noeo science

physics 1

Noeo Science Packages:

Biology 1	Biology 2	
Physics 1	Physics 2	Physics 3
Chemistry 1	Chemistry 2	Chemistry 3

Published by Logos Press
The Curriculum Division of Canon Press
PO Box 8729, Moscow, Idaho 83843
800-488-2034 | www.logospressonline.com

Cover design & illustration by Forrest Dickison
Printed in the United States of America.

Revised July2016

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by Dr. Randy Pritchard

Logos Press
LEADERS IN CLASSICAL CHRISTIAN EDUCATION

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What does 'noeo' mean?

noeo | (no eh' o) | verb

1. To perceive with the mind, to understand, to have understanding.

2. To think upon, heed, ponder, consider.
(Source: The New Testament Greek Lexicon)

3. Train the brain.
(Source: our 8 year-old son)

Romans 1:20

For since the creation of the world His invisible attributes, His eternal power and divine nature, have been clearly seen, being **understood** through what has been made, so that they are without excuse.

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Book List

Max Axiom, Super Scientist Series, by Emily Sohn
- *A Crash Course in Forces and Motion*
- *The Illuminating World of Light*
- *The Attractive World of Magnetism*
- *Adventures in Sound*

How Do You Lift a Lion?, by Robert E. Wells

First Flight: The Story of Tom Take and the Wright Brothers, by George Shea

Now & Ben, by Gene Barretta

Thomas Edison and His Bright Idea, by Patricia Brennan Demuth

Did it Take Creativity to Find Relativity, Albert Einstein?, by Melvin & Gilda Berger

The Story of Inventions, by Anna Claybourne & Adam Larkum

Alexander Graham Bell (National Geographic Reader: Level 2), by Barbara Kramer

Who Was Galileo?, by Patricia Brennan Demuth

Little Kids First Big Book of Space, by Catherine D. Hughes (National Geographic Kids)

Wishing on a Star: Constellation Stories and Stargazing Activities for Kids, by Fran Lee

Experiment Kits

Physics Discovery

The Young Scientist Club Kits:

- Kit #3 Magnets
- Kit #16 Flight
- Kit #21 Light
- Kit #22 Mirrors
- Kit #33 Forces

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Weekly Schedule of Topics

Week 1	**Forces the Move Us**
Week 2	**More on Forces**
Week 3	**Newton's Laws of Motion: 1 & 2**
Week 4	**Newton's 3rd Law of Motion**
Week 5	**Light**
Week 6	**Light**
Week 7	**Light**
Week 8	**Mirrors**
Week 9	**Mirrors**
Week 10	**Einstein**
Week 11	**Einstein**
Week 12	**Simple Machines…Levers**
Week 13	**Simple Machines…Wheels & Pulleys**
Week 14	**Simple Machines…Pulleys**
Week 15	**Inventions**
Week 16	**Inventions (The Wright Brothers)**
Week 17	**Flight**
Week 18	**Flight**
Week 19	**Benjamin Franklin**
Week 20	**Thomas Edison**
Week 21	**Electric Inventions**
Week 22	**Electric Inventions**
Week 23	**Magnetism: An Invisible Force**
Week 24	**Magnetism**
Week 25	**Magnetism**
Week 26	**Electromagnetism**
Week 27	**More Inventions (Sound)**
Week 28	**Sound**
Week 29	**Sound**
Week 30	**Galileo**
Week 31	**Space**
Week 32	**Space**
Week 33	**Space**
Week 34	**Space**
Week 35	**Space**
Week 36	**Space**

Additional Materials

The following is a complete list of items that will be used for the experiments over the entire 36-week course. This list includes many items that are common in most homes. The list does not include the items that are provided in *The Young Scientists Club* kits.

Item Needed	Week(s) Used
Large piece of cardboard or wood	1, 3
Glue	1, 3
Scissors	2, 18
2-liter (empty) soda bottle	2
2 eggs	3
2 chairs	4, 18
Tape	4, 9, 17, 18, 25, 29
Bright light source (e.g. lamp, flashlight)	5
Colored pencils or markers	6
Pencil	6, 23
Glass of water	7
Large mirror (e.g. bathroom mirror)	8
Piece of paper	8, 9
Pen	8
Large metal spoon	9
Small toy car or block	18
Foil	20
D batteries (1 or 2)	20
Flashlight bulb	20
Electrical Tape	20
Steel or iron nail, screw, or other piece of metal	23
Various small household items (to test for magnetism)	24
Permanent marker	24
Cereal bowl	24
Iron filings	25, 26
(optional: Binoculars or telescope)	35

Introduction

Welcome to Noeo Science! Thank you for trusting us to provide you with quality materials for teaching science at home. We understand that many homeschooling parents do not have a science background and may feel a bit intimidated about teaching science…especially when it comes to the experiments! Our books and experiment kits have been carefully selected to be of the highest quality available, yet simple enough for even the most science-phobic teachers and students. We intensely searched through library catalogs, websites, and hundreds of books before deciding on what we believe are the "best-of-the-best". We hope that you will agree and we're always open to your comments and suggestions.

Our Instructor's Guides provide a logical, focused progression through the books and experiments. Multiple sources of information are used to teach each science topic. However, you won't need to spend your time searching for books or cross-checking indexes to make the curriculum flow. That work has been done for you!

The Noeo Philosophy

The essence of science is simply observing and describing God's creation. When scientists make a new discovery, they are seeing another part of creation revealed. Romans 1:20 tells us that His attributes, power, and divine nature are clearly seen in what has been made.

While some scientists deny that their discoveries are evidence of God's creation, there are many that do recognize His attributes in all of creation. Our children should not be protected from science because of some scientific theories that deny God. They should instead be immersed in the sciences so that "'His invisible attributes, His eternal power and divine nature" will be clearly seen.

The Noeo Method

You will find that the Noeo Science curriculum is different from all the rest. Each year of science will fill your child with wonder and excitement as they build a strong foundational knowledge of science. They'll be having so much fun that the learning will come naturally for them...and painlessly for you.

Noeo Science is variety-filled, with a structure that is best described as a balance between the classical method and the Charlotte Mason approach. We emphasize narration and summarization, vocabulary development, observation, and the scientific method. We do not promote rote memorization or the worksheet and test methodology, as we think that this approach is less valuable for long-term retention. The following table illustrates these characteristics:

Teaching Method	Corresponding Noeo Science Curriculum Qualities:
Classical	• **Emphasizes vocabulary development, especially in the younger years.** • **Develops critical thinking skills and logic through the use of the scientific method.** • **Incorporates the classical stages of learning, i.e. the "Trivium" (grammar, logic, and rhetoric).**
Charlotte Mason	• **Provides the best books available (including "living books").** • **Utilizes a child's natural curiosity to acquire knowledge. "Studies serve for delight".** • **Uses narration and notebooks rather than worksheets, tests, or repetitive drills to evaluate learning .**

We think it is important to learn science from a variety of sources, using a variety of teaching techniques. Our curriculum does not use the traditional, single textbook approach to science education. We think variety will encourage more interest in science, particularly with younger students. All of the books are carefully selected to allow children to discover the beauty, complexity, orderliness, and wonder of God's design. While some written work is expected, many hands-on activities are included within the bright, colorful, and well-written books. Living book biographies of many important scientists are included to provide a practical perspective. Optional Internet references are also provided throughout the curriculum.

Occasionally, a book may introduce a particularly secular viewpoint. We view these times as an opportunity for discussions and encourage you not to skip over or "cover up" this information. We do not provide "canned" answers for these discussions, but encourage instructor's to study the issues for themselves and to pray for guidance and understanding in providing answers to each student's unique questions.

Just as creation is orderly and well organized, we think a good science curriculum should follow an orderly design. Each year of the curriculum will focus on biology, chemistry, or physics. Each of these three foundational sciences is studied independently for an entire year rather than jumping randomly from one subject to another without reason. The study of biology, chemistry, and physics is then repeated at a higher level and in more detail upon the completion of each three-year course of study (e.g. biology in 1st and 4th grade, chemistry in 2nd and 5th grade, etc.). Subjects that overlap multiple science disciplines, such as geology, weather, and astronomy, are included at logical points within the three major science studies. For example, astronomy is studied in parallel with the study of gravity within the physics curriculum.

	Approximate Ages	Grade Equivalent	Classical Trivium Stage
Biology I Chemistry I Physics I	**5-8**	**1-3**	**Early Grammar**
Biology II Chemistry II Physics II	**9-12**	**4-6**	**Late Grammar or Early Logic**
Biology III Chemistry III Physics III	**12-15**	**7-9**	**Late Logic or Early Rhetoric**

Our curriculum is designed on a 4-day per week schedule. If you would prefer to do science twice weekly, then simply complete the first two days of scheduled readings and assignments on your first day, and the last two days of reading and assignments on your second day. Alternatively, you may wish to do all of the reading on the first day and the assignments and experiments on the second day. The key is to understand what works best for you and your children and to adjust the schedule as necessary.
The daily time necessary to complete the assignments will vary with individual student ability and based on the content being studied. We provide the following table as a guideline of the approximate time that you can expect to spend on daily assignments:

	4-Day Schedule	**2-Day Schedule**
Grades 1-3	**15-20 minutes**	**30-40 minutes**
Grades 4-6	**20-30 minutes**	**40-60 minutes**
Grades 7-9	**30-40 minutes**	**60-80 minutes**

Noeo Notebooks

We provide reproducible sheets for creating science and lab notebooks for use with the Noeo Science curriculum. The notebooks are an integral part of the curriculum. Feel free to modify these sheets and to tailor your expectations for each child.

Your student will be asked to describe, sketch or summarize what they learn from the reading assignments, or to complete a lab sheet for their experiments. This method will encourage concentration and attention to detail. In addition, the lab sheets are designed to help your student to apply the scientific method in all of their experiments.

Younger students may need to "narrate" their descriptions and observations to you or an older sibling. You will need to determine the length and amount of detail that your student is capable of. We encourage you to increase this expectation over the course of time.

Lab Experiments

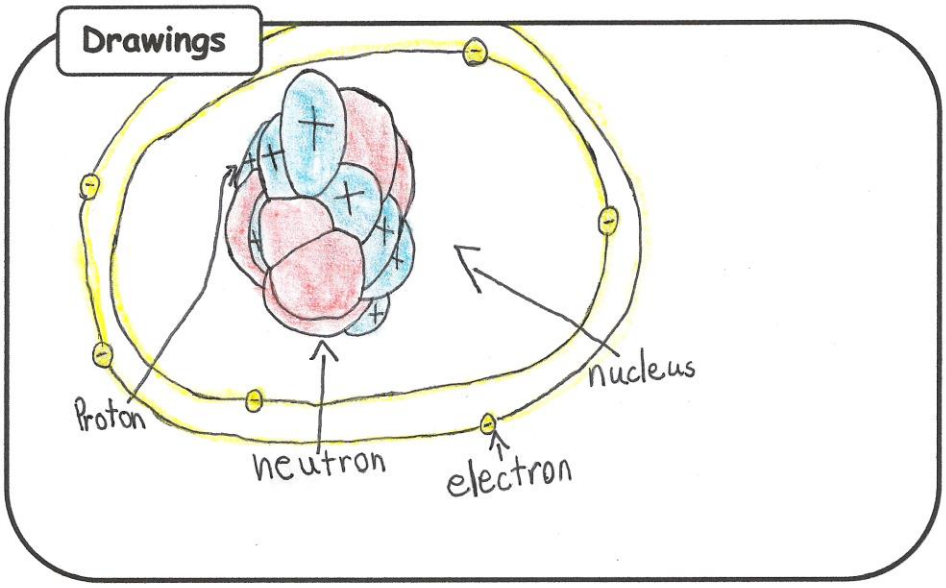
Science is not a spectator sport. The best way for your child to learn and truly comprehend science is by doing hands-on experiments and activities. We understand that this is probably the most difficult part of science for many homeschool families. That is why we were determined to find sources of high quality, yet simple, experiments.

We are pleased to say that the experiments in our curriculum will provide a strong science foundation without wreaking havoc on your daily schedule. For example, many of our experiments are provided through a unique arrangement with *The Young Scientists Club*. These experiment kits come complete with all the items that are normally difficult to find. They have won multiple awards for their high quality and have become increasingly popular among homeschoolers in recent years. We think you will be pleasantly surprised as your child progresses through these well organized, fully explained experiment kits while actually having fun learning science.

Our other experiments and activities are also carefully selected to provide relevant and interesting examples of the topics being studied. We provide a supply list for each week of the year, along with a "Master Supply List" at the beginning of the Instructor's Guide. You'll notice that most, if not all, of the items on this list can already be found in your home (honest!).

The following pages are samples copied from a science notebook of a nine-year-old using our Chemistry II course. Younger students would orally "narrate" their summaries to an older sibling or adult. Older children should be expected to provide more detailed narrations (summarizations). It is not necessary to complete an experiment sheet for every experiment, especially with younger students. However, it is good to complete them often in order to establish a strong understanding of the scientific method.

Drawings



Reading Notes

Atoms are made up of: electrons, neutrons, and protons.
Atoms are tiny particles of what everything is made.

Definitions

nucleus- The core section of an atom that contains protons and neutrons.
neutron- a subtomic particle with no electrical charge in the nucleus of an atom.
Proton- a positively charged subatomic particle in the nucleus of an atom.
electron shells- an energy level around the nucleus.

Date 2/2/06

Experiment Name A feast for Yeast

What have you learned about this subject? (observation/research)
That yeast is alive!

What question are you trying to answer? (question)
what happens when you feed sugar to yeast?

What things do you need? (materials)

1. a bottle
2. yeast
3. sugar
4. warm water
5. a balloon
6.
7.
8.

What will you do to answer the question? (experiment/test)
put yeast in a bottle, put in sugar and put a balloon over it.

What do you think will happen? (hypothesis/prediction)
the balloon will blow up with CO_2 that the yeast makes

What happened? (results)
the balloon inflated.

Why do you think this happened? (conclusion)
The balloon catches the CO_2.

Reproducibles

Science & Lab Notebook Pages

The following pages are provided for your convenience. They may also be found on our website (www.logospressonline.com) for free downloading and printing. New pages will also be added occasionally on the website. There are a variety of page styles to be used for notebook creation. Some contain a space for drawing *and* writing; others have space only for drawing *or* writing. Different line spacing options are also provided for young writers. Feel free to make as many copies as you need.

Please remember that younger students should begin by orally "telling back" what they have just learned. You may prefer to write their thoughts down in a notebook for them. As they become better writers, then begin to have them write a sentence or two. Increase your expectations over time until you can find a balance between the student's love for learning and their need for applied narration.

The lab notebook pages (experiment page) are intended to be used as a tool for teaching the scientific method. Again, younger students should not be expected to complete this sheet without assistance. Begin by orally asking some of the questions on the sheet after completing an experiment. Progressively increase your expectations for the completion of the experiment sheet. Older students should eventually be able to write a complete lab report without the need for this sheet.

Drawings

Drawings

Reading Notes/Definitions

Reading Notes

Definitions

Option 1

Date _____

Lab Experiment _____

What I did:

What I saw:

I think this happened because...

Option 2

Date _____

Lab Experiment _____

What I did:

What I saw:

I think this happened because...

Date _____

Lab Experiment _____

What have you learned about this subject? (observation/research)

_____

_____

_____

What question are you trying to answer? (question)

_____

_____

_____

What things do you need? (materials)

1._____
2._____
3._____
4._____
5._____
6._____
7._____
8._____

What will you do to answer the question? (experiment/test)

_____

_____

_____

What do you think will happen? (hypothesis/prediction)

_____

_____

_____

What happened? (results)

_____

_____

_____

Why do you think this happened? (conclusion)

_____

_____

_____

Weekly Reading & Experiments

Week 1 – Forces that Move Us				
	Day 1	**Day 2**	**Day 3**	**Day 4**
Forces and Motion with Max Axiom	Pp. 4-5	Pp. 6-7	Pp. 8-9	Pp. 10-11
The Young Scientists Club Kit		Kit # 33: Forces Experiment 1 Students read page 7 & 8 (teacher: pg. 1)		Kit # 33: Forces Experiment 2 Student, pg.9 (teacher, pg. 1)

Supply List:

large piece of cardboard or wood
glue

Assignments:

Day 1 – Read the assigned pages and describe and/or sketch what you learn from your reading in your science notebook.

Note: Use the reproducible sheets to create a science notebook for writing/sketching important ideas. Younger students can orally "narrate" what they have learned. You may need to ask prompting questions to get younger students to begin to concentrate on the important topics in the reading assignments.

Max Axiom said that "the world is full of all kinds of motion." What kinds can you name?

Max also says, "everything that moves needs a force to get it moving," then he explains what a force is. Describe **force** in your science notebook, and give an example if you want. What is **gravity**?

Day 2 – Read the assigned pages and describe and/or sketch what you learned in your science notebook. Be sure to include what you read about **inertia** and **Isaac Newton.** What is **Newton's First Law of Motion?**

Now do the first experiment in Kit #3 (it's super-easy). Read the explanation first and write down any new ideas that you learn about **Isaac Newton** and **gravity**. Then do the experiment described on the bottom of page 8. Record your "observation" in your lab notebooks (experiment sheets are in the Reproducible Pages section of this book).

Day 3 – Read the assigned pages and describe and/or sketch what you learned in your science notebook. What is **speed**? What is **acceleration**? How does **gravity** affect speed and acceleration?

Day 4 – Read the assigned pages and describe and/or sketch what you learned in your science notebook. What is **friction**?

Now, in the Young Scientist's Kit, read the top of page 9 and do the first experiment on that page (the first four text boxes). Record what you observed about **friction** in your lab notebooks.

Week 2 – More on Forces				
	Day 1	**Day 2**	**Day 3**	**Day 4**
The Young Scientists Club Kit	Kit # 33: Forces Experiment 3 Student, pg. 9-10 (teacher, pg. 2)	Kit # 33: Forces Experiment 4 Student, pg.10-11 (teacher, pg. 2)	Kit # 33: Forces Experiment 5 Student, pg.11 (teacher, pg. 2)	Kit # 33: Forces Experiment 6 & 7 Student, pg.11 (teacher, pg. 3)

Supply List:

2-liter empty soda bottle scissors

Assignments:

Day 1 – Beginning with the last text box on the bottom of page 9, complete the coin experiment. Did your coin reach the ground first? Why do you think this happened? What is the explanation given in by "Celsius the Science Bug"? Record your observations in your lab notebook.

Day 2 – In the middle of page 10 is a "cool trick" to show your friends and family. Try this trick, then record your observations in your lab notebook.

Day 3 – Now you'll learn about **centrifugal force**. Complete the experiment and record your observations in your lab notebook.

Day 4 – Continue experimenting with centrifugal force. Be sure to record your observations in your lab notebook.