

# Biology for **HIGH** **SCHOOL**



by Bradley Hudson

## Biology for High School

First Edition, 2019

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## Introduction to this Guide

Welcome to Biology! This year, you will learn about biochemistry, cell structure, photosynthesis, genetics, plants, microorganisms, anatomy, and much more. In this guide, you will find three types of schedules, as well as notes with the assignments for each week. To get links to the textbook, teacher guide, experiment, and quick-links for the activities in this guide, please visit:

 <https://elementalscience.com/blogs/resources/bhs>

### Three Courses in One

This guide contains the plans for three courses in one book. These are:

- ☞ **Honors** - The plans in this option are for a lab science, 1-credit *Honors Biology* course. There are textbook assignments, experiments, events in science, optional hands-on activities, and written work with these plans. Expect to take about 5 to 6 hours a week to complete these plans. We recommend this option for students who plan on going into the sciences. The honors course will also fulfill a lab science credit for graduation.
- ☞ **Standard** - The plans in this option are for a standard lab science, 1-credit *High School Biology* course. There are textbook assignments, experiments, and written work with these plans. Expect to take about 4 to 5 hours a week to complete these plans. We recommend this option for students who are not and for students who are planning on going into the sciences. The standard course will fulfill a lab science credit for graduation.
- ☞ **Survey** - The plans in this option are for an information-only, 1-credit *Survey of Biology* course. There are textbook assignments, written work, and events in science with these plans. There are no experiments or hands-on activities scheduled with these plans. Expect to take about 4 to 5 hours a week to complete these plans. We recommend this option for students who are not planning on going into the sciences and do not need a lab science credit for graduation.

Each of the scheduling pages will note at the top which course the plans are for. These schedules for these courses are suggestions; please check with your local oversight contact to make sure that you are meeting your state's graduation requirements. Please feel free to tailor this program to the needs of your students.

## An Explanation of the Sections

After the scheduling pages, you will find the notes sheets. These sheets are divided into four sections - textbook, experiments, events in science, and hands-on activities. Here is an explanation of each of these sections.


### Textbook

For this study, we have chosen to use a widely available, standard text book, *CK-12 Biology*.

You can download this text as a pdf from the resource page above. You will complete the reading assignment and then answer several of the questions from the text. These answers should be added to the reading section of the science notebooks. You will also define several of the key terms from the chapter. The definitions should be added to the glossary section of the science notebook.


## Experiment

All the experiments come from *Illustrated Guide to Home Biology Experiments*, along with the corresponding experiment kit. You can download the guide for free and purchase the kit (BK01A Standard/Honors Home School Biology Laboratory Kit) from here:

 <https://www.thehomescientist.com/bk01-main.php>

With each of these experiments, you will find a purpose, required pre-reading, procedure, lab notebook assignments, and lab questions. For each week, we have included a supply list for your convenience. If you would like to see a full list of the household supplies you will need in addition to the experiment kit, please see pg. 239 in the Appendix.

We have also incorporated an optional online lab into the standard course. These online labs are available through Beyond Labz. You can visit the resource page for this program for directions on how to sign up and use these labs or visit their website directly at:

 <https://www.beyondlabz.com/>

As part of unit four, the standard- and honors-course students will complete a full lab report for one of the experiments. We have included an explanation of what a full lab report includes after this introduction.

## Events in Science

This section gives two options for the Events in Science section. One will familiarize you with current events in science, as you research on the internet for the various topics. The other will familiarize you with the key historical figures in biology through the scientist biography report. We have included two articles to explain these options in more depth following this introduction.





## Hands-on Activities

We have also included optional hands-on experiments for each week. You can see a list of the supplies you will need for these in the Appendix on pg. 242.

## The Science Notebook

This year, you will each create a science notebook. Each notebook should contain the following sections:





-  Reading (All Students) - This section of the notebook will contain any notes you have taken, along with the answers to the questions that were assigned each week.
-  Lab (Standard- and Honors-Course Students Only) - This section of the notebook will house the notes from the experiments you have done, along with any other materials relating to the labs.
-  Events (Survey- and Honors-Course Students Only) - This section of the notebook will include either the current events article summaries or the historical reports you have done.
-  Glossary (All Students) - This section of the notebook will have the definitions for the assigned vocabulary words.

This notebook can be a composition book, divided into the required sections, or a three-ring binder with dividers for each section.

## Grading and Credits

The three options in this guide meet the requirements for a full credit of high school biology, as explained above. Each week, the student will answer lab and textbook questions, do events in science written work, and define vocabulary that can count toward a classwork grade for the course. The textbook for this course has chapter tests available for free in the quizzes and tests packet. We suggest that you use these for the exam grade for the course. We suggest you use the following percentages to come up with a final grade for the course:

-  Class work: 70%
-  Exam: 30%

Note - A grading rubric for the Scientist Biography Reports can be found on pg. 244 in the Appendix.

## Students Going Into The Sciences

If your students plan to go on to major in the sciences, we suggest that you also add an in-depth project and a research report at some point during the year to this program. An explanation of the in-depth project and of the research report can be found on the following pages.

## Final Thoughts

As the authors and publishers of this curriculum, we encourage you to contact us with any questions or problems that you might have concerning *Biology for High School* at support@elementalscience.com. We will be more than happy to answer you as soon as we are able. We trust that you and your students will enjoy *Biology for High School!*

# Biology for High School


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Unit 1 - Cell Structure,  
Function, and Reproduction

## Week 1 Notes - Introduction to Biology

### Textbook Assignments

#### Reading

 *CK-12 Biology* Sections 1.1, 1.2

#### Written

After you finish reading, answer questions #1-6 in section 1.2 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:


- |   |                                   |
|---|-----------------------------------|
| <input type="checkbox"/> Dependent variable   | <input type="checkbox"/> Stage    |
| <input type="checkbox"/> Independent variable | <input type="checkbox"/> Turret   |
| <input type="checkbox"/> Scientific theory    | <input type="checkbox"/> Aperture |
| <input type="checkbox"/> Scientific law       | <input type="checkbox"/> Rheostat |

### Experiment - Using a Microscope

#### Purpose

The purpose of this lab is to familiarize you with how biology labs work and to get you comfortable with using the *Illustrated Guide to Home Biology Experiments*.


#### Pre-Reading

 Read the background and procedure sections for the “Using the Microscope” lab on pg. 53 in the *Illustrated Guide to Home Biology Experiments*.

#### Procedure

- ✓ Do the lab entitled “Using the Microscope” lab on pg. 53 in the *Illustrated Guide to Home Biology Experiments*.


#### Lab Notebook

 Write down on a sheet of paper or type out your notes as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook. (See pp. 4-6 in the *Illustrated Guide to Home Biology Experiments* for information about a lab notebook.)

#### Lab Review Questions

- ✎ Complete the review questions of the “Using the Microscope” lab on pg. 61 in the *Illustrated Guide to Home Biology Experiments*. Record the answers in the lab section of your science notebook.

### Online Lab

 There is no online lab scheduled for this week.

## Events in Science

### Current Events

- ⊕ Find a current events article relating to the field of biochemistry and complete the article summary sheet found on pg. 246 of the Appendix. Once you are done, add the sheet to the events section of your science notebook.

### Historical Figures

- ⊕ Begin to research the life and work of Aristotle, who is considered by many to be the father of biology. You will have three weeks to complete your research. After that, you will have two weeks to prepare a two to three page paper on this scientist and his contributions to the field of biology.

## Hands-on Activity

### Optional Hands-on

- ✂ Practice using a microscope by making wet mount and dry mount slides. Directions can be found here: <https://elementalscience.com/blogs/science-activities/how-to-make-a-microscope-slide>.

## Week 1 Supply List

Weekly Experiment	
Supplies from BK01A Biology Kit	<input type="checkbox"/> Goggles, Forceps, Ruler (millimeter scale)
Additional Supplies From Home	<input type="checkbox"/> Gloves, Lamp or book light, Microscope, Scissors, Slide - prepared (bacteria or diatoms), Notebook or copy paper
Hands-on Activity	
Supplies Needed	<input type="checkbox"/> Microscope, Blank slides, Various materials to examine

Week 1	Unit 1 (Honors Course)				5-Day
Weekly Topic					
→ This week will be an introduction to biology.					
	Day 1	Day 2	Day 3	Day 4	Day 5
<b>Textbook and Experiment</b>	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.1.	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.2.	<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Using a Microscope" lab on pg. 53 in <i>Illustrated Guide to Home Biology Experiments</i> .	<input type="checkbox"/> Do the optional Hands-on Assignment - Wet and Dry Mount Slides.
<b>Writing</b>	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.		<input type="checkbox"/> Record what you have done in the lab section of your science notebook.	<input type="checkbox"/> Complete the lab review questions for the week.
<b>Events in Science</b>	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.				
Other Notes					

Week 1	Unit 1 (Standard Course)			4-Day
Weekly Topic				
→ This week will be an introduction to biology.				
	Day 1	Day 2	Day 3	Day 4
Textbook and Experiment	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.1.	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.2.	<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Using a Microscope" lab on pg. 53 in <i>Illustrated Guide to Home Biology Experiments</i> .
Writing	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.		<input type="checkbox"/> Record what you have done in the lab section of your science notebook.
Other Notes				


Week 1	Unit 1 (Survey Course)		2-Day
Weekly Topic			
→ This week will be an introduction to biology.			
	Day 1	Day 2	
<b>Textbook</b>	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.1.	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.2.	
<b>Writing</b>	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	
<b>Events in Science</b>	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.		
Other Notes			



## Week 2 Notes - Chemistry of Life, part 1

### Textbook Assignments

#### Reading

 *CK-12 Biology* Sections 2.1, 2.2

#### Written

After you finish reading, answer questions #1-7 in section 2.1 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:


- |  |   |
|--|---|
| <input type="checkbox"/> Amino Acid              | <input type="checkbox"/> Monosaccharide     |
| <input type="checkbox"/> Carbohydrate            | <input type="checkbox"/> Polysaccharide     |
| <input type="checkbox"/> Complementary Base Pair | <input type="checkbox"/> RNA                |
| <input type="checkbox"/> DNA                     | <input type="checkbox"/> Anabolic Reaction  |
| <input type="checkbox"/> Lipid                   | <input type="checkbox"/> Catabolic Reaction |

### Experiment - Mounting Specimens

#### Purpose

The purpose of this lab is to familiarize you with how to mount specimens.


#### Pre-Reading

 Read the background and procedure sections for the “Mounting Specimens” lab on pg. 63 in the *Illustrated Guide to Home Biology Experiments*.

#### Procedure

- ✓ Do the lab entitled “Mounting Specimens” on pg. 63 in the *Illustrated Guide to Home Biology Experiments*.

#### Lab Notebook

 Write down on a sheet of paper or type out your notes as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook.

#### Lab Review Questions


- ✎ Complete the review questions of the “Mounting Specimens” lab on pg. 69 in the *Illustrated Guide to Home Biology Experiments*. Record the answers in the lab section of your science notebook.

### Online Lab - Introduction to the Microscopy Lab

#### Purpose

The purpose of this online lab is to learn about the strengths and capabilities of the four different microscopes available on the microscopy lab bench.

#### Pre-Reading

 Print and read the section of the workbook for the “Introduction to the Microscopy Lab”

online lab.

### Procedure

- ✓ Do the lab entitled “Introduction to the Microscopy Lab” and answer the questions as you work through the online lab.

### Lab Notebook

- ☞ Add the completed workbook pages that were printed to the lab notebook.

## Events in Science

### Current Events

- ⊕ Find a current events article relating to the field of biochemistry and complete the article summary sheet found on pg. 246 of the Appendix. Once you are done, add the sheet to the events section of your science notebook.

### Historical Figures

- ⊕ Continue to research the life and work of Aristotle.

## Hands-on Activity

### Optional Hands-on

- ✂ Learn about how complimentary base pairs work by creating a DNA ladder out of LEGOS. Directions can be found here: <http://elementalblogging.com/homeschool-science-corner-dna/>.

## Week 2 Supply List

Weekly Experiment	
Supplies from BK01A Biology Kit	<input type="checkbox"/> Goggles, Coverslips, Forceps, Glycerol, Pipettes, Scalpel, Slide (well), Slides (flat), Stain, methylene blue, Stirring rod (optional)
Additional Supplies From Home	<input type="checkbox"/> Gloves, Butane lighter (or other flame source), Carrot (raw), Microscope, Microtome (purchased or homemade), Petroleum jelly, Human hair, Pond water, Toothpicks, Vegetable oil (olive or similar), Water, distilled
Hands-on Activity	
Supplies Needed	<input type="checkbox"/> LEGO bricks

Week 2		Unit 1 (Honors Course)				5-Day
Weekly Topic						
→ This week will begin a look at the chemistry of life.						
	Day 1	Day 2	Day 3	Day 4	Day 5	
<b>Textbook and Experiment</b>	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.1.	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.2.	<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Mounting Specimens" lab on pg. 63 in <i>Illustrated Guide to Home Biology Experiments</i> .	<input type="checkbox"/> Do the optional Hands-on Assignment - DNA Ladder.	
<b>Writing</b>	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	<input type="checkbox"/> Take the Chapter 1 Test from <i>CK-12 Biology</i> .	<input type="checkbox"/> Record what you have done in the lab section of your science notebook.	<input type="checkbox"/> Complete the lab review questions for the week.	
<b>Events in Science</b>	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.					
Other Notes						


Week 2		Unit 1 (Standard Course)			4-Day
Weekly Topic					
→ This week will begin a look at the chemistry of life.					
	Day 1	Day 2	Day 3	Day 4	
Textbook and Experiment	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.1.	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.2.	<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Mounting Specimens" lab on pg. 63 in <i>Illustrated Guide to Home Biology Experiments</i> .  <b>OR</b> <input type="checkbox"/> Do the online lab "Introduction to the Microscopy Lab."	
Writing	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	<input type="checkbox"/> Take the Chapter 1 Test from <i>CK-12 Biology</i> .	<input type="checkbox"/> Record what you have done in the lab section of your science notebook.	
Other Notes					

Week 2	Unit 1 (Survey Course)		2-Day
Weekly Topic			
→ This week will begin a look at the chemistry of life.			
		Day 1	Day 2
<b>Textbook</b>	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.1.		<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.2.
<b>Writing</b>	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. <input type="checkbox"/> Take the Chapter 1 Test from <i>CK-12 Biology</i> .		<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.
<b>Events in Science</b>	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.		
Other Notes			

## Week 3 Notes - Chemistry of Life, part 2

### Textbook Assignments

#### Reading

 *CK-12 Biology* Section 2.3

#### Written

After you finish reading, answer questions #1-6 in section 2.3 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:

Acid

pH

Base


Polarity

### Experiment - Staining

#### Purpose

The purpose of this lab is to practice and learn various techniques for staining microscope slides.


#### Pre-Reading

 Read the background and procedure sections for the “Staining” lab on pg. 71 in *Illustrated Guide to Home Biology Experiments*.


#### Procedure

✓ Do the lab entitled “Staining” on pg. 71 in *Illustrated Guide to Home Biology Experiments*.

#### Lab Notebook

 Write down on a sheet of paper or type out your notes as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook.

#### Lab Review Questions

 Complete the review questions of the “Staining” lab on pg. 76 in *Illustrated Guide to Home Biology Experiments*. Record the answers in the lab section of your science notebook.

### Online Lab - Staining Bacteria

#### Purpose

The purpose of this online lab is to learn how microbiologists use stain microscope slides to tell different types of bacteria apart.

#### Pre-Reading

 Print and read the section of the workbook for the “Staining Bacteria” online lab.

#### Procedure

✓ Do the lab entitled “Staining Bacteria” and answer the questions as you work through the online lab.

## Lab Notebook

- ☞ Add the completed workbook pages that were printed to the lab notebook.

## Events in Science

### Current Events

- ⌚ Find a current events article relating to the field of biochemistry and complete the article summary sheet found on pg. 246 of the Appendix. Once you are done, add the sheet to the events section of your science notebook.

### Historical Figures

- ⌚ Continue to research the life and work of Aristotle.

## Hands-on Activity

### Optional Hands-on

- ✂ Test common household materials to see if they are acids or bases. Directions can be found here: <https://elementalscience.com/blogs/science-activities/kitchen-acid-test>.



## Week 3 Supply List

Weekly Experiment	
Supplies from BK01A Biology Kit	<input type="checkbox"/> Goggles, Coverslips, Pipettes, Slides (flat), Stain - eosin Y, Stain - Gram's iodine, Stain - Hucker's crystal violet, Stain - methylene blue, Stain - safranin O, Stirring rod (optional)
Additional Supplies From Home	<input type="checkbox"/> Gloves, Butane lighter (or other flame source), Ethanol 70%, Microscope, Paper towels, Toothpicks, Water, distilled
Hands-on Activity	
Supplies Needed	<input type="checkbox"/> Red cabbage juice or pH paper, Common household chemicals such as bleach, ammonia, and vinegar

Week 3	Unit 1 (Honors Course)				5-Day
Weekly Topic					
→ This week will wrap up a look at the chemistry of life.					
	Day 1	Day 2	Day 3	Day 4	Day 5
Textbook and Experiment	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.3.		<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Staining" lab on pg. 71 in <i>Illustrated Guide to Home Biology Experiments</i> .	<input type="checkbox"/> Do the optional Hands-on Assignment - Kitchen Acids and Bases.
Writing	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	<input type="checkbox"/> Take the Chapter 2 Test from <i>CK-12 Biology</i> .	<input type="checkbox"/> Record what you have done in the lab section of your science notebook.	<input type="checkbox"/> Complete the lab review questions for the week.
Events in Science	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.				
Other Notes					

Week 3		Unit 1 (Standard Course)			4-Day
Weekly Topic					
→ This week will wrap up a look at the chemistry of life.					
	Day 1	Day 2	Day 3	Day 4	
Textbook and Experiment	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.3.		<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Staining" lab on pg. 71 in <i>Illustrated Guide to Home Biology Experiments</i> .  <b>OR</b> <input type="checkbox"/> Do the online lab "Staining Bacteria."	
Writing	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	<input type="checkbox"/> Take the Chapter 2 Test from <i>CK-12 Biology</i> .	<input type="checkbox"/> Record what you have done in the lab section of your science notebook.	
Other Notes					

Week 3	Unit 1 (Survey Course)		2-Day
Weekly Topic			
→ This week will wrap up a look at the chemistry of life.			
		Day 1	Day 2
<b>Textbook</b>	<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.3.		<input type="checkbox"/> Take the Chapter 2 Test from <i>CK-12 Biology</i> .
<b>Writing</b>	<input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.		<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.
<b>Events in Science</b>	<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.		
Other Notes			