

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

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

Created by Dr. Randy Pritchard

noeo science
MOSCOW, IDAHO

Noeo Science Packages

**GRADES 1–3 /
AGES 5–8**

Biology 1
Chemistry 1
Physics 1

**GRADES 4–6 /
AGES 9–12**

Biology 2
Chemistry 2
Physics 2

**GRADES 7–8 /
AGES 12–14**

Chemistry 3
Physics 3

Published by Noeo Science
PO Box 8729, Moscow, Idaho 83843
800-488-2034 | www.noeoscience.com
Email us at service@noeoscience.com

Noeo Science Biology 1: Instructor's Guide, 4th Edition
Copyright ©2022 by Noeo Science
First edition 2005. Second edition 2015. Third edition 2021. Fourth edition 2022.

Cover design & illustration by Forrest Dickison
Interior design by Valerie Anne Bost
Printed in the United States of America. All rights reserved.

Scripture taken from the NEW AMERICAN STANDARD BIBLE®, Copyright © 1960, 1962, 1963, 1968, 1971, 1972, 1973, 1975, 1977, 1995 by The Lockman Foundation. Used by permission.

All rights reserved. Unless otherwise noted, no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical, photocopy, recording, or otherwise, without prior permission of the author, except as provided by USA copyright law.

Contents

Introduction

Welcome to Noeo	3
Resource List	9

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

UNIT 2: BACTERIA AND FUNGI

Week 5: Louis Pasteur	29
Week 6: More about Louis Pasteur.	33

UNIT 3: INVERTEBRATES

Week 7: Creepy Crawlies.....	37
Week 8: Creepy Crawlies and Flying Insects	39

UNIT 4: HABITATS—CACTUS DESERT

Week 9: Reptiles	43
Week 10: Desert Creatures.	45
Week 11: Frogs and Amphibians	47

UNIT 5: HABITATS—WOODS

Week 12: Woodland Animals	51
Week 13: More Woodland Animals.....	55
Week 14: Trees and Their Inhabitants	57

UNIT 6: BIRDS

Week 15: Birds	63
Week 16: John James Audubon	67
Week 17: More About John James Audubon	69

UNIT 7: HABITATS—SEASHORE

Week 18: Tides	75
Week 19: Crustaceans	79
Week 20: More Seashore Creatures	81
Week 21: Fish	85
Week 22: More Ocean Creatures	87

UNIT 8: WILD ANIMALS

Week 23: Monkeys, Apes, and Cats	93
Week 24: Megafauna	95
Week 25: Horses, Cows, and More	99

UNIT 9: THE HUMAN BODY

Week 26: The Body and Heart	105
Week 27: The Heart and Lungs	107
Week 28: Voice, Teeth, and Digestive System	111
Week 29: Kidneys, Skin, Hair, and Nails	115
Week 30: Bones and Joints	117
Week 31: Muscles, Brain, and Nerves	121
Week 32: Seeing and Hearing	125
Week 33: Taste and Smell	127
Week 34: Touch	131

UNIT 10: PLANTS

Week 35: Roots	137
Week 36: Seeds	141

Lab Materials at Home	145
Additional Lab Materials	147
Additional Materials –Week by Week	149

INTRODUCTION

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. 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.

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!

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
Classical	<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).
Charlotte Mason	<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 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.

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 TRIVIAM STAGE
Biology I Chemistry I Physics I	6-8	1-3	Early Grammar
Biology II Chemistry II Physics II	9-11	4-6	Late Grammar or Early Logic
Chemistry III Physics III	12-14	7-8	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 7-8	30-40 minutes	60-80 minutes

Experiment Kits

There are 4 experiment kits, including all of the wild and wacky materials that you would normally spend hours (and let's face it: way too much money) sourcing on Amazon. Each kit lists its contents sorted by what you'll need for each week's experiments. Why 4 kits? It's much less overwhelming than opening a box full of loose food dye and pipettes. But there is an even better reason: say your child opens their Noeo box, and sees a toy car for an experiment 20 weeks away. Realistically, that car is toast. With the materials sorted into kits, the materials are a little easier to manage—and you only have a few weeks to make sure you don't lose that car, instead of 36.

Student Lab Manual

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 know that this is one of the most dreaded parts of science for many homeschool families; that's why we were determined to put together high quality, but straightforward experiments.

Noeo provides a strong foundation in science without wreaking havoc on your daily schedule. Each experiment and activity builds on the material that you cover in the week's readings, but don't worry — at the end of each experiment there is a section that explains what should have happened, and *why* it happened. So, if you decide to change things up, it won't be an issue.

The experiment kits come with any items that are normally difficult — or just plain inconvenient — to find. Both the Student Lab Manual and Instructor's Manual have a complete supply list at the back, showing you which materials we're providing, and which materials you'll need from home. And yes, the home materials are real, honest-to-goodness, *home materials* — things for school, from your cabinets, and your pantry. Watch as your student progresses through these well organized, fully explained experiment kits, while actually having fun learning science.

You might notice that in between the Experiments there are some Activities and Optional Activities. Activities include the supplies you'll need, but they don't require as much explanation as Experiments, and your student won't be answering questions about them. Optional Activities are fun, optional things to do related to the reading of the week — most of the time they're outings or family activities, or they need materials that we didn't want to require you to buy.

Each week, your student will answer questions about key points both from their reading and experiments. The experiment questions in particular are centered around

drawing results, making observations, asking questions, and making connections—all things that will slowly introduce your student to the scientific method and lab reports.

Younger students may need to “narrate” their descriptions and observations to you or an older sibling. It’s completely up to you to determine the length and amount of detail you expect from your student, but we do encourage you to increase this expectation over time.

Instructor’s Guide

Schedules, answers keys, lists of books and home supplies—it’s all here. Everything you need to make Noeo work for you is right here in the Instructor’s Guide. A list of the supplied books is provided, so that you can keep an eye on exactly which books you need for the course.

Lists of both home and included supplies are at the back of the book. The materials list is organized by weeks; so, if an experiment calls for a carrot, you won’t be stuck with a slowly decomposing root vegetable in your fridge until you need it thirty weeks later.

Every week, you can refer to our provided schedule (flexible enough that you could do it all in one day if you’ve got an enthusiastic scientist, or stretch it out as much as you need), overview of the week’s subject matter, and answers to both reading and experiment questions. If your student ends up begging to do more, no need to worry—you don’t work for your curriculum, Noeo works for you.

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*)

Experiment Kits

- *Noeo Experiment Kits 1-4*

**DAILY LESSON
PLANS FOR
READING &
EXPERIMENTS**



unit 1:

W E A T H E R

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>Lab Manual Experiment</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 & Experiment 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. How many layers are in the atmosphere? **There are four layers in the atmosphere.**

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!

MATERIALS

Included in Kit

- construction paper
- push pin
- bendy straw

From Home

- ruler
- scissors
- pencil with eraser (or use a plastic straw)

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>Lab Manual Experiment</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 & Experiment 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 kinds of clouds.**

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.**

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

1. Can you walk in a cloud? **Yes, if there is fog along the ground.**
2. What are clouds made of? **Clouds are made of water vapor or ice crystals.**
3. What kind of clouds let us know the weather will change soon? **Cirrus clouds show changes in the weather.**

DAY 4

Experiment: Make a Cloud

MATERIALS

From Home

- glass jar
- matches (use with an adult's help)
- gallon-sized ziploc bag
- ice

EXPERIMENT QUESTIONS

1. What happened when you put the ice on top of the jar? **When the ice was placed on the jar, a cloud formed in the jar.**
2. Draw a picture of the results of this experiment.
3. Why did the cloud appear? **The ice and warm air formed a mini water cycle, and that formed a cloud.**