Exploring Creation
with
General Science
2nd Edition

Exploring Creation with General Science, 2nd Edition
Student Notebook

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PARENT NOTES

The text contains 16 modules, and this notebook contains 16 corresponding modules. Each module in this notebook provides graphic organizers designed to reinforce the material presented in the text, with an emphasis on scientific vocabulary. Each module in the notebook also provides space for students to answer the "On Your Own" questions, study guide questions, and summary questions, creating a concise handbook to study for the module and quarterly tests. The fill-in-the-blank summaries are strictly optional. If students are having trouble studying for the test, you may choose to assign the summaries for extra practice. If students have mastered the material, they may skip the summaries and take the test after reviewing the module in the text and notebook. The tests and the answers to the study guides, summaries, and tests are provided in the *Solutions and Tests for Exploring Creation with General Science* manual.

The notebook also contains lab report forms for every experiment in each module. Students can simply complete the lab report forms as they are investigating each experiment when they come to it in the text. Finally, the notebook provides "What Does God's Word Say" and "Digging Deeper" opportunities throughout the modules. The "What Does God's Word Say" sections direct students to Scripture to investigate some aspect of the module. The "Digging Deeper" sections provide hands-on or web-based activities to discover more about a given topic in the module.

About Experiments

Completing hands-on lab investigations is an essential part of science education. Experimenting provides students with a unique opportunity to engage in the processes of inquiry and exploration as they manipulate equipment and materials to construct their knowledge of scientific concepts and phenomena. However, experiments can be time consuming, especially if the needed materials must be gathered first. To make completing experiments as students come to them in each module more convenient, I suggest that you put together a lab box to contain all of the materials required for the experiments in each module. This can be done several ways:

- During the summer, gather all non-perishable items and place them into the box (or a couple of boxes). Tape a list of the perishable items required for each module to the top of the boxes. This works best for my family.
- Four times during the year, gather the non-perishable items needed for the next four modules and tape a list of the perishable items required for these modules to the top of the box.
- Before each module, put away the materials for the previous module and gather the new materials. In most cases, the perishable items can be gathered at this time too.

You can find a list of materials for each module in Appendix C of the text (page 475). Instructions for completing a lab report are in the experiment section. A checklist and a grading rubric are in Appendix A of this notebook. You may wish to copy the checklist so students can refer to it when completing each lab report.

STUDENT NOTES

This notebook will help you organize your notes, provide a space to answer all of the module questions, and serve as your lab notebook. When you are finished with the *Exploring Creation with General Science* course, this notebook will be a great reference book and resource as you study these science concepts in more depth in the future.

You should begin this course by becoming familiar with your text and this notebook. The daily schedule on pages 4–9 breaks down each module into approximately two weeks of work. You can check off each day as you complete the work outlined as a way of recording just how far you've come in your study of God's amazing creation.

About Experiments

Completing experiments and lab reports is an essential part of science education.The experiment section in the back of this notebook contains a lab report form for every experiment you will do as you read the text. Read the instructions for completing a lab report in module 1 just before you start your first experiment. You may wish to make a copy of the checklist in Appendix A so that you can have it in front of you when completing each lab report.

Collect all of the materials that you will need to complete all of the experiments in each module before you start the module, and keep them in a box designated just for your lab materials. That way you will have everything you need when you need it. This will save you a lot of time in the long run. You can find a list of materials needed for each module on page 475 in the text.

MODULE 1

A Brief History of Science

Introduction & The First Inklings of Science (From Ancient Times to 600 BC)

Read pages 1–3 in the text, *Exploring Creation with General Science* (2nd Edition). Summarize what you learn while you are reading in a few sentences in the space below. Answer "On Your Own" question 1.1 and then begin your history timeline, as explained in "Digging Deeper."

ON YOUR OWN

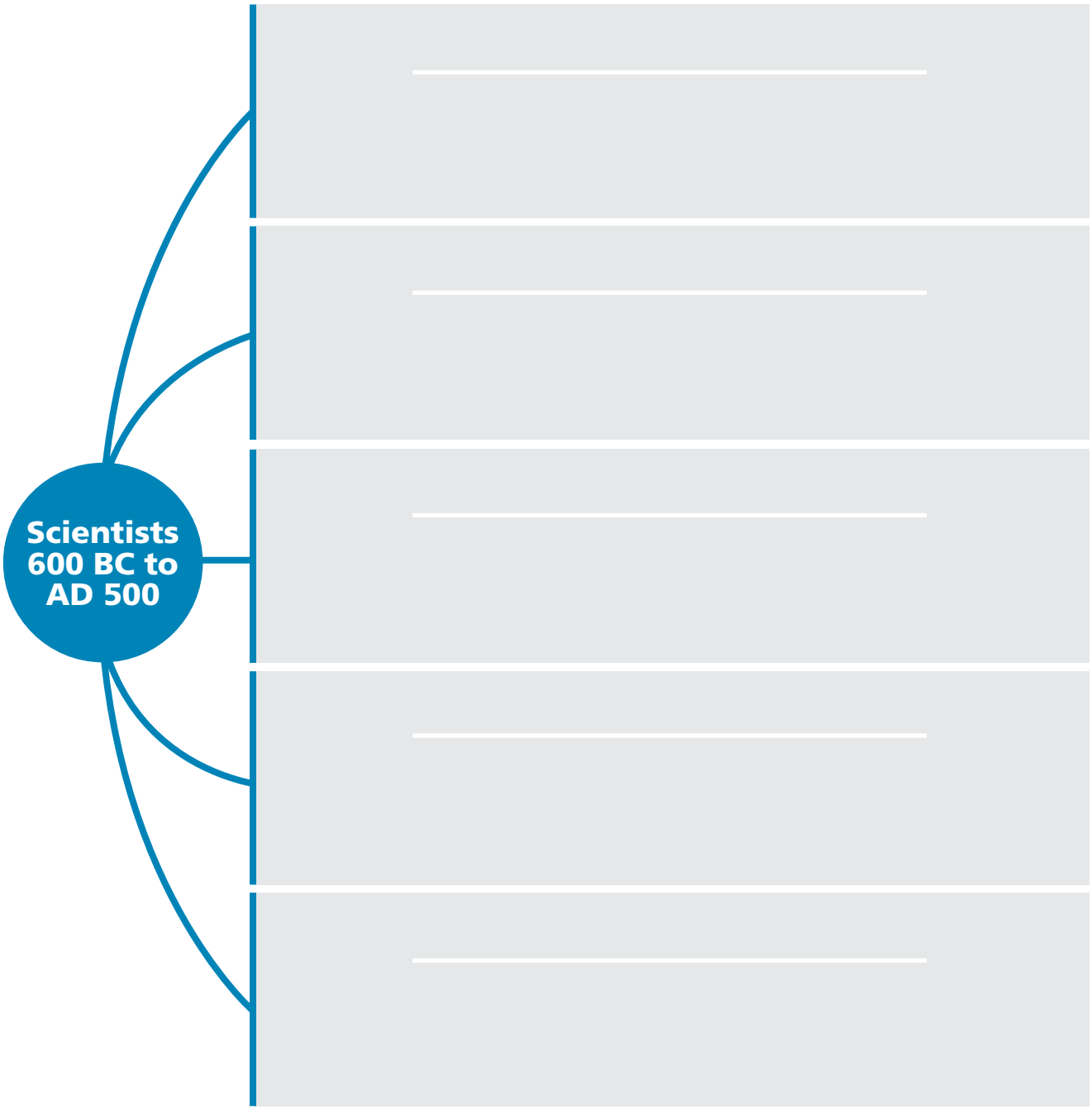
1.1 Although the ancient Egyptians had reasonably advanced medical practices for their times, and although there were many inventions that revolutionized life in the ancient world, most historians of science do not think of Egyptian doctors and ancient inventors as scientists. Why? (Hint: Look at the entire definition of science.)

DIGGING DEEPER
History of Science Timeline

Remove the timeline on pages 37–43 in this notebook. Cut off the dashed line on page 39, cutting just to the right of it, and tape (or paste) it to the right side of page 37, hiding the dashed line. Then match the dotted line on the left side of page 41 with the dotted line on the right side of page 39 and cut and paste as before. Finally, match the wavy line on page 43 with the wavy line on page 41 and cut and paste as before. You now have a complete timeline that can be folded to fit into your notebook. Paste the timeline to page 35. As you study the important people in the history of science, look up each of them on the Internet (a good place to start is the Book Extras website at **www.apologia.com/bookextras**) and learn three interesting facts about them that you didn't know before. Print and paste the picture on the timeline at the right year (or as close as you can get) and then write the three interesting facts underneath the picture. Imhotep, the first important scientist you will meet, has been done for you.

True Science Begins to Emerge (600 BC to AD 500)

Use the graphic organizer below to take notes on the scientists you will learn about as you read the text on pages 3–6. As you read about each scientist, put his name on a line. To help organize your notes, write a sentence or two about what each of the scientists is known for in the space beneath his name. Don't forget to add them to your timeline when you are finished!



Complete experiment 1.1, found in the experiment section of this notebook, and fill out the lab report. Answer "On Your Own" question 1.2.

ON YOUR OWN

1.2 Based on your results in experiment 1.1, order the items you used in your experiment (water, vegetable oil, the grape, etc.) in terms of increasing density. In other words, list the item with the lowest density first, followed by items of higher and higher density, and end your list with the item of greatest density.

Complete experiment 1.2 and fill out the lab report. Read p. 7 in the text and answer "On Your Own" question 1.3.

ON YOUR OWN

1.3 Do the atoms in an ice cube move faster or slower than the atoms in a glass of water?

Three Other Notable Greek Scientists

As you read this section of the text (pp. 8–11), fill out the chart below with what you learn about the scientists you meet. Add them to your timeline and then answer the notebook question and "On Your Own" questions 1.4 and 1.5. Finally, complete the "What Does God's Word Say" section.

NAME	WHEN DID HE LIVE?	WHAT DID HE DO?
Aristotle		
Archimedes		
Ptolemy		

Explain in a few sentences what the geocentric system is:

ON YOUR OWN

1.4 Dr. Steven Hawking is one of the most brilliant scientists of the early twenty-first century. He believes in an idea called "the big bang." This idea tries to describe how the universe was formed. If your friend tells you that you should believe in the big bang because Dr. Hawking is smart and he believes in it, what famous example from the history of science should you tell to your friend?

ON YOUR OWN

1.5 What episode from the history of science tells us we need to leave our personal biases behind when we do science?

WHAT DOES GOD'S WORD SAY?

Men have been studying the stars and planets for nearly two thousand years, since the time of Ptolemy! Look up Psalm 19:1 and write what God says about the sky and heavens in the space below.

The Progress of Science Stalls for a While (AD 500 to 1000)

Read pages 12–16 in the text. Take notes and answer the two notebook questions. Complete experiment 1.3 and fill out the lab report. Answer "On Your Own" question 1.6.

1. What does the text say is necessary for science to progress? You should have two answers.

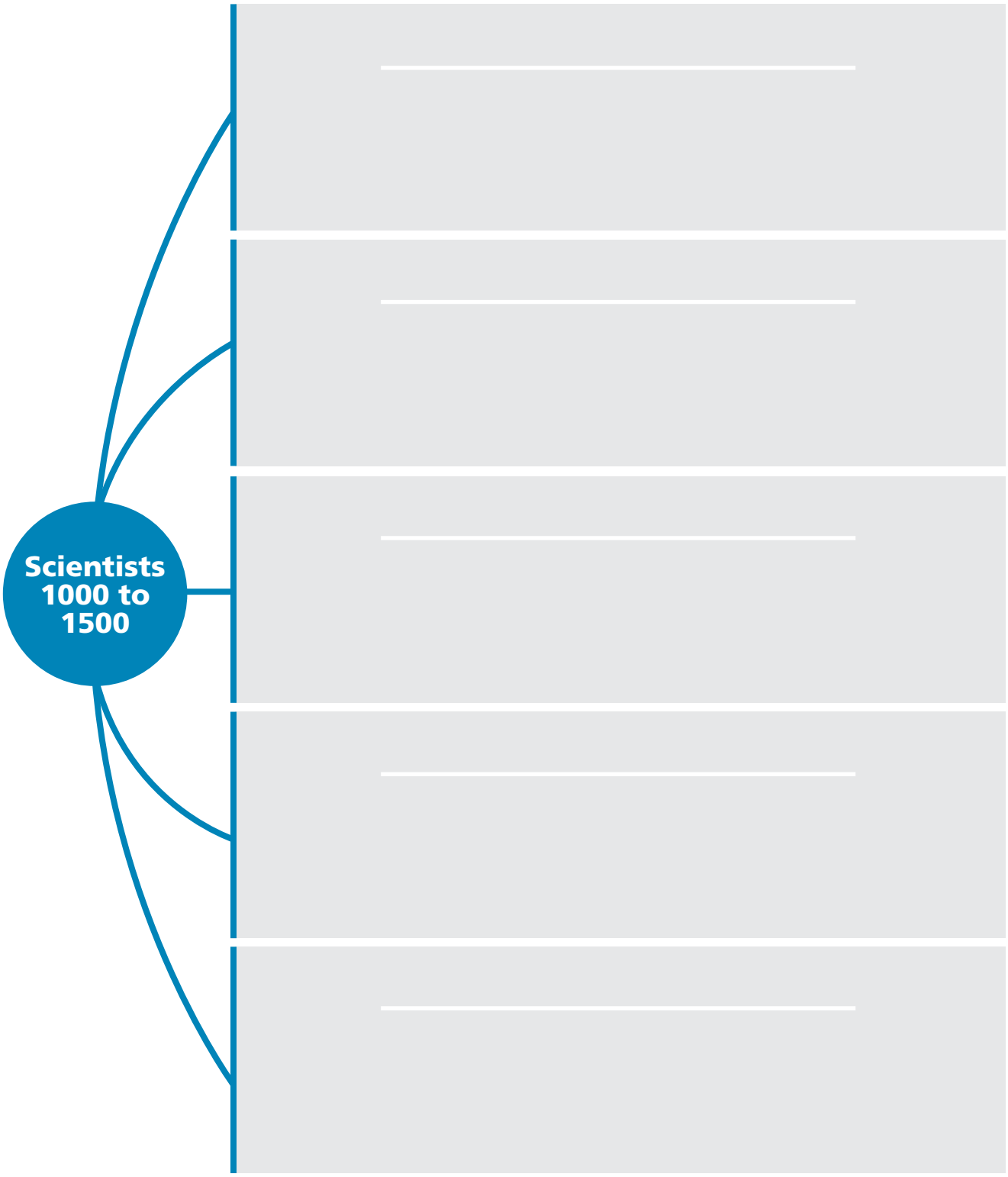
ON YOUR OWN

1.6 A great many scientists today worry that most students do not appreciate science. As a result, there are those who worry about the future of science. Although it is true that most young people today don't care about science, there are some who do. They will obviously become the scientists of the future. Since there will always be at least a few people who are interested in science, why are today's scientists worried about the future of science?

2. How do you feel about science? Are you interested in science? What do you like about it and what do you dislike about it?

Science Begins to Pick Up Steam (AD 1000 to 1500)

Read pp. 16–18 in the text. Write the name of each scientist you meet as you read this section on the lines below; write two things you learn about each scientist in the spaces provided. Don't forget to add these men to your timeline. Then answer "On Your Own" question 1.7.



ON YOUR OWN

1.7 Some historians call Grosseteste the first modern scientist. Why does Grosseteste deserve that honor?

The Renaissance: The "Golden Age" of Science (AD 1500 to 1660)

As you read this section in the text (pp.18–23), fill out the chart on the next page with what you learn about the scientists you'll meet. Don't forget to add them to your timeline. Next, answer the notebook question. Complete experiment 1.4, fill out the lab report, and answer "On Your Own" question 1.8.

Copernicus's drawing of the heliocentric view of the solar system, along with his notes

NAME	WHEN DID HE LIVE?	WHAT DID HE DO?
Nicolaus Copernicus		
Andreas Vesalius		
Johannes Kepler		
Galileo Galilei		
Blaise Pascal		

Explain in a few sentences what the heliocentric system is:

ON YOUR OWN

1.8 Galileo faced a very difficult decision in his life. He was convinced by science that the heliocentric system was correct. Nevertheless, his church said that he was wrong and threatened to throw him out if he didn't recant his belief in the heliocentric system. Galileo, in obedience to his church, agreed to publicly recant his belief, even though he knew it was right. Did Galileo make the right choice, or should he have stayed true to his science and been thrown out of the church?

The Era of Newton (AD 1660 to 1735) & The "Enlightenment" and the Industrial Revolution (AD 1735 to 1820)

Read pp. 23–26 in the text. Write two things you learn about each scientist. Don't forget to add these men to your timeline. Answer the notebook question and "On Your Own" question 1.9.

Sir Isaac Newton

Robert Boyle

Antoni van Leeuwenhoek

Carolus Linnaeus

Antoine-Laurent de Lavoisier

John Dalton

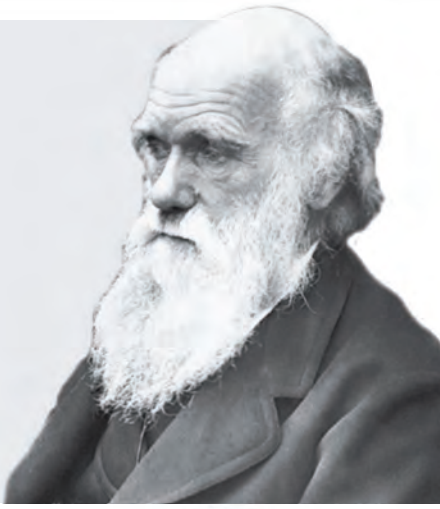
What does the term *Enlightenment* describe?

ON YOUR OWN

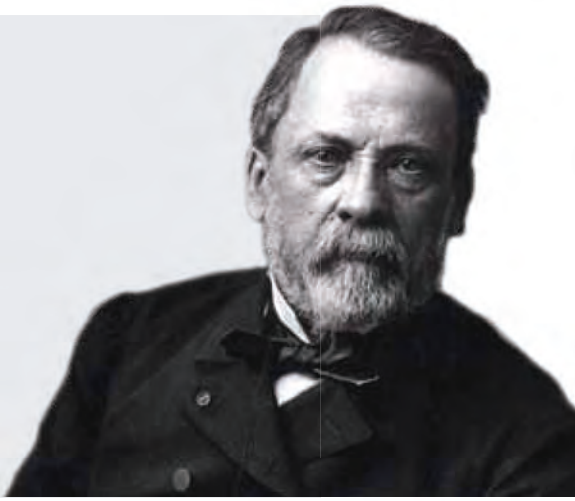
1.9 Some students think mathematics is too difficult to learn. In order to teach science to such students, there are many science textbooks written today that do not use mathematics at all. What do you think Newton would say about such textbooks?

The Rest of the Nineteenth Century (AD 1820 to 1900)

Read pp. 26–29 in the text. Write some facts you learn about the following scientists. Don't forget to add them to your timeline. Then answer "On Your Own" question 1.10.



Charles Darwin



Louis Pasteur

Sir Charles Lyell

Gregor Mendel

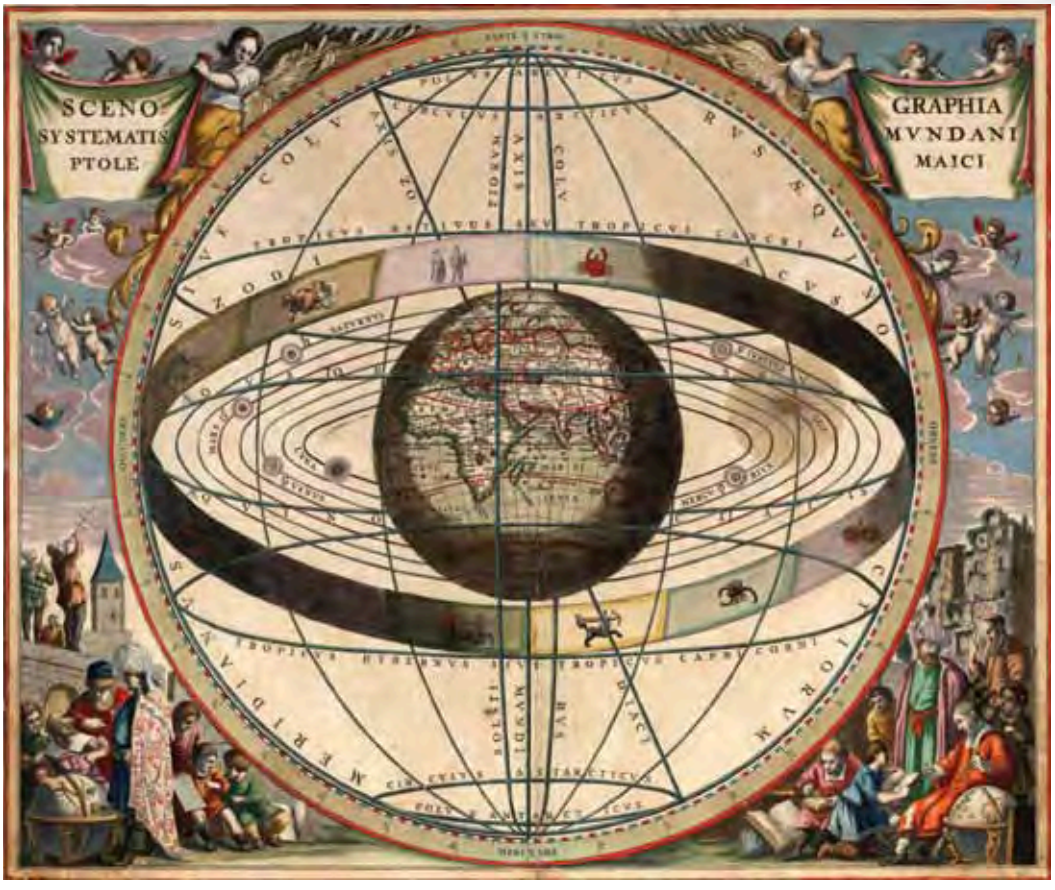
Michael Faraday

James Clerk Maxwell

James Joule

ON YOUR OWN

1.10 As mentioned in the text, even scientific ideas that are wrong can still lead to advances in science. Besides the scientists mentioned in this section, name another famous scientist that proposed the wrong ideas that still advanced science.



A map of the Ptolemaic view of the solar system with the earth at the center

Modern Science (AD 1900 to the Present) & Summing It Up

As you read these sections in the text (pp. 29–31), fill out the chart below with what you learn about the scientists you meet. You may need to look them up online to find out when they lived. Don't forget to add them to your timeline. Complete the study guide questions and have your parent correct them. If you need additional practice, you may wish to complete the optional summary for this module, located in the summary section at the back of this notebook. Take time to understand anything that you may have missed and review your notes before taking the test for this module.

NAME	WHEN DID HE LIVE?	WHAT DID HE DO?
Max Planck		
Albert Einstein		
Niels Bohr		

Study Guide

1. Define the following terms:

   a. Science

   b. Papyrus

   c. Spontaneous generation

2. There were three lessons from the history of science specifically mentioned in the text. What are they?

3. Who was Imhotep?

4. Although the ancient Egyptians had incredibly advanced medical practices for their time, we do not consider them scientists. Why not?

5. Who were Thales, Anaximander, and Anaximenes?

6 Leucippus and his student, Democritus, are remembered for what idea?

7 Who championed the idea of spontaneous generation and is responsible for it being believed for so long?

8 Who came up with the first classification scheme for living creatures?

9 What is the main difference between the geocentric system and the heliocentric system? Which is correct?

10 What was the main goal of alchemists?

11 Why don't we consider alchemists to be scientists?

12 What was the main reason that science progressed near the end of the Dark Ages?

13 Who is considered to be the first modern scientist and why does he deserve that honor?

14 Two great works were published in 1543. Who were the authors and what were the subjects?

15 Although Galileo collected an enormous amount of data in support of the heliocentric system, he was forced to publicly reject it. Why?

16 Galileo built an instrument based on descriptions he had heard of a military device. This allowed him to collect a lot more data about the heavens. What did he build?

17 Who was Sir Isaac Newton? Name at least three of his accomplishments.

18 A major change in scientific approach took place during the Enlightenment. What was good about the change and what was bad about it?

19 What was Lavoisier's greatest contribution to science?

20 What is John Dalton remembered for?

21 What is Charles Darwin remembered for?

22 What does "immutability of species" mean, and who showed that this notion is wrong?

23 What is Gregor Mendel remembered for?

24 James Clerk Maxwell is known as the founder of modern _____.

25 What law did James Joule demonstrate to be true?

26 What is the fundamental assumption behind quantum mechanics? Who first proposed it?

27 What is Niels Bohr remembered for?

28 Einstein was one of the founders of the quantum mechanical revolution. He also is famous for two other ideas. What are they?

Paste your timeline here.

History of Science Timeline

2065 BC — **1000 BC**

1. Imhotep was an architect who built Egypt's first step pyramid that is still located in Saqqara, Egypt.

2. He is also considered to be the first physician to have used plants for medicine and who was able to treat conditions like appendicitis and arthritis.

3. It is said that Imhotep created or improved the papyrus scroll.

800 BC

600 BC

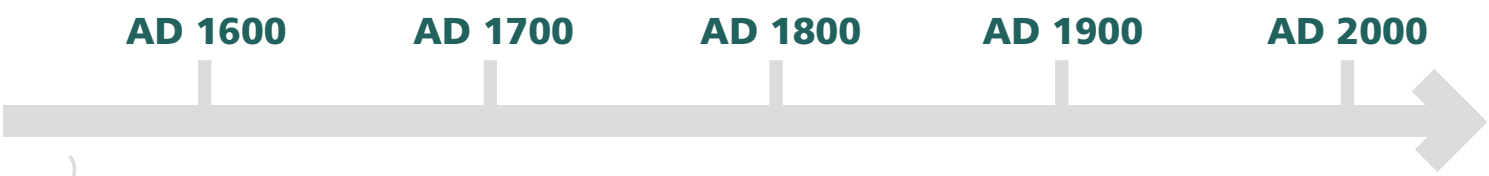
400 BC

200 BC

c. 4 BC

Birth of Christ

AD 1100 AD 1200 AD 1300 AD 1400 AD 1500


AD 1600
AD 1700
AD 1800
AD 1900
AD 2000

Experiments

"Get wisdom; develop good judgment."
Proverbs 4:5 (NLT)

Welcome to the most exciting part of your notebook! While it is important to learn about science, it is always more fun to *do* science. When you are reading your science text, you are studying important information gathered from scientists who came before you. You build upon that knowledge as you conduct your own scientific inquiry using the scientific method. In this section of your notebook, you will record your experiments.

Each of your experiments is designed to progressively build your confidence in understanding and using the scientific method. Lab report templates for each experiment listed in your text are included in this section to help you write a complete lab report. The lab report templates for the experiments in module 1 include instructions to help you become familiar with what to write in each section..

Before you begin, you need to know that *science cannot prove anything*. Does that surprise you? It shouldn't. Scientific conclusions are continually being changed based on new information. Richard P. Feynman, a Nobel Prize winner in physics, said, "Scientific knowledge is a

body of statements of varying degrees of certainty—some most unsure, some nearly sure, none absolutely certain." If the scientific method is used correctly, however, scientists can draw reliable conclusions. Thus, while the scientific method doesn't provide the process to *prove* something, it does provide the best method that allows you to construct consistent conclusions about the natural world.

When scientists begin to solve a problem, they follow a series of steps often referred to as the **scientific method**. These steps help ensure that they will have valid records and that their procedures can be duplicated (repeated) by anyone else who wants to conduct the same experiment. Why would that be important? Think about it. Science may not be able to prove something, but if the data repeatedly show the same result, it can be trusted.

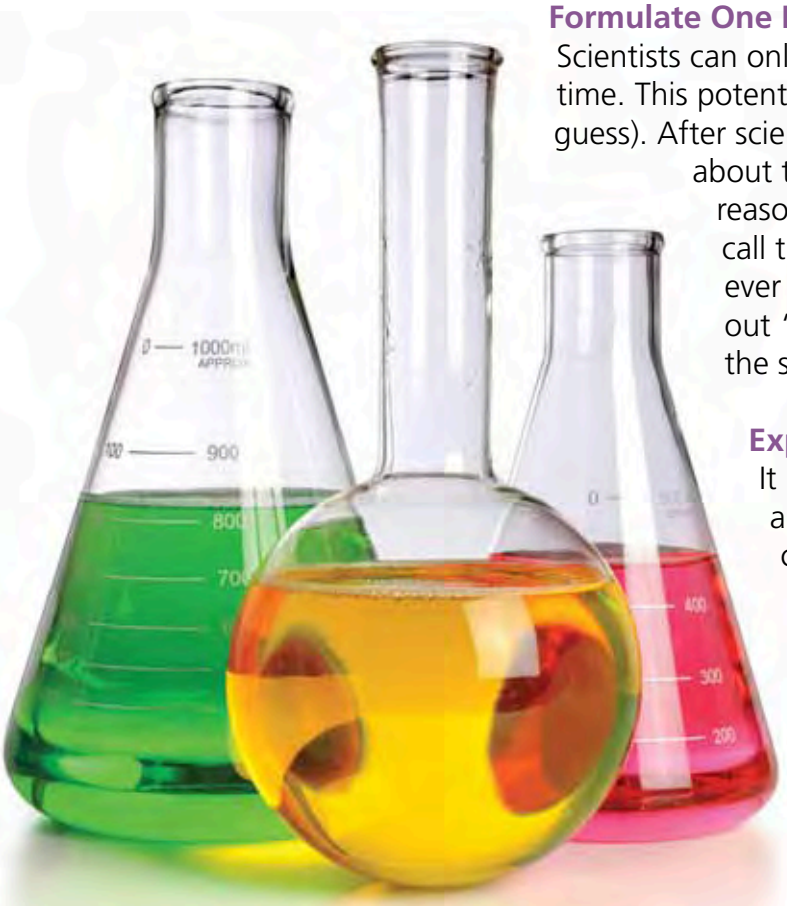
The Scientific Method

Observe the World

The scientific method starts with **observation** and **research**. Scientists are aware of the world about them and study what others have learned before them.

Question the World

Observation and research usually lead scientists to ask questions about what they see. All scientific work begins with a question that can be answered with an experiment. This question is the **objective** (or **purpose**) of their experiment. Scientists state the purpose of their experiment as the first step in their lab report so that others know why they are conducting their investigation.



Formulate One Possible Answer to the Question

Scientists can only test one possible answer to a question at a time. This potential answer is called a **hypothesis** (or educated guess). After scientists have researched a subject and thought about the purpose of an experiment, they have a reasonable idea about what will happen. Scientists call this type of logic deductive reasoning. Have you ever read a mystery book? When you try to figure out "who's done it" based on the information in the story, you have created a hypothesis.

Experiment to Test the Hypothesis

It is important that the hypothesis can be tested and proven wrong. Remember that science cannot prove something to be right; it can only prove something to be wrong or build strong evidence that the hypothesis is reliable!

When scientists are designing an experiment, it is also important to keep as many factors as possible the same. These are called **control factors** because scientists

control their consistency. If you try to grow a plant and you add fertilizer, extra water, and plenty of sun, can you tell which factor affected the plant's growth? There are too many **variables** (factors that change) in this example. Any one or a combination could affect plant growth. In scientific experiments, only one condition can vary.

Collect Data, Build Conclusions, and Share Results

Scientists record and interpret all the data they collect during an experiment. This is not always easy. Often the results from one experiment lead to many new questions. Finally, scientists share their **conclusions** about their results with other scientists so that knowledge can continue to grow. Now, let's go have some fun!

"When a wise man is instructed, he gets knowledge."
Proverbs 21:11 (NIV)

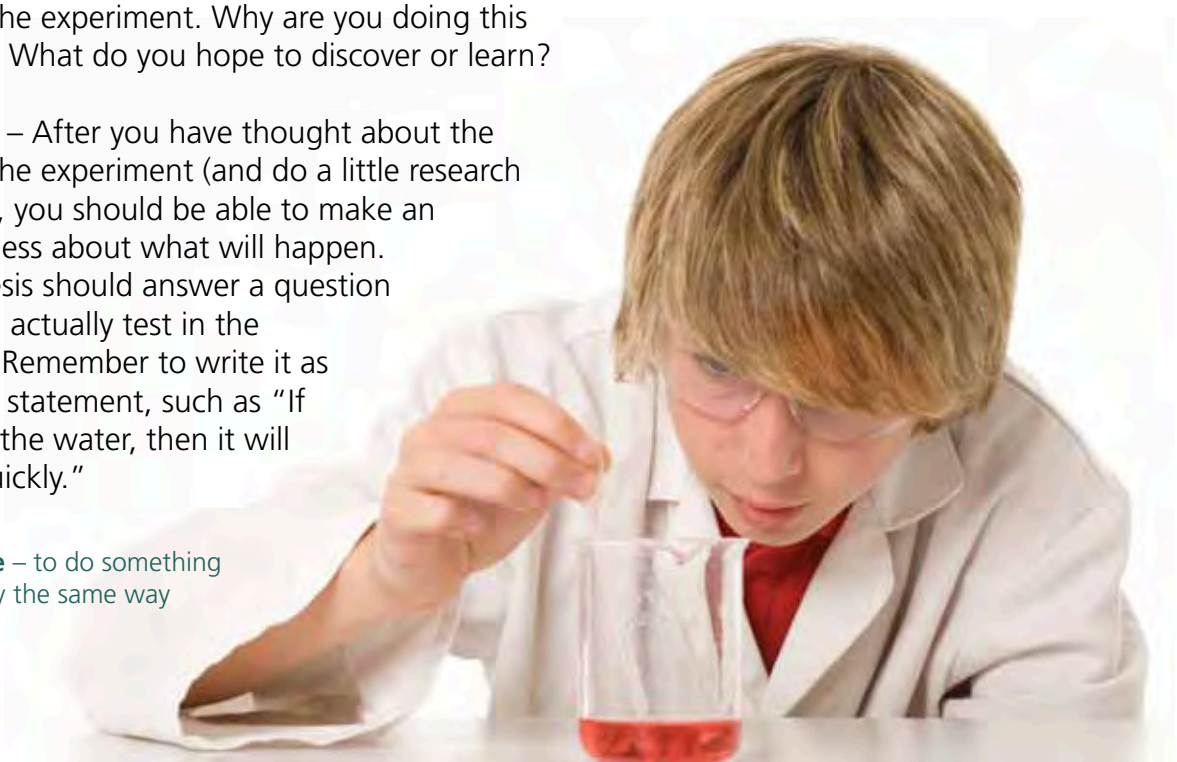
Doing Experiments in *Exploring Creation with General Science*

When you come to each experiment in your reading, gather all of the supplies listed and set them out on your work table. Read over the procedure or instructions completely, thinking through how you will complete each step. Next read the procedure again, this time carefully completing each step in order as you read them.

In science it is very important to keep accurate, legible records of your experiments so that others can **replicate**[1] them. As you complete each experiment, fill out the lab report forms in this notebook. Use the following information about the sections on the lab report form to help you fill it out. Remember that neatness counts. As you read in the text, "The goal you should have in mind is that someone who has never read this book should be able to read your laboratory notebook and understand what you did and what you learned" (*Exploring Creation with General Science*, p. 5).

Objective or Purpose – In paragraph form, describe the purpose of the experiment. Why are you doing this experiment? What do you hope to discover or learn?

Hypothesis – After you have thought about the purpose of the experiment (and do a little research if necessary), you should be able to make an educated guess about what will happen. The hypothesis should answer a question that you can actually test in the experiment. Remember to write it as an "if/then" statement, such as "If I add salt to the water, then it will boil more quickly."



1. **replicate** – to do something again in exactly the same way

Materials – List all of the materials you actually used to perform the experiment. Do not just copy the list from the lab instructions because you may need or decide to make changes to the materials. Remember that in science it is important that someone else be able to replicate your experiment exactly, especially if you get interesting or unusual results. Remember to include details like the quantity or size of the materials when appropriate. If you are building something to conduct your experiment, it may be helpful to draw a picture of what you're doing so that someone else can understand and replicate your experiment.

Procedure – In your own words, and in complete sentences, write a paragraph explaining what you actually did to complete the experiment. It should be detailed enough that someone else can repeat what you did. You do not have to include things like "I wrote down the data in the data table" or "I cleaned up the materials." You should include any safety precautions or guidelines that will help someone replicating your experiment to avoid mistakes.

Data and Observations – Record all of the data that you collect during the experiment in a data table. This includes any measurements you make or numbers you count; remember to include units. You should also write down any observations that you make, such as what you see, hear, smell, or feel. Make sure that you don't include **inferences**[2] as your observations. Sometimes it is helpful to draw a picture of your observations to help explain what happened.

Results – This should be a sentence or two that explains what your data show, such as "The greater the amount of salt added to the water, the faster the water boiled until a certain amount of salt was added, and then any more showed no increase in boiling time." Sometimes you can show your results in a table or a graph.

Discussion and Conclusions – This is the most important section of your report. Write a good paragraph (not just one or two sentences) explaining why you think you got the results that you did. Was your hypothesis supported? In other words, was your guess correct? If so, why do you think so? If not, why do you think it wasn't? What factors do you think contributed to your results? In other words, what were some things that could have caused errors? You should list several sources of possible errors in your experiment. You should also connect how this experiment and the lesson you are learning in the text relate. This section is used to make sure that you understand *why* you did the experiment as well as *how* you did the experiment.

2. inference – a conclusion drawn from an observation

SCIENTIFIC LAB REPORT

Experiment 1.1
Density in Nature

Objective or Purpose
What is the problem you are investigating? What do you want to find out?

Hypothesis
Write an educated guess about what will happen. Use the if/then format.

Materials
What supplies did you use to complete this experiment? List them.

Procedure
In your own words, write a brief paragraph explaining what you did.

Data and Observations

Write your observations (what you see, hear, smell, or feel), record any measurements, and/or draw any applicable drawings/diagrams in the data table below.

DATA TABLE

After the water, syrup, and vegetable oil were added to the glass, it looked like this: (Draw the glass, showing the layers that formed. Label the layers.)

After the rock, grape, ice cube, and cork were added, it looked like this: (Draw the glass, showing the layers that formed and where the rock, ice cube, grape, and cork are. Label the layers and the items).

Results

What did you find out by completing this experiment? was your hypothesis accurate?

Discussion and Conclusions

write a good paragraph explaining why you think you got the results that you did.

SCIENTIFIC LAB REPORT

Experiment 1.2
Atomic Motion

Objective or Purpose
What is the problem you are investigating? what do you want to find out?

Hypothesis
Write an educated guess about what will happen. use the if/then format.

Materials
What supplies did you use to complete this experiment? List them.

Procedure
In your own words, write a brief paragraph explaining what you did.

Data and Observations

Write your observations (what you see, hear, smell, or feel), record any measurements, and/or draw any applicable drawings/diagrams in the data table below.

DATA TABLE

After the drop of food coloring was added, the water and drop in each jar looked like this: (Draw what the jars of water with the drops of food coloring looked like. Make sure to label each jar accurately.)

Results

What did you find out by completing this experiment? Was your hypothesis accurate?

Discussion and Conclusions

write a good paragraph explaining why you think you got the results that you did.

SCIENTIFIC LAB REPORT

Experiment 1.3
A Chemical Reaction

Objective or Purpose
What is the problem you are investigating? What do you want to find out?

Hypothesis
Write an educated guess about what will happen. use the if/then format.

Materials
What supplies did you use to complete this experiment? List them.

Procedure
In your own words, write a brief paragraph explaining what you did.

Data and Observations

Write your observations (what you see, hear, smell, or feel), record any measurements, and/or draw any applicable drawings/diagrams in the data table below.

DATA TABLE

Describe (and draw) what you see when the baking soda falls into the vinegar.

Results

What did you find out by completing this experiment? Was your hypothesis accurate?

Discussion and Conclusions

write a good paragraph explaining why you think you got the results that you did.

SCIENTIFIC LAB REPORT

"Experiment" 1.4
Mapping the Paths of the Planets

Do you wonder why the author put "Experiment" 1.4 in quotation marks? That is because it really isn't an experiment. What this "experiment" is asking you to do is to build a model. Scientists use models to help them understand things that are too big, too small, or too complicated to work with. Fill out this lab report as you model the path of the planets around the sun.

Objective or Purpose
What is the problem you are investigating? What do you want to find out?

Hypothesis
Write an educated guess about what will happen. Use the if/then format.

Materials
What supplies did you use to complete this experiment? List them.

Procedure
In your own words, write a brief paragraph explaining what you did.

Data and Observations

Write your observations (what you see, hear, smell, or feel), record any measurements, and/or draw any applicable drawings/diagrams in the data table below.

DATA TABLE

Take a picture of the two ellipses you drew and paste it below.

Results

What did you find out by completing this experiment?

Discussion and Conclusions

write a good paragraph explaining why you think you got the results that you did.

These fill-in-the-blank summaries are strictly optional. They are provided for extra practice for students who are having trouble studying for the module tests. If you have mastered the material for a module, your parent may have you skip the summary and take the test after you have reviewed your notes on the text.

MODULE 1 SUMMARY (OPTIONAL)

1 We should support a scientific idea based on the _____, not based on the people who agree with it. Scientific progress depends not only on scientists, but also on _____ and _____. Scientific progress occurs by building on the work of _____.

2 In ancient times, people traveled for miles to visit _____ in Egypt because he was renowned for his knowledge of medicine. Despite the fact that he could cure many ills, his medicine was based not on science, but on _____ and _____. Egyptian medicine was advanced by the invention of _____, which made recording information and passing it on from generation to generation much easier.

3 Three of the first scientists were _____, _____, and _____, who were all from ancient Greece. _____ studied the heavens and tried to develop a unifying theme that would explain the movements of the _____. His pupil, _____, mainly studied life and was probably the first to attempt an explanation for the origin of the human race without reference to a _____. _____ believed that all things were constructed of air, which led to one of the most important scientific ideas introduced by the Greeks: the concept of _____.

4 _____ was a Greek scientist who is known as the father of atomic theory, but the works of his student, _____, are much better preserved. This student built on his teacher's foundation, and although most of his ideas about atoms were wrong, he was correct that atoms are in constant _____.

5 _____ is often called the father of the life sciences. He was the first to make a large-scale attempt at the _____ of animals and plants. Although Aristotle was known for a great number of advances in the sciences, he was also responsible for nonsense that _____ science for many, many years. He believed in _____, which says that certain living organisms spontaneously formed from non-living substances. Unfortunately, his _____ caused the idea of spontaneous generation to survive for thousands of years.

6 _____ is best known for proposing the geocentric system of the heavens, where the _____ is at the center of the universe and all other heavenly bodies _____ it. It was later replaced by the more correct _____ system, in which the earth and other planets orbit the _____. Three scientists who played a huge role in giving us this system were _____, _____, and _____. _____ collected much evidence in support of this system using a _____ he built based on descriptions of a military device. He had to publicly renounce the system, however, for fear of being thrown out of his _____.

7

During the Dark Ages,_____ was done in place of science. In this pursuit, people tried to turn lead or other inexpensive items into_____. These people were not scientists because they worked strictly by _____ and _____.

8 Science began to progress toward the end of the Dark Ages because the _____ worldview began to replace the Roman worldview. _____ is generally considered the first modern scientist because he was first to use the scientific method, although his student, _____, is sometimes given that title.

9 In the Renaissance, two very important books were published. One was by _____, and it was a study of the human body. The other was by Copernicus, and it was the first serious proposal of the _____ system. In pursuit of data to confirm this system, _____ was able to develop mathematical equations that showed the planets do not orbit the sun in circles, but in _____.

10 _____ was one of the greatest scientists of all time. He laid down the laws of _____, developed a universal law of _____, invented the mathematical field of _____,wrote many commentaries on the _____, showed white light is really composed of many different _____ of light, and came up with a completely different design for _____.

11 The era of _____ produced good and bad changes for scence. The good change was that science began to stop relying on the authority of past _____. The bad part of the change was that science began to move away from the authority of the _____. During this era, _____ published his classification system for life, which we still use today. In addition, _____ came up with the law of mass conservation, and _____ developed the first detailed atomic theory.

12 _____ is best known for his book, *The Origin of Species*. While most of the ideas in that book have been shown incorrect, it did demonstrate that living organisms can adapt to changes in their surroundings through a process he called _____. This essentially destroyed the old, incorrect view called _____, which says that living creatures cannot change.

13 _____ was able to finally destroy the idea of spontaneous generation once and for all. He developed a process called _____,which is used to keep milk from going bad as quickly as it otherwise would. His work laid the foundation for most of today's _____, which have saved millions and millions of lives by protecting people from disease.

14 _____, an Augustinian monk, devoted much of his life to the study of _____. The entire field of modern _____, which studies how traits are passed on from parent to offspring, is based on his work. Although he loved his scientific pursuits, he gave them up in the latter years of his life

15 because of a political struggle between the government and the _____. _____ is known as the founder of modern physics because he was able to show that _____ and _____ are really just different aspects of the same phenomenon, which is now called _____.

16 _____ determined that, like matter, energy cannot be created or destroyed. This is now known as the _____, and it is the guiding principle in the study of energy.

17 In the modern era, _____ made the assumption that energy comes in small packets called "quanta." _____ used that assumption to explain the photoelectric effect, which had puzzled scientists for quite some time. He also developed the special theory of _____ and the general theory of _____. _____ also used the assumption that energy comes in quanta to develop a mathematical description for the _____. As a result, the idea that energy comes in little packets is now a central theme in modern science, forming the basis of the theory of _____ mechanics.