Tree of Life School

"Wisdom is a tree of life to those to those who embrace her."
Proverbs 3:18

Physical Science
Course Outline

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Course Outline

Introduction

This course is a general introduction to Physical Science, the study of the non-living physical natural world as created by God. The subjects of this course will cover matter and energy, heat, forces and motion, the earth and space, rocks, water and air, and weather. Generally, this course serves as an entry point into further studies in chemistry and physics. This course will present many new words and definitions, but also key concepts and ideas about current issues and the limitations of science. The variety of assignments and tests will focus on memory of factual information as well as understanding of concepts, practical experiments, research, and writing. The goal of this course is to introduce the student to the language and systematic study of the physical world as well as to instill an appreciation and wonder of God's creation.

How to Work Through The Course

This course has been divided into a **140 day schedule**. This will allow the student to follow a **four-day school week** and still complete the course in a normal academic year. The **fifth day** of each week can used to **catch up on assignments**, do **extra reading**, or simply **take the day off** from the course. If, however, a five-day school week is more desirable, the student is encouraged to pursue this course and will be rewarded by early completion of the material. Care has been taken to provide specific instructions for each day's work. Therefore, **all work is to be completed in the order presented in the daily schedule**.

The guide provides a suggested day-by-day sequence of lessons that will pace you through the reading material, experiments, assignments, and tests. This course uses the textbook *Exploring Creation with Physical Science* by Jay Wile, but the textbook is not itself the course, but only the main reading source you will use as you study the science. This course guide offers important suggestions over the next few pages on **how to study this course** as well as comments and tips throughout the 140 day plan. The beginning of the textbook also describes how the textbook should be used during study.

Calculating Your Final Grade

During this Physical Science course, you will complete 10 assignments and 6 tests. Every module (chapter) of the course has either an assignment or a test to send for marking. **Please note that Tree of Life doesn't use the test package that comes with your textbook.** Your final mark in the course will be based on the following percentages:

10 Assignments	50%
6 Tests	50%

Assignment Expectations

Tests
Short answer tests should be written in complete sentences. Rarely should answers be more than a few sentences or a brief paragraph unless otherwise indicated. In these cases a short (one page) essay may be required to expand on the material learned throughout the year.

Paragraph
Well-written paragraphs contain a topic sentence that makes it clear what the thesis (purpose) of the assignment is. The student will then expand on this thesis, developing it so that the reader is led systematically through the argument until he/she arrives at the final sentence of the paragraph (the conclusion). It is here that the student will close his/her paragraph in a way that is appropriate to the topic.

Lab Reports

Submitted lab reports demonstrate the stages of thinking about a particular scientific idea (asking a question, giving a possible solution, devising an experiment, making observations/measurements, providing a conclusion/answer to the question). Every lab report contains this format. A sample lab report is found at the end of this guide.

1. Title of Lab/course/name/date

The title of the lab should describe the experiment. Instead of "*Atmospheric Pressure,*" use "*The Effect of Atmospheric Pressure on Cans*".

2. Problem 1-2 sentences

State the scientific question in the form of a question (ending in "?"). For example: "*What happens to the freezing point of water when salt is dissolved in the water?"* Depending on the experiment, you may also need to explain what the question means in connection with the experiment if it is not obvious.

3. Hypothesis 1-3 sentences

The hypothesis is an educated guess or possible answer to the problem, and is written before doing the experiment. The hypothesis should imply or state a prediction for what *should* happen during the experiment (not what *did* happen already). Also, the hypothesis may state a theory or reason for the prediction. For example: *The freezing point of water will decrease after dissolving the salt. Therefore, the pure water will freeze before the salt water. This is because the salt interferes with the formation of a solid crystal structure*." Note the *"will"*

prediction in my example. Do not use "I believe" or "We think" at the beginning. Do not use past tense either as that would imply you already did the experiment.

4. Summary of Procedure max. 5 sentences

You do not need to give every detailed step of the experiment, nor every item you used. You should not copy the procedure from the textbook. This section should be at most 5 sentences. See sample lab report for example.

5. Observations and Results 1-2 paragraphs

The results section is an important part of the lab report because it describes what you discovered by doing the experiment. There are different kinds of results:

1. Sense observations (what you saw happening, smell, touch, sound, taste)
2. Measurements (numbers from measuring instruments)

Generally, you should always include some kind of sense observations in written form for every lab. Try to be as detailed as possible with your observations. Instead of saying "*The tablet reacted with the water",* you could say:

"*When the tablet was added to the glass of water, it began to bubble vigourously with a fizzing sound. Small bubbles came from the surface of the tablet. The tablet bounced around on the bottom of the glass. There was no smell from the reaction. The reaction lasted 22 seconds. After the reaction was done, the tablet was gone."*

Note that this example also has a measurement (22 seconds). Some experiments won't require any measurements, however. If the experiment involves many measurements, you should present these in a table. Note that the results section should **not** explain or interpret the results of the experiment (say what it means or why it happened). Save this for the conclusion. Just describe objectively what has occurred during the experiment.

6. Discussion and Conclusion 1-2 paragraphs

The conclusion paragraph of the lab report is not quite the same thing as an essay conclusion. The science conclusion should include the following things:

- Restate the problem and your hypothesis
- Summarize the results (what happened)…yes, write it again
- Answer the question (problem) you wrote at the beginning of the lab
- Say if the hypothesis was supported or rejected (not correct/incorrect)
- Explain the results as best you can (*why* did it happen?)

- You may need to mention some background theory that helps explain the results.

If you write at least 1 sentence per item above, you will have at least one good conclusion paragraph.

Bibliography

If you have used the ideas of others to help you form your thoughts for your assignment, you need to cite them at the end of your assignment in the bibliography. The format for the bibliography is different than for footnotes; merely copying and pasting your information will not be adequate.

Following you will find some common examples to help you.

Book Smith, Tom.	Skating to the Music Hogtown: Ice Palace Publishers, 2010.
Work from Anthology	Clark, Jim. "Working the Judges." Anthology of Skating Poems. Editor John Doe. Boston: Ice Palace Publishers, 2001. 354.
Article from Reference Book ed.	"Figure Skating," Big City Encyclopedia. 1988 Reference on CD-ROM Macrotuff Multimedia Encyclopedia. Computer Software. Hogtown, ON: Macrotuff Software, 2001. CD-ROM.
Magazine	Smith, Sally, "Skating Is My Life," Skating Magazine 12 May 2009: 20-24.
Newspaper	Same basic format as that of magazine.
TV or Radio	"An Interview with Zeke," Skaters' Forum, CBC, Toronto, 12 March 2010.
Personal Interview	Bill Jones, personal interview, 23 August 2011.
Internet	Camelspin, Tom , "Jumping for Glory", www.skate.com, 10 January, 2010.
Oral Presentation	Champ, Ima. Speech. NB Figure Skating Convention, Fredericton, 21 May, 2002

Evaluative Comments and Grades

At the high school level, students are given numerical grades for each of their tests and assignments. We try to be as objective as we can be, but much of what we do is subjective by nature and with several people evaluating work, some will give higher grades than others. We make every effort to be on the same page (so to speak) so that there is not a wide disparity in grades from subject to subject (especially in those areas where much written work is submitted). We also make every effort to communicate to the student what was positive about the assignment and what needs work. If there is a question about a grade or comment on an assignment, we encourage you to communicate this to us. The best way is to send an e-mail or return the assignment with a note attached the next time you send work by mail. This way we can make sure that the evaluator who can best answer your question is notified and can have the opportunity to review the question and assignment and get back to you with what will hopefully be a satisfactory explanation.

Generally speaking, we employ the following percentages when marking work. We do not usually break down the mark to reflect this but hopefully the comments will reflect areas where the assignment may be improved.

Introduction 20%
Body 40%
Conclusion 20%
Style 10%
Mechanics 10%

Submitting Assignments for Evaluation

Email:
This is our highly preferred mode of submission, due to low cost and faster return rate of graded assignments.

- **Most of the assignments and tests can be typed using the "*Physical Science lab assignment form"* and Test forms, which are downloaded from the Tree of Life website. These files are pdf forms that you can type into and then email for marking. Save the proper pdf file onto your computer and then open it.**
- Save each individual assignment as a separate file. Do not save a batch of assignments in one file; this will be returned ungraded to you. Study Guides for Great Ideas courses should also be sent as individual files.
- Name the file with your name, the course, and the assignment number. For example, “John Doe_WH I_Essay 4” or “Sally Brown_GI I_ Confessions Study Guide”.
- Attach each assignment in a **separate email to** evaluation@treeoflifeathome.com **The subject line of your e-mail should be the same as the file name of your assignment.** This helps us organise the work and be sure it gets to the proper evaluator.

Regular mail:
Be sure all work is clearly labelled with your full name, course name, and assignment. Also, be aware this mode of submission will have the longest turnaround time.

Address: Tree of Life
443 Weston Road
Weston, NB
E7K 1B1

How To Study This Course

Reading and Note-Taking

The backbone of the course is the textbook, which poses questions and provides scientific information and discussion in a very understandable and conversational tone. However, simply reading the textbook will yield little learning if there is no critical interaction with the material. One does not read science as one read novels of fiction, for example. Some people can read novels very quickly. But for science, you must slow down and sometimes read every word in the sentence to understand the concept. You might need to look back and forth five times between a diagram and a paragraph you are reading in order to "connect the dots". This type of careful reading is necessary for learning science.

One very important learning method you should employ for this and following science courses is **note-taking** or **reading notes**. When reading a section of the textbook, you should always have at your side a notebook used for recording important terminology, definitions, explanations, facts, diagrams, and illustrations. The best time to write down notes is the moment your mind is on them. The purpose of reading notes is threefold. First, the act of note-taking forces you to think about what are the most important things in what is being said – that's what to write down. Second, good notes give you a quick reference to the most important information from the textbook. You can find the main points more easily when studying for the test. Thirdly, as in the case of copying diagrams, note-taking causes you to look carefully and think harder about what you are looking at. If you take good notes while reading, you might accumulate 2-3 pages per module (not including practise questions).

How to use this Study Guide

This study guide is intended to provide a sequence of learning steps to pace you through the course. Each day gives a suggested number of pages for reading, practise questions, experiments, and tips. Some days will require more time and work; in this case, take an extra day if you need. If you are able to move faster, that's fine too. However, good study habits are still important to develop, so following every lesson step is recommended. A good memory for terminology and concepts in science only goes so far, and a failure to develop study methods will eventually make learning harder or less enjoyable.

A few other tips and notes…

- You should always check the answers to the practise questions ("On Your Own" questions); the answers are at the end of the module. Don't "peek"

if you aren't sure of an answer; give your honest effort first, then check afterwards.

- It is a good idea to review the materials required for different experiments ***before*** the day of the lab. That way, you can be prepared. It is very important to pre-read the entire procedure for the experiment before you start.

Why do experiments?

The experiments in this course are very important to do for several reasons. First, many experiments can help turn abstract scientific concepts into observable events and memorable pictures in your mind that help develop understanding. Another reason for the experiments is that they are fun and sometimes entertaining! They give variety to the course. Thirdly, experiments are an important activity of working scientists who make hypotheses about their observations in nature, and then set out to test their predictions within controlled conditions. Although you must learn the foundations of science before practicing like real scientists, the kind of experiments in this course emulate the same thinking processes in natural science.

Daily Schedule

Module 1 – The Basics

Day 1 Date: _____

- Read pages 1-3 in the textbook (Introduction and Experiment 1.1).
- Do Experiment 1.1. This is an interesting experiment and a good way to start the course! Read the instructions carefully and record your observations in a notebook. You might want to make a quick diagram showing what you saw.

Day 2 Date: _____

- Write 1-2 sentences in your notebook explaining what you think Experiment 1.1 tells us about Atoms and Molecules.
- Read pages 3-7. Make sure you understand the difference between atoms and molecules, as well as examples of each.
- Complete questions 1.1 and 1.2 (page 6) in your notebook. You could also answer the first question on Assignment 1.

Day 3 Date: _____

- The next section is about numbers and measurement in science. This will involve some math. Numbers are very important in science because they allow us to accurately compare and make conclusions about things in nature. Read pages 7-11.
- Copy Tables 1.1 and 1.2 into your notebook, as well as any other important information about scientific measurement.
- Practise: Study Guide questions 1-6 (end of module).

Day 4 Date: _____

- Read pages 11-14. Follow the example calculations very carefully and make sure you understand every step. You may want to copy them into your notebook.

Assignment 1
Module 1 – Measurement

Answer the following questions. For concept questions, answer using **complete sentences**. For calculation questions, **show all steps and units**, and circle the final answer. This assignment should be completed on a separate page, and submitted by mail or scanned and emailed.

1. Explain the difference between an atom and a molecule. Give an example of each.

2. Complete the table by naming the correct quantity, unit, or abbreviation.

Quantity (what is being measured?)	*Unit*	*Abbreviation*
Mass		
	Liters	
Length/distance		
		s

3. Convert the following units.
   a. 2.5 m ↘ ___ mm

   b. 0.73 kg ↘ ___ g

   c. 20.1 mL ↘ ___ L

   d. 13 s ↘ ___ hr

   e. 15.7 in ↘ ___ m (hint: convert to centimetres first)

   f. 1134.5 kL ↘ ___ mL

4. You and your sister decide to have a competition to see who can make the best lemonade. You made your lemonade with fresh lemons, 1 cup of sugar, and 3 liters of water. Your sister uses fresh lemons, 1.2 cups of sugar, and 1 gallon of water. Whose lemonade is sweeter? Support your answer with calculations.

Tree of Life School Physical Science			
Assignment	Test	Description	Mark
1		Module 1 (Calculations assignment)	
2		Module 2 (lab report/questions)	
	1	**Module 2/3 Test**	
3		Module 4 (lab report/questions)	
	2	**Module 4/5 Test**	
4		Module 6 (lab report/questions)	
5		Mini – Research assignment	
	3	**Module 7/8 Test**	
6		Module 9 (calculations assignment)	
7		Module 10 (lab report/questions)	
	4	**Module 9/10/11 Test**	
8		Module 12 (lab report/questions)	
	5	**Module 12/13 Test**	
9		Module 14 (lab report/questions)	
10		Module 15 (lab report questions)	
	6	**Module 14/15/16 Test**	
		Assignments (50%)	
		Tests (50%)	
		Final Mark	