

**NOEO
SCIENCE
BIOLOGY 1
INSTRUCTOR'S GUIDE**

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INSTRUCTOR'S GUIDE**

Created by Dr. Randy Pritchard

noeo science
MOSCOW, IDAHO

Noeo Science Packages

**GRADES 1-3 /
AGES 5-8**

Biology 1
Physics 1
Chemistry 1

**GRADES 4-6 /
AGES 9-12**

Biology 2
Physics 2
Chemistry 2

**GRADES 7-8 /
AGES 12-15**

Physics 3
Chemistry 3

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INTRODUCTION

Welcome to Noeo

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 experiments 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. Each week you will find an overview of what your student will learn as well as an answer key for the student lab manual reading and experiment questions. 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!

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. (*The New Testament Greek Lexicon*)
3. Train the brain.

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.

noeo

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. Ro-

mans 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 tests, 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
<p>Classical</p>	<ul style="list-style-type: none"> • 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).
<p>Charlotte Mason</p>	<ul style="list-style-type: none"> • 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 sci-

ence, 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.

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 instructors 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.

NOEO COURSE	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 will be 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 Experiment Guides and Student Lab Manuals

The experiment guides and student lab manuals are an integral part of the curriculum.

Your student will be asked to answer questions about what they learn from the reading assignments and experiments. This method will encourage concentration and attention to detail. In addition, the lab manual questions are designed to help your student start to apply the scientific method in 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 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. These experiment kits come with all the items that are normally difficult to find. They have become in-

creasingly 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 Lab Manual. You’ll notice that most, if not all, of the items on this list can already be found in your home (honest!).

Resource List

Books

- *Audubon's Birds of America Coloring Book*, by Paul E. Kennedy
- *The Boy Who Drew Birds: A Story of John James Audubon*, by Jacqueline Davies
- *DK First Animal Encyclopedia*
- *Experiments in Earth Science and Weather with Toys and Everyday Stuff*, by Emily Sohn
- *Exploring Nature Activity Book for Kids*, by Kim Andrews
- *Louis Pasteur and Pasteurization*, by Jennifer Fandel
- *My First Book about Weather*, by Donald M. Silver & Patricia J. Wynne
- *One Small Square: Cactus Desert*, by Donald M. Silver
- *One Small Square: Seashore*, by Donald M. Silver
- *One Small Square: Woods*, by Donald M. Silver
- *Usborne Internet-Linked First Encyclopedia of the Human Body*
- *Weather Clues in the Sky: Clouds*, by Belinda Jensen
- *Weather Ready-to-Read* by Marion Dane Bauer (*Wind, Rain, Clouds, Snow
Rainbow, Sun*)

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. Numbers in parentheses indicate the weeks the items are used. The list does not include the items that are provided in the experiment kits.

INCLUDED IN KITS

2 plastic resealable zip-lock bag (2, 12, 21, 28)
agar plate petri dish (derived from seaweed) (5)
cotton swab (5)

2 packets yeast (5, 25)
thermochromatic pigment (10)
cream of tartar (10)
3 rubber gloves (12, 25, 34)
3 rubber bands (12, 25, 28)
seeds (12)

2 sheets black construction paper (13, 30)
bug sprinkles (15)
nut in a shell (15)
3 straws (15, 26, 27)
chopsticks (15)
feather (16)
paper plate (17)
string (18, 19, 31)
4 paper cups (28)
1 sheet blue construction paper (18)
1 sheet yellow construction paper (18)
2 sheets gray construction paper (18)
sea sponge (20)
kitchen sponge (20)
9 balloons (22, 25, 26, 27, 34)
sidewalk chalk (22)
rubber duck (24)
ping pong ball (24)
pushpin (25)
pipe cleaners (25)
paper drawing of heart and lungs (26)
3 bendy straws (26, 27)
toothpick (26)
one stocking (28)
paper drawings of digestive system and organs) (29)

HOUSEHOLD ITEMS

construction paper (1)
marker (1, 11, 18, 30, 31, 34)
ruler (1, 22)
scissors (1, 3, 14, 15, 16, 18, 20, 25, 27, 28, 30, 31)
thumbtack (1)
pencil with eraser (1, 25, 30, 31)
3 identical washcloths (2)
matches (for adult use) (2)
gallon-sized plastic resealable bag (2)

ice (2, 12, 31, 34)
2 rubber toys, such as a duck or ball (3)
2 plastic toys, such as action figures (3)
2 metal toys, such as cars (3)
flat piece of styrofoam, at least as big as your hand (3)
aluminum pie tin (3)
tape (3, 5, 11, 16, 17, 25, 26, 27, 31, 34)
glass cup or jar (4, 6, 9, 22, 32)
copy paper (4, 5, 16, 17, 18, 25)
2 2-liter bottles (4)
duct tape (4, 26, 27)
permanent marker (5, 22)
liquid soap (5)
4 glass cups or jars (5, 15)
sugar (5, 15, 33)
flour (5, 10)
table or other fine grain salt (5, 10, 33)
cups with yeast from the *Yeast Growth* experiment (5)
oil (5, 15, 22)
milk (6)
plastic wrap (6, 25, 27)
egg (9)
white vinegar (9)
baby oil (vegetable or coconut oil works too) (10)
spoon (10)
lamp (10)
2 plastic containers (11)
syrup (11)
solid shortening such as Crisco (or use soft butter) (12)
large bowl (12, 21, 31, 34)
dirt (12)
shallow pan or bowl (12)
3 clear glasses (14)

food coloring (red and blue - red is optional) (14, 15, 26)

2 marshmallows (15)

rice (15)

juice (15)

gummy worms (15)

two small bowls (15)

cup (15, 24, 33, 34)

tweezers (15)

pliers (15)

coins, small rocks, knick-knacks, or other small objects (17)

book, apple, water bottle, or other heavier object (17)

hole punch (Or an adult can use a needle, safety pin, or paperclip) (18)

glue (18)

measuring spoon (20)

2 metal spoons (21)

a tub or bowl to fill with water (22)

tape measure (or yardstick or ruler) (22)

small rock or a quarter (24)

blindfold (24, 33, 34)

dinner plate (24, 28)

plastic bottle (27)

small plastic bottle (27)

duct tape or playdough (27)

knife (28, 30)

crackers or bread (28)

banana (28)

orange juice (28)

mirror (32)

4 small bowls or plates (33)

lemon (33)

unsweetened chocolate (33)

foods that have a strong smell such as spices (ginger, cloves, nutmeg), onion, vinegar, coffee (33)

essential oil or peppermint extract (or other strong smelling liquid) (33)

cotton ball (33)

candy (a variety of flavors, similar shapes and sizes such as jelly beans or Skittles®-you'll need enough for three experiments!) (33)

small bag or pillowcase (34)

**DAILY LESSON
PLANS FOR
READING &
EXPERIMENTS**



unit 1:

WEATHER

Week 1: The Atmosphere and Winds	15
Week 2: Clouds	17
Week 3: Rain and Thunderstorms	21
Week 4: Rainbows and Weather Events	23



Week 1: The Atmosphere and Winds

Schedule

	DAY 1	DAY 2	DAY 3	DAY 4
<i>My First Book About Weather</i>	pp. 1-2	pp. 3-4	pp. 5-7	
<i>Ready-to-Read: Sun</i>		Read the whole book		
<i>Ready-to-Read: Wind</i>			Read the whole book	
<i>Experiments in Earth Science and Weather</i>				pp. 12-13
<i>Experiment Guide</i>				Blown Away!

Overview

We mean two things when we talk about science. 1) Science is the process we use to answer questions about the physical world we see around us (testing with experiments). 2) Science is the body of knowledge other people (scientists) have collected by using the scientific process (or scientific method).

You have to admit that it is strange that the world is a place where one day warmth can come from the sky, another day water, and another day (in some places) ice and snow. In this unit you will learn about the atmosphere, which is what makes Earth's climate a place where life can flourish – so different from the Moon's climate, for example. This week we will answer the question every kid has had: What causes the blustery weather when it's windy outside?

Reading Questions

DAY 1

1. What is the earth's atmosphere made of? **The earth's atmosphere is made of air flowing around the earth.**
2. What are the four layers of the atmosphere? **The four layers of the atmosphere are the thermosphere, mesosphere, stratosphere, and troposphere.**

DAY 2

1. According to *Ready-to-Read Sun*, what is the sun? **The sun is a star.**
2. What vitamin does the sun give us? **The sun gives us vitamin D**

DAY 3

1. According to *Ready-to-Read Wind*, does hot air go up or down? **Hot air goes up.**
2. Does cool air rise or fall? **Cool air falls.**
3. What is made when hot and cold air trade places? **Wind is made.**

DAY 4

Experiment: Blown Away!

Experiment: Blown Away!

MATERIALS

From Home

- construction paper
- ruler
- scissors
- thumbtack
- pencil with eraser

EXPERIMENT QUESTIONS

1. Why does the pinwheel spin? **The curls of the pinwheel catch the wind, and that makes it spin.**
2. What direction does the pinwheel spin? **If you made your pinwheel the same way the book did, it should spin clockwise.**



Week 2: Clouds

Schedule

	DAY 1	DAY 2	DAY 3	DAY 4
<i>Weather Clues in the Sky: Clouds</i>	pp. 4-11	pp. 12-19		pp. 20-21, Experiment
<i>Experiments in Earth Science and Weather</i>	pp. 8-9			
<i>Ready-to-Read: Clouds</i>			Read the whole book	
<i>My First Book about Weather</i>			pp. 8-9	
<i>Experiment Guide</i>	The Water Cycle			Make a Cloud

Overview

You might have looked for cloud shapes in the sky before. This week, you may be surprised to learn that clouds are made of water in the sky. How that water gets up there, though, is what you'll spend most of your time on this week, as you dive into the details of clouds and the water cycle.

Reading Questions

DAY 1

1. According to *Weather Clues in the Sky*, what are the three steps in the water cycle (see page 9)? **The three steps are rising moisture, water and ice crystals, and rain.**
2. What are the weather clues that Bel points out? **The clues are the different clouds.**

Experiment: The Water Cycle

DAY 2

1. Which clouds are thin and wispy? **Cirrus clouds are thin and wispy.**
2. Which clouds are flat on the bottom and fluffy on top? **Cumulus (and Cumulonimbus) clouds are flat on the bottom and fluffy on top.**
3. Which clouds look like a gray blanket? **Stratus clouds look like a gray blanket.**

DAY 3

No worksheet today

DAY 4

Experiment: Make a Cloud

Experiment: The Water Cycle

MATERIALS

From Home

- 3 identical washcloths

EXPERIMENT QUESTIONS

1. Which washcloth dried the fastest? **The washcloth in the sun should have dried faster.**
2. Which washcloth dried the slowest? **The washcloth inside should have dried the slowest.**
3. Where did the water from the washcloths go? **The water in the washcloths evaporated into the air.**

Experiment: Make a Cloud

MATERIALS

From Home

- Glass jar
- Matches (use with an adult's help)
- Gallon-sized Ziploc bag
- Ice