noeo science

chemistry 1

Noeo Science Packages:

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

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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

Chemistry: The Atom and Elements (Super Smart Science Series), by April Chloe Terrazas

A Drop of Water, by Walter Wick

The Dynamic World of Chemical Reactions with Max Axiom (Graphic Science Library), by Agnieska Biskup

Everyday Materials: Plastic, by Andrew Langley

George Washington Carver (National Geographic Kids), by Kitson Jazynka

Mad Margaret Experiments with the Scientific Method (In the Science Lab)

Rocks and Minerals (National Geographic Kids), by Kathleen Weidner Zoehfeld

Pop! A Book About Bubbles, by Kimberly Brubaker Bradley

Many Kinds of Matter, by Jennifer Boothroyd

Super Science Concoctions, by Jill Frankel Hauser (A Kids Can! Book)

True Books: The Elements, by Matt Mullins

What's Smaller than a Pygmy Shrew?, by Robert Wells

What's the Matter in Mr. Whisker's Room?, Michael Elsohn Ross

Experiment Kits

The Young Scientist Club Kits:

- Kit #1 Recycling
- Kit #5 The Three Phases of Matter
- Kit #7 Minerals
- Kit #8 Crystals
- Kit #9 Fossils
- Kit #11 Weight and Volume

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Weekly Schedule of Topics

Week 1	The Scientific Method
Week 2	What is Matter?
Week 3	What is Matter? (cont'd)
Week 4	What is Matter? (cont'd)
Week 5	What is Matter? (cont'd)
Week 6	The World of the Very Small
Week 7	Atoms and Elements
Week 8	The Periodic Table
Week 9	The Periodic Table (compounds)
Week 10	Mighty Molecules
Week 11	Molecules and Solutions
Week 12	Changing States (phases) of Matter
Week 13	Changing States (phases) of Matter
Week 14	Changing States & Chemical Reactions
Week 15	Chemical Reactions
Week 16	Chemical Reactions
Week 17	Chemical Reactions (acids and bases)
Week 18	Chemical Reactions (acids and bases)
Week 19	Properties of Liquids
Week 20	Weight and Volume
Week 21	Properties of Water
Week 22	Properties of Water
Week 23	Properties of Water
Week 24	Properties of Water
Week 25	Properties of Water
Week 26	Fun Formulas
Week 27	Fun Formulas
Week 28	Plastic
Week 29	Recycling Plastics
Week 30	George Washington Carver
Week 31	George Washington Carver
Week 32	Rocks & Minerals
Week 33	Rocks & Minerals
Week 34	Crystals
Week 35	Minerals
Week 36	Fossils

Additional Materials

The following is a list of household items that will be used for the experiments over the entire 36-week course. These items are NOT provided in *The Young Scientists Club* kits.

Item needed	Week(s) used
cornstarch	2, 26
food coloring	2, 10,11, 14,19, 20, 2122, 34
spoon	2, 17, 19, 26, 27
measuring cup	2, 17, 19
bottle, spray (empty)	3
mirror	3
paintbrushes	3, 17
ice	3, 12, 13, 27
vinegar	4, 11, 14, 17, 18, 27, 34, 35
bottles	4, 11, 19, 22, 24
baking soda	4, 14, 17, 33, 34
jar	10, 17, 18, 19, 33
coffee filter	11
cup	11
garlic cloves, whole	11
herb springs, fresh	11
pebbles	11
sand	11, 14
alcohol, rubbing	11, 22
paper clips	11, 23
pencil	11, 23
film canister (or something similar)	11, 17
oil (olive or cooking)	11, 19
scissors	11, 23
marker, waterproof	11, 20, 23, 29
bowls	11, 27, 16, 34, 35
page protector, plastic	12
popcorn (and a way to pop it)	12
watercolors	12
zip-lock bag	12
medicine-style dropper	12, 22, 23
pan	12, 17, 26, 27
candle, taper	13
milk carton, quart	13
paraffin	13

can, coffee (or similar)	13, 14,27
chocolate chips	14
double-boiler or microwave-safe dish	14
soap, liquid	14, 22, 24
paper, waxed	14, 23
bag, plastic	16
plaster of Paris	16
twist tie	16
knife	17
lids (2)	17
red cabbage	17
water, distilled	17
paper	17, 22, 23, 35
sieve	17, 27
eggs	18, 27
bottle, plastic 2 liter, empty (with lid)	19
cloves	19
index cards (2)	19
potato, turnip, radish, carrot	19
raisins	19
toothpicks	19
tray	19
syrup	19, 20
salt	19, 27, 34, 35
cereal box, empty (or similar box)	20
lightweight objects, small (10)	20
tape	20
vegetable oil	20
glass container	21
pin, steel	21
string	21
pitcher	21, 22
handkerchief, old	22
pennies (30)	22
rubber band	22
detergent	23
glass plate	23
pan, baking	23
pop tops	23
rubber cement	23
straws, drinking	23
tabs, plastic	23
ruler	23, 35
sugar	24, 27, 24
cookie sheet	27
cream	27
cream of tartar	27
jug, plastic milk, 1 gallon	27
milk	27
sugar, powdered	27

towel	27
vanilla	27
whisk	27
apple	29
bag, brown paper	29
cloth, piece of	29
containers, empty (4)	29
lettuce	29
newspaper	29
paper towel	29
plastic, small piece of colored	29
rolling pin	29
toilet paper	29
hammer	34
magnifying glass	34

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

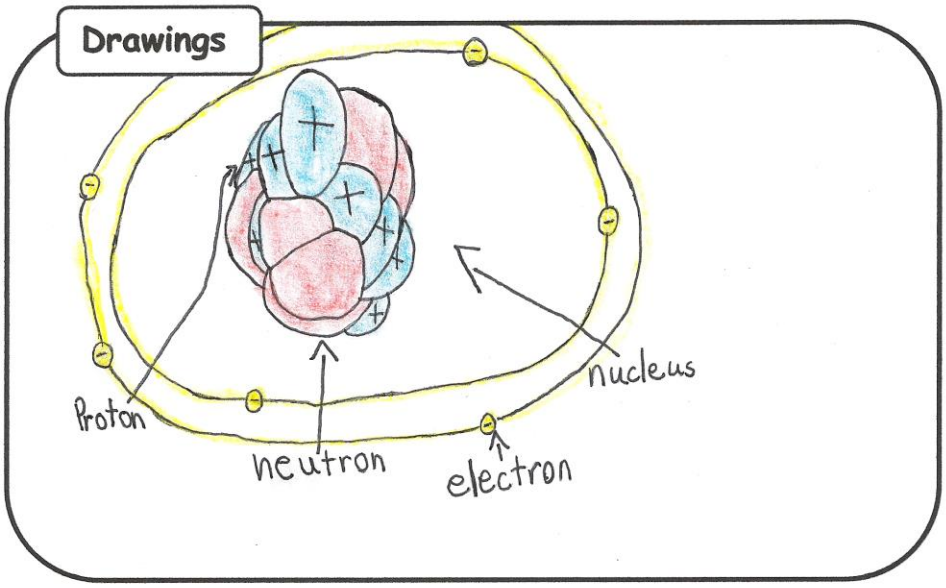
Science is not a spectator sport. The best way for your child to learn and truly comprehend science is by doing hands-on experiments and activities. We understand that this is probably the most difficult part of science for many homeschool families. That is why we were determined to find sources of high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

Option 3

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 The Scientific Method				
	Day 1	**Day 2**	**Day 3**	**Day 4**
Mad Margaret Experiments with the Scientific Method	Pp. 3-7	Pp. 8-9	Pp. 10 -13	Pp. 14-22
Optional Internet Browsing				Check out www.Facthound.com and type in the code listed on page 23

Assignments

NOTE: Younger students will "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. Use the reproducible sheets to create a science notebook for writing/sketching important ideas.

Day 1 – Read the assigned pages. What is the "scientific method"? Write this down in your new science notebook. What is the first step in the scientific method? Write this down, too.

Day 2 – Read the assigned pages. What is the second step in the scientific method? Add that to your notebook.

Day 3 – Read the assigned pages. What is the third step in the scientific method? Make sure you can explain what a **hypothesis** is. Add all of this to your notebook.

Day 4 – Read the assigned pages. What is the fourth step in the scientific method? Add that to your notebook.

Page 22 mentions one last thing to do with your hypothesis. What is it?

Now, look at the pages in this Instructor's Guide which have been provided for you to record the results of your experiments. Does this follow the Scientific Method?

Week 2 What's Matter?				
	Day 1	**Day 2**	**Day 3**	**Day 4**
What's the Matter in Mr. Whisker's Room?	Pp. 9-15 Water Droppers	Pp. 16-19 Gloop	Make your own "gloop" (p. 43) with Exp. Kit #5 (below)	Pg. 20-23 Oobleck Make your own "Oobleck" (p. 44)
Young Scientists Club Experiment Kit			Kit # 5 The Three Phases of Matter Experiment 5 (This is basically "gloop") Teacher, p. 2 Student, p. 8 (stop at text box 3)	Kit # 5 The Three Phases of Matter Experiment 4 (this is basically "Oobleck") Teacher, pg. 2 Student, p. 7 (begin at text box 5)

Supply List

measuring cups and spoons
food coloring (optional)
2 tablespoons of cornstarch

Assignments

Day 1 – You might not have a dropper full of water, but can you still explain what the "big idea" in Mr. Whiskers' classroom for today? Write the BIG IDEA in your science notebook. After you do that, you can explore your own "classroom" to see matter taking up space. Which things take up the most space? What is **matter**?

Day 2 – What is the "big idea" in Mr. Whisker's classroom today? Write it down in your science notebook.

Day 3 – Do you have anything in your house that is like GLOOP? Maybe you'll want to use the recipe at the back of the Mr. Whiskers book to make some. Experiment 5 also makes the silly substance. Try it. Take pictures of everyone playing with your gloop.

Day 4 – What is the "big idea" in Mr. Whisker's classroom today? Write it down in your science notebook. Do you have anything in your house that is like OOBLECK? Maybe you'll want to use the recipe at the back of the book to make some. But you can also make some with Experiment 4 in the Young Scientist' Kit. Have fun. Take pictures!

Prepare for your next lesson by freezing some water in a plastic container (see page 44 for an explanation).