

Specify the units.

Plot the points according to the numbers displayed in the table.

Connect the points and obtain a curve.

Give a title for the curve.

Put a legend.

Respects the instructions.

Competency: Deduce by interpreting results concerning respiration.

Differentiate the studied factors.

Separate the homogenous sequences in accordance with the studied problem.

Pick out the scientific terms relating to the selected sequences.

Relate the factors.

Generalize the relation.

Write in a scientific language that is grammatically correct.

Competency: Formulates a hypothesis relating to the influence of temperature on respiration.

Pick out the information that relates to the topic at hand.

Pick out the appropriate knowledge.

Find the relation(s) possible.

Formulate the relation in a doubtful sentence.

Write the sentences in grammatically correct English.

Domain: Applying the steps of the scientific method

Competency: Test a hypothesis by conceiving an experiment about the dietary behavior of a rabbit.

Propose an experiment to determine the sense organ by which it locates or spots its food.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Specify the hypotheses.

State the hypotheses retained.

Number the experiments.

Names the experiments.

Respect the rules of an experiment: Specify the variables, specify the studied factors, give evidence.

Anticipate the results

Takes into consideration the logical sequence of the experiment.

Domain: Applying the steps of the scientific method

Competency: Test a hypothesis by conceiving an experiment about the absorption of water by plants.

Conceive an experiment to determine the plant organ that helps the plant absorb water.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Specify the hypotheses.

State the hypotheses retained.

Number the experiments.

Name the experiments.

Respect the rules of an experiment: specify the variables, specify the studied factors, and give evidence.

Anticipate the results

Takes into consideration the logical sequence of the experiment.

Domain: Using Knowledge

Competency: Apply knowledge relating to digestion.

Fill in the blank with the appropriate term.

In the digestive tract, ----- is digested, that means being transformed into ----- in the presence of the digestive juices. This digestion is facilitated by the mechanical -----, of teeth: ----- and stomach:----- . A good ----- of teeth facilitate the good functioning of the digestive -----.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Read the instructions.

Identify the problem and adapt it to the context.

Pick out the appropriate information to the topic.

Write the words correctly.

Domain	Competencies
Using knowledge	<ul style="list-style-type: none"> - Apply knowledge concerning the immunity of the human body and geology. - Relate acquired knowledge to new givens (relates the intensity of an earthquake to the effects it produces.)
Applying the steps of the scientific method	<ul style="list-style-type: none"> - Pick information by analyzing texts or scientific representations (table, graphs, diagram, chart, drawing, etc.) concerning the immunity of the human body and geology. - Interrelate new information Blood form of different diseases. - Pose a problem (the cause of rejecting a graft, the origin of a volcano...). - Formulate a hypothesis (the possible causes of polluting underground water...). - Prove a hypothesis by conceiving an experiment (simulate the formation of a fault...) or do a research (the earthquakes of the region...). - Deduce by interpreting results (the successful result of a transplant...). - Synthesize (the repartition of earthquakes and volcanoes all over the earth, the modes of defense of organisms...). - Critique by supporting with evidence a certain experiment or behavior (the benefit of vaccines, effect of alcohol on the fetus...).
Mastering experimental techniques	<ul style="list-style-type: none"> - Performing an experiment by following certain steps (a test to identify rocks...).
Communicating scientifically	<ul style="list-style-type: none"> - Compose a text (a report on a visit to a site...) or do a display to communicate the results of a research or group work (the use of geological resources...) - Use a suitable scientific language: Trace a curve (variation of the internal temperature of a woman during the menstrual cycle...); make a drawing, diagram, or chart (phagocytosis, reproductive system...), construct a table (regrouping the vaccines, the infectious agents...).

Evaluation Exercises

Domains: - Applying the steps of the scientific method
 - Using knowledge

Competencies: - Interrelate information about immunity
 - Pick out by analyzing the blood tests of two patients
 - Relates knowledge to information concerning immunity

In the medical laboratory, the labels of two blood tubes were lost. One belongs to subject A and the other to subject B.

Symptoms of the disease of subject A

Fever

Inflammation of the neck ganglion

Coetaneous eruption

Fatigue

Symptoms of the disease of subject B

Fever

Repeated diverse infections

Big fatigue

Hemorrhage

BLOOD TEST		
LEUCOCYTE	9000/mm ³	(N: 5000 - 8000)
RED BLOOD CELLS	4,4 x 10 ⁶ /mm ³	(N: 4,4 à 5,6 x 10 ⁶)
LEUCOCYTE REPARTITION		
Polynuclear neutro %	13,0	(N: 50 - 70)
Lymphocyte %	40,0	(N: 25 - 45)
Monocyte %	15,0	(N: 3 - 10)
Polynucleaire eosino %	0,0	(N: 1 - 5)
Polynucleaire baso %	0,0	
Lymphocytes atypique %	30,0	
Plasmocyte %	2,0	
OBSERVATION :		
Hématies morphologiquement normales		
Test d'agglutination (M.N.I.) : positive		

BLOOD TEST		
LEUCOCYTE	(1 600/mm ³ de sang)	(N: 5000 - 8000)
RED BLOOD CELLS	(2,2 x 10 ⁶ /mm ³)	(N: 4,20 - 5,60)
HEMOGLOBINE (g %)	6,2	(N: 13,0 - 18,0)
	mmol/l	3,8 (N: 7,4 - 10,5)
LEUCOCYTE REPARTITION		
Polynuclear neutro %	20,0	(N: 50 - 70)
Lymphocyte %	60,0	(N: 25 - 45)
Monocyte %	20,0	(N: 3 - 10)
Polynucleaire eosino %	0,0	(N: 1 - 5)
Polynucleaire baso %	0,0	

- 1- According to the analysis of the blood count, are we talking about the same disease? Justify your answer.
- 2- How do you explain the big fatigue of subject B?
- 3- One of the two diseases is the deficiency of red bone marrow while the other is mononucleosis (kissing disease). Relate each subject to its disease and justify your answer.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competencies: - Interrelate information about immunity

Recall the collected information.

Pick out the information.

Write the relation(s) identified.

Respect grammatical rules.

Competency: Relates knowledge to information concerning immunity

Pick out the collected information.

Select adequate knowledge.

Relate knowledge to the collected information.

Write correctly.

Competency: Pick out information by analyzing a text about the blood of two patients

Identify the nature (experiment, experimental results, description of an object or an action...).

Pick out information relating to the topic.

Identify the factors and the experimental results studied.

Connect the information.

Draw a conclusion relating to the topic.

Write correctly.

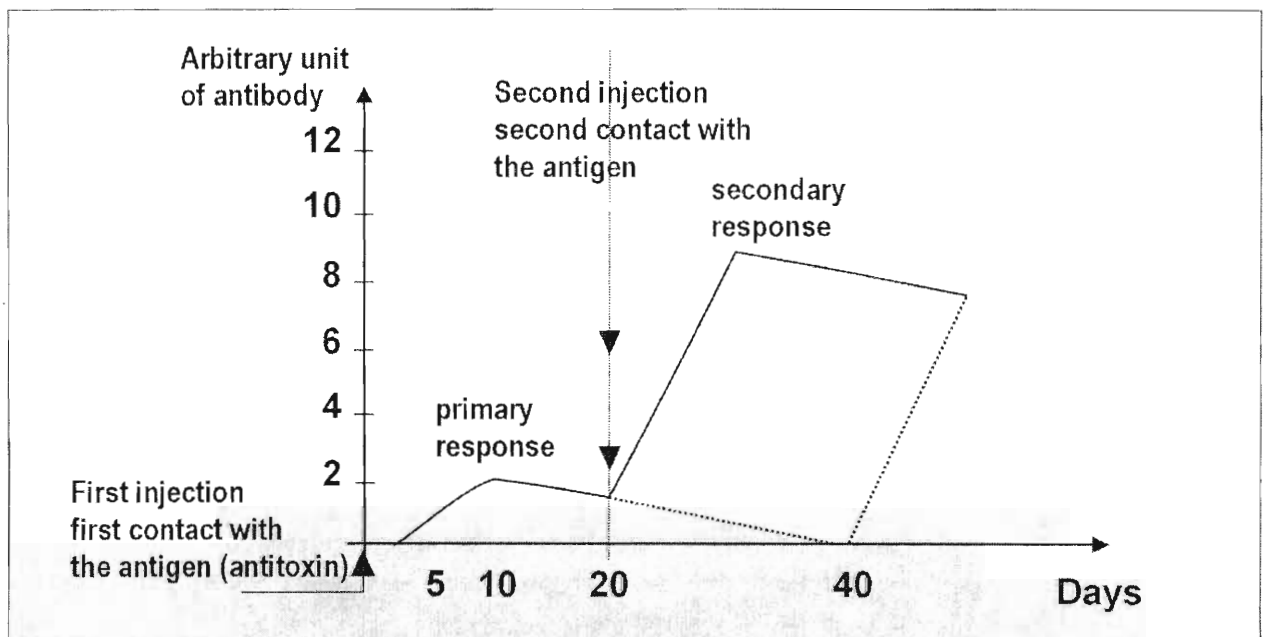
Domains: - Using knowledge
- Applying the steps of the scientific method

Competencies: - Relates knowledge to information about immunity
- Interrelates information about immunity
- Pick out information by analyzing a curve about immunity response
- Formulate a hypothesis about the immunity response

Tetanus is a disease provoked by the presence, in an infected wound, of a bacteria that develops in the absence of air by producing a poison, tetanic toxin, that fixates on the nervous centers.

A person is injected twice by a small dose of a heated tetanic toxin, that has lost its poison, called antitoxin. We dose the body of a quantity of antibodies (antitoxin) every time.

- 1- Why do we use an antitoxin?
- 2- Compare the two answers and deduce the importance of the first injection.
- 3- Formulate a hypothesis about the capacity of defense of an organism after losing the cells as a result of the first injection.



The organism's response to the introduction of tetanic toxin

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Relates knowledge to information concerning immunity

Pick out the collected information.

Select adequate knowledge.

Relate knowledge to the collected information.

Write correctly.

Competency: Interrelate information about immunity

Recall the collected information.

Pick out the information.

Write the relation(s) identified.

Respect grammatical rules.

Competency: Pick information by analyzing a graph about the immunity response

Find the function studied.

Determine the scale and the indicated units.

Separates the curve into homogenous sequences by graphing the main points.

Describe the noticeable variations.

Draw a conclusion relating to the studied factors and the experimental conditions.

Write correctly.

Competency: Formulates a hypothesis about the immunity response

Pick out the information that relates to the topic at hand.

Mobilize knowledge.

Pick out the appropriate knowledge.

Find the relation(s) possible.

Formulate the relation in a doubtful sentence.

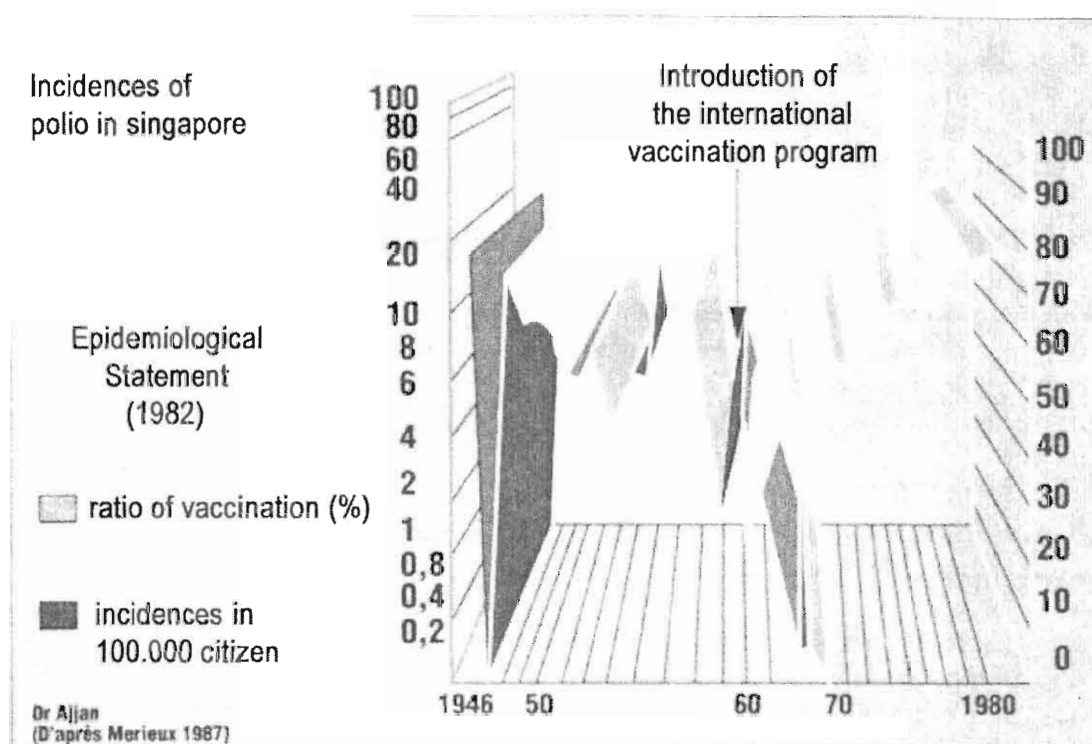
Write the sentences in grammatically correct English.

Domain: Applying the steps of the scientific method

Competencies: - Pick out information by analyzing a graph about polio in Singapore
- Deduce by interpreting results.

Polio is a viral infection. The virus fixates on the nervous centers. The consequences are the paralysis of more or less important muscles that are given order by the nerve. The poliovirus is present in the dirty water, which is spread in Singapore.

The graph below represents the incidences of polio in Singapore for tens of years.



§ Analyze the graph and draw a conclusion about the cause of the eradication of the disease in 1972.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Pick information by analyzing a graph about polio in Singapore

Find the function studied.

Determine the scale and the indicated units.

Separates the curve into homogenous sequences by graphing the main points.

Describe the noticeable variations.

Draw a conclusion relating to the studied factors and the experimental conditions.

Write correctly.

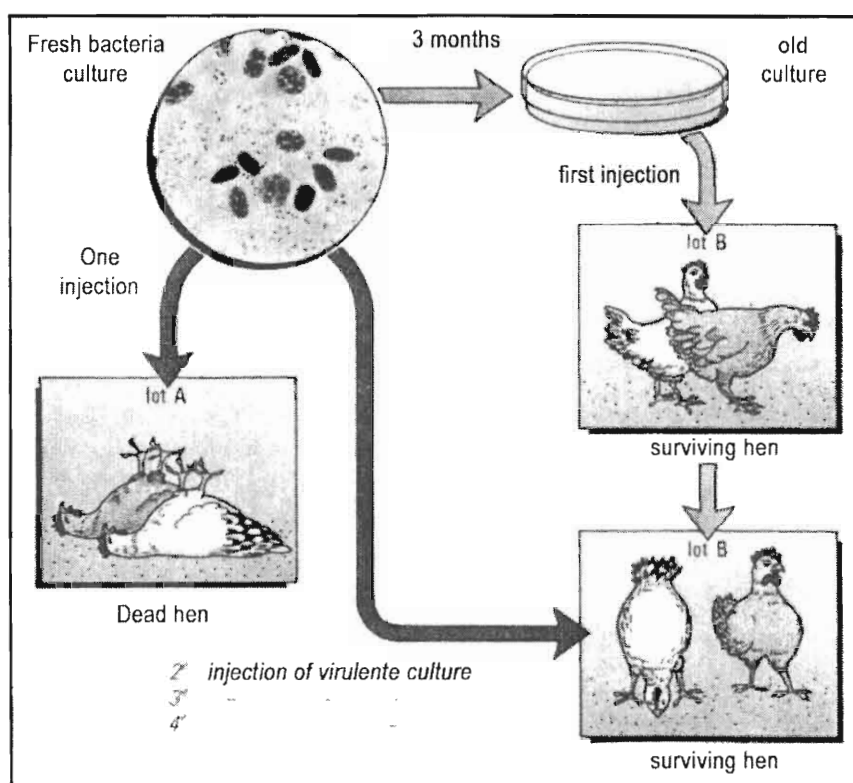
Domain: Applying the steps of the scientific method

Competency: - Pick out information by analyzing an experiment about immunity.

- Formulate a hypothesis about the mode of prevention against the cholera.
- Deduce by interpreting results.

Below is a representation of the experiment done by Pasteur and was the onset of a big discovery relating to immunity.

- 1- Formulate a hypothesis about what the researcher wanted to prove by this experiment.
- 2- How do you explain the survival of the injected chicken in group B during the second injection, with the same microbe as group A?
- 3- What is the effect of leaving an active bacteria culture that causes cholera for several months?



To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Pick out information by analyzing an experiment about immunity.

Identify the nature (experiment, experimental results, description of an object or an action...).

Pick out information relating to the topic.

Identify the factors and the experimental results studied.

Connect the information.

Draw a conclusion relating to the topic.

Write correctly.

Competency: Formulates a hypothesis about the mode of prevention against the cholera

Pick out the information that relates to the topic at hand.

Mobilize knowledge.

Pick out the appropriate knowledge.

Find the relation(s) possible.

Formulate the relation in a doubtful sentence.

Write the sentences in grammatically correct English.

Tidy away the clean material at the end of the activity.

Clean and organizes the workspace at the end of the activity

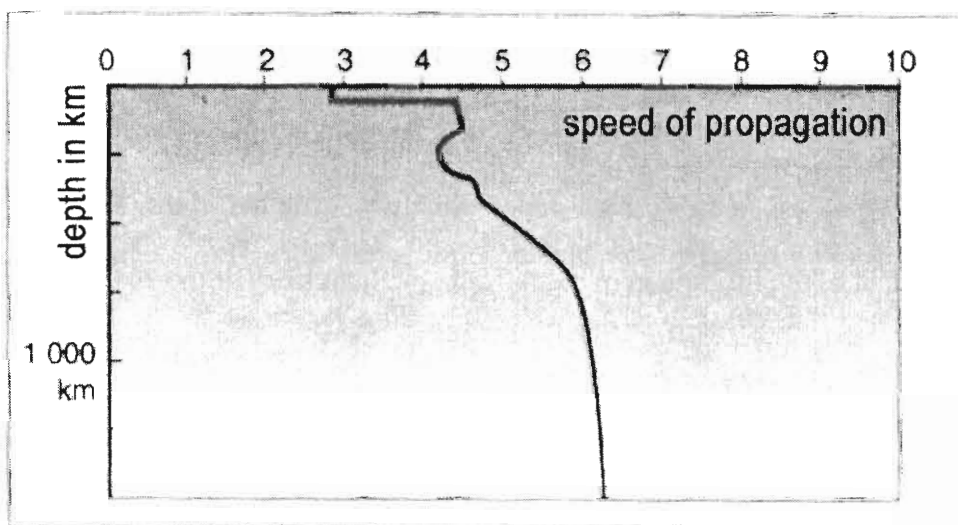
Domain: - Using knowledge

- Applying the steps of the scientific method

Competency: - Apply knowledge about geology

- Pick out information by analyzing a graph about the propagation of seismic waves

The graph below represents the speed of seismic waves of depth



- § Indicate the depth in which we observe the sudden augmentation of the speed of waves occurs. The sudden augmentation indicates the limit between two layers of the earth. Name these two different layers.
- § Describe the variation in speed of waves between 50 and 700 km.
- § Indicate the depth in which we observe the diminution of the speed of waves. This variation in speed indicates the limit between two parts of the globe. What are these two parts?

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Apply knowledge about geology

Specify the topic studied.

Identify the problem and

Pick out the appropriate information to the topic.

Adapt it to the context.

Write the words correctly.

Competency: Pick information by analyzing a graph about the propagation of seismic waves

Find the function studied.

Determine the scale and the indicated units.

Separates the curve into homogenous sequences by graphing the main points.

Describe the noticeable variations.

Draw a conclusion relating to the studied factors and the experimental conditions.

Write correctly.

Domains: - Using Knowledge

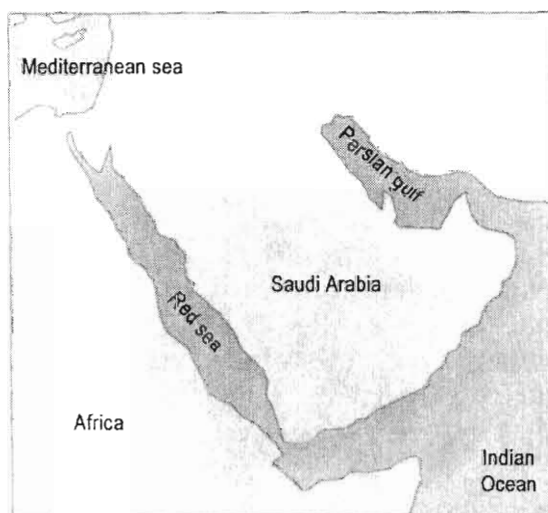
- Communicating Scientifically

Competencies: - Relates knowledge to information about geology

- Uses an appropriate scientific language: Make a diagram the movement of plates

The age of basalt rocks of the oceanic crust was determined in the regions of the red sea the Eden gulf. The more recent ones are found in the axial zone and the old ones are found in the periphery.

- 1- Justify the affirmation: “The axis of the red sea and of the Eden gulf correspond to the dorsal axis”.
- 2- Trace the map on a transparent paper. Draw the dotted lines to represent the dorsal oceanic axis of that region of the earth and show by red arrows the direction of the displacement of the lithosphere plates situated on both sides of the dorsal.



To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Relates knowledge to information about geology

Pick out information.

Select knowledge relating to the topic.

Connect knowledge to the collected information.

Write correctly.

Competency: Uses an appropriate scientific language: Make a diagram the movement of plates

Specify the key words and find a connection between them.

Indicate the appropriate code.

Places them in logical order.

Come up with the legend for the used symbols.

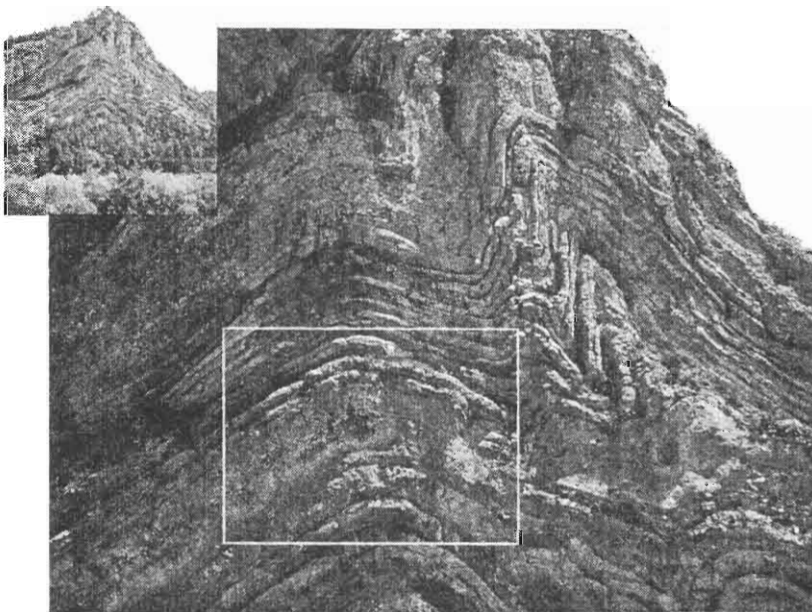
Write a title.

Domains: - Using Knowledge
- Communicating scientifically

Competencies: - Connect knowledge with information about geology
- Use an appropriate scientific language on the deformation of strata

On the outcrop, the folding of the strata sometimes appears as shown below.

- 1- Draw a diagram that represents in red the place of the fault and in blue arrows the direction of movements from the origin of the deformation.
- 2- Name the movements.



To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Connect knowledge with information about geology

Pick out information.

Select knowledge relating to the topic.

Connect knowledge to the collected information.

Write correctly.

Competency: Use an appropriate scientific language on the deformation of strata

Specify the key words and find a connection between them.

Indicate the appropriate code.

Places them in logical order.

Come up with the legend for the used symbols.

Write a title.

Domains: - Using knowledge

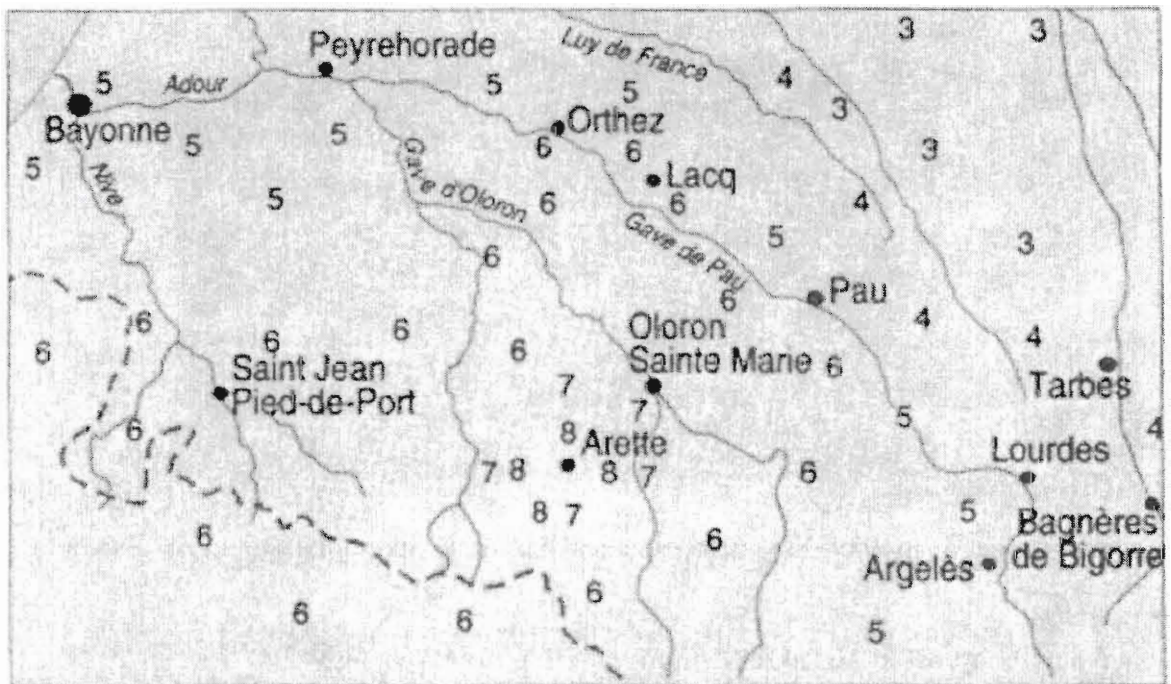
- Applying the steps of the scientific method
- Communicate scientifically

Competencies: - Pick out information by analyzing a map

- Connect knowledge to information about geology
- Use appropriate scientific language to represent the isoseismal lines.

The map below represent the intensity degrees of certain regions in reach of the earthquake of the Pyrenees.

- 1- Name two cities in the region where the earthquake reached an intensity degree of 6. Justify your answer.
- 2- Trace the map on a transparent paper and trace the isoseismal lines. Color in red the epicenter zone. Name the city which damage was the most. Justify your answer.



To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competencies: Pick out information by analyzing a map

Derive the phenomenon studied.

Identify the geographic sites that relate to the topic.

Pick out the indicated scale.

Separate the sites into homogenous sequences by plotting the remarkable points.

Describe the detected variations.

Draw a conclusion about the subject studied.

Competency: Connect acquired knowledge with new information concerning geology

Pick out information.

Select knowledge relating to the topic.

Connect knowledge to the collected information.

Write correctly.

Competency: Use appropriate scientific language to represent the isoseismal lines.

Pick out the component that relate to the studied topic by eliminating the unneeded data.

Choose a simple form for each element.

Respect the proportions of the elements to be drawn.

Make a drawing with final, continued, and neat features.

Write the legend.

Write the title.

Specify the scale of the graphic representation.

Domain: Applying the steps of the scientific method

- Competencies:** - Pick out information by analyzing texts about the earthquakes
 - Critique by arguing the quality of collected information from the media

Article 1: The trembling of Japan

"The earthquake in Japan which trembled the region of Kansai on January 17, 1995 has particularly struck Kobe. The earthquake, with a magnitude of 8 on the Richter scale, caused the death of more than 2,000 and the injury of 12,000 people. It also caused the destruction of houses and buildings. A bridge and a toboggan on the national road were destroyed. The train railways were twisted. The phone lines, electricity, and urban net were all interrupted. The earthquake, which lasted for 47 seconds, was followed by six earth tremors of less intensity. The focus of the earthquake was close to the earth's surface (10 to 15 Km), which explain the gravity of the tremors".

Tuesday January 18, 1995

Article 2: A deadly earthquake hits the center of Japan

An earthquake hit Kansai on Tuesday January 17 in the morning. Kansai is a big industrial region, well-populated and situated at 400 Km to the southeast of Tokyo. The earthquake has particularly struck the city of Kobe. 40 seconds accompanied by big noise were enough to transform Kobe, 1.4 million inhabitants, into a zone deprived of electricity, gas, telephone, water, and almost isolated from the rest of Japan.

The earthquake having a magnitude of 7.2 on the Richter scale caused the death of about a thousand people, the disappearance of at least 500, and the injury of more than 3,000. It provoked the destruction of houses and buildings. A bridge and a toboggan on the national road were destroyed and the railways were twisted. Numerous incidents occurred. The center of Kobe was devastated.

Tuesday January 18, 1995

- § Pick out from the article the characteristics of the earthquake and its consequences.
 § Upon the analysis of the two articles, what conclusion can you make about the quality of information transmitted by the media?

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Pick out information by analyzing a text about the earthquakes

Identify the nature (experiment, experimental results, description of an object or an action...).

Pick out information relating to the topic.

Identify the factors and the experimental results studied.

Connect the information.

Draw a conclusion relating to the topic.

Write correctly.

Competency: Critique by arguing the quality of collected information from the media

Identify the subject studied.

Pick out information relating to the topic.

Bridge the acquired knowledge and the new information.

Formulate an opinion about the studied topic by presenting positive and negative sides.

Argue your choice by sorting the collected information and the knowledge that back up your opinion.

Write in grammatically correct English.

Domains: - Mastering experimental techniques
- Communicating Scientifically

Competencies: - Perform an experiment by following a procedure: simulate the deformation of rocks
- Use a suitable scientific language: make a diagram about the deformation of rocks.

Perform the following experiment in order to study the deformation of strata.
Bring a basin made of wood and Plexiglas and has mobile lateral edges.
Deposit layers of colored sand on top of each other in the basin.
Bring slowly and regularly the lateral edges of the basin close to each other.
Observe the deformation of the layers of sand.
Use the suitable scientific language to represent the obtained results.

To evaluate the acquisition of these competencies, the following points should be taken into consideration.

Competency: Perform an experiment by following a procedure: simulate the deformation of rocks

Read what is required (purpose of the experiment, the necessary time, the needed material...).
Locate and choose the appropriate material.
Use accurately the equipment needed for the experiment
Follow the indicated steps by respecting the given chronological order.
Obtain a quality result.
Records the results accurately and with precision.
Respects the security rules.
Tidy away the clean material at the end of the activity.
Clean and organizes the workspace at the end of the activity

Competency: Use a suitable scientific language: make a diagram about the deformation of rocks

Specify the key words and find a connection between them.
Indicate the appropriate code.
Places them in logical order.
Come up with the legend for the used symbols.
Write a title.

Domains: - Mastering experimental techniques
- Applying the steps of the scientific method

Competencies: - Perform an experiment by following a procedure on the effect of water that is rich in carbon dioxide on the rocks
- Deduce by interpreting the results of the effect of water that is rich in carbon dioxide on the rocks

Perform the experiment below:

Prepare two test tubes; one containing distilled water and the other gaseous water.

Place a little amount of powdered chalk in the two tubes.

Stir the two tubes.

Observe and make a conclusion about the dissolution of calcium-carbonated soil.

Add a little amount of the reactant: The ammonium oxalate, in the two tubes.

N.B. The ammonium oxalate shows the presence of the dissolved calcium in spite of the apparition of an insoluble white body in the liquid.

Observe and make a conclusion about the role of rainwater and streams that are rich in carbon dioxide on the calcium carbonated rocks.

Competency: Perform an experiment by following a procedure: simulate the deformation of rocks

Read what is required (purpose of the experiment, the necessary time, the needed material...).

Locate and choose the appropriate material.

Use accurately the equipment needed for the experiment

Follow the indicated steps by respecting the given chronological order.

Obtain a quality result.

Records the results accurately and with precision.

Respects the security rules.

Competency: Deduce by interpreting results concerning the effect of water that is rich in carbon dioxide on rocks.

Differentiate the studied factors.

Separate the homogenous sequences in accordance with the studied problem.

Pick out the scientific terms relating to the selected sequences.

Relate the factors.

Generalize the relation.

Write in a scientific language that is grammatically correct.

EVALUATION: **TEACHER'S GUIDE**

MATERIAL: **LIFE SCIENCE**

Secondary Education

Domain	Competencies
Using knowledge	<ul style="list-style-type: none"> - Apply in a similar situation knowledge relating to: the nutrition of a plant; communication in an animal; production,; management and protection of water and soil. - Relate acquired knowledge to new givens (variation of the oxygen produced by a plant with the ratio of carbon dioxide present in the medium; response of an organ to a chemical messenger to the presence of target cells...)
Practice the scientific method	<ul style="list-style-type: none"> - Pick information by exploiting different modes of scientific representations (texts, table, graphs, diagram, etc.) concerning the nutrition of plants, nervous and hormonal communication, management and protection of water and soil... - Pose a problem (action of humans in relation to the management of water...). - Formulate a hypothesis (the nature of communication between the different organs...) - Verify a hypothesis by conceiving an experimental procedure, carrying out a research, or by reasoning (action of an environmental factor on the production in plants, the quality of fresh water in the region...) - Interpret results and draw a conclusion (the presence of starch in the chloroplasts...) - Critique and argue by supporting with evidence a certain experiment, method, or a behavior... (experiment about communication in the nervous system...)
Mastering experimental techniques	<ul style="list-style-type: none"> - Performing experiments by following a procedure (preparing microscopic observations, identifying chemical constituents...). - Dissect an invertebrate (crayfish...) and a vertebrate (fish...) - Cultivate (wheat plants in a mineral medium...)
Communicating scientifically	<ul style="list-style-type: none"> - Use the modes of scientific representations to communicate the results (table, graph, diagram...) - Write a text or do a display about the nutrition in plants, communication in animals, management and protection of water and soil.

Evaluation Exercises

Domain: - Mastering acquired knowledge.

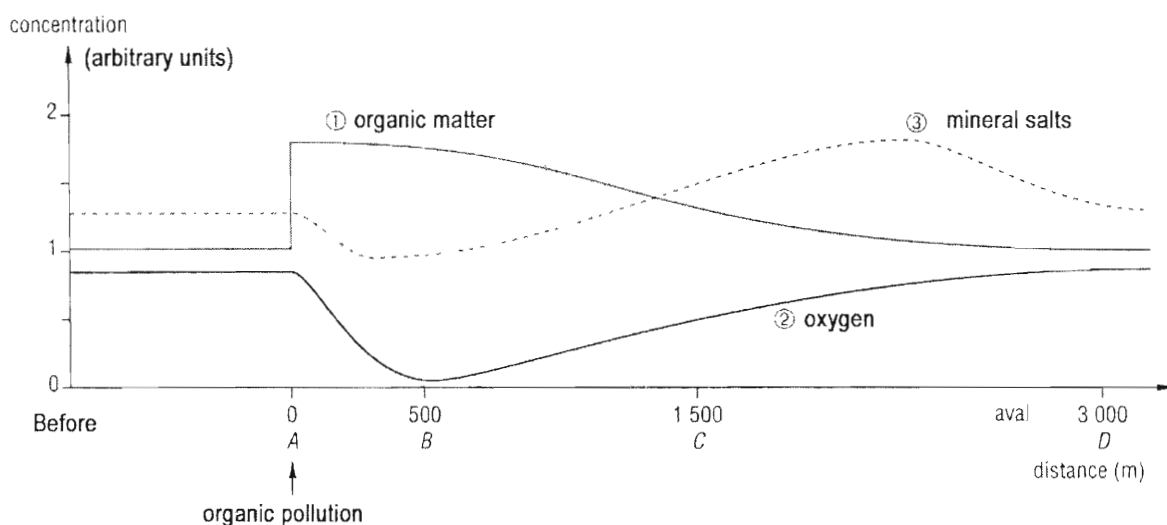
- Communicating scientifically.

- Practice the scientific method.

Competency: - Apply in a similar situation knowledge relating to the protection of water.

- Formulate a hypothesis.

- Write a text.

Exercise:

Study the characteristics of water in a brook receiving organic matter:

a- Give a functional title for each curve in the figure.

b- Explain the chain of phenomena between A and B.

c- Propose two hypotheses explaining the variation ratio of O₂ of C to D.

d- Present in a maximum of four lines the mechanisms shown by the curves.

To apply in a similar situation, the students will be able to:

. Choose the knowledge

. Find the relation

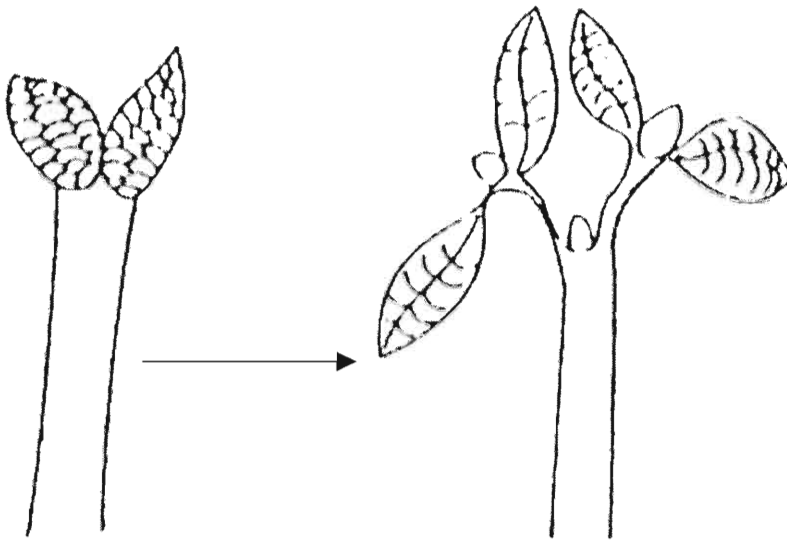
. Express correctly

Domains: - Using knowledge
- Practice the scientific method

Competencies: - Apply in a similar situation knowledge relating to nutrition in plants.
- Formulate a hypothesis.

Examples:

A young twig, in the spring, possesses solely buds but not leaves. Nevertheless, it grows and leaves develop:



Questions:

- 1- What chemical substances are necessary for the growth of the twig and the apparition of leaves?
- 2- Formulate a hypothesis to explain by what means these substances reached the young twig?

1- To apply in similar situation, the student will be able to:

- . Choose knowledge
- . Find a relation
- . Express correctly

To apply the steps of the scientific method (formulate a hypothesis), the student will be able to:

- . Sort out the collected information
- . Choose the acquired knowledge relating to the topic
- . Find the possible relation(s)
- . Express correctly

Domains:

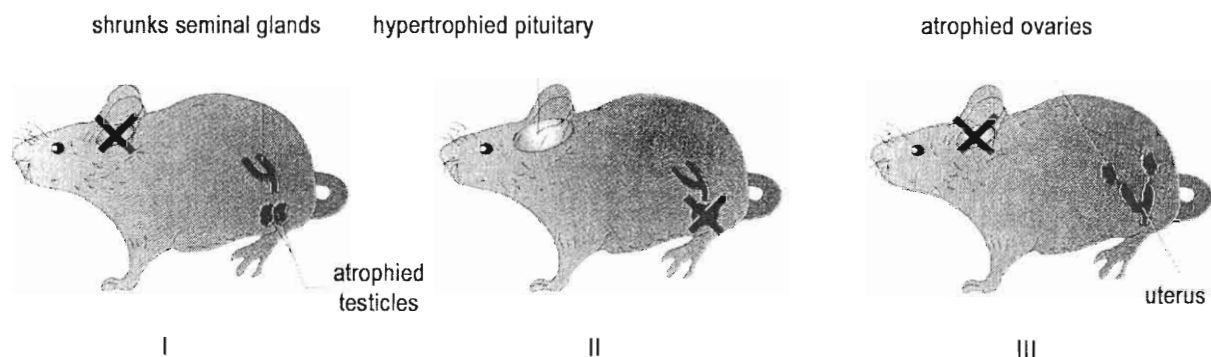
- Using knowledge
- Practice the scientific method
- Communicating scientifically

Competencies:

- Pick information by exploiting different modes of scientific representations (text and diagram) concerning the hormonal communication.
- Interpreting results and drawing a conclusion.
- Formulate a hypothesis.
- Using the modes of scientific representations (diagram to communicate the results).

Exercise:

Suppose that we have two male rats (I and II) and a female rat (III).



Experiment I:

Rat II is castrated, Rats I and III underwent the removal of the pituitary. The consequences of these operations are presented in the figure.

The results are as follows:

- Rat I has atrophied testicles, merely active spermatogenesis, and a reduced reproductive system;
- Rat II shows a hypertrophied pituitary and a reduced reproductive organ;
- Rat III has atrophied ovaries.

a- Formulate a hypothesis to explain the results obtained in rats I and II.

Experiment 2

A lateral suture of the skin and muscles reunited the same three rats experimentally; the scar allowed the mixing of blood: we say that the animals are in “parabiosis”.

We note that the testicles and the reproductive system of rat I develop, and the same for the ovaries of the female rat III.

- b- Represent the results of the second experiment in a diagram.
- c- Do the results of this experiment validate the hypothetical explanation presented previously?
- d- What means of communication took place in this case?

1- To analyze different modes of scientific representations, the student will be able to:

- Extract information related to the posed problem.
- Find relation.
- Draw a conclusion.
- Express correctly.

2- To use different modes of scientific representations (diagram) for the purpose of communicating his ideas, the student will be able to:

- Specify the key words and the links
- Indicate the appropriate codes
- Represent in a logical order.

3- To interpret the results, the student will be able to:

- Analyze the experiment.
- Pick out the information
- Establish links
- Express correctly

Domains: - Using knowledge
- Practice the scientific method

Competencies: - Apply in a similar situation the acquired knowledge relating to the production of high quality plants.
- Analyze different modes of scientific representations (text) concerning the production of the high quality plants.
- Pick out information by exploiting a scientific text.

Exercise:

In the Ivory Coast, coffee constitutes one of the important resources of the country. The only species that is well adapted to the climatic conditions is, until the present, the variety "robusta" (*Coffea Canephora*). whose grains give beverage rich in caffeine, with bitter taste and no aroma. However the taste preferences of the consuming countries evolved towards coffee without bitterness but rich in aroma, such as the "arabica" (*Coffea Arabian*). This latter kind of coffee however is not adapted to the climatic conditions. Since the robusta is very difficult to improve, researchers created a species that is the result of a cross between the two previous species. This new species possesses the genetic make-up of both the robusta and the arabica; it is less productive than the robusta, but yields the best quality coffee. As a result of its hybrid nature, the multiplication by grains of this new species, called arabusta, leads to descendents that are too heterogeneous to a degree where all the benefits of the cross are lost.

- a- After explaining what the impossibility of multiplying the arabusta by grains is based upon, propose a technique to multiply this high quality plant. Conclude with the properties of the plant cells upon which your technique is based.
- b- Pick out the characteristics of the new species and deduce the definition of a "high quality plant"..
- c- Name two techniques that lead to the cloning of high quality plants.

To connect the acquired knowledge to new givens, the student will be able to:

- Choose the knowledge.
- Extract pertinent information from the new givens.
- Find relations.
- Elaborate the identified relations.
- Represent correctly the relations in an adequate scientific mode.

Domain: - Mastering experimental techniques
- Communication scientifically.

Competencies: - Perform an experiment by following a procedure to observe the stomata.
- Use the modes of scientific representations to communicate the results.

Exercise:

- Peel a small section of the lower epidermal layer from a lettuce leaf.
- Place it in a drop of water between a slide and a cover slip.
- Observe the slide under the microscope.
- Draw the stomata.

To perform an experiment, the student will be to:

- Follow instructions.
- Manipulates with cleanliness.
- Use the adequate knowledge.
- Use correctly the appropriate material.
- Communicate the observation in the form of a drawing.

Domain: - Using knowledge.

- Communicating scientifically.

Competency: - Use the modes of scientific representations to communicate the results.

- Apply knowledge in a similar situation.

Exercise:

Draw a diagram of the water cycle highlighting the principal sources of pollution and the means utilized to remedy the problem.

To communicate the information in the form of a functional diagram, the student will be able to:

- Specify the key words.
- Establish the links.
- Indicate the appropriate codes.
- Represent in a logical order.
- Write a legend.

Domain: - Using knowledge.

- Communicating scientifically.

Competencies: - Using the modes of scientific representations (histogram) to represent the results.

- Calculate a percentage.

Exercise:

A soil sample, already dried in an oven at 60°C, was put in a column of sieves. The sieves in the column are placed in a decreasing order according to the size of their holes. The soil that is left on each sieve was then weighed and the following results were obtained:

Sieve holes (mm)	63	40	20	10	5	2	1	0.4	Others
Remaining mass in each sieve (g)	610	1530	3570	2330	1150	875	365	272	205

- Indicate the size of the elements contained in each sieve.
- Calculate the percentage (%) of the fraction retained in each sieve.
- Represent in the form of a histogram the results obtained by taking as abscissa a unit for each sieve hole.
- Indicate the texture or the average granulometry of the soil.

To represent the results in the form of a diagram, the student will be able to:

- Specify the variables, units, and the axes.
- Respect the proportions.
- Conclude
- Find a relation.
- Represent clearly.

Domain	Competencies
Using knowledge	<ul style="list-style-type: none"> - Apply, in a similar situation, knowledge relating to: the biological identity and the genetic information; the molecular renewal and the energetic; nutrition and health; interdependence among living things and the carbon cycle. - Relate acquired knowledge to new givens (an altered protein is a mutated one, the formation of the atheroma in the presence of cholesterol...).
Applying the scientific method	<ul style="list-style-type: none"> - Pick information by exploiting different modes of scientific representations (texts, table, graphs, diagram, etc.) concerning the molecular renewal and the energetic metabolism; nutrition and health; the interdependence among living things and the carbon cycle. - Pose a problem (effect of certain factors on the muscular energy expenditure; nutrition and health). - Formulate a hypothesis (site of cellular oxidation...). - Test a hypothesis by conceiving an experimental procedure, carrying out a research, or by reasoning (the variation in the food diet of people in a region). - Interpret results and draw a conclusion. - Synthesize (the necessary food contribution to assure the energetic metabolism, the cellular and molecular renewal...) - Critique and argue by supporting with evidence a certain experiment, method, or a behavior... (Mode of nutrition of a person...)
Mastering experimental techniques	<ul style="list-style-type: none"> - Performing experiments by following a procedure (Identify the glycogen in the liver, the food constituents...)
Communicating scientifically	<ul style="list-style-type: none"> - Use the modes of scientific representations (table, graph, diagram...) - Write a text or do an oral presentation (the biological identity, nutrition and health...)

Evaluation Exercises

Domain: Using knowledge

Competencies: - Apply knowledge in a similar situation.

- Connect acquired knowledge to new givens about the energetic metabolism.

Exercise:

A 45g rat was placed in different temperatures. The volume of dioxygen absorbed in 3 minutes by the rat was measured using a respirometer...?

T°C	10	20	30
VO ₂ ml	14.4	10.7	15.2

- Calculate the corresponding respiratory intensity in L.Kg⁻¹.h⁻¹
- Propose an explanation for the results obtained.

To connect the acquired knowledge to new givens, students will be able to:

- Choose the gathered information.
- Mobilize the acquired knowledge in relation to the topic.
- Express correctly.

Domain: - Using knowledge

Competency: Apply knowledge in a similar situation

Exercise:

In a gene coding the synthesis of an enzyme intervened punctually and accidentally the addition of a nucleotide and the loss of a nucleotide. The sequence of amino acids on an enzymatic portion was initially:

... Lys-Try-Gly-Ileu-Val-Lys... became

... Lys-Val-Gly-Asn-Cys-Lys...

Using the genetic code, tell:

- What are the added and lost nucleotides? Where is this mutation located?

- What are the consequences of this mutation on the synthesized product?

To apply the acquired knowledge, the student will be able to:

- Choose the knowledge
- Establish a relation
- Express correctly

Domain: - Applying the scientific method

- Using Knowledge.

Competencies: - Pick information by exploiting different modes of scientific representations (diagram, experimental result) about the energetic metabolism.

- Apply knowledge in a similar situation.

- Interpret results and draw a conclusion.

Exercise:

The Euglena is a unicellular organism provided with the different organelles shown in the figure:

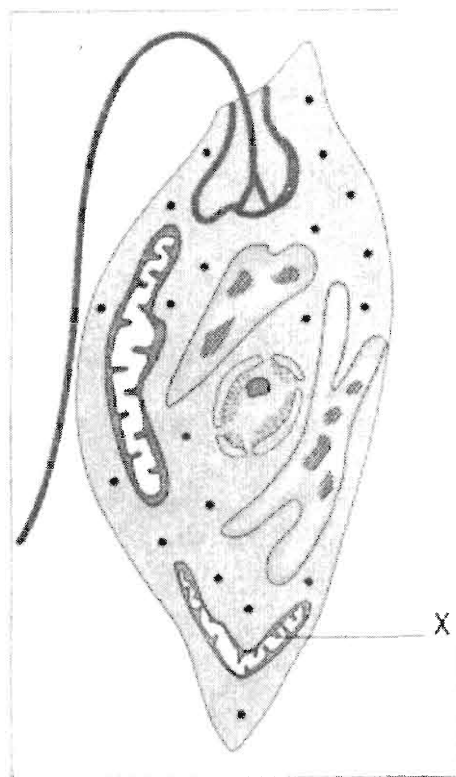
Flagella, nucleus, chloroplasts, mitochondria

We incubate the organelles X in an oxygenated medium containing ADP, inorganic phosphate, and an oxydative substrate. We notice:

- Oxidation of the substrate?
- Absorption of dioxygen.
- Production of carbon dioxide.
- Diminution of the phosphate and ADP in the medium.
- Production of ATP.

In a second experiment, we treat the organelles X in a way that detaches the ATP azes of the internal membranes before replacing the set-up in the same incubation medium.

We notice the same changes as in the first experiment with the exception of the concentrations of ATP, ADP, and Pi?...



- 1- Identify the organelles X from their structure.
- 2- Explain the results obtained in the first experiment: What metabolic passage prevails in X?
- 3- What does experiment 2 teach you about the mechanism of ATP production by the organelles X?

- 1- To exploit a document, the student will be able to:
 - Differentiate the studied factors.
 - Make a link between the factors.
 - Find a relation
 - Express correctly

Domain: - Applying the scientific method

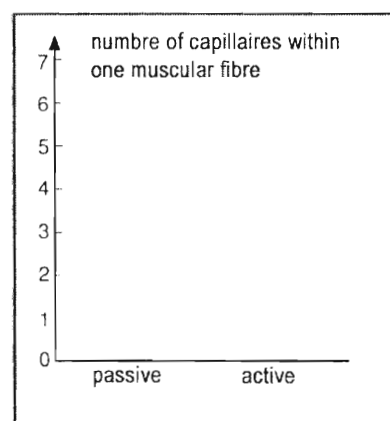
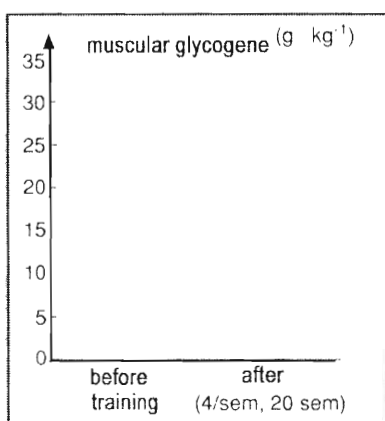
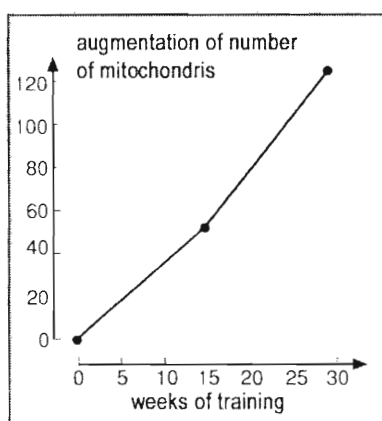
Competencies: - Pick information by exploiting different modes of scientific representations (graph) about the energetic metabolism.

- Elaborate a synthesis about the energetic metabolism.

Exercise:

Experiments were performed to study the effect of training on runners carrying out long-duration tests.

The modifications of some physiologic and biochemical parameters after some weeks of training are represented in the following graphs:



- Analyze the different graphs and interrelate the obtained results to understand the improvement in performance after training.

To exploit a graph, the student should be able to:

- Pick the scale of sizes indicated.
- Separate the curve into homogenous sequences.
- Plot the remarkable points.
- Describe the detected variations.
- Draw a conclusion about the studied factors.
- Express correctly.

To synthesize, the student will be able to:

- Identify the studied subject.
- Extract the information relating to the topic.
- Draw a conclusion.
- Find the link between the deduced conclusions.
- Generalize.
- Express correctly.

Domain: Mastering experimental techniques

Competencies: Perform an experiment by following a procedure to identify the glycogen.

Exercise:

Identify experimentally the presence of glycogen in an organ (liver, muscle):

- Crush a piece of a liver.
- Boil in a solution of sodium sulfate.
- Filter.
- Add iodine solution.
- Identify the obtained color.

To perform an experiment, the student will be to:

- Manipulates with cleanliness.
- Choose the appropriate material.
- Use correctly the needed equipment.
- Follow instructions.
- Obtain a satisfactory result.

Domain: Mastering experimental techniques

Competencies: Perform an experiment by following a procedure to identify the glycogen.

Exercise:

Raise an in vitro culture of yeast under aerobic conditions:

- Take 1g of yeast.
- Place it in a culture tube containing sweet water at 9g.L-1.
- Keep in the air.

Domain: - Using knowledge.

- Communicating scientifically.

Competency: - Write a text about the regulation of the supply of glucose throughout energetic metabolism.

- Apply knowledge in a similar situation

Exercise:

After defining the terms glycogenogenesis and glycogenolysis, neoglucogenesis, write a text that relates them together by indicating the physiological situations in which they take place.

To write a text, the student will be able to:

- List the key words.
- Extract knowledge.
- Interrelate indispensable information to the topic.
- Answer the questions posed.
- Express correctly.

Domain	Competencies
Using knowledge	<ul style="list-style-type: none"> - Apply, in a similar situation, acquired knowledge relating to the human reproduction and immunology. - Relate acquired knowledge to new givens (some modes of prevention...).
Applying the scientific method	<ul style="list-style-type: none"> - Analyze various documents (texts, table, graphs, diagram, etc.) about human reproduction and immunity. - Establish links relating to new information (between diseases and blood make-up...). - Synthesize (reproduction, graft...) - Critique and argue by supporting with evidence a certain experiment, method, or a behavior... (mode of prevention...) - Pose a problem (the rejection of a graft...) - Formulate a hypothesis (relation between hormones and the sexual cycle...). - Test a hypothesis by conceiving an experimental procedure or carrying out a research (the auto-immune diseases of the region...) - Interpret results and draw a conclusion.
Communicating scientifically	<ul style="list-style-type: none"> - Write a text or do an oral presentation (a report, an investigation...) - Use the modes of scientific representations (table, graph, diagram...)

Evaluation Exercises

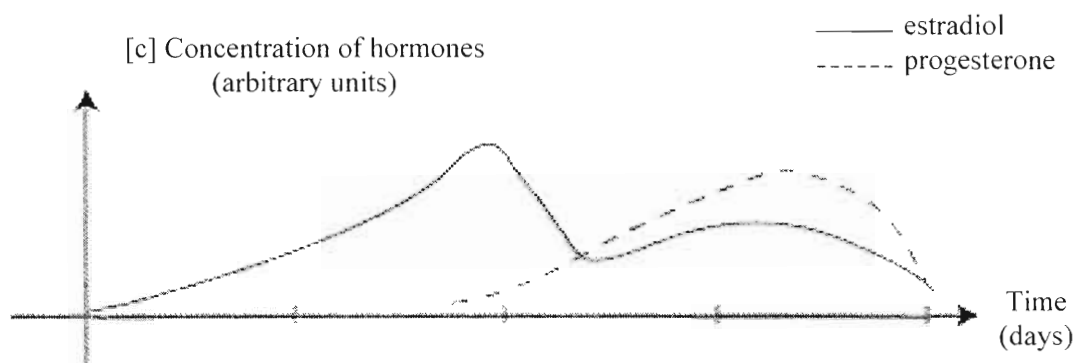
Domains: - Mastering acquired knowledge

Competencies: - Apply in a similar situation knowledge relating to reproduction.

Exercise:

The quantity of estradiol and progesterone in the blood of a woman during her ovarian cycle was determined.

The results were represented in the graph below:



- Locate, according to the curves, the major events of the ovarian cycle.
- Specify the possible origin of these substances.

To apply in similar situation, the student will be able to:

- Extract knowledge
- Pick out information
- Find the relations
- Express correctly

Domain: - Practice the scientific method

Competencies: - Pick information by exploiting different modes of scientific representations.

- Interpret results and draw a conclusion.

Exercise:

Here are some experimental observations:

- The removal of the uterus of a female does not modify the functioning of the ovaries.
- The castration of females during the active period of reproduction stops the menstrual cycle and atrophies the uterus.
- The ovary graft of a castrated mouse, after puberty, produces a recapture of the normal weight of the uterus.

Interpret these givens. What are the determinants of the sexual cycle?

To analyze the results of an experiment, the student will be able to:

- Gather new givens.
- Relate the variable factors to the obtained givens.
- Draw a conclusion.
- Express correctly.

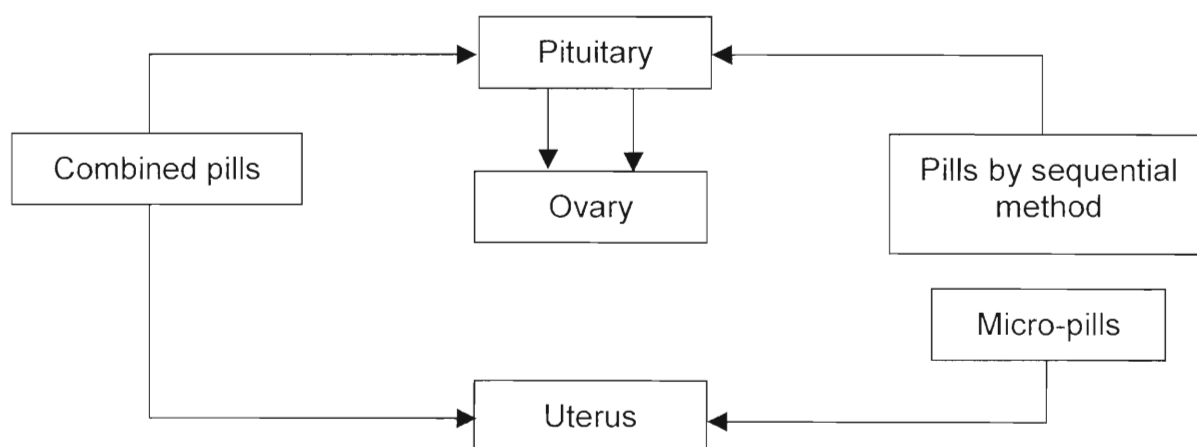
Domain: Practice the scientific method

Competencies: - Pick information by exploiting different modes of scientific representations.
- Establish links.

Exercise:

The contraceptive pill is an oral technique of contraception. They are formed of one or two hormones, estradiol and progesterone.

It is presented in two different forma. The diagram below shows three forms of pills and the organs on which they act.



1- What does each kind of pills contain?

2- What is the mode of action of each?

1- To exploit a diagram, the student will be able to:

- Extract information.
- Deduce the relations.
- Draw an adequate conclusion
- Express correctly

2- To establish links, the student will be able to:

- Choose the knowledge.
- Pick out the information.
- Find the relation.
- Express correctly.

Domain: - Using knowledge

Competency: - Apply in a similar situation knowledge.

Exercise:

Explain the affirmation: "the therapy by vaccines is preventive"?

To write a text, the student will be able to:

- Recall the posed question.
- Interrelate the knowledge indispensable to the topic.
- Answer the question.
- Express correctly.

