SciQuest 100: Milo's Mission

Sample Packet

The following sample packet includes the first two weeks of the *SciQuest 100: Milo's Mission* materials. You will see:

- ✓ The Instructor's Guide (*beginning on p. 12*)
- ✓ The Lab Journal (*beginning on p. 25*)

You can get more information and purchase this story-based program here:

- https://elementalscience.com/collections/sciquest-100-milos-misson

A sample of the adjoining novel, *The PB Nanner Fluffer Test*, can be found on Amazon here:

- https://a.co/d/09f16wAT

Teacher Notes At-A-Glance

The teacher guide is your go-to resource for guiding your students through science!

1. Two Scheduling Options

Provide guidance to the students with these two grid-style scheduling options. There are two-day-a-week and five-day-a-week schedules. These schedules break down the essential work and the optional activities into manageable chunks so that you can help them proceed with confidence.

2. Notes

Get key information and further explanations of the topics when necessary after the schedules. These notes will assist you as you teach science to your students and are described below.

READ SCIENCE

3. Reading Assignments

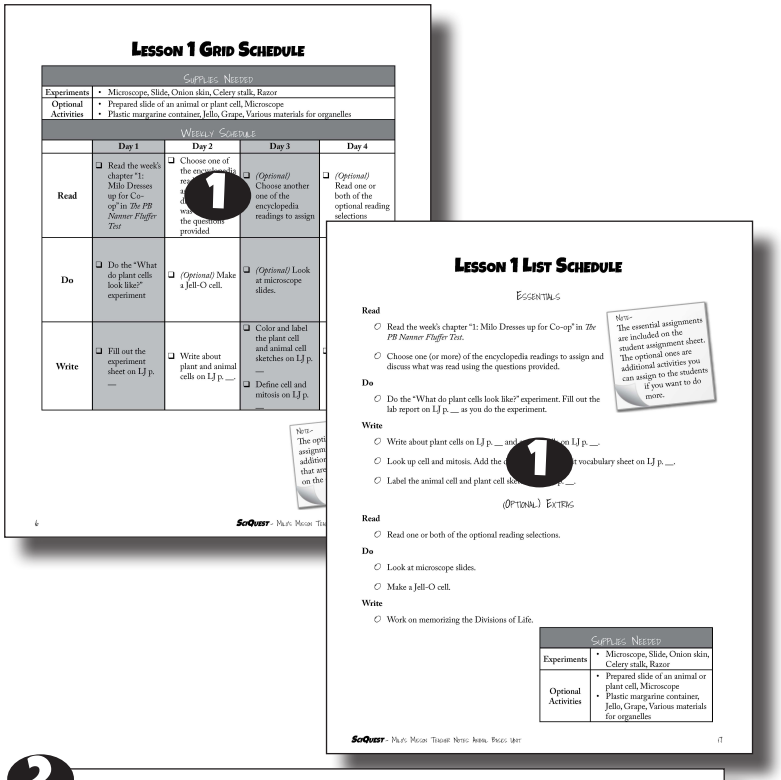
See the week's reading assignments. First, you will find the chapter from the springboard novel. After that, you will find the encyclopedia pages, which contain the core of the information for the week.

4. Discussion Questions with Answers

Get discussion questions with the answers so you have the tools necessary to lead an effective discussion time without having to read the selection.

5. Optional Readings

Find optional books you can check out from your local library.



Lesson 1 Grid Schedule

Supplies Needed	
Experiments	• Microscope, Slide, Onion skin, Celery stalk, Razor
Optional Activities	• Prepared slide of an animal or plant cell, Microscope • Plastic margarine container, Jello, Grape, Various materials for organelles

Weekly Schedule

	Day 1	Day 2	Day 3	Day 4
Read	❑ Read the week's chapter "1: Milo Dresses up for Co-op" in *The PB Nanner Fluffer Test*	❑ Choose one of the encyclopedia [illegible] the questions provided	❑ *(Optional)* Choose another one of the encyclopedia readings to assign	❑ *(Optional)* Read one or both of the optional reading selections
Do	❑ Do the "What do plant cells look like?" experiment	❑ *(Optional)* Make a Jell-O cell.	❑ *(Optional)* Look at microscope slides.	
Write	❑ Fill out the experiment sheet on LJ p. __	❑ Write about plant and animal cells on LJ p. __	❑ Color and label the plant cell and animal cell sketches on LJ p. __ ❑ Define cell and mitosis on LJ p. __	

Note–
The optional assignments are included on the student assignment sheet. The optional ones are additional activities you can assign to the students if you want to do more.

1

Lesson 1 List Schedule

Essentials

Read

- ○ Read the week's chapter "1: Milo Dresses up for Co-op" in *The PB Nanner Fluffer Test*.
- ○ Choose one (or more) of the encyclopedia readings to assign and discuss what was read using the questions provided.

Do

- ○ Do the "What do plant cells look like?" experiment. Fill out the lab report on LJ p. __ as you do the experiment.

Write

- ○ Write about plant cells on LJ p. __ and [illegible] on LJ p. __.
- ○ Look up cell and mitosis. Add the [illegible] vocabulary sheet on LJ p. __.
- ○ Label the animal cell and plant cell sk[illegible] p. __.

(Optional) Extras

Read

- ○ Read one or both of the optional reading selections.

Do

- ○ Look at microscope slides.
- ○ Make a Jell-O cell.

Write

- ○ Work on memorizing the Divisions of Life.

Supplies Needed	
Experiments	• Microscope, Slide, Onion skin, Celery stalk, Razor
Optional Activities	• Prepared slide of an animal or plant cell, Microscope • Plastic margarine container, Jello, Grape, Various materials for organelles

Note–
The essential assignments are included on the student assignment sheet. The optional ones are additional activities you can assign to the students if you want to do more.

1

SciQuest - Milo's Mission Teacher Notes: Animal Biggies Unit 17

2

Lesson 1 Science Focus: The Cell

Read: Gathering Information

Key Idea
Cells are the basic building blocks of life.

Week's Readings

First, spark an interest by having the students read this week's story opener:

- Read chapter 1 in *The PB Nanner Fluffer Test* "Milo D[illegible] for Co-op" (Your student will meet Milo and learn a bit[illegible]-op as his class participates in the annual science costume contest where his class d[illegible]p as a plant cell.)

3

Then follow the story up with some facts. You can choose which resource works best for your students:

- *Usborne Science Encyclopedia*: "Plant Cells" pp. 250-251, "Animal Cells" pp. 298-299
- *Kingfisher Science Encyclopedia:* "Single-celled Organisms" p. 54
- *Usborne Illustrated Dictionary of Science:* "The Structure of Living Things" pp. 238-241
- *Everything You Need to Ace Science in One Big Fat Notebook:* "Cell Theory and Cell Structure" pp. 303-312

Discussion Questions

After the reading, use the following questions to guide your discussion time with the students.

1. What are three of the basic parts of a plant cell and what does each do? (Answers should be: Three parts of the plant cell are _____, _____, and_____. The _____ does_____, and so on.Answers should come from the following information: Cell wall – made of cellulose and helps the cell keep its shape, Cell membrane – found just under the cell wall, Vacuoles-fluid-filled sacs that store liquids such as sap for the plant[illegible]eus – controls the activity in the cell, Cytoplasm –[illegible]id surrounding the nucleus that contains the organe[illegible]ell, Chloroplasts – chlorophyll, which makes food for the plant and gives it a green color.)

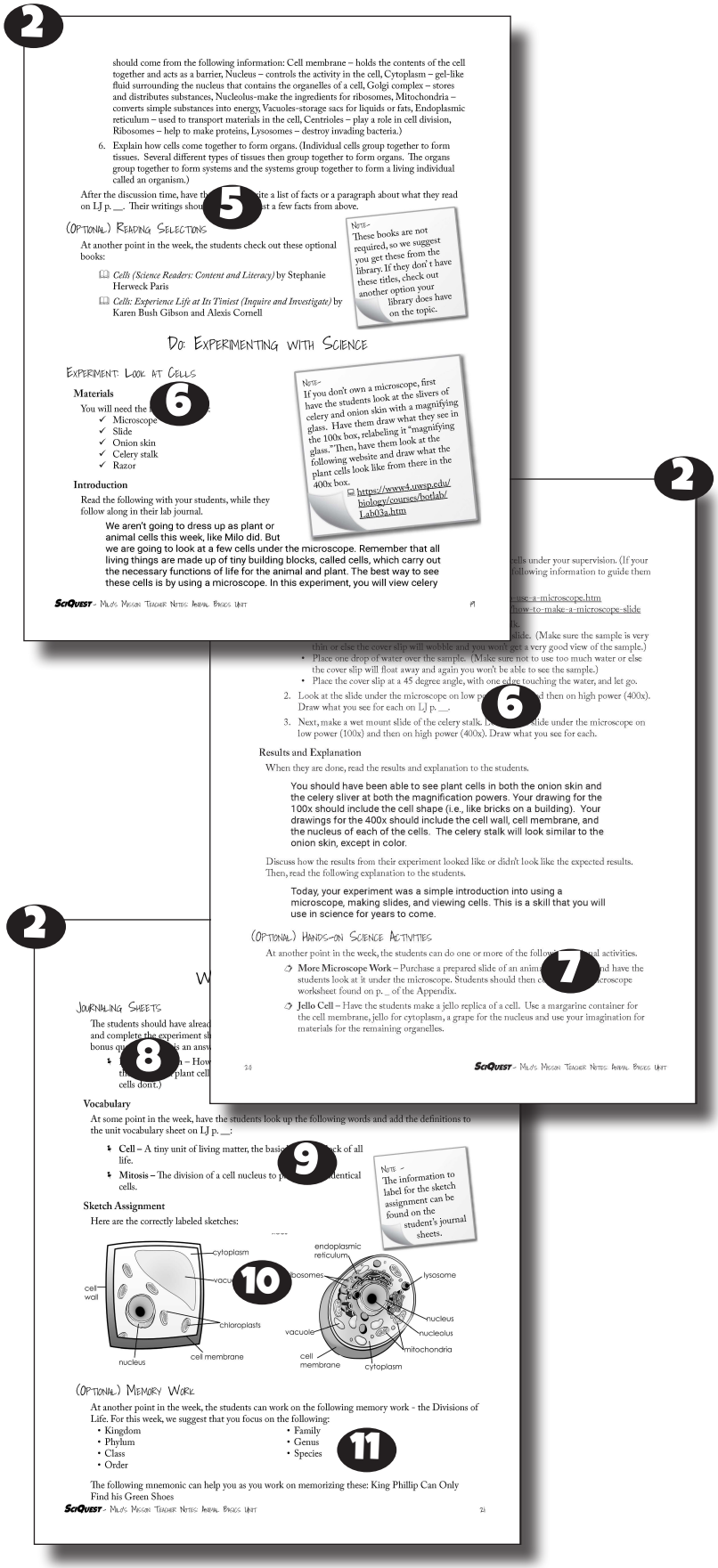
4

Note–
This information included in the discussion questions is what you want the students to know from the week. If they don't catch this from the readings they did, be sure to share it with them.

2. Are all plant cells the same? (No) Why or why not? (Plant cells have different shapes and structures depending on the job they have in the cell.)
3. What are the two stages of cell division in a plant cell? (The two stages of cell division in a plant are called mitosis and cytokinesis.)
4. What happens during each of the stages of mitosis? (During mitosis, the nucleus divides, creating two parts; each part becomes a new nucleus. During cytokinesis, a cell plate forms along the dividing line and a new cell wall builds up along the plate.)
5. What are three of the basic parts of an animal cell and what does each do? (Answers should be: Three parts of the animal cell are _____,_____, and _____. The _____does_____, and so on. Answers

18 SciQuest - Milo's Mission Teacher Notes: Animal Biggies Unit

Teacher Notes At-A-Glance



Do Science

6. Experiment Information

Know what you need to know about the weekly experiment, which will coordinate with the topic. This section includes the introduction and procedure, which are also included in the student materials. It also lists the expected results, an explanation, and ideas to take the hands-on science fun further.

7. Optional Hands-on Activities

Add a bit of fun with these optional research projects and hands-on science project ideas. These relate to and reinforce what the students are learning about the week's subject.

Write Science

8. Journal Sheets

Understand what the students will be writing down for the week, along with a bonus question. These are deeper inquiries designed to make the students think about the subject matter.

9. Vocabulary

Enhance your students' science vocabulary by introducing words that are relevant to the weekly topic.

10. Sketch Answers

Know how and where the students should label the pre-drawn sketches with the completed images.

11. Optional Memory Work

Have the students memorize key facts about the unit's topics with these optional memory work selections.

Lab Journal At-A-Glance

Go on a scientific quest to learn about cells, animals, and our planet.

1. Unit Memory Work

Memorize key facts about the unit's topics with these optional memory work selections.

2. Unit Glossary

Keep all the unit vocabulary in one place. The glossary gives space to write the definitions for each vocabulary word.

3. Student Assignment Sheet

See the plan for the week on the student assignment sheets, broken into reading, doing, and writing sections. This sheet has all the tasks for the week with checkboxes for you to use as you complete the work.

4. Experiment Sheet

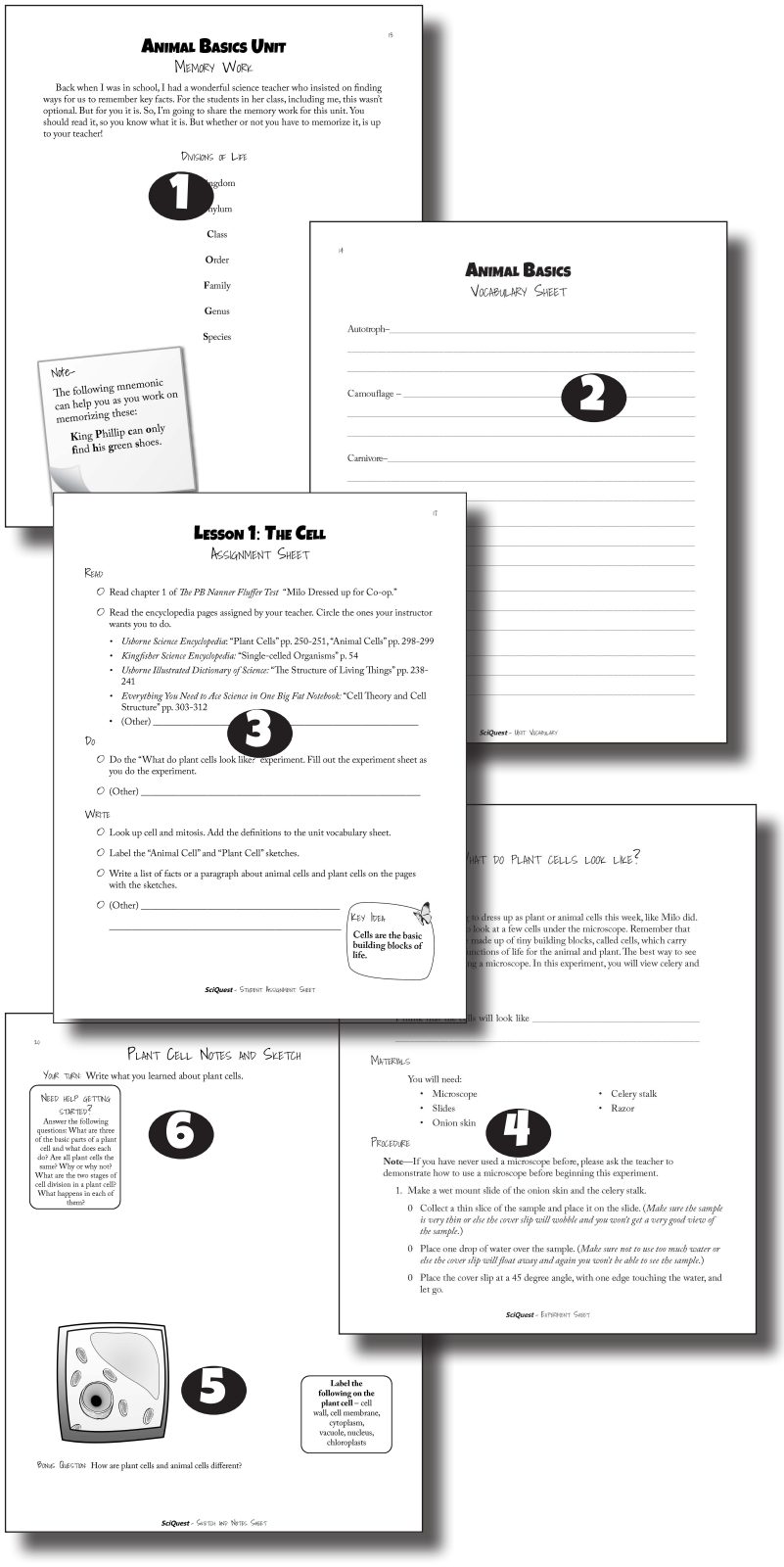
Do an experiment related to the topic for the week. The Experiment Sheet contains the introduction and the procedure for the experiment. It also has space to record the hypothesis, materials, observations, results, and conclusion.

5. Pre-drawn Sketch

Color the pre-drawn sketch relating to the week's topic. Then, label it with the information given on the page.

6. Written Assignment

Know the questions for discussion time, and have plenty of space to write either a list of facts, an outline, or a summary.



SciQuest: Milo's Mission
Introduction

Welcome to a quest to learn about science, or should I say a SciQuest! This is a journey that your students are going to embark on with a bit of independence.

In *SciQuest 100: Milo's Mission*, you'll be learning about basics blocks of life, vertebrates, and our planet. Milo Pemberton will serve as an introduction for your students for the week. They will learn about the topics in biology and earth science by reading, doing, and writing about science.

The Broad-Brush-Stroke View

In a nutshell, your students will enjoy learning about science as they do three things each week. These three things are based on the *Three Keys to Teaching Science* by Paige Hudson. Check them out here: https://elementalscience.com/blogs/news/3-keys. Here is what they are:

Read: Gathering Information

In this section of the lesson notes, you will find the assigned readings and discussion questions. Check out this podcast to understand the importance of discussion time:

💻 Don't skip that discussion time - https://elementalscience.com/blogs/podcast/53

You'll also find a few optional assignments for those students who want to dig deeper.

Do: Experimenting with Science

In this section of the lesson notes, we will be employing those inquiry-based methods. In other words, the students are going to do science. You will find an experiment introduction and directions – don't worry, these are in the student's journal, too. You will also find the expected results, an explanation, and any troubleshooting tips for the experiment in this section. Read this article to understand how your role is shifting from presenter-of-hands-on-science to mentor-of-a-budding-scientist:

💻 Scientific demonstrations vs. experiments - https://elementalscience.com/blogs/podcast/94

Plus, we added a few optional activities for those students who love to play with science.

Write: Keeping a Journal

In this section of the lesson notes, we are helping our students to organize what they have learned and to think analytically about it. This is where you will find the written assignments, vocabulary, and memory work for the lesson. The written assignments include a customizable writing assignment (either a list of facts, an outline, or a paragraph) and the sketch for the lesson. Watch this series of videos to learn about the progression of writing skills as they pertain to science:

💻 Writing in Homeschool Science: The Elementary Years - https://youtu.be/BrunFyeHhlQ
💻 Writing in Homeschool Science: Middle School and Beyond - https://youtu.be/B96DKXriCng

Also, with the written work, we have included a bonus question to help the students start to make those all-important connections.

The Nitty-Gritty Details of the Lesson Notes

Week's Readings

First, spark an interest by having the students read this week's story opener. These chapters come from the middle-grade novel, *The PB Nanner Fluffer Test*. Your students will read about Milo as he makes friends at his local homeschooling co-op. Each chapter has a hint of science and is designed to be read by the students on their own.

Later in the week, the students will follow up the story with facts. The following encyclopedias have pages detailed in this guide. You can choose which resources work best for your student. They will be used in subsequent levels of this program. If you can only purchase one or two of these, we recommend getting the ones with an *.

- *Usborne Science Encyclopedia**
- *Kingfisher Science Encyclopedia**
- *Usborne Illustrated Dictionary of Science (used in Units 1 and 2)*
- *Super Earth Encyclopedia (used in Unit 3)*
- *Everything You Need to Ace Science in One Big Fat Notebook*

Discussion Questions

After all that reading, we have provided questions, along with the answers, to guide your discussion time with the students.

(Optional) Reading Selections

In this section, you will find additional reading suggestions. These are not required, but these library books can be used to enhance what the students have learned.

Experiment Information

Materials

This section will detail the supplies you need for the experiment. As much as possible, we have attempted to make these household supplies. However, if you don't want to pull these items together, you can purchase an experiment kit from us that contains the supplies for level 100 and 200.

Introduction

This section shares a glimpse of the science behind the experiment. It is also included in the lab journal.

The paragraphs written in this font are meant to be read to the student.

Directions

This section will detail what to do for the experiment, step by step. It is also included in the lab journal.

Results and Explanation

When the students are done with the experiment, read the results and explanation to them. Discuss how the results from their experiment looked like or didn't look like the expected results.

As before, the paragraphs written in this font are meant to be read to the student.

(Optional) Hands-on Science Activities

In this section, you will find optional hands-on science activities to reinforce what the students are learning.

Write: Keeping a Journal

Journaling Sheets

This section will have the page numbers and bonus questions. The students should record what they learn about the subjects on notes pages and the experiment sheets in the lab journal. On the notes page, the students can also answer the bonus question. These questions are meant to challenge the students and cause them to think about the subject.

Vocabulary

The students will look up the vocabulary words and add the definitions to their unit vocabulary sheet in the lab journal. In this guide, you will find the definitions for the words they have to look up.

Sketch

In this section, you will find the labeled sketches to use as an answer key.

(Optional) Memory Work

Every unit has memory work, which you can choose to assign or not.

Additional Resources

We have put together a page containing quick links to the activities suggested in this guide along with several helpful downloads:

💻 https://elementalscience.com/blogs/resources/sq100

How to Schedule this Study

SciQuest 100: Milo's Mission should take up to three hours per week to complete. You and your student can choose whether to complete the work over five days or over two days. Below are two options for scheduling to give you an idea of how you can schedule your week:

Two-days-a-week Schedule

Day 1

Define the vocabulary, do the experiment, and complete the experiment sheet.

Day 2

Read the assigned pages and discuss them together, take your notes, and complete the sketch.

Five-days-a-week Schedule

Day 1

Do the experiment and complete the experiment sheet.

Day 2

Record the dates and define the vocabulary.

Day 3

Read the assigned pages, discuss them, and complete the sketch.

Day 4

Prepare the science report or an outline.

Day 5

Complete one of the other activities assigned by your teacher and work on the memory work.

Final Thoughts

If you find that this program contains too much work, please tailor it to the needs of your students. With that said, I encourage you to contact us with any questions or problems that you might have concerning *SciQuest 100: Milo's Mission* at support@elementalscience.com. Our team will be more than happy to answer them as soon as we are able. I hope that you and your students enjoy your quest to learn about science!

~ Paige Hudson

List of Topics

Animal Basics Unit

- Plant Cells
- Animal Cells
- Microscopes
- Taxonomy
- Dichotomous Keys
- Migration
- Animal Navigation
- Adaptations
- Defenses
- Animal Diet (Herbivore, Carnivore, and Omnivore)

Vertebrates Unit

- Fish
- Amphibians
- Reptiles
- Birds
- Mammals
- Animal Reproduction
- Mitosis
- Meiosis

Scientist Biography Unit

- The students will learn about a scientist of their choice.

Planet Earth Unit

- Inside the Earth
- Maps and Mapping
- Longitude and Latitude
- Rivers
- Oceans
- Currents
- Glaciers
- Biomes
- Habitats
- Water Cycle
- Nitrogen Cycle
- Carbon Cycle

Demonstration Supplies

Animal Basics Unit

Lesson	Materials Needed
1	Microscope, Slide, Onion skin, Celery stalk, Razor
2	Leaf from outside, Dichotomous key for plants
3	A place to observe, Access to the Internet or a local field guide
4	Gloves, Tweezers, Wooden stick (coffee stirrer or popsicle stick will work), Newspaper or paper towel, Owl pellet
5	Newspaper, Plain paper, Black and green construction paper

Vertebrates Unit

Lesson	Materials Needed
6	1 Large clear glass jar or bowl, 3 Small balloons, 3 Small marbles, Ruler, Water
7	Chopsticks, Tweezers, Pliers, Eye dropper, Sugar, Water, Gummy worms, Peanuts, Seeds, Raisins, Plates
8	1 Frog dissection kit, 1 Preserved frog
9	Clothespin, Blindfold, 5 Plates, 5 Pieces of bread with different edible spreads on them (such as garlic, cinnamon sugar, butter, peanut butter, and plain)
10	Felt, Cotton balls, Water, 1 Large cup, 4 Small cups, Instant read thermometer

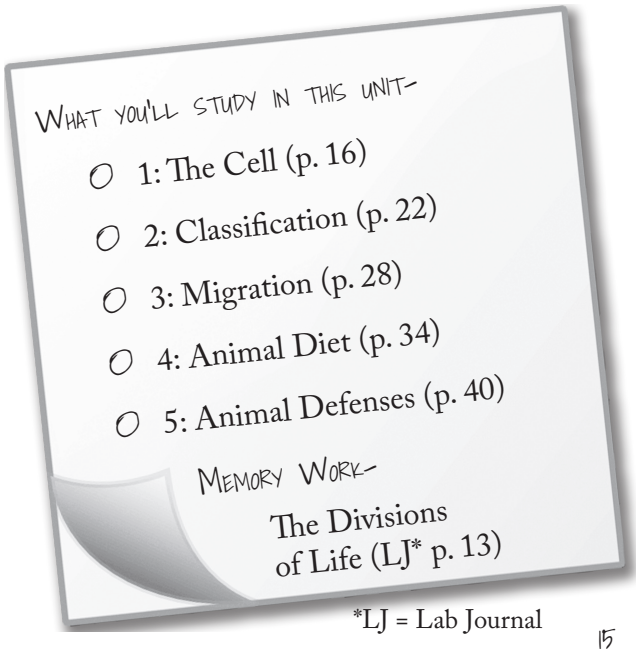
Planet Earth Unit

Lesson	Materials Needed
12	Permanent marker, 1 Raw egg, 1 Hard-boiled egg
13	Blue balloon (with the continents drawn or printed on it), Flat map, Pin
14	Pitcher for water, Water, Cookie sheet, Paper cup, Straw, Dirt or sand, Small rocks, Books, Tape
15	Aluminum bread pan or Plastic bin, Air dry clay, Water, Sand (1 cup), 2 Straws
16	Glacier Melt Model (You will need a cup, water, pebbles, and sand to make this), Large cutting board with a handle, Large rubber band
17	Paper towels, Cookie sheet, Wax paper, Rubber band, Water
18	Cup, Water, Plastic Baggie, Rubber Band

SciQuest

Milo's Mission Teacher Notes

Animal Basics Unit



*LJ = Lab Journal

Lesson 1 Grid Schedule

Supplies Needed	
Experiments	• Microscope, Slide, Onion skin, Celery stalk, Razor
Optional Activities	• Prepared slide of an animal or plant cell, Microscope • Plastic margarine container, Jello, Grape, Various materials for organelles

Weekly Schedule				
	Day 1	**Day 2**	**Day 3**	**Day 4**
Read	❑ Read Chapter 1: "Milo Dresses up for Co-op" in *The PB Nanner Fluffer Test*	❑ Choose one of the encyclopedia readings to assign and discuss what was read using the questions provided	❑ *(Optional)* Choose another one of the encyclopedia readings to assign	❑ *(Optional)* Read one or both of the optional reading selections
Do	❑ Do the "What do plant cells look like?" experiment	❑ *(Optional)* Make a Jell-O cell	❑ *(Optional)* Look at microscope slides	
Write	❑ Fill out the experiment sheet	❑ Write about plant and animal cells	❑ Color and label the plant cell and animal cell sketches ❑ Define cell and mitosis	❑ *(Optional)* Work on memorizing the Divisions of Life

Note-
The optional assignments are additional activities that are not included on the student's assignment sheet.

Lesson 1 List Schedule

Essentials

Read

- ○ Read Chapter 1: "Milo Dresses up for Co-op" in *The PB Nanner Fluffer Test*.
- ○ Choose one (or more) of the encyclopedia readings to assign and discuss what was read using the questions provided.

Do

- ○ Do the "What do plant cells look like?" experiment. Fill out the lab report as you do the experiment.

Write

- ○ Write about plant cells and animal cells.
- ○ Look up cell and mitosis. Add the definitions to the unit vocabulary sheet.
- ○ Label the animal cell and plant cell sketches.

Note-
The essential assignments are included on the student assignment sheet. The optional ones are additional activities you can assign to the students if you want to do more.

(Optional) Extras

Read

- ○ Read one or both of the optional reading selections.

Do

- ○ Look at microscope slides.
- ○ Make a Jell-O cell.

Write

- ○ Work on memorizing the Divisions of Life.

Supplies Needed	
Experiments	• Microscope, Slide, Onion skin, Celery stalk, Razor
Optional Activities	• Prepared slide of an animal or plant cell, Microscope • Plastic margarine container, Jello, Grape, Various materials for organelles

Lesson 1 Science Focus: The Cell

Read: Gathering Information

Key Idea

Cells are the basic building blocks of life.

Week's Readings

First, spark an interest by having the students read this week's story opener:

- Read Chapter 1 in *The PB Nanner Fluffer Test*: "Milo Dresses up for Co-op." (Your student will meet Milo and learn a bit about his co-op as his class participates in the annual science costume contest where his class dresses up as a plant cell.)

Then follow the story up with some facts. You can choose which resource works best for your students:

- *Usborne Science Encyclopedia*: "Plant Cells" pp. 250-251, "Animal Cells" pp. 298-299
- *Kingfisher Science Encyclopedia:* "Single-celled Organisms" p. 54
- *Usborne Illustrated Dictionary of Science:* "The Structure of Living Things" pp. 238-241
- *Everything You Need to Ace Science in One Big Fat Notebook:* "Cell Theory and Cell Structure" pp. 303-312

Discussion Questions

After the reading, use the following questions to guide your discussion time with the students.

1. What are three of the basic parts of a plant cell and what does each do? (Answers should be: Three parts of the plant cell are _____, _____, and_____. The _____ does_____, and so on. Answers should come from the following information: Cell wall – made of cellulose and helps the cell keep its shape, Cell membrane – found just under the cell wall, Vacuoles-fluid-filled sacs that store liquids such as sap for the plant cell, Nucleus – controls the activity in the cell, Cytoplasm – gel-like fluid surrounding the nucleus that contains the organelles of a cell, Chloroplasts – chlorophyll, which makes food for the plant and gives it a green color.)

Note-
This information included in the discussion questions is what you want the students to know from the week. If they don't catch this from the readings they did, be sure to share it with them.

2. Are all plant cells the same? (No.) Why or why not? (Plant cells have different shapes and structures depending on the job they have in the cell.)
3. What are the two stages of cell division in a plant cell? (The two stages of cell division in a plant are called mitosis and cytokinesis.)
4. What happens during each of the stages of mitosis? (During mitosis, the nucleus divides, creating two parts; each part becomes a new nucleus. During cytokinesis, a cell plate forms along the dividing line and a new cell wall builds up along the plate.)
5. What are three of the basic parts of an animal cell and what does each do? (Answers should be: Three parts of the animal cell are _____,_____, and _____. The _____does_____, and so on. Answers

should come from the following information: Cell membrane – holds the contents of the cell together and acts as a barrier, Nucleus – controls the activity in the cell, Cytoplasm – gel-like fluid surrounding the nucleus that contains the organelles of a cell, Golgi complex – stores and distributes substances, Nucleolus – make the ingredients for ribosomes, Mitochondria – converts simple substances into energy, Vacuoles – storage sacs for liquids or fats, Endoplasmic reticulum – used to transport materials in the cell, Centrioles – play a role in cell division, Ribosomes – help to make proteins, Lysosomes – destroy invading bacteria.)

6. Explain how cells come together to form organs. (Individual cells group together to form tissues. Several different types of tissues then group together to form organs. The organs group together to form systems and the systems group together to form a living individual called an organism.)

After the discussion time, have the students write a list of facts or a paragraph about what they read. Their writings should include at least a few facts from above.

(Optional) Reading Selections

At another point in the week, the students can check out these optional books:

- 🕮 *Cells (Science Readers: Content and Literacy)* by Stephanie Herweck Paris
- 🕮 *Cells: Experience Life at Its Tiniest (Inquire and Investigate)* by Karen Bush Gibson and Alexis Cornell

> **Note–**
> These books are not required, so we suggest you get these from the library. If they don't have these titles, check out another option your library does have on the topic.

Do: Experimenting with Science

Experiment: Look at Cells

Materials

You will need the following items:

- ✓ Microscope
- ✓ Slide
- ✓ Onion skin
- ✓ Celery stalk
- ✓ Razor

> **Note–**
> If you don't own a microscope, first have the students look at the slivers of celery and onion skin with a magnifying glass. Have them draw what they see in the 100x box, relabeling it "magnifying glass." Then, have them look at the following website and draw what the plant cells look like from there in the 400x box.
>
> 💻 https://www4.uwsp.edu/biology/courses/botlab/Lab03a.htm

Introduction

Read the following with your students, while they follow along in their lab journal.

> We aren't going to dress up as plant or animal cells this week, like Milo did. But we are going to look at a few cells under the microscope. Remember that all living things are made up of tiny building blocks, called cells, which carry out the necessary functions of life for the animal and plant. The best way to see these cells is by using a microscope. In this experiment, you will view celery

and onion cells.

Directions

Have the students do the following experiment looking at plant cells under your supervision. (If your students have never used a microscope before, please refer to the following information to guide them through using a microscope.)

💻 How to Use a Microscope: https://www.youtube.com/watch?v=Kp28CsflBp8
💻 https://elementalscience.com/blogs/science-activities/how-to-make-a-microscope-slide

1. Make a wet mount slide of the onion skin and celery stalk.
   - Collect a thin slice of the sample and place it on the slide. (Make sure the sample is very thin or else the cover slip will wobble and you won't get a very good view of the sample.)
   - Place one drop of water over the sample. (Make sure not to use too much water or else the cover slip will float away and again you won't be able to see the sample.)
   - Place the cover slip at a 45 degree angle, with one edge touching the water, and let go.
2. Look at the slide under the microscope on low power (100x) and then on high power (400x). Draw what you see for each.
3. Next, make a wet mount slide of the celery stalk. Look at the slide under the microscope on low power (100x) and then on high power (400x). Draw what you see for each.

Results and Explanation

When they are done, read the results and explanation to the students.

> You should have been able to see plant cells in both the onion skin and the celery sliver at both the magnification powers. Your drawing for the 100x should include the cell shape (i.e., like bricks on a building). Your drawings for the 400x should include the cell wall, cell membrane, and the nucleus of each of the cells. The celery stalk will look similar to the onion skin, except in color.

Discuss how the results from their experiment looked like or didn't look like the expected results. Then, read the following explanation to the students.

> Today, your experiment was a simple introduction into using a microscope, making slides, and viewing cells. This is a skill that you will use in science for years to come.

(Optional) Hands-on Science Activities

At another point in the week, the students can do one or more of the following optional activities.

- **More Microscope Work –** Purchase a prepared slide of an animal or plant cell and have the students look at it under the microscope. Students should then complete the microscope worksheet found on p. 135 of the Appendix.
- **Jello Cell –** Have the students make a jello replica of a cell. Use a margarine container for the cell membrane, jello for cytoplasm, a grape for the nucleus and use your imagination for materials for the remaining organelles.

Write: Keeping a Journal

Journaling Sheets

The students should have already recorded what they learned about cells on their notes page (LJ pp. 20-21) and completed the experiment sheet (LJ pp. 18-19). On the notes page, the students can also answer the bonus question. Here is an answer for your reference as you discuss this with your students.

- **Bonus Question** – How are plant and animal cells different? (Plant cells have cell walls and the inside of a plant cell is under pressure. Plant cells also contain chloroplasts, while animal cells don't.)

Vocabulary

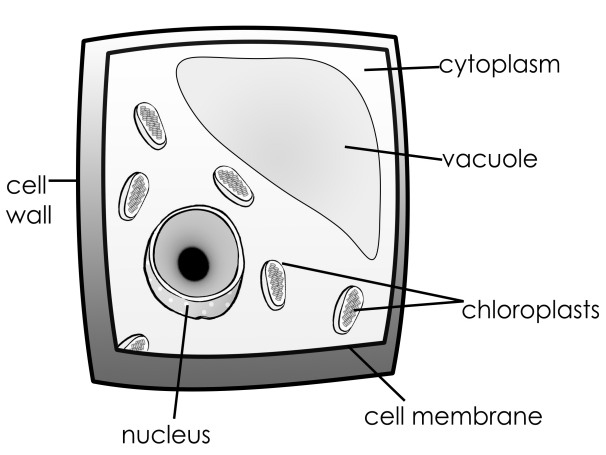
At some point in the week, have the students look up the following words and add the definitions to the unit vocabulary sheet on LJ pp. 14-16:

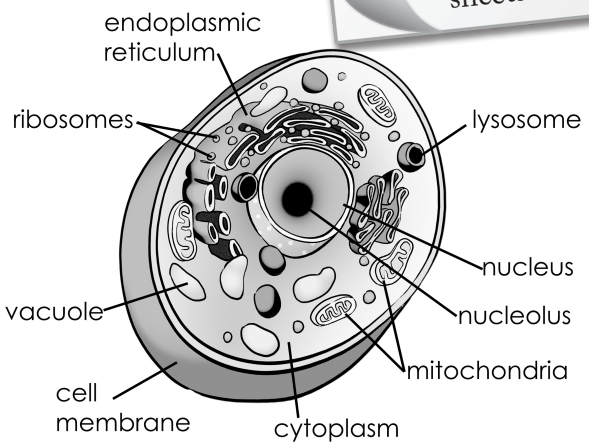
- **Cell –** A tiny unit of living matter, the basic building block of all life.
- **Mitosis –** The division of a cell nucleus to produce two identical cells.

Note –
The information to label for the sketch assignment can be found on the student's journal sheets.

Sketch Assignment

Here are the correctly labeled sketches: (LJ pp. 20-21)





(Optional) Memory Work

At another point in the week, the students can work on the following memory work - the Divisions of Life. For this week, we suggest that you focus on the following:

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

The following mnemonic can help you as you work on memorizing these: King Phillip Can Only Find his Green Shoes.

Lesson 2 Grid Schedule

Supplies Needed	
Experiments	• Leaf from outside, Dichotomous key for plants
Optional Activities	• Another leaf, Field guide for trees • Paper, Pencil

Weekly Schedule				
	Day 1	**Day 2**	**Day 3**	**Day 4**
Read	❑ Read Chapter 2: "Milo Unpacked... With Help" in *The PB Nanner Fluffer Test*	❑ Choose one of the encyclopedia readings to assign and discuss what was read using the questions provided	❑ *(Optional)* Choose another one of the encyclopedia readings to assign	❑ *(Optional)* Choose another one of the encyclopedia readings to assign
Do	❑ Do the "What kind of tree is it?" experiment	❑ *(Optional)* Make a Dichotomous Key	❑ *(Optional)* Do the New Species activity	❑ *(Optional)* Create a Tree Classification book
Write	❑ Fill out the experiment sheet	❑ Write about classification	❑ Color and label the divisions of life sketch ❑ Define classification, kingdom, and species	❑ *(Optional)* Work on memorizing the Divisions of Life

Lesson 2 List Schedule

Essentials

Read

- ○ Read Chapter 2: "Milo Unpacked... With Help" in *The PB Nanner Fluffer Test.*
- ○ Choose one of the encyclopedia readings to assign and discuss what was read using the questions provided.

Do

- ○ Do the "What kind of tree is it?" experiment. Fill out the lab report as you do the experiment.

Write

- ○ Write about classification.
- ○ Look up classification, kingdom, and species. Add the definitions to the unit vocabulary sheet.
- ○ Label the divisions of life sketch.

(Optional) Extras

Read

- ○ Choose another one (or two) of the encyclopedia readings to assign.

Do

- ○ Create a Tree Classification book or make a Dichotomous Key.
- ○ Make a Dichotomous Key.
- ○ Do the New Species activity.

Write

- ○ Work on memorizing the Divisions of Life.

Supplies Needed	
Experiments	• Leaf from outside, Dichotomous key for plants
Optional Activities	• Another leaf, Field guide for trees • Paper, Pencil

Lesson 2 Science Focus: Classification

Read: Gathering Information

Key Idea

All living things can be organized or grouped.

Week's Readings

First, spark an interest by having the students read this week's story opener:

- Read Chapter 2 in *The PB Nanner Fluffer Test*: "Milo Unpacked... With Help." (Your student will watch Milo work with his mother to unpack and organize his moving boxes.)

Then follow the story up with some facts. You can choose which resource works best for your students:

- *Usborne Science Encyclopedia*: "Classifying Plants" pp. 294-295, "Classifying Animals" pp. 340-343
- *Kingfisher Science Encyclopedia*: "Classification of Living Things" pp. 52-53
- *Usborne Illustrated Dictionary of Science:* "The Classification of Living Things" pp. 340-341
- *Everything You Need to Ace Science in One Big Fat Notebook:* "Organisms and Biological Classification" pp. 292-300

Discussion Questions

After all that reading, use the following questions to guide your discussion time with the students.

1. What are the five main kingdoms? (The five kingdoms are monera, protista, fungi, plant, and animal.)
2. How do scientists classify living things? (Scientists classify living things by identifying their main characteristics and then comparing them with similar species.)
3. What are the two main divisions of the plant kingdom? (The two main divisions of the plant kingdom are plants that contain vascular tissue and plants that do not.)
4. What are the taxonomic ranks (or divisions of life)? (Kingdoms can be broken down into phyla, each phylum is broken down into classes, each class is broken down into orders, each order is broken down into families, each family is broken down into genera, and each genus is broken down into species.)
5. What language is a biological name given in and how is it created? (Biological names are always written in Latin. The first part of a biological name is based on the organism's genus, the second identifies its species.)

After the discussion time, have the students write a list of facts or a paragraph about what they read. Their writings should include at least a few facts from above.

(Optional) Reading Selections

At another point in the week, the students can check out these optional books:

- *Karl, Get Out of the Garden!: Carolus Linnaeus and the Naming of Everything* by Anita Sanchez and Catherine Stock

Do: Experimenting with Science

Experiment: What kind of tree is it?

Note -
If you don't want to type in the whole long dichotomous key link, we have got a solution for you! Check out the easy-to-click resource page for this program:
💻 https://elementalscience.com/blogs/resources/sq100

Materials

You will need the following items:

- ✓ Leaf from outside
- ✓ Dichotomous key for plants from the following website:
  💻 https://treespnw.forestry.oregonstate.edu/

Introduction

Read the following with your students, while they follow along in their lab journal.

> A dichotomous key is a method that can be used to identify a living thing. At each step, you are given a question that has only two answers. The answers eventually lead to the identity of the living thing. In this experiment, you will be using a dichotomous key from the internet to identify an unknown leaf.

Directions

Have the students do the following experiment to use a leaf to learn about a local tree under your supervision.

1. Go outside and choose a leaf from a tree that you want to identify.
2. Once inside, write down what kind of tree you think the leaf is from.
3. Spend a few moments observing the leaf, making notes about its shape and size under the "Observations" section.
4. Use the dichotomous key from the website above to identify the leaf. (Although the website is for trees of the Pacific Northwest, it will help you identify trees from all over the USA and other countries. If you don't live in America and the key doesn't work for your leaf, just head over to your search engine of choice and type in "Tree Dichotomous Key for {the place you live}.)

Results and Explanation

When they are done, read the results and explanation to the students.

> You should have been able to identify the genus of tree that the leaf came from.

Discuss how the results from their experiment looked like or didn't look like the expected results. Then, read the following explanation to the students.

> This was a simple introduction into how to use a dichotomous key. Scientists use dichotomous keys all the time to help them identify plants

and animals.

For more information on tree identification, check out a field guide from the library or see this website:

💻 https://treespnw.forestry.oregonstate.edu/

(Optional) Hands-on Science Activities

At another point in the week, the students can do one or more of the following optional activities.

- **Tree Classification Book –** Choose more than one leaf to identify and use those leaves to make a book about the trees in our area. You can download free templates for a book like this from here:

  💻 https://elementalscience.com/products/fall-leaf-book-free-printable

- **Dichotomous Key** – Create your own dichotomous key for a group of items in your room. Have the students follow the key to identify what the items are called.
- **New Species** – Draw your own species of animal, then have the students use the classification chart to assign it a phylum, class, order, family, and genus.

Write: Keeping a Journal

Journaling Sheets

The students should have already recorded what they learned about classification on their notes page (LJ p. 27) and completed the experiment sheet (LJ pp. 24-25). On the notes page, the students can also answer the bonus question. Here is an answer for your reference as you discuss this with your students.

- **Bonus Question** – How has a deeper understanding of DNA changed Linnaeus's classification ideas? (As we learn more about DNA, the science of classifying organisms is changing. This article from Science News for Students is a good one to get the students thinking about how DNA affects classification: https://student.societyforscience.org/article/bird-dna-leads-strange-family-tree.)

Vocabulary

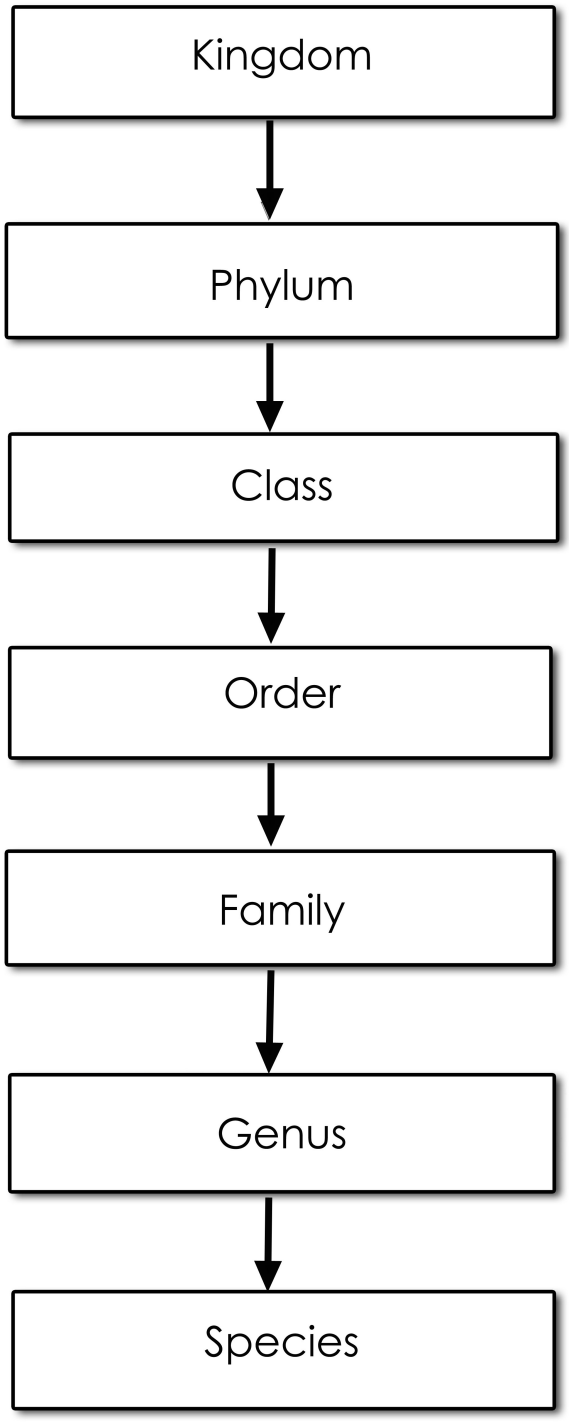
At some point in the week, have the students look up the following words and add the definitions to the unit vocabulary sheet on LJ pp. 14-16:

- **Classification –** A way of identifying or grouping living things.
- **Kingdom –** The highest category into which living things are classified.
- **Species –** A group of living things than can breed together in the wild.

Sketch Assignment

See the next page for the correctly labeled sketch. (LJ p. 26)

Divisions of Life



(Optional) Memory Work

At another point in the week, the students can work on the following memory work - the Divisions of Life.

SciQuest

Milo's Mission Lab Journal

Animal Basics Unit

Animal Basics Unit

Memory Work

Back when I was in school, I had a wonderful science teacher who insisted on finding ways for us to remember key facts. For the students in her class, including me, this wasn't optional. But for you it is. So, I'm going to share the memory work for this unit. You should read it, so you know what it is. But whether or not you have to memorize it, is up to your teacher!

Divisions of Life

Kingdom

Phylum

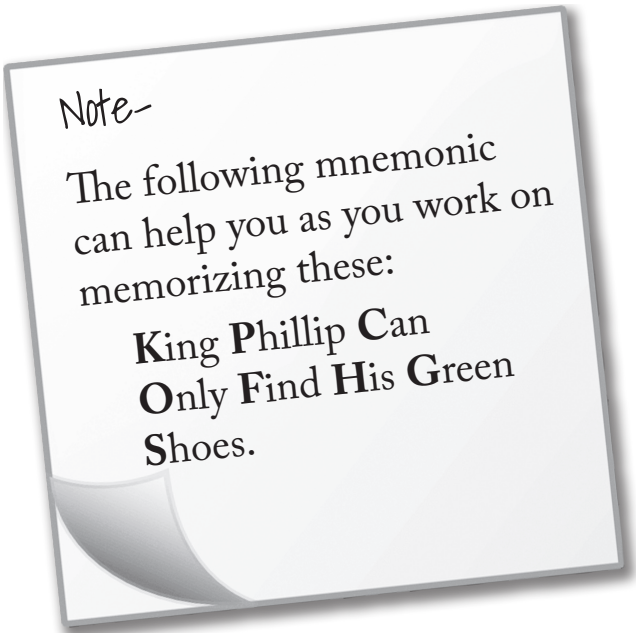
Class

Order

Family

Genus

Species



Animal Basics

Vocabulary Sheet

Autotroph–_____

_____

_____

Camouflage – _____

_____

_____

Carnivore–_____

_____

_____

Cell–_____

_____

_____

Classification – _____

_____

_____

Hemisphere–_____

_____

_____

Herbivore–_____

_____

_____

Heterotroph – _____

_____

_____

Kingdom–_____

_____

_____

Migration – _____

_____

_____

Mitosis–_____

_____

_____

Omnivore–_____

_____

_____

Predator – _____

_____

_____

Prey–_____

_____

_____

Species–_____

_____

_____

Lesson 1: The Cell

Assignment Sheet

Read

- ○ Read Chapter 1 in *The PB Nanner Fluffer Test*: "Milo Dresses up for Co-op."
- ○ Read the encyclopedia pages assigned by your teacher. Circle the ones your instructor wants you to do.
  - *Usborne Science Encyclopedia*: "Plant Cells" pp. 250-251, "Animal Cells" pp. 298-299
  - *Kingfisher Science Encyclopedia:* "Single-celled Organisms" p. 54
  - *Usborne Illustrated Dictionary of Science:* "The Structure of Living Things" pp. 238-241
  - *Everything You Need to Ace Science in One Big Fat Notebook:* "Cell Theory and Cell Structure" pp. 303-312
  - (Other) _____

Do

- ○ Do the "What do plant cells look like?" experiment. Fill out the experiment sheet as you do the experiment.
- ○ (Other) _____

Write

- ○ Look up cell and mitosis. Add the definitions to the unit vocabulary sheet.
- ○ Label the "Animal Cell" and "Plant Cell" sketches.
- ○ Write a list of facts or a paragraph about animal cells and plant cells on the pages with the sketches.
- ○ (Other) _____

_____

Key Idea

Cells are the basic building blocks of life.

What do plant cells look like?

Introduction

We aren't going to dress up as plant or animal cells this week, like Milo did. But we are going to look at a few cells under the microscope. Remember that all living things are made up of tiny building blocks, called cells, which carry out the necessary functions of life for the animal and plant. The best way to see these cells is by using a microscope. In this experiment, you will view celery and onion cells.

Hypothesis

I think that the cells will look like _____

_____

Materials

You will need:

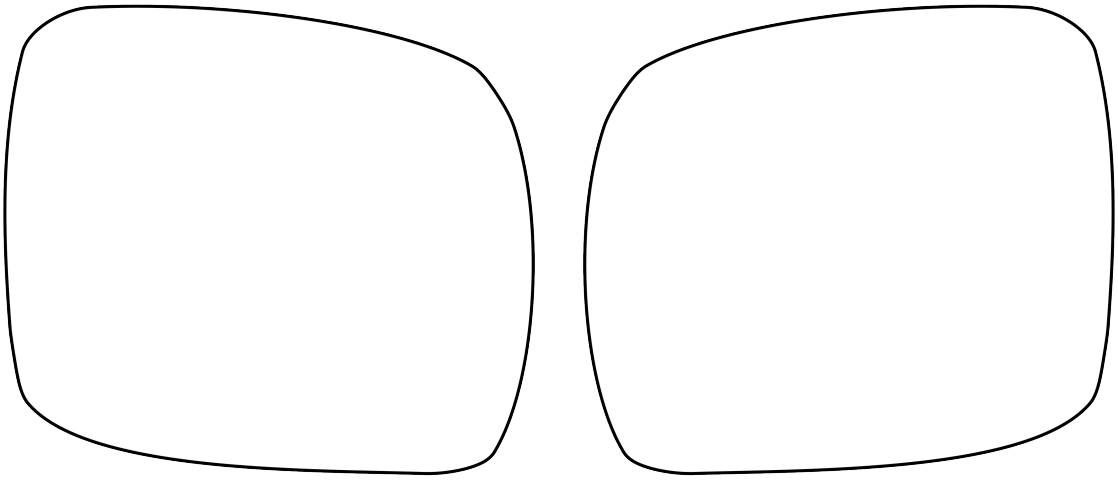
- Microscope
- Slides
- Onion skin
- Celery stalk
- Razor

Procedure

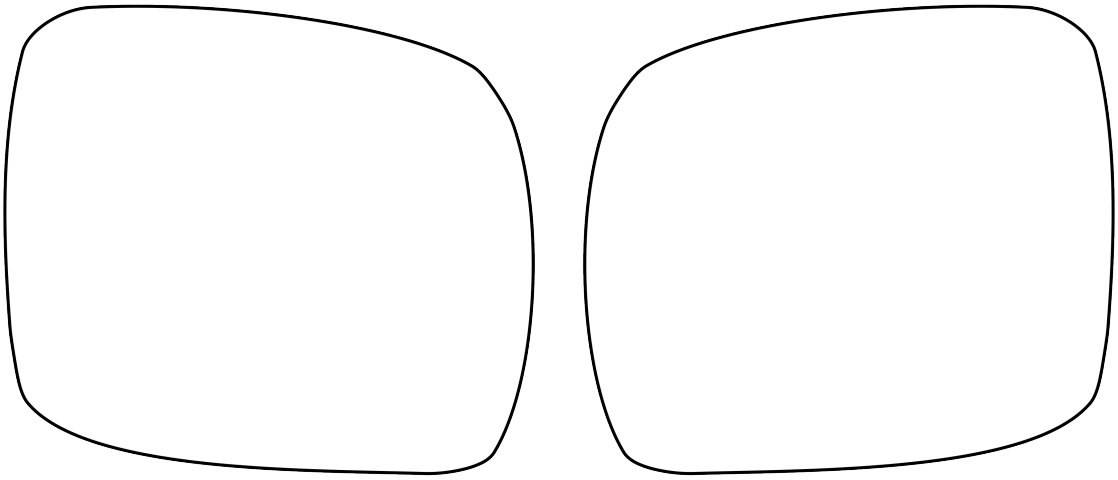
Note—If you have never used a microscope before, please ask the teacher to demonstrate how to use a microscope before beginning this experiment.

1. Make a wet mount slide of the onion skin and the celery stalk.
    - 0 Collect a thin slice of the sample and place it on the slide. (*Make sure the sample is very thin or else the cover slip will wobble and you won't get a very good view of the sample.*)
    - 0 Place one drop of water over the sample. (*Make sure not to use too much water or else the cover slip will float away and again you won't be able to see the sample.*)
    - 0 Place the cover slip at a 45 degree angle, with one edge touching the water, and let go.

2. Look at the slide under the microscope on low power (100x) and then on high power (400x). Draw what you see for each.



3. Next, look at the slide under the microscope on low power (100x) and then on high power (400x). Draw what you see for each.



Conclusion

_____

_____

_____

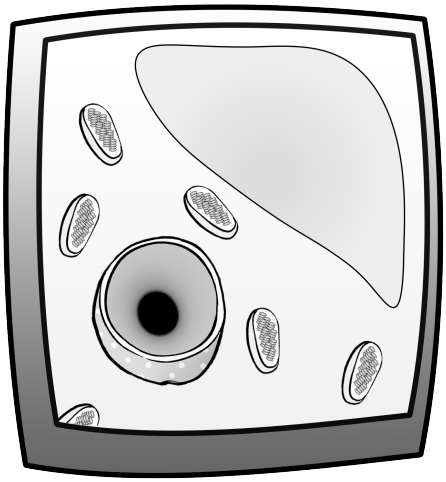
_____

_____

Plant Cell Notes and Sketch

Your turn: Write what you learned about plant cells.

Need help getting started?
Answer the following questions: What are three of the basic parts of a plant cell and what does each do? Are all plant cells the same? Why or why not? What are the two stages of cell division in a plant cell? What happens in each of them?



Label the following on the plant cell – cell wall, cell membrane, cytoplasm, vacuole, nucleus, chloroplasts

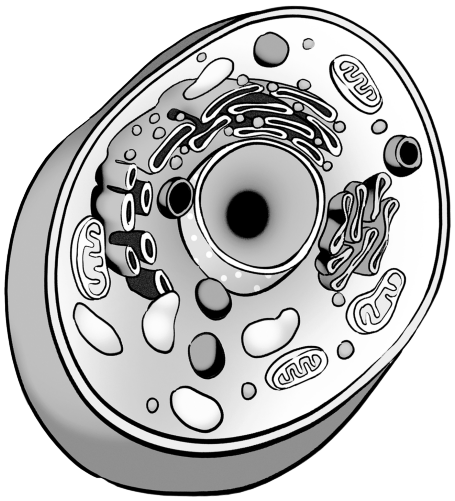
Bonus Question: How are plant cells and animal cells different?

Animal Cell Notes and Sketch

Your turn: Write what you learned about animal cells.

Need help getting started?
Answer the following questions: What are three of the basic parts of an animal cell and what does each do? Explain how cells come together to form organs.

Label the following on the animal cell – nucleus, nucleolus, mitochondria, vacuole, endoplasmic reticulum, ribosome, cell membrane, lysosome, cytoplasm



Lesson 2: Classification

Assignment Sheet

Read

- ○ Read Chapter 2 in *The PB Nanner Fluffer Test*: "Milo Unpacked... With Help."
- ○ Read the encyclopedia pages assigned by your teacher. Circle the ones your instructor wants you to do.
  - *Usborne Science Encyclopedia*: "Classifying Plants" pp. 294-295, "Classifying Animals" pp. 340-343
  - *Kingfisher Science Encyclopedia*: "Classification of Living Things" pp. 52-53
  - *Usborne Illustrated Dictionary of Science:* "The Classification of Living Things" pp. 340-341
  - *Everything You Need to Ace Science in One Big Fat Notebook:* "Organisms and Biological Classification" pp. 292-300
  - (Other) _____

Do

- ○ Do the "What kind of tree is it?" experiment. Fill out the experiment sheet as you do the experiment.
- ○ (Other) _____

Write

- ○ Look up classification, kingdom, and species. Add the definitions to the unit vocabulary sheet.
- ○ Label the "Divisions of Life" sketch.
- ○ Write a list of facts or a paragraph about migration on the pages with the sketches.
- ○ (Other) _____

_____

Key Idea

All living things can be organized or grouped.

What kind of tree is it?

Introduction

You may not have a pile of boxes to sort as your stuff away like Milo did, but that doesn't mean you can't use a dichotomous key. This method can be used to identify a living thing, such as a tree. At each step, the user is given a question with two answers. The answers eventually lead to the identity of the living thing. In this experiment, you will be using a dichotomous key from the internet to identify an unknown leaf.

Hypothesis

I think the leaf is from the _____

_____ tree.

Materials

You will need:

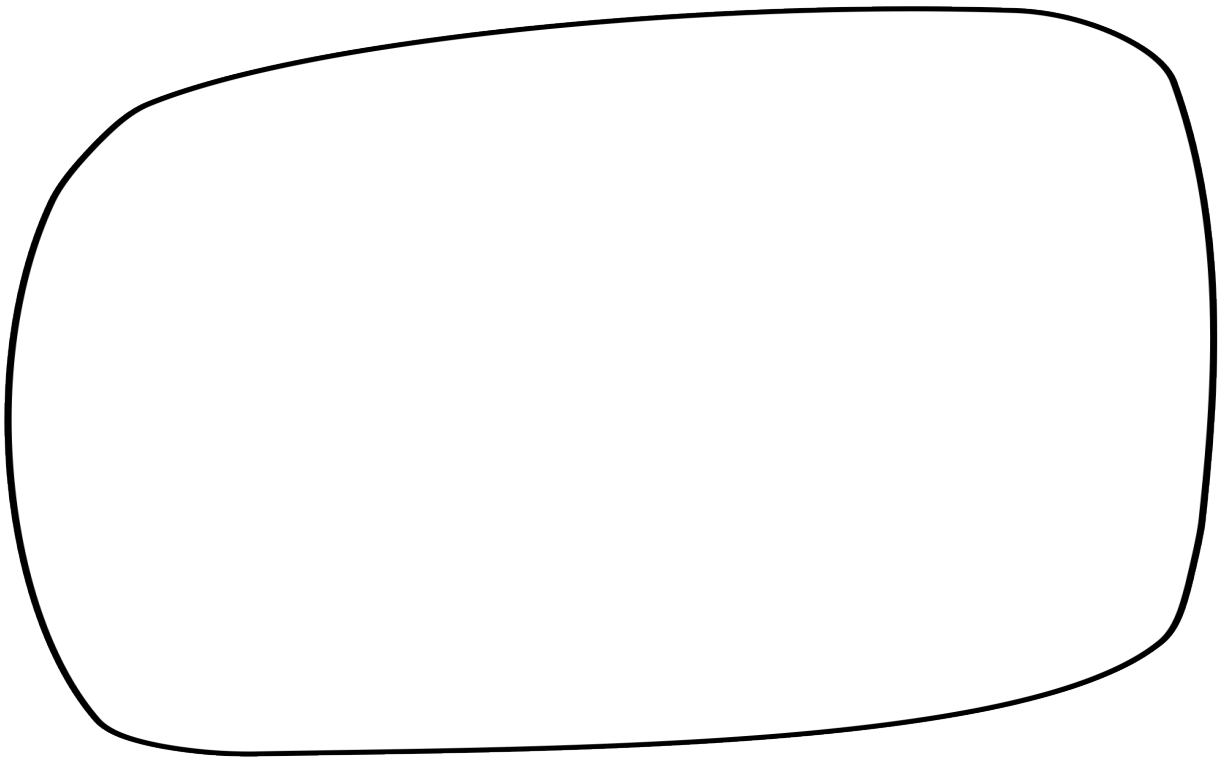
- Leaf from outside
- Dichotomous key for plants from the following website:

  https://treespnw.forestry.oregonstate.edu/

Procedure

1. Go outside and choose a leaf from a tree that you want to identify.
2. Once inside, write down what kind of tree you think the leaf is in the hypothesis section above.
3. Spend a few moments observing the leaf, making notes about its shape and size under the "Observations" section.
4. Use the dichotomous key from the website above to identify the leaf. (Although the website is for trees of the Pacific Northwest, it will help you identify trees from all over the USA and other countries. If you don't live in America and the key doesn't work for your leaf, just head over to your search engine of choice and type in "Tree Dichotomous Key for{the place you live}.)

Drawing or Picture of the Leaf



Results

_____

_____

_____

_____

Conclusion

_____

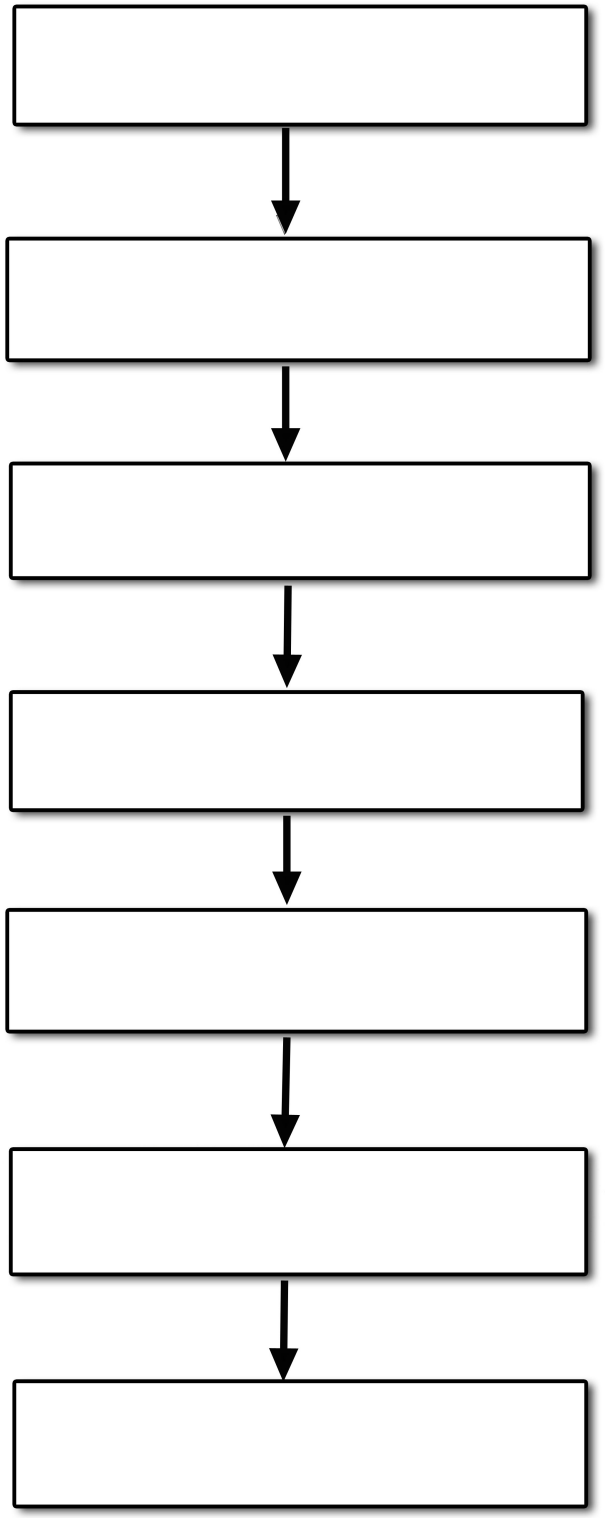
_____

_____

_____

Classification Sketch

Label the following in the boxes below – Kingdom, Phylum, Class, Order, Family, Genus, Species.
Add the title: Divisions of Life



Classification Notes

Your turn: Write what you learned about classification.

Need help getting started?
Answer the following questions: What are the five main kingdoms? How do scientists classify living things? What are the two main divisions of the plant kingdom? What are the taxonomic ranks (or divisions of life)? What language is a biological name given in and how is it created?

Bonus Question: How has a deeper understanding of DNA changed Linnaeus's classification ideas?

elemental science

ARE YOU READY TO START?

Learn about cells, vertebrates, and our planet by purchasing *SciQuest 100: Milo's Mission* here:

- https://elementalscience.com/collections/sciquest-100-milos-misson

Or check out the rest of our story-based science programs here:

- https://elementalscience.com/collections/story-based-science

STORY-BASED SCIENCE