Grade 10 Science (20F)

A Course for Independent Study
GRADE 10 SCIENCE (20F)

A Course for Independent Study
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ACKNOWLEDGEMENTS

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GRADE 10 SCIENCE (20F)

Introduction
INTRODUCTION

Overview

Welcome to Grade 10 Science: A Course for Independent Study! This is a full-credit course that is designed to develop your scientific literacy through inquiry-based activities that aim to strengthen and encourage your critical thinking, problem solving, and analytical skills/abilities. The Grade 10 Science course is intended to provide a broad scientific background and to assist you in preparing for more specialized courses in Grade 11 and 12.

As a student enrolled in a distance learning course, you have taken on a dual role— that of a student and a teacher. As a student, you are responsible for mastering the lessons and completing the learning activities and assignments. As a teacher, you are responsible to check your work carefully, noting areas in which you need to improve and motivating yourself to succeed.

What Will You Learn in This Course?

In this course, Grade 10 Science: A Course for Independent Study students will learn about the fascinating world of ecosystems, how chemicals react, the physics of objects in motion, and how weather works, as well as how people can use their knowledge of ecology, chemistry, physics, and meteorology to live responsibly in our world.

How Is This Course Organized?

This course is divided into four modules:

- Module 1: Dynamics of Ecosystems
- Module 2: Chemistry in Action
- Module 3: In Motion
- Module 4: Weather Dynamics

Each module in this course consists of several lessons, which contain the following components:

- Lesson Focus: The Lesson Focus at the beginning of each lesson identifies one or more specific learning outcomes (SLOs) that are addressed in the lesson. The SLOs identify the knowledge and skills you should have achieved by the end of the lesson.
Introduction: Each lesson begins with an explanation of what you will be learning in that lesson.

Lesson: The main body of the lesson is made up of the content that you need to learn. It contains text, explanations, images, and diagrams.

Learning Activities: Many lessons include one or more learning activities that will help you learn about the lesson topics and prepare you for the assignments, the midterm examination, and the final examination. Once you complete a learning activity, check your responses against those provided in the Learning Activity Answer Key found at the end of each module. You will not submit the completed learning activities to your tutor/marker.

Assignments: Assignments are found at the end of lessons. You will mail or electronically submit all your completed assignments to your tutor/marker for assessment at the end of each module. In total, all assignments are worth 60 percent of your final course mark.

Video Files: Some lessons refer to the Grade 10 Science Independent Study Video Files, which you are required to view for this course.

Key Words: This list identifies the important words that are used in the lesson. The key words are highlighted in bold within the text and identified by key word icons.

Summary: Each lesson ends with a brief review of what you just learned.

What Resources Will You Need for This Course?

You do not need a textbook for this course. All the content is provided directly within the course and in the video files. You will, however, need access to a variety of resources.

The required and optional resources for this course are identified below.

Required Resources

For this course, you will need access to the following resources. If you do not have access to one or more of these resources, contact your tutor/marker.

- Supplies: A metric ruler, pencil, and coloured pencils (red, green, light blue, light brown)
- **Videos:** You will need to view the Grade 10 Science videos, which are available in the Audios and Videos section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/av.html>. If you do not have access to the Internet, or if you need a copy of the videos, contact the ISO office at 1-800-465-9915.

- **Booklet:** You will need to read the booklet *In Motion: A Learning Resource for Students*, which is found in the Student Downloads section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>. If you do not have access to the Internet, contact the Independent Study Option office at 1-800-465-9915 to obtain a copy of the *In Motion: A Learning Resource for Students* booklet.

- **A computer/mobile device** to view video and PDF files: Access to a computer/mobile device with appropriate software is required to view the Grade 10 Science video files and the PDF file of the booklet *In Motion: A Learning Resource for Students*.

**Optional Resources**

It would be helpful if you had access to the following resources:

- **A calculator:** A calculator would be helpful as you work through the course. You may also use a calculator during the examinations.

- **Photocopier/scanner:** With access to a photocopier/scanner, you could make a copy of your assignments before submitting them so that if your tutor/marker wants to discuss an assignment with you over the phone, each of you will have a copy. It would also allow you to continue studying or to complete further lessons while your original work is with the tutor/marker. Photocopying or scanning your assignments will also ensure that you keep a copy in case the originals are lost.

- **Access to a school laboratory** or access to **equipment** is required to perform **optional** laboratory activities. (You must be supervised by a teacher or guardian/parent.)

- **Resource people:** Access to local resource people, such as teachers, school counsellors, and librarians, would help you complete the course.

- **A computer with word processing and presentation software:** Access to word processing software (e.g., Microsoft Word) and presentation and slide software (e.g., Microsoft PowerPoint) would help you complete some assignments.
• A computer/mobile device with Internet* access: Some lessons suggest website links as sources of information or for supplementary reference and reading. If you do not have Internet access, you will still be able to complete the course, but you will need to find different ways of accessing information.

Internet Safety

If you choose to use the Internet to do research, be safe. The Internet is a valuable source of information and should be used responsibly. Talk to your parents/guardians about Internet safety, and use the following guidelines when going online:

• Choose a user name that does not reveal your name, gender, age, or other personal details.
• Never give anyone private information.
• Do not answer emails from strangers.
• If someone asks you to keep your relationship with him or her a secret, stop talking to the person and immediately tell your parent/guardian.
• Do not email or post pictures or files.

The above is not a complete list because no list can possibly cover all dangerous situations. Use your common sense and be careful.

Who Can Help You with This Course?

Taking an independent study course is different from taking a course in a classroom. Instead of relying on the teacher to tell you to complete a learning activity or an assignment, you must tell yourself to be responsible for your learning and for meeting deadlines. There are, however, two people who can help you be successful in this course: your tutor-marker and your learning partner.

Your Tutor/Marker

Tutor/markers are experienced educators who tutor ISO students and mark assignments and examinations. When you are having difficulty with something in this course, contact your tutor/marker, who is there to help you. Your tutor/marker’s name and contact information were sent to you with this course. You can also obtain this information in the Who Is My Tutor/Marker? section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/assistance.html>.

* A note about Internet sites: All of the URLs in the course were working when this course was written, but, since Internet sites come and go, you might find that some of these sites are no longer active or appropriate. If that happens, you could use a search engine (e.g., <www.google.ca>) to find the information that you are looking for.
Your Learning Partner

A learning partner is someone you choose who will help you learn. It may be someone who knows something about science, but it doesn’t have to be. A learning partner could be someone else who is taking this course, a teacher, a parent or guardian, a sibling, a friend, or anybody else who can help you. Most importantly, a learning partner should be someone with whom you feel comfortable and who will support you as you work through this course.

Your learning partner can help you keep on schedule with your coursework, read the course with you, check your work, look at and respond to your learning activities, or help you make sense of assignments. You may even study for your examinations with your learning partner. If you and your learning partner are taking the same course, however, your assignment work should not be identical.

Plagiarism

Plagiarism is a big deal with serious consequences, so it’s important that you understand what it is and how to avoid it.

What is plagiarism?

In brief, plagiarism is taking someone’s ideas or words and presenting them as if they are your own.

How can you avoid plagiarism?

- Begin early. Research takes time. Allow enough time to search for, evaluate, and read sources, and to get help if you need it. Always document your sources immediately.
- Present your research by quoting and paraphrasing.
  - When you use a quote, you use the exact same words with quotation marks, and you indicate exactly where it came from.
  - When you paraphrase, you rewrite an author’s idea using your own words and you do not use quotation marks (but you also make sure to state clearly whose idea it is).
- Learn how to use different citation styles.
- Give credit where credit is due. Never pretend someone else’s idea is your own.
How Will You Know How Well You Are Learning?

You will know how well you are learning in this course by how well you complete the learning activities, assignments, and examinations.

Learning Activities

The learning activities in this course will help you to review and practise what you have learned in the lessons. You will not submit the completed learning activities to your tutor/marker. Instead, you will complete the learning activities and compare your responses to those provided in the Learning Activity Answer Key found at the end of each module.

Make sure you complete the learning activities. Doing so will not only help you to practise what you have learned, but will also prepare you to complete your assignments and the examinations successfully. Many of the questions on the examinations will be similar to the questions in the learning activities. Remember that you will not submit learning activities to your tutor/marker.

Assignments

Each module in this course contains assignments, which you will complete and submit to your tutor/marker for assessment. The assignments are worth a total of 60 percent of your final course mark.

The tutor/marker will mark your assignments and return them to you. Remember to keep all marked assignments until you have finished the course so that you can use them to study for your examinations.

Midterm and Final Examinations

This course contains a midterm examination and a final examination.

- The midterm examination is based on Modules 1 and 2, and is worth 20 percent of your final mark in this course. You will write the midterm examination when you have completed Module 2.
- The final examination is based on Modules 3 and 4, and is worth 20 percent of your final mark in this course. You will write the final examination when you have completed Module 4.

The two examinations are worth a total of 40 percent of your final course mark. You will write both examinations under supervision.
To do well on each examination, you should review all the work you have completed from the modules, including all learning activities and assignments.

**Practice Examinations and Answer Keys**

To help you succeed in your examinations, you will have an opportunity to complete a Practice Midterm Examination and a Practice Final Examination. These examinations, along with the answer keys, are found in the Student Downloads section of the distance learning website at [www.edu.gov.mb.ca/k12/dl/downloads/index.html](http://www.edu.gov.mb.ca/k12/dl/downloads/index.html). If you do not have access to the Internet, contact the Independent Study Option office at 1-800-465-9915 to obtain a copy of the practice examinations.

These practice examinations are similar to the actual examinations you will be writing. The answer keys enable you to check your answers. This will give you the confidence you need to do well on your examinations.

**Requesting Your Examinations**

You are responsible for making arrangements to have the examinations sent to your proctor from the ISO office. Please make arrangements before you finish Module 2 to write the midterm examination. Likewise, you should begin arranging for your final examination before you finish Module 4.

To write your examinations, you need to make the following arrangements:

- **If you are attending school**, ask your school’s ISO school facilitator to request your examination. Do this at least three weeks before you are ready to write your examination. For more information on examination procedures, please contact your ISO school facilitator or visit the Grading and Evaluation section of the distance learning website at [www.edu.gov.mb.ca/k12/dl/iso/assignments.html](http://www.edu.gov.mb.ca/k12/dl/iso/assignments.html).

- **If you are not attending school**, check the Examination Request Form for options available to you. The form was mailed to you with this course. Three weeks before you are ready to write the examination, fill in the Examination Request Form and mail, fax, or email it to

  ISO Office
  555 Main Street
  Winkler MB  R6W 1C4
  Fax: 204-325-1719
  Toll-Free Telephone: 1-800-465-9915
  Email: distance.learning@gov.mb.ca
How Much Time Will You Need to Complete This Course?

Learning through independent study has several advantages over learning in the classroom. You are in charge of how you learn and you can choose how quickly you will complete the course. You can complete as many lessons as you wish in a single session. You do not have to wait for your teacher or classmates.

From the date of your registration, you have a maximum of 12 months to complete this course, but the pace at which you proceed is up to you. Read the following suggestions on how to pace yourself.

Chart A: Semester 1

If you want to start the course in September and complete it in January, you can follow the timeline suggested below.

<table>
<thead>
<tr>
<th>Module</th>
<th>Completion Date</th>
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<tbody>
<tr>
<td>Module 1</td>
<td>End of September</td>
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<tr>
<td>Module 2</td>
<td>Middle of November</td>
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<tr>
<td>Midterm Examination</td>
<td>End of November</td>
</tr>
<tr>
<td>Module 3</td>
<td>Middle of December</td>
</tr>
<tr>
<td>Module 4</td>
<td>End of December</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Middle of January</td>
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</table>
Chart B: Semester 2

If you want to start the course in February and complete it in June, you can follow the timeline suggested below.

<table>
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<th>Module</th>
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<tr>
<td>Module 1</td>
<td>End of February</td>
</tr>
<tr>
<td>Module 2</td>
<td>End of March</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>Beginning of April</td>
</tr>
<tr>
<td>Module 3</td>
<td>End of April</td>
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<tr>
<td>Module 4</td>
<td>Middle of May</td>
</tr>
<tr>
<td>Final Examination</td>
<td>End of May</td>
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Chart C: Full School Year (Not Semestered)

If you want to start the course in September and complete it in June, you can follow the timeline suggested below.

<table>
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<th>Completion Date</th>
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<td>Module 1</td>
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<tr>
<td>Module 2</td>
<td>End of December</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>Middle of January</td>
</tr>
<tr>
<td>Module 3</td>
<td>Middle of March</td>
</tr>
<tr>
<td>Module 4</td>
<td>Middle of May</td>
</tr>
<tr>
<td>Final Examination</td>
<td>End of May</td>
</tr>
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</table>
Timelines

Do not wait until the last minute to complete your work, since your tutor/marker may not be available to mark it immediately. It may take a few weeks for your tutor/marker to assess your work and return it to you or your school.

If you need this course to graduate this school year, remember to schedule and complete your final examination by **May 31**.

When and How Will You Submit Completed Assignments?

When to Submit Assignments

While working on this course, you will submit completed assignments to your tutor/marker four times. The following chart shows exactly what assignments you will be submitting at the end of each module.

<table>
<thead>
<tr>
<th>Submission</th>
<th>Assignments You Will Submit</th>
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| 1          | **Module 1: Dynamics of Ecosystems**  
  Module 1 Cover Sheet  
  Assignment 1.1: Biochemical Cycles  
  Assignment 1.2: Toxin Investigation  
  Assignment 1.3: Predator-Prey Interactions  
  Assignment 1.4: Hydroelectric Power Decisions |
| 2          | **Module 2: Chemistry in Action**  
  Module 2 Cover Sheet  
  Assignment 2.1: Atoms and Ionic Compounds  
  Assignment 2.2: Atomic Bonding  
  Assignment 2.3: Conservation of Mass  
  Assignment 2.4: Chemical Reactions  
  Assignment 2.5: Acids and Bases  
  Assignment 2.6: Chemistry in Technology and the Environment |
| 3          | **Module 3: In Motion**  
  Module 3 Cover Sheet  
  Assignment 3.1: Inertia and the Unrestrained Passenger  
  Assignment 3.2: The Link between Force and Motion  
  Assignment 3.3: Speed and Braking Distance |
| 4          | **Module 4: Weather Dynamics**  
  Module 4 Cover Sheet  
  Assignment 4.1: Energy Flow  
  Assignment 4.2: Research Project  
  Assignment 4.3: Climate Change Discussion |
How to Submit Assignments

In this course, you have the choice of submitting your assignments either by mail or electronically.

- **Mail:** Each time you mail something, you must include the print version of the applicable Cover Sheet (found at the end of this Introduction).

- **Electronic submission:** Each time you submit something electronically, you must include the electronic version of the applicable Cover Sheet (found in the Student Downloads section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>) or you can scan the Cover Sheet located at the end of this Introduction.

Complete the information at the top of each Cover Sheet before submitting it along with your assignments.

### Submitting Your Assignments by Mail

If you choose to mail your completed assignments, please photocopy/scan all the materials first so that you will have a copy of your work in case your package goes missing. You will need to place the applicable module Cover Sheet and assignments in an envelope, and address it to

ISO Tutor/Marker  
555 Main Street  
Winkler MB R6W 1C4

Your tutor/marker will mark your work and return it to you by mail.

### Submitting Your Assignments Electronically

Assignment submission options vary by course. Sometimes assignments can be submitted electronically and sometimes they must be submitted by mail. Specific instructions on how to submit assignments were sent to you with this course. You can also obtain this information in the Grading and Evaluation section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/assignments.html>.

If you are submitting assignments electronically, make sure you have saved copies of them before you send them. That way, you can refer to your assignments when you discuss them with your tutor/marker. Also, if the original hand-in assignments are lost, you are able to resubmit them.

Your tutor/marker will mark your work and return it to you electronically.

---

The Independent Study Option office does not provide technical support for hardware-related issues. If troubleshooting is required, consult a professional computer technician.
What Are the Guide Graphics For?

Guide graphics are used throughout this course to identify and guide you in specific tasks. Each graphic has a specific purpose, as described below.

**Lesson Focus:** This graphic appears at the beginning of each lesson, indicating the specific learning outcomes targeted for the lesson.

**Key Words:** This graphic also appears at the beginning of each lesson, where there is a list of new words and terms that will be defined within the lesson.

**Learning Partner:** Ask your learning partner to help you with this task.

**Learning Activity:** Complete this learning activity to help you review or practise what you have learned and to prepare for your assignments or exams. You will not send learning activities to your tutor/marker.

**Check Your Work:** This graphic reminds you to check your work using the answer key.

**Assignment:** Complete this assignment to the best of your ability. It will be assessed by your tutor/marker as part of your final mark for the course.

**Caution:** Be careful when conducting this learning activity or experiment.

**Submit Assignment:** It is now time to submit your assignment for tutor/marker assessment. You will be sending in your assignments at the end of every module.

**Exam:** Prepare to write your midterm or final exam.
Remember: If you have questions or need help at any point during this course, contact your tutor/marker or ask your learning partner for help.

Good luck with the course!
Grade 10 Science (20F)

Module 1
Cover Sheet

Please place on top of your assignments to assist in proper recording of your work.

Send to:
ISO Tutor/Marker
555 Main Street
Winkler MB  R6W 1C4

Name: ________________________________     Phone: _________________________
Address: ________________________________
City/Town: ________________________________     Postal Code: ____________________
Attending School:  ☐ No      ☐ Yes     Email: ________________________________
School Name: ________________________________

For Office Use Only

Module 1: Dynamics of Ecosystems

Date Received: _________________________     Date Returned: _________________________

Marks

☐ Assignment 1.1: Biochemical Cycles       ___ /7
☐ Assignment 1.2: Toxin Investigation        ___ /14
☐ Assignment 1.3: Predator-Prey Interactions ___ /14
☐ Assignment 1.4: Hydroelectric Power Decisions ___ /22

Total: ___ /57

Remarks:
## Assignment 1.2: Toxin Investigation Rubric

<table>
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<tr>
<th>Content</th>
<th>Length and Style</th>
<th>Sources Used</th>
<th>Total</th>
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<tbody>
<tr>
<td>7 marks</td>
<td>3 marks</td>
<td>4 marks</td>
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<tr>
<td>- Describe how humans use the substance.</td>
<td><strong>Report:</strong> At least 1 typewritten page, double-spaced, using a font no larger than 12.</td>
<td>Include a “Works Cited” page at the end of your report that details all of your research resources.</td>
<td></td>
</tr>
<tr>
<td>(2 marks)</td>
<td><strong>PowerPoint:</strong> At least 4 slides. Text is in a font and colour that is easy to read. Uses backgrounds, transitions, and pictures to enhance the presentation.</td>
<td><strong>Books:</strong> Include the title, author, and publisher.</td>
<td></td>
</tr>
<tr>
<td>- Describe how the substance affects human and/or environmental health. (3 marks)</td>
<td><strong>Poster:</strong> On 8½” x 11” paper. Clear title and subheadings. Text is organized into sections. Uses colour and pictures to capture attention.</td>
<td><strong>Internet Resources:</strong> Include the Page Name, Author, and URL.</td>
<td></td>
</tr>
<tr>
<td>- Explain how people can avoid or reduce exposure to the substance. (2 marks)</td>
<td></td>
<td><strong>Interviews:</strong> Include the name of each person you interview as well as their occupation and place of work.</td>
<td></td>
</tr>
</tbody>
</table>
Please place on top of your assignments to assist in proper recording of your work.

Send to:
ISO Tutor/Marker
555 Main Street
Winkler MB  R6W 1C4

Name: ______________________________________     Phone: _________________________
Address: _____________________________________________________________________
City/Town:  __________________________________     Postal code:  ____________________
Attending School:   □ No   □ Yes     Email: _________________________
School Name:_______________________________________________________________

Module 2: Chemistry in Action

Date Received: ________________________  Date Returned: ________________________

Marks

❑ Assignment 2.1: Atoms and Ionic Compounds  ____ /41
❑ Assignment 2.2: Atomic Bonding  ____ /31
❑ Assignment 2.3: Conservation of Mass  ____ /23
❑ Assignment 2.4: Chemical Reactions  ____ /35
❑ Assignment 2.5: Acids and Bases  ____ /16
❑ Assignment 2.6: Chemistry in Technology and the Environment  ____ /24

Total:  ____ /170

Remarks:
Module 3
Cover Sheet

Please place on top of your assignments to assist in proper recording of your work.

Send to:
ISO Tutor/Marker
555 Main Street
Winkler MB R6W 1C4

Name: _________________________________ Phone: ____________________________
Address: _________________________________________________________________
City/Town: __________________________ Postal Code: _________________________
Attending School: □ No □ Yes Email: ________________________________
School Name: ________________________________

For Office Use Only

Module 3: In Motion

Date Received: _________________________ Date Returned: _________________________

Marks

☐ Assignment 3.1: Inertia and the Unrestrained Passenger ______ /14
☐ Assignment 3.2: The Link between Force and Motion ______ /27
☐ Assignment 3.3: Speed and Braking Distance ______ /15

Total: ______ /56

Remarks:
Grade 10 Science (20F)

Module 4
Cover Sheet

Please place on top of your assignments to assist in proper recording of your work.

Send to:
ISO Tutor/Marker
555 Main Street
Winkler MB R6W 1C4

Name: ______________________________________ Phone: _________________________
Address: _____________________________________________________________________
City/Town: __________________________________ Postal Code: ____________________
Attending School:  ☐ No  ☐ Yes Email: _________________________
School Name: __________________________________________________________________

For Office Use Only

Module 4: Weather Dynamics

Date Received: ________________________ Date Returned: ________________________

☐ Assignment 4.1: Energy Flow  ____ /12
☐ Assignment 4.2: Research Project  ____ /20
☐ Assignment 4.3: Climate Change Discussion  ____ /20

Total:  ____ /52

Remarks:
## Assignment 4.2: Research Project Rubric

<table>
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<th>Content</th>
<th>Length and Style</th>
<th>Sources Used</th>
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<tbody>
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<td>14 marks</td>
<td>3 marks</td>
<td>3 marks</td>
<td>/20</td>
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</table>

- **Content**
  - provides details of the event (name of the event, date, time, location) (2 marks)
  - provides the timeline of event (3 marks)
  - provides social, economic, and environmental impacts (6 marks)
  - provides analysis of aftermath and lessons learned (3 marks)

- **Length and Style**
  - **Report:** At least 1 typewritten page, double-spaced, using a font no larger than 12.
  - **Power point:** At least 5 slides. Text is in a font and colour that is easy to read. Uses backgrounds, transitions, and pictures to enhance the presentation.
  - **Poster:** On 8½" x 11" paper. Clear title and subheadings. Text is organized into sections. Uses colour and pictures to capture attention.

- **Sources Used**
  - Include a "Works Cited" page at the end of your report that details all of your research resources.
  - **Books:** Include the title, author, and publisher.
  - **Internet Resources:** Include the page name, author, and URL.
  - **Interviews:** Include the name of each person you interview as well as their occupation and place of work.
GRADE 10 SCIENCE (20F)

Module 1

Dynamics of Ecosystems

This module contains the following:

- Introduction
- Lesson 1: Introduction to Ecology
- Lesson 2: Energy Flow
- Lesson 3: The Cycles of Life
- Lesson 4: Disturbing the Carbon Cycle
- Lesson 5: Disturbing the Nitrogen Cycle
- Lesson 6: Bioaccumulation
- Lesson 7: Population Growth
- Lesson 8: Factors Limiting Population Growth
- Lesson 9: Population Dynamics
- Lesson 10: A Population Dynamics Case Study
- Lesson 11: Biodiversity
- Lesson 12: Species Extinction
- Lesson 13: Species Introduction: A Case Study
- Lesson 14: Decision Making and Environmental Issues

Module 1 Learning Activity Answer Key
Welcome to Module 1: Dynamics of Ecosystems. This module will give you the chance to learn about the fascinating world of ecosystems. An ecosystem is a community of living organisms and the physical environment with which they interact. This topic is very important today because ecosystems are being seriously threatened by human activity.

You will apply your knowledge by examining a case study. At the end of this module, you will use the decision-making model to propose a course of action regarding an important environmental issue.

Learning Activities

There are several learning activities placed throughout this module, which will help you to practise using the information you will learn. The answer keys for each of these learning activities are found in Module 1 Learning Activity Answer Key. Check the answer key carefully and make corrections to your work.

Assignments

In order to complete this first module, you need to study Lessons 1 to 14, and complete the following four assignments, which you will be sending to your tutor/marker when you have completed the module. The instructions on how to send them in are in the course introduction and at the end of the module.

Assessment Checklist

- Lesson 3: Assignment 1.1: Biochemical Cycles
- Lesson 6: Assignment 1.2: Toxin Investigation
- Lesson 10: Assignment 1.3: Predator-Prey Interactions
- Lesson 14: Assignment 1.4: Hydroelectric Power Decisions

These assignments will be worth a portion of the 60 percent of the total marks you will receive for assignments in this course.
What Will You Need?

In order to complete this module, you will need access to the following resources.

Required Resources

- **metric ruler, pencil, and two coloured pencils** of your choice to complete the graph in Assignment 1.3

Optional Resources

- **A computer with Internet access** would be beneficial throughout this course, especially to complete research assignments like Assignment 1.2. It would also help you to access additional information that is provided on websites that are listed throughout the course. All URLs listed in this course were working when this course was written. However, since some Internet sites change or disappear, you might find that some of these sites are no longer available or appropriate. If that happens, you could use a search engine (e.g., <google.ca>) to find the information that you are looking for.

- **A computer with a word processor like Microsoft Word** would be beneficial to help you complete assignments, including Assignment 1.2, where you will have the option of writing a report.

- **A computer with presentation and slide software like Microsoft PowerPoint** would be beneficial to help you complete assignments, including Assignment 1.2, where you will have the option of creating a slide presentation.

- **Access to a library**, such as a public library or school library, would be beneficial, especially if you do not have access to a computer with Internet access. Access to a library would help you complete research assignments like Assignment 1.2.
Lesson 1: Introduction to Ecology

Lesson Focus

After completing this lesson, you will be able to

- explain the difference between ecology, ecologist, and ecosystem
- provide examples of abiotic and biotic factors
- explain the difference between habitat and niche
- describe the roles of producers, consumers, and decomposers

Key Words

- ecology
- ecologist
- ecosystem
- abiotic factors
- biotic factors
- produce
- consumer
- decomposer
- habitat
- niche

Introduction

Welcome to Grade 10 Science! This first lesson will re-introduce you to the field of ecology and to several key concepts that you may have covered in previous grades.
Dawn breaks over Lake Winnipeg. The early morning sunlight sparkles in the calm water. The plaintive call of a loon can be heard over a chorus of bullfrogs and red-winged blackbirds. A moose and her calf wade quietly in the muddy shallows, breakfasting on water lilies and pondweed. Jewel-like dragonflies chase mosquitoes along the water’s edge as a snapping turtle suns itself on a rock. An eagle circles lazily overhead. Minnows dart in and out of wild rice in the shallows, while a northern pike lurks in the deeper water hoping for a meal. Two canoeists survey the scene and quietly remark that it is going to be a beautiful summer day.

All the living and non-living things described in this scene are involved in delicately balanced interactions with one another. How do wild rice, snapping turtles, mosquitoes, and the water of Lake Winnipeg interact?

Interactions among Living Things

The branch of biology that deals with the study of the interactions among organisms and with their environment is known as ecology. (The word eco comes from the Greek word oikos, which means house.) Scientists who study ecology are called ecologists. Because our planet has many diverse plants, animals, and environments, ecologists tend to study smaller areas called ecosystems. An ecosystem consists of the physical environment (abiotic factors) and all the living things (biotic factors) within it. Examples of abiotic factors in the physical environment include water, sunlight, oxygen, soil, nutrients, and temperature. Examples of biotic factors in an ecosystem include the plants, animals, fungi, and bacteria that live within it.

Each type of living thing in an ecosystem has a place in which it lives. This is known as its habitat. The combination of the job an organism does and the
place in which it lives is called its **niche**. What are some jobs that organisms do? Plants and algae trap the energy in sunlight and produce their own food. Because of this, they are known as **producers**. Animals are **consumers** since they cannot make their own food and must obtain their food from producers or other consumers. Bacteria and fungi are **decomposers**. They eat dead plant and animal remains and convert them into substances that can be reused. They are the recyclers of the ecosystem.

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**Learning Activity 1.1: Introduction to Ecology**

1. Define *ecology*, *ecologists*, and *ecosystems*. How are they related to one another?

2. Consider the Lake Winnipeg ecosystem described in the introduction. Write a descriptive paragraph that illustrates a local ecosystem with which you are familiar. It could be a local park, your yard, a forest, or a pond. Be sure to include a variety of abiotic and biotic factors in your descriptive paragraph, as well interactions among them.

3. How does a niche differ from a habitat?

4. What would happen to an ecosystem if all the decomposers were destroyed?

5. One student argues that humans are producers because they produce their own food by growing crops and raising livestock. Do you agree? Why or why not?

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Check the Learning Activity Answer Key found at the end of this module.

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**Summary**

At first glance, an ecosystem may appear simple, even boring. Upon closer examination, you will notice the wide variety of living things present in the ecosystem. Abiotic factors become apparent, as do the interactions of organisms with one another, and with the physical environment. Ecology truly is the study of the “houses” of Earth.