LEARNING GUIDE

TRANSFORMATIONS CLIMATE CHANGE

SCIENCE AND TECHNOLOGY TSC-4062-2



IN COMPLIANCE WITH THE NEW PROGRAM

LEARNING GUIDE

TSC-4062-2

TRANSFORMATIONS CLIMATE CHANGE

SCIENCE AND TECHNOLOGY



Original French Version

Project Manager Alain Pednault

Instructional Design France Garnier, Pedagogical Advisor, Adult General Education, des Draveurs school board

Writer

France Garnier (Chapters, Appendices) Marie-Ève Côté (Self-Evaluation, Review, Glossary) Junior Carrier

(Answer Key)

Pedagogical and Scientific Content Revision Junior Carrier, Teacher and Pedagogical Advisor, Adult General Education, Charlevoix school board

France Vallée, Teacher, Adult General Education, des Premières-Seigneuries school board

Jessie Trottier-Chabot, Teacher, Adult General Education, de l'Or-et-des-Bois school board

Gilles St-Louis

Illustrations Marc Tellier

Graphic Design and Cover Design Mylène Choquette

Layout Marquis Interscript

Proofreader Ginette Choinière

English Version

Project Manager Ali K. Mohamed

Translation Claudia de Fulviis

Proofreader Michèle Ortiz

Scientific Content Revision Daniel Afriyie (Mathematics and Science Consultant, English Montreal School Board)

Bernard Osei-Asamoah (Science Consultant, English Montreal School Board)

Lethisha Andrews (Science Teacher, Lester B. Pearson School Board)

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- The First Situation.



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About this Learning Guide

Welcome to the learning guide for the *Climate Change* course. This Secondary IV course in the Science and Technology program is intended to develop your ability to deal with situations relating to key climate change issues, such as:

- · disruptions in the carbon cycle and the increase in the greenhouse effect caused by human activities;
- acidification of the oceans;
- the melting of the glaciers leading to flooding;
- · increased frequency of droughts and extreme climate events;
- · disturbances in terrestrial and aquatic biomes, which affect various animal and plant species.

A better understanding of these issues will enable you to take action to reduce your carbon footprint and raise public awareness of climate change as part of a project you will carry out.

You will develop the following three competencies:

- · Seeks answers or solutions to scientific or technological problems;
- Makes the most of his/her knowledge of science and technology;
- Communicates in the languages used in science and technology.

You are now invited to carry out the learning activities presented in the six chapters of this learning guide.

Portailsofad.com

Video capsules and printable versions of complementary resources for this guide and the TRANSFORMATIONS collection are available on the **portailsofad** website. They will be useful throughout this course.



CHAPTER ORGANIZATION

The learning process presented in each chapter allows you to make progress by building on what you learned in the previous sections. The following diagram illustrates this process and states the educational aim of each section.

INTRODUCTION

The first page describes the context and the theme that will provide the basis for learning the new concepts introduced in the chapter.



A table of contents opposite the first page presents the knowledge to be acquired in the two learning situations and the theme of each one.



SITUATIONS

There are two learning situations in each chapter: one is theoretical and the other is practical, in the form of an experiment. The learning process in both situations allows you to acquire new concepts and develop competencies within real-life, meaningful contexts.

PARTS OF A LEARNING SITUATION



PRESENTATION OF THE LEARNING SITUATION

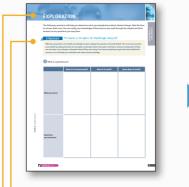
This page sets out the main theme of the chapter, briefly describes the context of the learning situation, and provides the information needed to complete the task.

A text box describes the task to be carried out later on, in the *Resolution* section. This task is the starting point for acquiring the new knowledge that will enable you to complete it.

SOLUTION

When you get to this section, you should have all the knowledge you need to complete the task described at the beginning of the chapter.

Additional elements of the investigative process in science and exploration strategies are suggested here.



- EXPLORATION

In this section you will analyze the information provided in the learning situation and identify what you already know about the topic at hand, as well as the new knowledge you will need to complete the task.

Different aspects of the investigative process in science and exploration strategies are suggested here.

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CONSOLIDATION

This section allows you to put into practice the knowledge covered in *Acquisition A* and *Acquisition B*. Like the *Integration* exercises, the *Consolidation* exercises also help you to develop the competencies.

	The greenhouse effect a	ind plobal warmion
	What is the screenbouse effect?	,,
	weat it and presented metter	
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		and re-emilled in a farm at a weater energy (heat). This nate cit unable a or noof, caucing the temperature to nor. The warming capacity of
		the glass of a greenhouse herse the expression "greenhouse effect."
	KEY KNOWLEDGE	
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	and earns the planet's surface.	ey wear and taken a suppress of the same same press
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100	Part of the incoming solar collation is absorbed in the Earth's surface and	- Independent
_	another sad is re-endled id a the	by be decaybee
	atmosphere as infrared subation these.	
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	annexated matrix its human activity. At a	
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	been increasing deadly stuir the clarit of	
	around 1832. As a result, even more head	

ACQUISITION

In this section, you will acquire the knowledge required to complete the task.

AT THE END OF EACH CHAPTER

KNOWLEDGE SUMMARY

This section summarizes all the key concepts presented in the chapter.

INTEGRATION

This section includes complex exercises and scenarios that require you to apply what you have learned in the chapter.

LES

The learning and evaluation situation (*LES*) is a complex task similar to those that you will encounter in the final exam. It includes a rubric for the comptencies (competency evaluation chart).

ADDITIONAL MATERIALS

	This last activity will prepare you for the final examination for this course and will help you to determine the extent to which you have mastered the subject matter. The self-evaluation activity is divided into two parts.	WILLIAM
	Part 1: Explicit Evaluation of Knowledge This part consists of questions that are not related to one another. Each question focuses on a specific area of knowledge.	SRF-EVALIMITOR
	Part 2: Evaluation of Competencies In this part, you will be added to salve a task similar to those you encountered in each chapter of this guide. You will be required to carry out tasks that involve various areas of transledge applied to a new context.	
	Instructions - Carolidy read each question before arcowering it You may use a clubalant You may use a clubalant Decar you have completed this activity, correct it using the answer key for each question.	
yourness strik (c) - GMAGB (Performance languing in the order of the second se	
		229

- SELF-EVALUATION

A Self-evaluation activity is found in the first part of the Additional Materials section. It is used to evaluate the knowledge you have acquired and the competencies you have developed during the course. It also helps you determine the knowledge you have mastered and the concepts you must review before doing the Scored Synthesis Activity.

The key concepts are bolded blue and the terms that black.	are defined in the body text of the chapters are bolded
Abiatic factor (p. 282)	Autotroph (p. 288)
Environmental conditions that influence populations.	An organism capable of synthesizing its own food from inorganic substances and the Sun's energy.
Acid (p. 196) A substance that releases hydrogen ions (H-)	Balancing a chemical equation (p. 52)
in aqueous solution.	A chemical equation needs to be balanced so that
Acid-base neutralization (p. 131)	It is consistent with the law of conservation of mass. A balanced chemical equation occurs when the
Reaction that consists in adding a base to an acidic	number of the different atoms of elements on the
solution or an acid to an alkaline solution in order to neutralize the solution (oH of 7).	reactants side is equal to that on the products side.
Aerobic (p. 55)	Base (p. 106)
Said of a process that occurs in the presence of	A substance that releases hydroxide (DH) j ions in aqueous solution.
oxygen or of a living organism that needs oxygen	
to survive.	Biodivenity (p. 281) Describes the richness and variety of the species
Air mass (p. 176)	Describes the richness and variety of the species present in a community.
A group of air molecules with similar characteristics such as temperature, moisture and pressure.	Biomass (p. 289)
	The quantity of organic plant and animal matter
Albedo (p. 12) Reflectiveness of a surface. The whiter the surface	in an ecosystem at any given time.
(e.g. snow cover), the greater its reflectivity and	Biomes (p. 212)
the higher its albedo.	Regions of the world with similar climate (weather,
Anaerobic (p. 20)	temperature), animals and plants.
Said of a process that occurs in the absence of	Biosphere (p. 17)
oxygen or of a living organism that does not need onygen to survive.	Encompasses all of the eccepterns on the planet together with all living organisms and their habitats.
Anian (see Negative (or)	Bistic factor (p. 282)
	Factor resulting from the activities of a living
Anthropogenic (p. 7) Originating in human activity.	organism in an environment.
	Buffering capacity of soil (p. 129)
Anticyclone (p. 104) An area of atmospheric circulation which forms	The ability of soil to withstand changes to its pH
around a high-one ware centre and is associated	by neutralizing acidity.
with good weather.	Canopy (p. 215)
Aqueous (p. 50)	The continuous cover of branches and foliage formed by the crowns of adjacent trees.
Refers to a molecule that is dissolved in water.	
Atmospheric pressure (p. 183)	Carbohydrate (p. 21)
The force exerted by the gas molecules in a column	A simple or complex sugar.
of air on a given surface.	

- GLOSSARY

Key concepts **bolded blue** and terms **bolded black** in the body text of the chapters also appear in the *Glossary*.

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en cara char brit deseg schetze, skordy for scherz and for scherze. el cardinal e		Determine whether the	following statement	is true or false. If it is false	correct it.	
		'The solvent is the mino	r component of a sol	ution, dissolved in the sol	ute."	
		For each of the following	solutions, identify t	he solute and the solvent		
State S		a) A soft drink				
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REVIEW

While working through the Situation sections, you will come across Reminder text boxes containing knowledge that you covered in previous courses and that you will need to understand new concepts or complete the task.

The *Review* section consists of questions that will help you to review the concepts appearing in the *Reminder* boxes.

The particle model of matter	
The particle model holds that all matter is made up of mic can be either atoms or groups of atoms called "molecules;	oscopic particles that are always moving. The particles
The motion of the particles is influenced by temperature.	
The higher the temperature	The loss the temperature
the faster the particles more.	the slower the particles move.
The particles attract or repel each other.	The smaller the distance between the particles, the operator the attractive form between them.
This face is inversely proportional to the space of the distance between the particles	

- APPENDICES

In this section, you will find additional information such as abbreviations and units of measure.

KPLORATION	MENTAL COMMITTE	E NEEL	JS TUUI	
		ading Wha	t is the greenhou	se effect? in the Acquisition section.
	How is it constructed?			How does it work?
What you know	Transparent walls that let through visible light and infrared radiation.			Sunlight (vicible light and infrared radiation carrying heat) passes through the transparent walk. A part of the infrared radiation is trapped inside the general-tase, causing a rise in temperature.
Questions you may have				
reading The greenh	ou can check your answerc by ouse effect: helpful or harmful sec in the Acquidition section.			er. You can check your answert by reading ge in the Acquisition section.
Indiation that early panes of a guession of the semaining are of the semaining are increase in the inter- ting the semaining are ensistent from rate are again the arroup radiation that is will re-emit it to the arr thermal inclunce- ment in the semaining of the semaining of the thermal inclunce- ing arr spin-semaining of the the semaining of the increasing sectors.	Not due to greenhouse gas ural cources maintains the gloi ent around 15°C. The greenho howe abaudo some of the sobal isotab by the Sanch Jordsond as norphew. Warming due to the inhouse effect is described as caused by the spagnosive inco- centrations generhouse gases in industrial revolution. The givenhous new infrand calacitors to be the traing levels of generhous new infrand calacitors to be	est gant suse an hal cose , nd the wate since inte	doxide, mett presere in the These gase I temperature organisms with the three man carbon doxic Gives that the of methane is the planet as a bit gives tas the planet as colored and the climate chan inweather co global warmin	and game-periodicitizing by Calibian and Samor space. The Varian Markov set and Samor space is the Calibian Samor

ANSWER KEY

The Answer Key at the end of the guide will allow you to check your answers and steer you through the learning process. It contains the answers to the questions in the guide and detailed explanations regarding the correct procedure or line of reasoning to be used.

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technological and the and the instationships between them. between them, between them
2.1 Aggeographic functional processing of the second sec

RUBRICS FOR THE COMPETENCIES

There are *Rubrics for the Competencies* at the end of the guide. After completing a learning and evaluation situation, or *LES*, you can use these rubrics to evaluate your work. You can then complete the abbreviated rubric found at the end of each *LES*.

HEADINGS



You will start planning your awarenessraising project.

Presents the task to be carried out as part of the learning situation.

REMINDER

The composition of air

Pure air is a mixture ...

Refers to knowledge acquired in previous courses and to review exercises related to this *Reminder*.

KEY KNOWLEDGE

The **greenhouse effect** is an increase in the atmospheric temperature ...

Presents new key concepts to be learned. This knowledge is prescribed by the program of studies.

INVESTIGATIVE PROCESS

The first step in the investigative process is to define the problem ...

B...

Presents aspects of the investigative process in science that can be applied in various situations.

STRATEGY Consider...

When an investigative strategy involves forming an opinion ...

Presents exploratory or analytical strategies that can be applied in various situations.

DID YOU KNOW?



Deforestation is responsible for 18% of GHG emissions worldwide ...

Encourages you to discover additional scientific, historical and cultural information related to the concepts being studied.

TIP

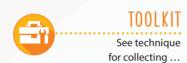
To remember the charge of an anion, ...

Gives a tip that makes the task simpler, or suggests a different approach to dealing with the problem or applying the concept in question.

NOTE

Electron transfer makes it possible for ionic bonds to form between a metal ...

Gives additional information or points out exceptions that can apply to the concept in question.



Refers to the information found in the **Toolkit**.



Read the **goal** of the experiment and the steps in the **experimental procedure** ...

Refers to information to be completed in the Experimental Activity Booklet.



Refers to Web resources (sites and videos) suggested on **portailsofad.com**.

ACTIVITY ACTIVITY

You must now do Scored Activity 1. It is available on the course website . . . Indicates that you are now ready to do the Scored Activity that will test your understanding of what you have learned. The Scored Synthesis Activity is done at the very end of the course.

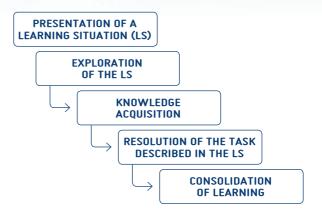
These activities are presented in separate booklets. Once you have completed them, you must submit them to your teacher or tutor, who will correct them and provide feedback. The **TRANSFORMATIONS** collection consists of all the courses in the Diversified Basic Education Program for Secondary IV and Secondary V.





SOFAD

The courses in the **TRANSFORMATIONS** collection feature a learning process based on the acquisition of prescribed knowledge through interesting and meaningful learning situations. The instructional approach underlying this learning process is outlined below.



The knowledge and competencies to be developed become meaningful through investigations that require learners to use inductive and deductive reasoning skills. The learning guides provide a variety of simple exercises and more complex tasks that address the needs of both learners and teachers. Additional resources are available on portailsofad.com.

Components of the TRANSFORMATIONS collection:

- Toolkit: Print and PDF versions;
- · Learning Guide: Print and PDF versions;
- Teaching Guide: PDF;
- · Video clips of concepts and laboratory techniques;
- Experiment kits;
- Scored activities;
- Answer keys.



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