Module 4: Exploring the Universe	1
Introduction	3
Lesson 1: A Brief History of Astronomical Science	7
Lesson 2: The Astrolabe	15
Assignment 4.1: Measuring Altitude	25
Lesson 3: Applying Coordinates to Celestial Objects	27
Assignment 4.2: Locating Celestial Objects Using a System of Coordinates	31
Lesson 4: Collecting Data from Celestial Objects over a Period of Time	e 37
Assignment 4.3: Path of the Sun and the Moon	45
Lesson 5: Copernicus, Kepler, Galileo, and Newton – The Heliocentric Cosmos	51
Lesson 6: Modern Astronomy	63
Lesson 7: Celestial Navigation	75
Lesson 8: Motions of Celestial Objects	87
Lesson 6: Modern Astronomy Lesson 7: Celestial Navigation Lesson 8: Motions of Celestial Objects Assignment 4.4: Monitoring the Verograde Motion of the Planet Mars Assignment 41: Life on Mars	91
Assignment 41: Life on Mars	97
bers B. Measuring Space OC	99
Assignment 4.6: Measuring in Space	107
Lesson 10: Objects Found in Our Solar System	109
Lesson 11: Nebulae, Stars, and Galaxies	127
Assignment 4.7: Stars	137
Lesson 12: Space Technologies	141
Lesson 13: Canada's Involvement in Space	153
Lesson 14: The Impact of Space Science and Technologies on Humans and the Environment	161
Assignment 4.8: Mars Colony Project	169
Lesson 15: Exploring the Universe Review	171
Module 4 Learning Activity Answer Key	179

Bibliography

Item Required	Module 1	Module 2	Module 3	Module 4
airtight jar		A 2.4, Option 4		
small cup		A 2.4, Option 4		
plastic straw			LA 3.1, 3.3, 3.5 A 3.2, Option 1	
paper bits			LA 3.1, 3.5	
wool cloth/fabric			LA 3.1, 3.3, 3.5	
transparent tape (packing tape)			LA 3.1; 3.3; 3.12, Option 2; 3.13, Option 2 A 3.2, Options 1 and 2; A 3.5, Option 2	LA 4.2
15 cm of copper tubing (1 cm in diameter)			LA 3.3	
30 cm string			LA 3.3	K
thread			LA 3.5 O	
pith ball or piece of foam		Notes	LA 3.3	
thread pith ball or piece of foam foam cup aluminum foll e soda can with pull tab lemon	from	12 01	and 2	
aluminum for ICV	pade	13	A 3.2, Options 1 and 2	
soda can with pull tab	Pas		A 3.2, Option 2	
lemon			LA 3.7, Option 1	
copper wire			LA 3.7, Option 1	
neon bulb, ammeter, galvanometer, or multimeter			LA 3.7, Option 1	
iron nail, plus welding rods, wires, or other metals			LA 3.7, Option 1	
2 D cell batteries			LA 3.12, Option 2 LA 3.13, Option 2 A 3.5, Option 2	
2 small flashlight bulbs			LA 3.12, Option 2 LA 3.13, Option 2 A 3.5, Option 2	
insulated copper wire			LA 3.13, Option 2 A 3.5, Option 2	

continued

Plagiarism

Plagiarism is taking someone's ideas or words as if they you're your own, without giving credit where credit is due. Some examples include the following:

- downloading material in whole or part from the Internet and submitting it as your own
- copying word-for-word from published or unpublished work
- paraphrasing, or using ideas from, published or unpublished work without giving credit

How can you avoid plagiarism?

- 1. Begin early because research takes time. In addition to the time needed to search for, evaluate, and read sources, you also need to remember to allow time to get help if you need it. Always document your sources immediately.
- 2. Incorporate information using quotations or paraphrases. A quotation uses exactly the same words and puts them in quotation mark A paraphrase uses an author's idea, but expresses it in your overproves without quotation marks, since it is no longer a porte or-word quotation. And just changing a few words from the routed does not count.
- 3. Discover how to use out out citation styles lite MLA to cite your sources.
- 4. Give credit Were credit is due:

The above is **not** a complete but because using citations could be a lesson in itself. This is a quick guide to help you research ethically and efficiently. When in doubt, talk to your tutor/marker, your librarian, a family member, or a teacher.

Final Exam



The final exam is based on all four modules and is worth 25 percent of the final mark of the course. In order to do well on the final exam, you should review all of the work that you have completed from Modules 1 to 4, including all learning activities and assignments. You should also complete and check your answers for the Final Practice Exam (more about this below).

You are responsible for applying for your exam and making arrangements to have the exam sent to your proctor from the Independent Study Option office. You should make arrangements to write your exam before you finish the final module. When you write your exam, you will be supervised by a proctor. Chart C: Full School Year (Not Semestered)

Here is a **suggested timeline** that you can follow if you start your course in September and need to complete it by June.

Module	Completion Date
Module 1	late October
Module 2	mid January
Module 3	mid March
Module 4 and Final Exam	late May

Do not wait until the last minute to complete your work, since your tutor/marker may not be available to mark it immediately to be sure that you leave enough time for your work to travel through the mail, as it might take over a week. It may also take a few week for your tutor/marker to mark everything and send the marks to your school

If you need this course to graduate diffiched year, remember to schedule and contribute your final example the end of May.

How and When Do You Send Assignments to Your Tutor/Marker?

When to Submit Assignments

While working on this course, you will mail or email completed assignments to your tutor/marker four times. Each time you send an assignment, you must include the Module Cover Sheet, which you will find at the end of this Introduction. The following chart shows you exactly what you will be mailing in at the end of each module.

Mailing	Modules	Assignments You Will Mail In
Mailing 1	Module 1	Assignments 1.1 – 1.4
Mailing 2	Module 2	Assignments 2.1 – 2.4
Mailing 3	Module 3	Assignments 3.1 – 3.6
Mailing 4	Module 4	Assignments 4.1 – 4.8

What Are 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.



Learning Outcomes: 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, listing the new words and terms that will be defined within.



Internet: If you have access to the Internet, you can use it to get more information. Internet access is optional.



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



Learn in g Activity: Complete this learning activity to help you review on practice what you have learned and to prepare for your essignment or examination. You will not send earned activities to your tutor/marker.



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



Assignment: This guide graphic tells you that there is an assignment you must complete.

Preview from Notesale.co.uk page 39 of 40