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# EXPLORING CREATION WITH GENERAL SCIENCE

## STUDY GUIDE

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### IN THE BEGINNING....

I believe we must always start at the beginning. Genesis 1: 1 says, “ In the beginning God created the heaven and the earth. In John 1:1 -3 we read, “ In the beginning was the Word, and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by him; and without him was not any thing made that was made.”

Genesis is the book of beginnings and it reminds us that that God created all that we see. John reminds us of the necessity to know words. So let’s look at a few words that are important in the study of General Science, like the word Science.

***Science comes from the latin word scientia meaning – to have knowledge.***

God’s Word gives us a very clear approach to learning in Proverbs chapter 24. This paradigm is very much like the classical approach to learning; ‘the trivium’, or the three roads, show how the grammar ( knowledge), the dialectic (understanding), and the rhetoric ( wisdom) tie together in the view of how a house is built.

Proverbs 24:3-4 – Through wisdom a house is built, by knowledge and understanding its rooms are filled with all precious and pleasant riches.

With this as our base let’s start adding to our knowledge and understanding of Science so that we can be full of the wisdom which glorifies God, Creator of all we are studying.

### *What is science?*

Science is a branch of study dedicated to the accumulation and classifications of observable facts in order to formulate general law about the natural world.

### *What is the purpose of science?*

The purpose of scienc is to develop laws which explain how and why the world works.

### *How do you practice science?*

We can practice science by observation, experimentation, data and conclusions. (lots of guesses and research to lead you to new hypothesis' and ideas.)

- ▶ Ultimately we are here to learn about this celestial ball we live on which hangs in space by immutable laws created by an omniscient God.

General Science will give you the precepts of the basic concepts of science; as well as an introduction into the laws that shape the world you live in. I believe it will prepare you for further study, observation, and collection of the measurable facts you find along the way and give you the foundation you need to start your journey of scientific discovery. I hope that it will also be the start of a new appreciation for the application of science study as you continue learning about God's amazing creation.

### *How to Outline the Science Module.*

There are many ways we can approach learning from text. One way that I have found most beneficial is by outlining the module as I study it. In my classes I have taught my students how to outline the science modules which they are studying. Below is a brief list that walks you through this process.

1. The first thing you need to do is LOOK at what you are going to be studying. Start at the beginning and look at the book, the table of contents, the subjects, the pictures and tables, etc. Once you have a general idea of the material you will be studying, go to the Module ( like a chapter) in the book which you are going to be reading through.
2. Do the same thing as I mentioned above. Go through the module, look at everything: the titles, the pictures and captions, the tables, definitions, bold words, etc. What you are allowing yourself to do is become acquainted with the material, an introduction of sorts.
3. I always encourage my students to have a notebook to take notes in and a notebook to write out the lab report. ( see the next section on how to do a lab report) If you prefer to use a binder instead and type everything out, that is great, too. You just need to have something to make notes on as you go through the outline.
4. As you begin making your outline start your skeleton by making a list of all the titles and subtitles. (If you don't know how to make an outline, please go here . I have also included notes at the end of this guide to help you.)
5. Then make a section for all the definitions and the bold-faced words. Take time to read the definitions and if you don't know what the bold-faced words mean, look them up before you start reading. Most often they are easy to define within the context of the material but there may be a time when you will need to look it up. Just by doing this short exercise, you are filling your vocabulary bank up and when you go to read the lesson it will be easier to understand.
6. Now take time to scan each section that you wrote on your outline. Note the important parts of that section and familiarize yourself with the terms, ideas, or concepts. If you left room on your outline, write down a brief summary of what you understand from the section.
7. Like you did with the definitions, now go through and make a note of all the formulas listed in the module. It is important to understand the math concepts in each module as they are cumulative and you will use them as you continue advancing in your scientific endeavors.
8. Make a note of the sections which were hard to understand. This will help you save time when studying so you spend your time on the sections that need more attention.
9. Go back and re-read the sections which were hard to understand and make any necessary notes from what you have read.
10. Now go through and re-read the module from beginning to end. In reality this may be the first time you have actually read the module through. That is ok. What you have been doing up to this point is giving yourself the grammar ( knowledge of the material) and asking questions (the dialectic stage ) and preparing yourself to make it your own but understanding what you are reading. When you understand something you can teach it to someone else, ( this is the rhetorical stage of learning.)

11. Once you have read through the module, begin preparing for your labs. Write down the lab procedures and materials in your lab notebook before you are in lab class. This way you don't waste valuable time doing that during the experiments when you are supposed to be making observations, hypotheses, and conclusions about what you are doing.
12. If you can get the audio CD which goes along with the text, try to listen to it at least once to add yet one more layer of information about the topics you have studied. Following this approach of dissecting the information in the text will allow you to go through the material at least 2 to 3 times, giving yourself a great opportunity for success with this subject.

### *Suggested Schedule:*

The schedule below is a typical 2 week schedule for this course. If you work through each module in 2 weeks you will finish this book in 1 calendar year. We have done this schedule over 2 semesters completing modules 1-8 first semester and 9-16 second semester. Some of the modules may actually take longer to complete( like the first one) and others can be lumped together with another module. This is just a suggestion, however, please take time to find what works for you.

**Day 1:** *Class Day*. Come with your lab information in your lab notebook already. ie: Materials and procedure listed. Bring your lab notebook and your text book with you each time we meet.

**Day2:** Review any notes from the day of class. Make sure you are able to complete your lab notebook. Take time to write down what the results were, if you haven't already, and draw/sketch what you saw during the labs. Look at the module, as we discussed in class, and begin to get an idea of what you are going to be studying. Make a general outline of the module and note all the vocabulary and tables or charts in the module.

**Day 3:** Read through the module. Use a sticky notes to make any notes that you may want to remember. A tip: Listening to the Audio CD while you are reading through the module may be a huge benefit to retain the information you are studying.

**Day 4:** Go through each section and summarize the material in your outline. Take your time with this and absorb the material.

Begin working on the On Your Own Questions, if you haven't already. See if you can answer them without looking for help in the material. Then look through the study guide to prepare for tomorrow's lesson.

**Day 5:** Complete the study guide.

## Week 2:

**Day 1-4:** Re-read the module and take the test when you are ready. This week you can spend time on extra projects that supplement the module using any extra book suggestions or concepts that are listed within the study guide or research activities.

- This schedule just a suggestion. Be diligent to be a wise time-manager. ☺If this doesn't work for you, make a plan that does. Pray and seek your parent's advice.
- ❖ Make sure you take the time to get acquainted with your text book. Look through the pages, at the cover and all the charts in the front and back. Be sure you look through the appendices at the end of the book. The Module Summary will help you to know your vocabulary.( Appendix B)

### *Lab Reports*

Having the proper lab report is a crucial part of your text and learning. You will want to set your lab book up with a specific goal in mind. Below is a suggestion on how to meet that goal.

1. Own your book! Make it something you want to show off. Make sure you put your name, the class, the year, etc. ( All the pertinent information.) on the front of the book or inside the first page.
2. Make a title page. (Perhaps you can combine step 1 and 2 together.)
3. Create a Table of Contents. ( Give yourself a few pages for this. It is always better to have some blank pages in between sections than to never have enough room.)
4. Leave a few pages for notes on the Scientific Method
  - a. Purpose-What are you investigating or trying to find out? Ask a question.
  - b. Introduction/Research- What do you know about this subject and what are your sources?
  - c. Hypothesis- What is your educated guess? What do you think will be the outcome based on your knowledge of the subject?
  - d. Materials/Supplies- list all the amounts and quantities of materials used.
  - e. Experiment/Procedure- Specifically state, accurately, what you did during the experiment.
  - f. Analysis/Results- Give your observations and data from the experiment. These are the facts, w/o your opinion weighed in. The information you are receiving through your senses should be measurable.
  - g. Conclusion- In paragraph or essay form, explain how the observations relate to the data. Show whether or not your question was answered and if it differed from your hypothesis, or expected outcome. Highlight any errors or discoveries you made through the process.

5. Title page for “Lab Pages”.
6. On your lab pages include the following:
  - Name
  - Date
  - Experiment and Title
  - Materials
  - Method/Procedure
  - Results
  - Drawings /Charts
  - Conclusion
  -
7. Make sure you number all your pages.

### *The Scientific Method*

The Scientific Method is a set of steps that direct you as you observe, experiment, collect data and conclude your observations. Patterned after the studies of Robert Grosseteste the scientific method is intended to explain the purpose of what we see.

This pattern is a suggested series of steps to follow as the scientist, or any interested individual, seeks to gain wisdom.

Proverbs 4:7 tells us, “Wisdom is the principal thing; therefore get wisdom: and with all thy getting get understanding.”

1 Corinthians 10:31 tells us,, “ Whatever you do in thought word or deed, do it all for the glory of God.”

If you look at 2 Timothy 2:15 “ Study to show thyself approved” and Acts 17:11 “ These were more noble than those in Thessalonica, in that they received the word with all readiness of mind, and searched the scriptures daily, whether those things were so.”

While that does not expressly suggest what we now call the Scientific Method, what I would encourage is that in all things we must relate everything to scripture and know it can be validated. It also leads to the difference between inductive and deductive reasoning.

- Inductive reasoning is made based on assumptions and ideas without reliable facts.
- Deductive reasoning shows observable facts with related data pointing to a definable conclusion.

### **STEPS OF THE SCIENTIFIC METHOD:**

- I. Ask a question: What do you want to know about? What would you like to learn about? Based on what you already know or are curious about.... You will formulate a question as the beginning of your study.
- II. Research: The first step Proverbs tells us is that “Wisdom is the Principal thing; therefore GET WISDOM.” You need to research, learn and gain that increased knowledge about the subject you are interested in. Take time to read and understand the topic you are embarking to experiment with. Study what others have already prepared before you and be willing to also add to that data by sharing what you will be learning.
- III. Form a hypothesis: ( An Educated Guess) Based on your previous research, come up with an answer to your question. Think about the cause and effect of the material you have read and the experiment you will perform. Going back to your original question in step 1, based on your study in step 2, predict the outcome in the form of your hypothesis
- IV. Experiment! Test your hypothesis by performing experiments to see if you were right. Make a plan and collect the data you obtain from the experiment(s) you perform. Data must be measurable. You also need to make sure you have a constant variable in your experiment so that you have something to measure it against.
- V. Analyze the data and make a conclusion: Gather your information, using graphs, math, and information you have previously studied ( don't forget some common sense).... Prove or disprove your hypothesis. Does the experiment support they hypothesis or does it refute it?
- VI. Publish your data or communicate your discovery: Put all your information in a form that is readable. Whether it is on a board to display, ( like a science fair project), or a report for others to read, ( like a research paper). Make it available for others to read. Most all of science is based on the shoulders of the men and women who searched for answers before you.
- VII. Reexamine: Sometimes you will find that you were completely out of the ball park with your hypothesis, but that is ok. Being willing to learn is the most important concept. You may find that your studies, experiment, and conclusions lead you to a new hypothesis...which then leads you to a new experiment..... etc. Reevaluate what you did and see if you need to make changes.

#### ➤ **Important concepts of to remember:**

Make sure you are objective, consistent and the material is observable and measurable, and can be reproduced. ☺

Always keep a record of what you do so that you can go back and look at any inconsistencies in your work. Be honest and be fair, admit if you were wrong and show any mistakes, that is often how we learn best.

Take time to be patient and always observe with a willingness to see the results clearly. Sometimes we just want to prove our hypothesis is right, that shouldn't be the goal.

It is hard not to have a bias, a general belief, show in your work. It is easy to be subjective, but try to always follow the example in scripture to speak truth at all times and be blameless in your actions.

Enjoy Science! It is evidence of God's masterful creation that we have the privilege to explore.

## TIPS FOR SUCCESS:

Go to Donna Young's website for great charts, lab notes, flash cards and vocabulary lists to help you get the most out of your science material. <http://donnayoung.org/apologia/general.htm>

Get a planner, either on-line at Donna Young's site above, or The Homeschool Mom Website ([www.thehomeschoolmom.com](http://www.thehomeschoolmom.com)). I know there are plenty more out there available and if you google them you will find many to choose from. The whole point is to give the student the tools to be successful. Help them to plan ahead wisely and manage their time well.

Always take time to do your lab reports the day you actually do the labs. By doing this you will have a fresh memory of what you did. I often have the students draw what they see in class, take any extra necessary notes that they may otherwise forget, and then have them summarize what happened when they are home. If you are not in a "class" setting with the labs, you can structure this to fit your needs.