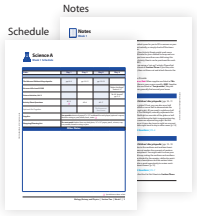
Instructor's Guide Quick Start

The BookShark™ Instructor's Guide (IG) is designed to make your educational experience as easy as possible. We have carefully organized the materials to help you and your children get the most out of the subjects covered. If you need help reading your schedule, see "How to Use the Schedule" in **Section Four**.

This IG includes a 36-week schedule, notes, assignments, readings, and other educational activities. For specific organizational tips, topics and skills addressed and other suggestions for the parent/teacher see **Section Three**. Here are some helpful features that you can expect from your IG.



Easy to use

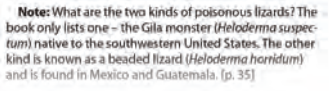
Everything you need is located right after the schedule each week. If a note appears about a concept in a book, it's easy to find it right after the schedule based on the day the relevant reading is scheduled.

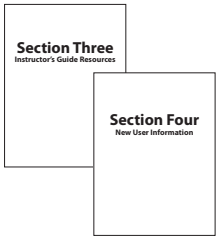
4-Day Schedule

Designed to save one day a week for music lessons, sports, field trips, co-ops, or other extra-curricular activities.

Notes

When relevant, you'll find notes about specific books to help you know why we've selected a particular resource and what we hope your children will learn from reading it. Keep an eye on these notes to also provide you with insights on more difficult concepts or content (look for "**Note:**").


Note: What are the two kinds of poisonous lizards? The book only lists one – the Gila monster (*Heloderma suspectum*) native to the southwestern United States. The other kind is known as a beaded lizard (*Heloderma horridum*) and is found in Mexico and Guatemala. (p. 35)

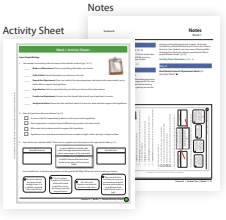


Instructor's Guide Resources and **New User Information**

Don't forget to familiarize yourself with some of the great helps in **Section Three** and **Section Four** so you'll know what's there and can turn to it when needed.

Activity Sheets and **Answer Keys**

Activity Sheets follow each week's notes and are customized for each lesson to emphasize important points in fun ways. They are designed with different skills and interests in mind. You may want to file them in a separate binder for your student's use. Corresponding Answer Keys have been included within your weekly Notes.



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Science G
Week 1 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Super Simple Biology	pp. 10–11, 14–16	pp. 12–13, 17–19	pp. 20–23		
Activity Sheet Questions	#1–9 [N]	#10–14	#15–16		
Optional: Do Together	Ethical or Not				
BookShark Science G Experiments Book				#1 Are Yeast Alive?	
Supplies	**We provide: 6SKB**— yeast[1], thermometer, 1-2 test tubes (optional), 2 small balloons (optional) **Paper Packet**: Are Yeast Alive? Worksheet **You provide:** measuring cups, 1-2 Tablespoons sugar, water, measuring tape or ruler, 1-2 feet string (optional), 1-2 clear plastic zip-top bags (optional), other materials available around the house (optional)				
Shopping/Planning List	**For next week:** 2 cups of the same height, 3 water samples (example: bottled water, tap water, and water from a pond or a puddle)				

Other Notes

1. Yeast should be stored in a refridgerator upon receiving.

[N] Special Note to Teachers

Notes
Week 1

Day 1

Super Simple Biology | pp. 10–11, 14–16

Scientists use many variations of the scientific method as opposed to one fixed set of steps. The list of steps on pages 10-11 of the book offer one example of a scientific method. Please know these steps can vary slightly across science disciplines, and depend on the subject studied or purpose.

Why do scientists follow the scientific method? Have you ever followed a recipe to make your favorite dessert? Or to build a specific toy out of Lego®s? How do the instructions help? Instructions help us make the same thing each time. A recipe helps us make the delicious cookies we expect and ensure the toy we build looks like the one in the picture.

The scientific method is a defined process scientists use that functions somewhat like a recipe. It creates a process to help scientists conduct experiments systematically. It reminds them to state a clear question and identify specific variables they'd like to test. The process also helps them organize and record data, and to report their findings. Each step help them record exactly how the experiment went, which helps them learn from their own data, and identify problems, which can help them refine future attempts of the same experiment. Their clear reports also help other scientists understand and learn from the results, or be able to conduct the same experiment themselves. The scientific method helps scientists learn continually and work as a community to grow and further our scientific knowledge.

Activity Sheet Questions | #1–9

Activity Sheet Questions

Activity Sheets are included after each week of notes and are assigned on the corresponding schedule page. Each Activity Sheet has a corresponding Answer Key page following these note pages.

You do not have to do every question on the Activity Sheets. Feel free to adjust and/or omit questions to meet the needs of your students. We cover the same concepts repeatedly throughout the year (and years to come!) to enable students to learn "naturally" through repetition and practice over time.

We have provided a variety of activities to interest and challenge your students. Feel free to let your students do those activities that they enjoy and simply talk through others.

Remember: This program is designed for you to use to meet your students' needs. It is not meant to use you! **Suggestion:** Your Activity Sheets might work more easily in a small binder for your students to keep and use as assigned. If you have more than one student using this program, extra Activity Sheets can be purchased for each student.

Supplies

When supplies are listed as "**We provide**" they are included in your Science G Supplies Kit **(6SK)**. When supplies are listed as "**You provide**" they are materials you can generally find around your home. For example:

- aspirin
- liquid bleach
- curry powder
- baking soda

Most durable items will be used repeatedly, so clean them after use and store in a safe place. This includes clay, pipettes, toothpicks, test tubes, pony beads, paper clips, and corn kernels.

Shipping Restrictions

Due to strict import regulations, it is illegal to ship biological matter to certain countries (including New Zealand and Australia). If you requested your science supplies to be shipped to a country with such restrictions, we have removed that kit from your order and reduced your charge accordingly.

Optional: Do Together | Ethical or Not

Each week throughout Science G, we will provide ideas for fun activities to do with your students. In general, we will try to make the activities actually "active": performing additional research on a particular topic, watching a video, playing a game, getting outside, or some other type of "hands-on" activity that seeks to apply what your students have been learning in a meaningful way.

Take our ideas for what they are—mere suggestions—and don't feel burdened by them. If your students don't want to do a particular activity or have a different, better idea, by all means ditch ours and go with theirs! Have fun!

Do you or your students think animal testing is ethical? Is there any instance you or your students would consider it ethical? Discuss the pros and cons of animal testing with your students. If you need additional pros or cons, do an online search.

Day 2

Super Simple Biology | pp. 12–13, 17–19

The book does not mention on p. 17 that a mode value only occurs when a value is repeated. If there is no repeated value, the data set will not have a mode.

Activity Sheet Questions | # 10–14

Day 3

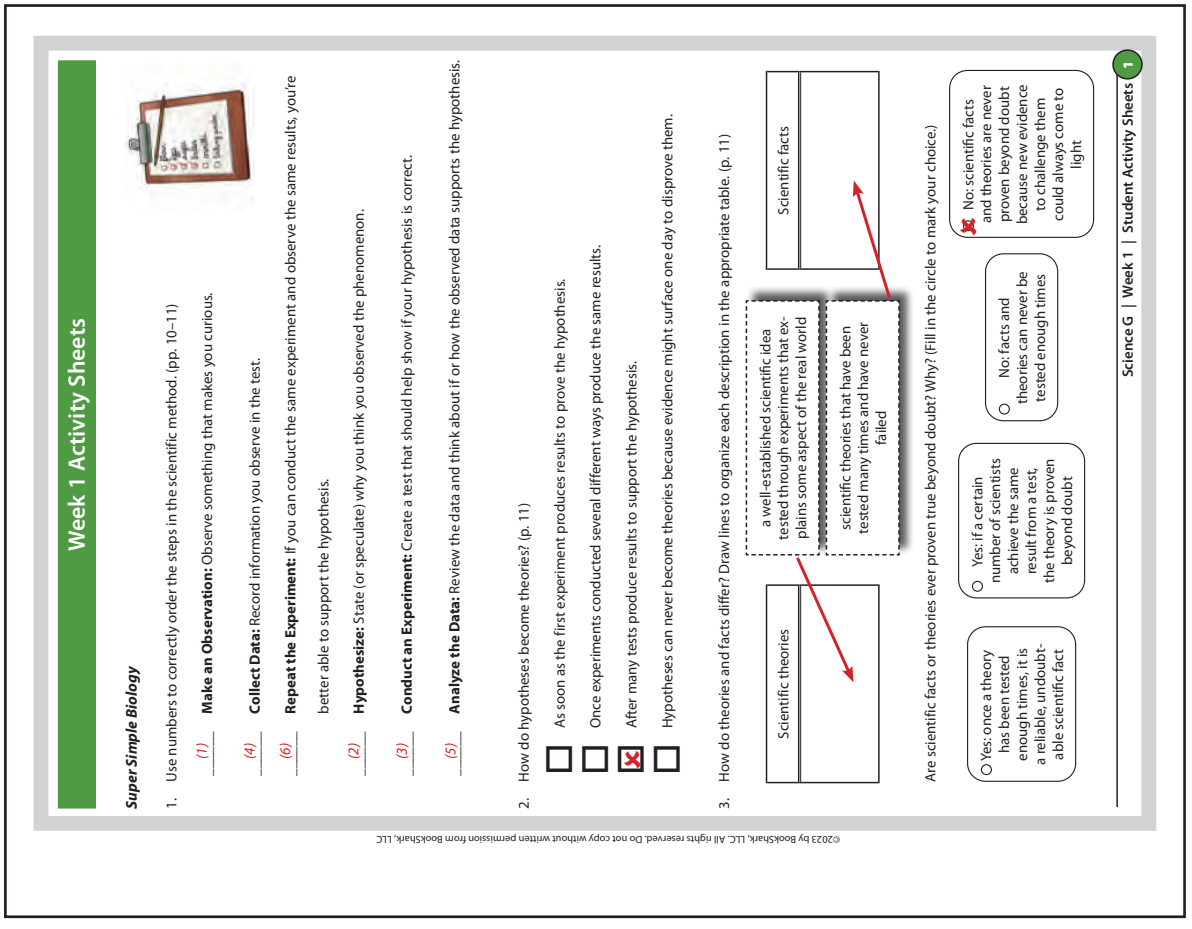
Super Simple Biology | pp. 20–23

Robert Hooke's book in which he illustrated plant tissue was made using a technique called 'copperplate.' This was an early book-making technique that involved etching drawings into a thin sheet of copper, placing ink into the etching, and transferring the ink to paper. Hooke also included very detailed illustrations of a louse and a flea in the book. Your students can view some of the incredible drawings from the book online by searching for "Micrographia Robert Hooke." [p. 20]

Activity Sheet Questions | #15–16

Day 4

BookShark Science G Experiments Book | #1
Are Yeast Alive? ■

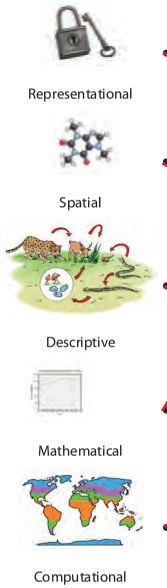


Week 1 Activity Sheets

4. Why are scientific models helpful? Mark all that are true. (p. 14)

- [x] Models help scientists understand or describe a scientific idea.
- [ ] Models make science crafty and fun.
- [x] Models help scientists make predictions that can be tested in experiments.
- [ ] If you can make a model, you've proved the hypothesis is true.

5. Draw lines to describe each type of scientific model. (p. 14)



- Observed data entered into a mathematical formula can help predict changes over time if the data continues to change at the same rate.
- Simplified shapes or objects represent complex ideas in the real world.
- Show the way something is arranged 3-dimensionally.
- Computers use data to simulate complex processes.
- Words or diagrams help describe something.

6. How do scientific and ethical questions differ? (p. 15)

- scientific questions → can be tested
- ethical questions → ask whether something is right or wrong, and can't be answered scientifically because they depend on people's opinions

Week 1 Activity Sheets

7. Why are some scientific questions hard to answer? (p. 15)

- [x] because not enough evidence is available to answer them
- [ ] because they don't have a right or wrong answer, they are based on opinions
- [ ] because they require a lot of research and testing

8. Read the example below that describes the benefits and risks that relate to a particular scientific development. Then answer the questions that follow.

> Even though some cancer treatments show they are able to treat the disease, reduce the presence of cancerous cells, and prolong a patient's health, the patient must endure unpleasant side effects while using the treatment.

List the benefits and risks described in the example.

Benefits: *(treatment reduces presence of cancerous cells; prolongs patient's health)*

Risks: *(patient must endure unpleasant side effects from the treatment)*

Scientists weigh the benefits and risks of scientific developments to determine if the development is _____ .

helpful overall **correct** **ethical** **efficient**

9. It is best to measure with accuracy and precision because measurements are: (p. 12)

easier to read **faster to measure** **more scientific** **more reliable**

Describe two ways you can improve recorded measurements. (p. 12)

1. Measure _____ *(several)* _____ times
2. Calculate the _____ *(average)* _____ of several measurements.

10. How do **accurate** and **precise** differ? Use **A** to label the *accurate* measurement and **P** to label the *precise*. Then explain why you made each choice. (p. 12)

(A) You use a 12-foot string to measure a distance you'd like to be 12 feet long across the floor, but stretch the string too much as you measure. You measure 3 times and mark the same spot on the floor.

Rationale: The marks may be in the same place but since the string stretched, the distance is likely longer than 12 feet, so the measure is **accurate** / **inaccurate** but **precise** / **imprecise** .

(P) You use a non-stretchy tape measure to measure 12 feet but it slides around a bit while you're measuring, so the marks aren't in the same place.

Rationale: The measurements are each 12 feet long, but because the tape measure moved, they aren't 12 feet from the same spot, so the measure is **accurate** / **inaccurate** but **precise** / **imprecise** .

Week 1 Activity Sheets

11. The experiment below is designed to see if surrounding a popsicle in more ice cubes can keep it frozen longer on a warm summer day. It is set up like so: (p. 13)

- 3 identical popsicles in 3 identical cups
- All cups will sit on the same table in the shade outdoors
- The temperature outside is a constant 85° Fahrenheit
- After 5 minutes, you will measure:
    1. Each popsicle's circumference
    2. The amount of liquid in the cup

#1: Popsicle with 10 ice cubes

#20: Popsicle with 20 ice cubes

#3: Popsicle with NO ice cubes

Identify the following terms in the box as either the independent variable, the dependent variable or constants in the experiment:

identical popsicles	cup location	ice cubes	popsicle circumference
outdoor temperature	identical cups	amount of liquid in the cups	

Independent variable: *(ice cubes)*

The independent variable is: **the deliberately changed variable** **the measured variable**

Dependent variable(s): *(popsicle circumference, amount of liquid in the cups)*

The dependent variable(s) is/are: **the deliberately changed variable** **the measured variable**

Control variables (or constants): *(constant outdoor temperature, identical cups, identical popsicles, cups are placed in the same location on the table in the shade)*

Which cup is the control test? Why? How is it useful?

- ☐ cup #1 because it has the fewest number of ice cubes
- ☐ cup #2 because it has the most ice cubes
- ☐ cup #3 because it has no ice cubes
- ☒ cup #3 because it shows how much the temperature could change the popsicle without the surrounding ice cubes

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Week 1 Activity Sheets

12. Use **mean**, **median** and **mode** to label each type of average. Then use the data set below to calculate to find each average. (p. 17)

Data Set: 5 8 4 10 4 6 2 4 8

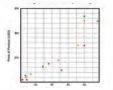
(mean): $\frac{\text{sum of values}}{\text{number of values}} = \frac{\textit{(51)}}{\textit{(9)}}$ *(or 51 ÷ 9)* = *(5.667)*

(mode): most frequent value = *(4)*

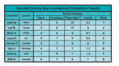
(median): middle value when arranged in order of size = *(2, 4, 4, 4, 5, 6, 8, 8, 10)* = *(5)*

13. Identify each type of chart or graph. Then use the letters to describe which type of data is best displayed in each. We have completed the first one for you. (p. 18)

pie chart — *c*



(scatter graph) — *(e)*



(table) — *(b)*

(bar chart) — *(d)*

(line graph) — *(f)*

(histogram) — *(a)*

a. To show how often data appears in a set. For example, how many pea plants grew to specific height ranges? Four plants grew between 6 and 8 inches, three plants grew between 9 and 12 inches.

b. To summarize collected data to help highlight

c. To show percentages

d. To help compare the results of a single variable across several separate tests. For example, the mature heights of different types of trees.

e. To show relationships between two independent variables.

f. To show data when two numerical variables change simultaneously. For example, number of ice cubes to number of minutes popsicles stay frozen.

Week 1 Activity Sheets

14. How do advancements in science and technology change scientific theories? Check all that are true. (pp. 20–23)

- [x] they help us better observe our world
- [ ] they help prove theories beyond a shadow of a doubt
- [x] new observations from them provide new data to either support or disprove theories
- [x] they can make scientists curious about ideas they haven't considered before
- [x] they help scientists make new discoveries

DID YOU KNOW? The International System of Units—or SI—use the metric scale because all base units in this system are powers (or multiples) of 10. This makes measurements easier to take and calculate. (p. 22)

Metric:	100,000 cm	=	1,000 m	=	1 km
Imperial:	100,000 in	=	8333.333 yd	=	1.57828282 mi

15. Convert each measurement into expanded form. (p. 22)

Example: 3×10^{2} cm = 300 cm 1×10^{-4} L = 0.0001 L

a. 8×10^{7} mm = *(80,000,000 mm)*

b. 2×10^{-3} km = *(0.002 km)*

c. 4.5×10^{8} cm = *(450,000,000 cm)*

Convert each measurement into standard form.

Example: 150,000 mm = 1.5×10^{5}

a. 250,000,000 g = *(2.5)* x 10 *(8)* g

b. 0.000004 L = *(4)* x 10 *(-6)* L

c. 4,700,000 km = *(4.7)* x 10 *(6)* km

Week 1 Activity Sheets

16. It is important to know safe ways to handle scientific equipment and materials because: (Check all that are true.) (p. 23)

- [x] science experiments are sometimes hazardous
- [x] we can avoid injury if we know how to handle equipment and materials appropriately
- [ ] safety measures help ensure accurate testing results
- [ ] safety measures help prove scientific theories

Draw a line to show how to safely handle each potentially hazardous situation.

open flame	read labels; use as instructed; use a fume hood if fumes are dangerous
hazardous chemicals	tie back loose hair and clothing; clear the immediate area, never use to heat alcohol
harmful to eyes, or splashes	handle with care; keep in center of table; insert stoppers and hoses carefully
hot or boiling water	tape dish lids to bases; incubate at appropriate temperatures; use aseptic techniques
avoid contaminated microorganisms	use heat-resistant gloves or tongs to handle equipment
hot glass	avoid splashing; run under cold water if splashed
working with glass	safety goggles

Week 1 Activity Sheets

Super Simple Biology

1. Use numbers to correctly order the steps in the scientific method. (pp. 10–11)

_____ **Make an Observation:** Observe something that makes you curious.

_____ **Collect Data:** Record information you observe in the test.

_____ **Repeat the Experiment:** If you can conduct the same experiment and observe the same results, you're better able to support the hypothesis.

_____ **Hypothesize:** State (or speculate) why you think you observed the phenomenon.

_____ **Conduct an Experiment:** Create a test that should help show if your hypothesis is correct.

_____ **Analyze the Data:** Review the data and think about if or how the observed data supports the hypothesis.

2. How do hypotheses become theories? (p. 11)

- ☐ As soon as the first experiment produces results to prove the hypothesis.
- ☐ Once experiments conducted several different ways produce the same results.
- ☐ After many tests produce results to support the hypothesis.
- ☐ Hypotheses can never become theories because evidence might surface one day to disprove them.

3. How do theories and facts differ? Draw lines to organize each description in the appropriate table. (p. 11)

Scientific theories		Scientific facts

a well-established scientific idea tested through experiments that explains some aspect of the real world

scientific theories that have been tested many times and have never failed

Are scientific facts or theories ever proven true beyond doubt? Why? (Fill in the circle to mark your choice.)

- ○ Yes: once a theory has been tested enough times, it is a reliable, undoubtable scientific fact
- ○ Yes: if a certain number of scientists achieve the same result from a test, the theory is proven beyond doubt
- ○ No: facts and theories can never be tested enough times
- ○ No: scientific facts and theories are never proven beyond doubt because new evidence to challenge them could always come to light

Week 1 Activity Sheets

4. Why are scientific models helpful? Mark all that are true. (p. 14)

- ☐ Models help scientists understand or describe a scientific idea.
- ☐ Models help scientists make predictions that can be tested in experiments.
- ☐ Models make science crafty and fun.
- ☐ If you can make a model, you've proved the hypothesis is true.

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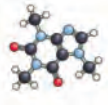
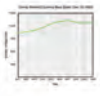
Representational

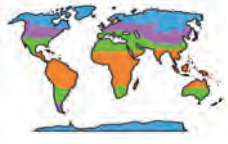


Spatial

Descriptive



Mathematical



Computational

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List the benefits and risks described in the example.

Benefits: _____

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Scientists weigh the benefits and risks of scientific developments to determine if the development is _____ .

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Independent variable: _____

The independent variable is: **the deliberately changed variable** **the measured variable**

Dependent variable(s): _____

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Control variables (or constants): _____

_____

Which cup is the control test? Why? How is it useful?

- ☐ cup #1 because it has the fewest number of ice cubes
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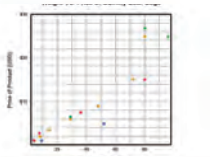
_____ *pie chart* _____ *c*

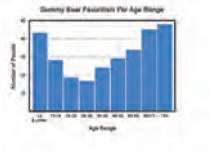


_____ _____

_____ _____

_____ _____

_____ _____



_____ _____

a. To show how often data appears in a set. For example, how many pea plants grew to specific height ranges? Four plants grew between 6 and 8 inches, three plants grew between 9 and 12 inches.

b. To summarize collected data to help highlight

c. To show percentages

d. To help compare the results of a single variable across several separate tests. For example, the mature heights of different types of trees.

e. To show relationships between two independent variables.

f. To show data when two numerical variables change simultaneously. For example, number of ice cubes to number of minutes popsicles stay frozen.

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Convert each measurement into standard form.

Example: 150,000 mm = 1.5×10^{5}

a. 250,000,000 g = _____ x 10 ——— g

b. 0.000004 L = _____ x 10 ——— L

c. 4,700,000 km = _____ x 10 ——— km

16. It is important to know safe ways to handle scientific equipment and materials because: (Check all that are true.)

(p. 23)

- ☐ science experiments are sometimes hazardous
- ☐ we can avoid injury if we know how to handle equipment and materials appropriately
- ☐ safety measures help ensure accurate testing results
- ☐ safety measures help prove scientific theories

Draw a line to show how to safely handle each potentially hazardous situation.

open flame	•	•	read labels; use as instructed; use a fume hood if fumes are dangerous
hazardous chemicals	•	•	tie back loose hair and clothing; clear the immediate area, never use to heat alcohol
harmful to eyes, or splashes	•	•	handle with care; keep in center of table; insert stoppers and hoses carefully
hot or boiling water	•	•	tape dish lids to bases; incubate at appropriate temperatures; use aseptic techniques
avoid contaminated microorganisms	•	•	use heat-resistant gloves or tongs to handle equipment
hot glass	•	•	avoid splashing; run under cold water if splashed
working with glass	•	•	safety goggles

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Science G
Week 2 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Super Simple Biology	pp. 25, 28–29				
The Usborne Complete Book of the Human Body		pp. 7–9	pp. 10–11		
Activity Sheet Questions	#1–8	#9–11	#12–14		
Optional: Do Together		Listen to Your Students			
BookShark Science G Experiments Book				#2 What are Living Things Made Of?	
Supplies	**We provide: 6SKB**— laser pointer, masking tape, 1 inch ball of clay*, oral syringe **Paper Packet**: What are Living Things Made of? Worksheet, Tissue Photo Cards **You provide:** 2 cups of the same height, 3 water samples (example: bottled water, tap water, and water from a pond or a puddle)				
Shopping/Planning List	**For next week:** 1 teaspoon gravel or dirt from backyard, onion, grass, table salt, flower, handheld microscope				

Other Notes

Special Note to Teachers

Notes
Week 2

Day 1

Super Simple Biology | pp. 25, 28–29

Scientists disagree on a single set of characteristics shared by all living things. Most scientists agree that all living organisms are made of cells, and that living things all maintain homeostasis, or internal order, which the book does not mention. It is important to note that science is constantly evolving as scientists learn more and modify previous thoughts and ideas. [p. 25]

The book mentions that most cells in the human body are specialized for a particular function. However, stem cells can develop into many different types of cells. Our bone marrow contains a type of stem cell that can develop into many types of blood cells, including red blood cells, white blood cells, or platelets. These adult stem cells can be harvested from bone marrow, that has been donated, and used in the treatment of some diseases, including certain types of cancer. [p. 28]

Activity Sheet Questions | #1–8

Day 2

The Usborne Complete Book of the Human Body | pp. 7–9

The picture of red blood cells on p. 8 was made with a scanning electron microscope, which your students learned about last week. These microscopes create a 3-D image, and the specimen does not need to be thinly sliced as is required with a traditional microscope.

Activity Sheet Questions | #9–11

Day 3

The Usborne Complete Book of the Human Body | pp. 10–11

Activity Sheet Questions | #12–14

Day 4

BookShark Science G Experiments Book | #2
What are Living Things Made Of? ■

Week 2 Activity Sheets

Super Simple Biology

1. Use the words in the box to label the seven key characteristics of life. (p. 25)

reproduction	growth	nutrition	movement
respiration	sensing	excretion	

(growth): increase size permanently

(sensing): ability to take in information about surroundings and respond to the information

(excretion): eliminate waste

(reproduction): produce offspring

(movement): maneuver some or all parts of their body, even if simply by growing

(nutrition): obtain or make food

(respiration): break down substances to release energy to enable cell processes

2. Decide whether each example is **alive** or **not alive**, based on how well each meet the characteristics of life and circle your choice. Then use the characteristics to explain and support your answer. (p. 25)

Cat: **alive** **not alive**

Explain: *(Possible: reproduces and has kittens; grows from a kitten into a cat; eats cat food; runs around; processes food and makes waste; can smell, hear, taste, see and touch)*

Oak Tree: **alive** **not alive**

Explain: *(Possible: makes seeds to reproduce; grows taller; makes food with soil nutrients and sunlight; grows toward the sun to move; senses direction of sunlight or obstacles it needs to grow around; gives off oxygen and water vapor)*

Robot dog: **alive** **not alive**

Explain: *(Possible: moves and can sense surroundings, and "consumes" battery or electrical power, but does not have cells that conduct processes, it does not grow and does not eliminate waste)*

Week 2 Activity Sheets

3. Do viruses carry out life processes? Explain. (p. 25)

(no, they cannot carry out any life processes on their own, and only reproduce by invading other cells)

Do scientists think they're alive?

(some do and some don't—they disagree)

4. Use the words in the box to complete the following. (p. 28)

organs	tissues	organ systems	cells

Cells are the basic building blocks of life. Similar *(cells)* combine to make *(tissues)*, which combine to make *(organs)*, that work together with other organs to make an *(organ systems)*.

5. Do plants have organs? (p.28) **yes** **no**

If yes, name them. *(root, stem, leaf, flower, fruit)*

6. Why do our bodies have several different organ systems? (p. 28)

(each organ system carries out a particular function in the body)

7. Why do we need different systems to make a single living body? (p. 29)

(the systems work together to complete processes our bodies need to stay alive, like breaking down food so nutrients can be absorbed into the blood, or carrying those nutrients in the blood to different parts of the body)

8. Use the words in the box to list the key organs in each of the body systems below. (p. 29)

heart	large intestine	liver	stomach
brain	lungs	small intestine	

Week 2 Activity Sheets

Circulatory System	Digestive System	Respiratory System	Nervous System
(heart)	*(large intestine)*	*(lungs)*	*(brain)*
	(stomach)		
	(liver)		
	(small intestine)		

The Usborne Complete Book of the Human Body

9. Use the words in the box to complete the following. (p. 7)

genes	cells	body parts

Inside our *(body parts)* are millions of tiny *(cells)* that have *(genes)* inside of them that tell the cells the things they need to do to make our bodies work and keep us alive.

10. Write each term in one of the boxes below to organize each body part into the appropriate category. (p. 8)

brain	lungs	bone	stomach juices	fat	sweat	muscle	blood	tears

Body Fluids	Organs	Body Tissues
(stomach juices)	*(brain)*	*(fat)*
(blood)	*(lungs)*	*(bone)*
(sweat)		*(muscle)*
(tears)		

11. Shade the glass to show how much of your body is made up of water. (p. 8)

(70%)

Week 2 Activity Sheets

12. Draw a line to match the terms to the correct definitions. (pp. 8–10)

systems	a group of cells of the same type; includes fat, bone, and muscle
organ	a group of organs or body parts whose jobs are closely related
tissues	different types of tissues grouped together to perform a particular task for the rest of the body

13. Match each body system to the main task(s) each performs. (pp. 10–11)

skeletal	extracts oxygen out of the air and passes it to the rest of your body; gets rid of waste gases
muscular	the male and female body systems that each play a part in making babies
skin, hair and nails	gives your body its shape; joints link its pieces together
digestive	sends messages and instructions from your brain to the rest of your body
nervous	holds you up and makes you move
respiratory	makes hormones that control how your body grows and changes
circulatory	protects you from dirt and danger; helps control your temperature
endocrine	pumps blood that carries food, oxygen, and other chemicals to all of your cells
urinary	changes food into energy
reproductive	filters waste water and chemicals out of your blood to pass out of your body

14. Think of one body part that belongs to more than one body system and explain how it serves both systems. (p. 10)

(Possible: throat is part of the digestive system while you eat, and part of the respiratory system while you breathe; at the most basic level, your leg is part of both the skeletal system—gives your leg its structure, and the muscular system—helps you walk)

Week 2 Activity Sheets

Super Simple Biology

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reproduction	growth	nutrition	movement
respiration	sensing	excretion	

_____ : increase size permanently

_____ : ability to take in information about surroundings and respond to the information

_____ : eliminate waste

_____ : produce offspring

_____ : maneuver some or all parts of their body, even if simply by growing

_____ : obtain or make food

_____ : break down substances to release energy to enable cell processes

2. Decide whether each example is **alive** or **not alive**, based on how well each meet the characteristics of life and circle your choice. Then use the characteristics to explain and support your answer. (p. 25)

Cat: **alive** **not alive**

Explain: _____

_____

_____

Oak Tree: **alive** **not alive**

Explain: _____

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_____

Robot dog: **alive** **not alive**

Explain: _____

_____

_____

Week 2 Activity Sheets

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_____

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If yes, name them. _____

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_____

_____

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_____

_____

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Circulatory System	Digestive System	Respiratory System	Nervous System

The Usborne Complete Book of the Human Body

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genes	cells	body parts

Inside our _____ are millions of tiny _____ that have _____ inside of them that tell the cells the things they need to do to make our bodies work and keep us alive.

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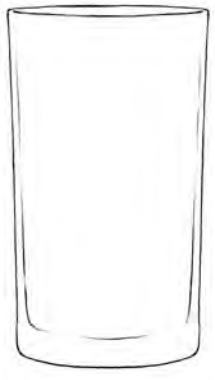
Body Fluids	Organs	Body Tissues

11. Shade the glass to show how much of your body is made up of water. (p. 8)



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skin, hair and nails	•	•	gives your body its shape; joints link its pieces together
digestive	•	•	sends messages and instructions from your brain to the rest of your body
nervous	•	•	holds you up and makes you move
respiratory	•	•	makes hormones that control how your body grows and changes
circulatory	•	•	protects you from dirt and danger; helps control your temperature
endocrine	•	•	pumps blood that carries food, oxygen, and other chemicals to all of your cells
urinary	•	•	changes food into energy
reproductive	•	•	filters waste water and chemicals out of your blood to pass out of your body

14. Think of one body part that belongs to more than one body system and explain how it serves both systems. (p. 10)

_____

_____

_____

Science G
Week 3 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
The Usborne Complete Book of the Human Body	pp. 12–13				
All in a Drop		pp. 8–23	pp. 24–45		
Activity Sheet Questions	#1–3	#4–8	#9–16		
Handheld Microscope Activities		Fantastic Fabrics	Antony's Antics, Part I		
Optional: Do Together		Convex or Concave			
BookShark Science G Experiments Book				#3 What is the Difference Between Living and Nonliving Things?	
Supplies	**We provide: 6SKB**— slide, coverslip, magnifying glass, a pinch of clay[1], pipette[2] **Paper Packet**: What is the Difference Between Living and Nonliving Things? Worksheet **You provide:** 1 teaspoon gravel or dirt from backyard, onion, grass, table salt, flower, handheld microscope				
Shopping/Planning List	**For next week:** handheld microscope, a spoonful of sand or dirt, sample of pond water (collect rainwater or other water that has been exposed to the environment to allow living things to thrive), leaves, onion, ink from a pen, fabric or textiles such as a knit sweater, 3 eggs, 3 containers (one to hold each egg), water, vinegar, corn syrup, tape measure				

Other Notes

1 & 2. Most durable items will be used repeatedly, so clean them after use and store in a safe place.

Special Note to Teachers

Notes
Week 3

Day 1

The Usborne Complete Book of the Human Body | pp. 12–13

Identical Twins and DNA

Do identical twins have identical DNA?

As a matter of fact, they do. Identical twins form when one fertilized egg splits, which means both babies will have the same set of 46 chromosomes. Fraternal twins, on the other hand, form from two eggs that are fertilized separately and therefore usually only share about 50% of their DNA. This explains why fraternal twins often look more like siblings rather than an identical copy of one another.

Even though identical twins share the same DNA, or *genotype*, they have different *phenotypes*, which are traits you can observe that result from the way DNA is expressed in slightly different ways. Have you ever noticed that once you get to know two identical twins, it's not too difficult to tell them apart? They may have slightly different temperaments, or something about their faces, or the way they prefer to dress that sets them apart. Since some of these phenotypes include physical appearance and fingerprints, this means that even though a DNA test can't tell identical twins apart, fingerprints can.

Activity Sheet Questions | #1–3

Day 2

All in a Drop | pp. 8–23

Leeuwenhoek was indeed an unlikely player in the world of science. Most of the important early scientists were highly educated and well-connected, and he was neither. He serves as a shining example of the importance of hard work, curiosity, and persistence.

Why would children drink beer? In Antony van Leeuwenhoek's day, germs and bacteria had not yet been discovered, but people did recognize that drinking water often made them sick. Instead they drank brewed beverages like tea, beer, cider, wine and ale. To brew beer, a brewer first boils water which kills all of the germs and bacteria it contains and makes it safe to drink. The first brewing contains alcohol. The same ingredients were used again to boil a second and third batch, like using the same tea bag to brew more cups. The beer produced by the third batch has almost not alchohol in it and was called small beer, and this beer the children would drink. [p. 13]

Activity Sheet Questions | #4–8

Handheld Microscope Activities | Fantastic Fabrics

This year, you will see a new view of science; from the microscopic level! We provide several hands-on activities for you to use a handheld microscope to investigate what everyday items look like up-close. If you did not purchase the handheld microscope from BookShark, search our website at www.bookshark.com for sku ES08. Some activities may be completed with more powerful microscopes and slides, if you have them.

Antony van Leeuwenhoek discovered many details with his microscope. Over the next few weeks, we will pick out a few items Leeuwenhoek investigated and ask you to look at them with your handheld microscope, too. Today, since Leeuwenhoek sold fine fabrics, you should look at different kinds of cloth in your home. Compare a warm shirt to a cool shirt. Jeans to khaki pants. Blankets to carpet. Soft to scratchy. Note the sizes of threads and how they weave together. Can you figure out what makes cloth warm, soft, sturdy, etc?

Optional: Do Together | Convex or Concave

Are your students familiar with the concept of concave/convex? If you have a magnifying glass, allow them to feel the shape of the lens. Is it concave (curves inward) or convex (bulges outward)? Why? If you or a family member have a pair of eyeglasses, allow them to feel the shape of the lenses in the glasses. Are they concave or convex? Discuss the reasoning for the curvature. For example, reading glasses will be convex in shape because they are acting like a magnifying glass to make close things appear larger. Eyeglasses used for distance will have a concave shape, although this curvature may be more difficult to feel depending on the prescription.

Day 3

All in a Drop | pp. 24–45

The book mentions the oldest scientific journal, *Philosophical Transactions*. This journal published the first scientific writings of Isaac Newton in 1672, in which he theorized that white light is actually composed of seven distinct colors. This writing launched his scientific career.

Another notable scientist, Benjamin Franklin, was published in *Philosophical Transactions*. Franklin had 19 of his papers published in the journal, including his findings on the connection between lightning and electricity. He founded the American Philosophical Society, which he modeled on the Royal Society. [p. 34]

Leeuwenhoek has been called the "Father of Microbiology" because of his ground-breaking discoveries with his microscopes. 'Micro' comes from the Greek word for small and 'Biology' is the study of life. Therefore, microbiology is the study of small life. Leeuwenhoek's inventive microscopes allowed him to see, for the first time, the small life that is all around us. [p. 39]

Activity Sheet Questions | #9–16

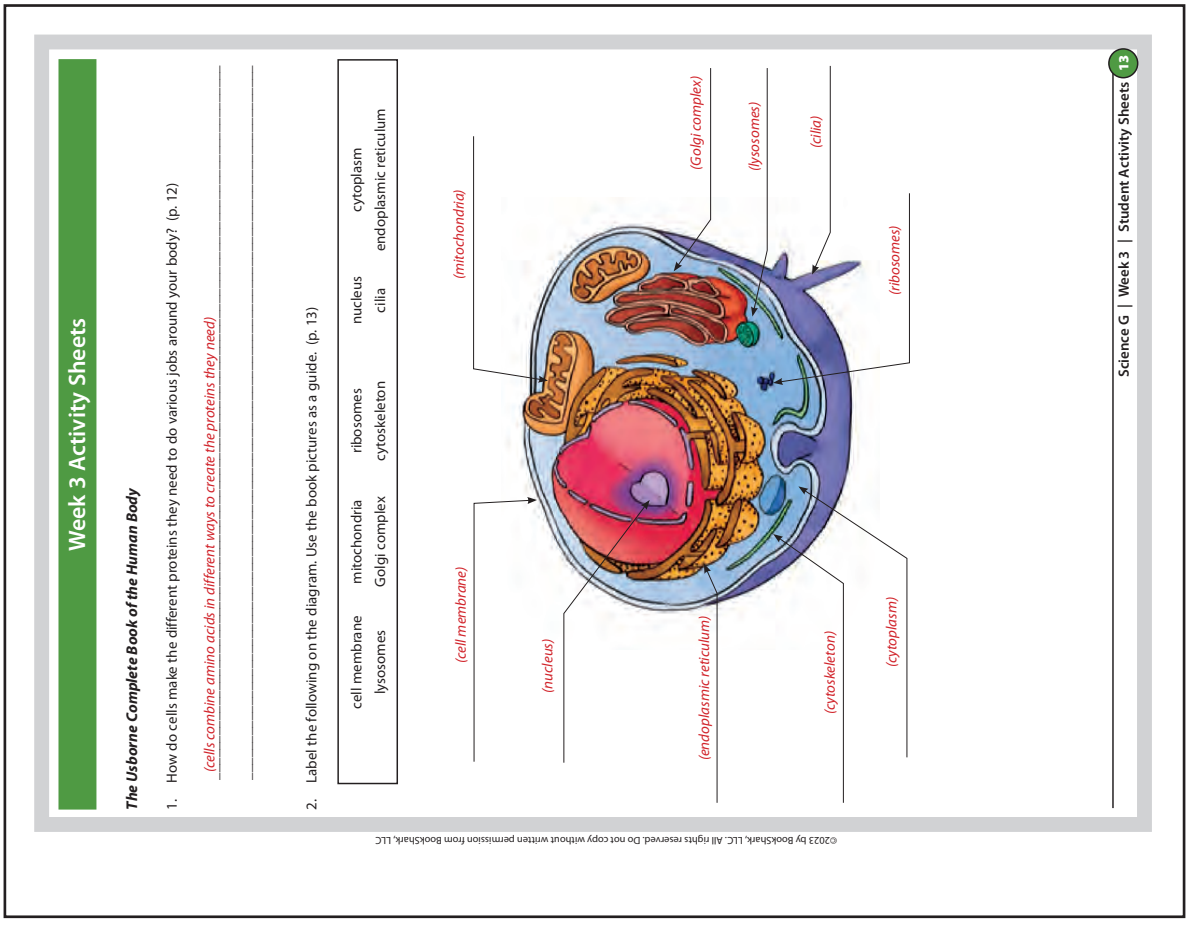
Handheld Microscope Activities | Antony's Antics, Part I

Here are several of Leeuwenhoek's items you can view with your handheld microscope:

- chalk (whole and smashed)
- coffee (whole bean and ground)
- various spices you have on hand.

Day 4

BookShark Science G Experiments Book | #3 What is the Difference Between Living and Nonliving Things? ■



Week 3 Activity Sheets

The Usborne Complete Book of the Human Body

1. How do cells make the different proteins they need to do various jobs around your body? (p. 12)

(cells combine amino acids in different ways to create the proteins they need)

2. Label the following on the diagram. Use the book pictures as a guide. (p. 13)

cell membrane, mitochondria, ribosomes, nucleus, cytoplasm, lysosomes, Golgi complex, cytoskeleton, cilia, endoplasmic reticulum

(mitochondria) (Golgi complex) (lysosomes) (cilia) (ribosomes) (cell membrane) (nucleus) (endoplasmic reticulum) (cytoskeleton) (cytoplasm)

Science G | Week 3 | Student Activity Sheets 13

Week 3 Activity Sheets

3. Write the letter on the line to match each cell part to its role or function. (p. 13)

_(c)_ membrane	a. controls and directs all cell activities; contains instructions for making new cells
_(d)_ mitochondria	b. transports proteins made by the ribosomes to other parts of the cell
_(e)_ ribosome	c. holds the cell together and controls the way substances such as food and water pass into and out of the cell
_(a)_ nucleus	d. food and oxygen react together here to produce energy for life
_(f)_ cytoplasm	e. proteins are created here
_(b)_ endoplasmic reticulum	f. a jelly-like substance that contains strands of protein and provides the backbone of the cell
_(h)_ Golgi complex	g. produce chemicals which destroy harmful foreign substances
_(g)_ lysosome	h. a storage area that keeps proteins until needed

All in a Drop

4. Why do you think Antony van Leeuwenhoek has a head for business, even when he is young? (p. 13)

(Possible: he watches his parents work, who are tradespeople—they know how to make something others need and sell it for profit, and he learned from them. He sells his pet silkworms to a silk spinner for profit)

5. Describe the schooling and training Antony van Leeuwenhoek received at each age. Use the information in the first box to complete his age and where he received each type of eduction. Then use the information in the Skills box to describe what he learned in each place. (pp. 14-18)

age 14	age 8	boarding school	Amsterdam linen merchant's shop

Skills:	reading	sales clerk	place orders	writing in Dutch
	cashier	place orders	some math	pay bills

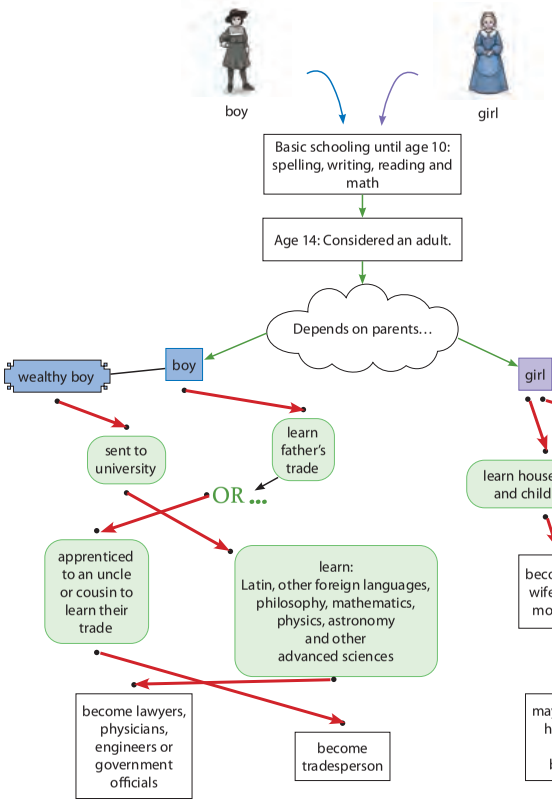
Age:	Where?	Skills:
(age 8)	*(boarding school)*	*(reading, writing in Dutch, some math)*
(age 14)	*(Amsterdam linen merchant's shop)*	*(sales clerk, place orders, cashier, pay bills)*

Week 3 Activity Sheets

6. Why is Antony van Leeuwenhoek's education simple at first? (p. 14)

(because he is expected to learn a trade and be an ordinary tradesperson)

7. Draw lines to connect the dots to form the typical career paths for each Dutch child. (p. 19)



Week 3 Activity Sheets

8. Draw lines from each lens to show how it changes the path of light. (p. 23)

convex lens

concave lens

9. What did Robert Hooke's book, *Micrographia*, inspire Antony van Leeuwenhoek to do? (p. 26)

- [x] try to make his own microscope
- [ ] make a laboratory
- [ ] learn to read English
- [ ] write to the Royal Society

10. Use numbers to order the steps to show how Antony van Leeuwenhoek made his first microscope. (pp. 26–28)

(5) He places felt with a powdery polish on it into the mold to polish the lens.
(1) He glues a bit of broken glass to a stick.
(4) He changes out the sand in the mold for finer and finer sand.
(2) He uses a metal plate with a spherical dent as a mold to make the glass round.
(6) He designs a way to mount a specimen on a pin and carefully adjust the pin's distance from the lens to bring the specimen into focus.
(3) He puts coarse sand in the mold and twists the glass in the sand until he smooths away the glass's rough edges.

11. Which quality helped Antony van Leeuwenhoek develop his microscope and make new discoveries? (p. 33)

- [ ] he knows many languages
- [x] he is exceedingly curious
- [ ] he liked photography
- [ ] he went to University

Week 3 Activity Sheets

12. Why was it important that van Leeuwenhoek convinced the Royal Society that he'd made new discoveries with his microscope? (pp. 32–34)

(because they began to publish his findings in the scientific journal Philosophical Transactions which informs the rest of the scientific community about them so they can learn from them)

13. Why did van Leeuwenhoek hire an artist? (pp. 36–37)

(so he could include detailed images with the reports of his findings, since photographs hadn't been invented yet)

14. Antony van Leeuwenhoek does not explain how he makes his microscopes or conducts his experiments in his reports—he keeps his microscope design top secret. Why does this make it harder for the Royal Society to believe he's found tiny animals in water samples? (pp. 43–44)

(since the Royal Society cannot replicate his results and they do not have the right equipment, they don't readily believe him)

Who is finally able to support van Leeuwenhoek's findings? How does he do it? (p. 44)

(Robert Hooke—he soaks whole peppercorns in rainwater for 10 days, then uses his best microscope to view the water in the smallest, thinnest glass tube he can find)

15. Why were van Leeuwenhoek's microscopes more powerful than Robert Hooke's? Check all that are true. (p. 45)

- [ ] he stacked multiple lenses together
- [x] he used small, spherical lenses
- [x] he used only a single lens
- [ ] he used larger, bowl-shaped lenses

16. Why is it less effective to use larger, stacked lenses in a microscope? (p. 45)

(multiple lenses increase the power of magnification but they also increase the amount of distortion, which makes an image less clear and sharp)

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Week 3 Activity Sheets

The Usborne Complete Book of the Human Body

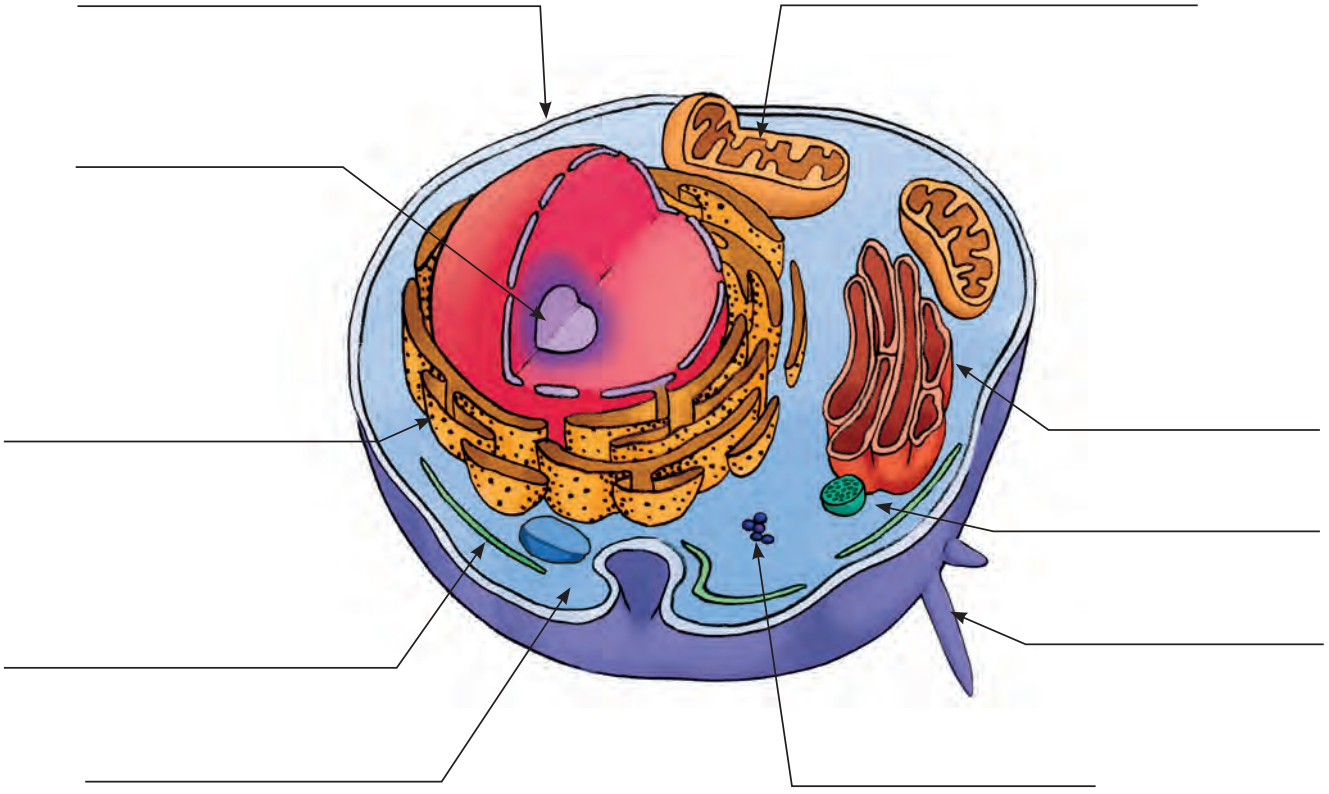
1. How do cells make the different proteins they need to do various jobs around your body? (p. 12)

_____

_____

2. Label the following on the diagram. Use the book pictures as a guide. (p. 13)

cell membrane	mitochondria	ribosomes	nucleus	cytoplasm
lysosomes	Golgi complex	cytoskeleton	cilia	endoplasmic reticulum



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_____ membrane

_____ mitochondria

_____ ribosome

_____ nucleus

_____ cytoplasm

_____ endoplasmic reticulum

_____ Golgi complex

_____ lysosome

a. controls and directs all cell activities; contains instructions for making new cells

b. transports proteins made by the ribosomes to other parts of the cell

c. holds the cell together and controls the way substances such as food and water pass into and out of the cell

d. food and oxygen react together here to produce energy for life

e. proteins are created here

f. a jelly-like substance that contains strands of protein and provides the backbone of the cell

g. produce chemicals which destroy harmful foreign substances

h. a storage area that keeps proteins until needed

All in a Drop

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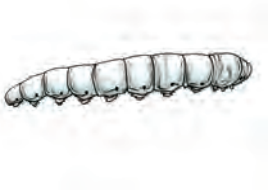

_____

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Skills:	reading	sales clerk	place orders	writing in Dutch
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Age:	Where?	Skills:

6. Why is Antony van Leeuwenhoek's education simple at first? (p. 14)

_____

_____

7. Draw lines to connect the dots to form the typical career paths for each Dutch child. (p. 19)

boy

girl

Basic schooling until age 10: spelling, writing, reading and math

Age 14: Considered an adult.

Depends on parents…

wealthy boy

boy

girl

sent to university

learn father's trade

OR …

learn housekeeping and childrearing

earn advanced education

apprenticed to an uncle or cousin to learn their trade

learn:
Latin, other foreign languages, philosophy, mathematics, physics, astronomy and other advanced sciences

become a wife and mother

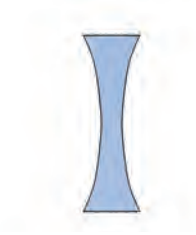
become lawyers, physicians, engineers or government officials

become tradesperson

may help with husband's family business

8. Draw lines from each lens to show how it changes the path of light. (p. 23)

convex lens



concave lens

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- ☐ try to make his own microscope
- ☐ make a laboratory
- ☐ learn to read English
- ☐ write to the Royal Society

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_____ He glues a bit of broken glass to a stick.

_____ He changes out the sand in the mold for finer and finer sand.

_____ He uses a metal plate with a spherical dent as a mold to make the glass round.

_____ He designs a way to mount a specimen on a pin and carefully adjust the pin's distance from the lens to bring the specimen into focus.

_____ He puts coarse sand in the mold and twists the glass in the sand until he smooths away the glass's rough edges.

11. Which quality helped Antony van Leeuwenhoek develop his microscope and make new discoveries? (p. 33)

- ☐ he knows many languages
- ☐ he is exceedingly curious
- ☐ he liked photography
- ☐ he went to University

12. Why was it important that van Leeuwenhoek convinced the Royal Society that he'd made new discoveries with his microscope? (pp. 32–34)

13. Why did van Leeuwenhoek hire an artist? (pp. 36–37)

14. Antony van Leeuwenhoek does not explain how he makes his microscopes or conducts his experiments in his reports—he keeps his microscope design top secret. Why does this make it harder for the Royal Society to believe he's found tiny animals in water samples? (pp. 43–44)

Who is finally able to support van Leeuwenhoek's findings? How does he do it? (p. 44)

15. Why were van Leeuwenhoek's microscopes more powerful than Robert Hooke's? Check all that are true. (p. 45)

- ☐ he stacked multiple lenses together
- ☐ he used small, spherical lenses
- ☐ he used only a single lens
- ☐ he used larger, bowl-shaped lenses

16. Why is it less effective to use larger, stacked lenses in a microscope? (p. 45)

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