TBYB Sample

# R.E.A.L. Science Odyssey

# Life

## RSO
## Life Science Curriculum

For Grades K – 2

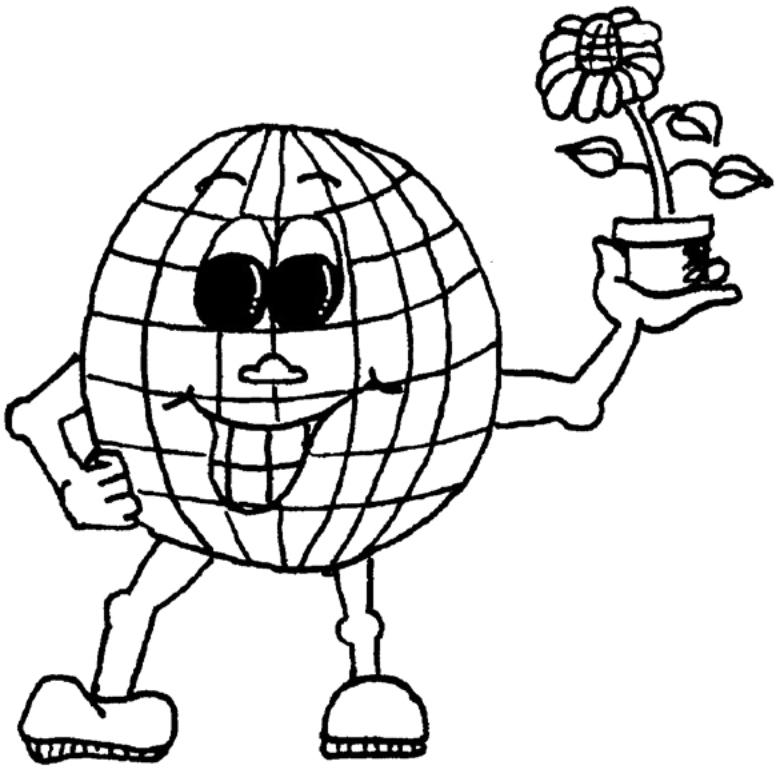
Pandia PRESS

R.E.A.L. Science – Read • Explore • Absorb • Learn Science

**Note about Printing:**
This file includes all of the blank pages found in the course book. For best results, set your printer to duplex mode to print on both sides of the paper.

# REAL Science Odyssey

Read ⁘ Explore ⁘ Absorb ⁘ Learn



# Life

For Grades K-2

ISBN: 978-0-9766057-0-6



The publisher and author have made every attempt to state precautions and ensure that all activities and labs described in this book are safe when conducted as instructed, but assume no responsibility for any damage to property or person caused or sustained while performing labs and activities in this or any RSO course. Parents and teachers should supervise all lab activities and take all necessary precautions to keep themselves, their children, and their students safe.

## WHAT'S IN THIS BOOK?

*Denotes a lab or activity

# AN INTRODUCTION TO RSO LIFE

This book was intended to be used from start to finish, much like a math book, and as such, vocabulary and concepts build on one another. You may find words and concepts that you feel the need to "review and practice." Feel free to do so if you wish, but understand that vocabulary words are repeated throughout the story sections, so your children will hear the same words many times. This is intended to help them learn without having to drill. Having said that, review can be a good thing, and anytime you can use a concept to refer to something you see in real life, your child will benefit greatly. Eating fish for dinner (fish sticks excluded)? How about showing your child the gills under those gill flaps? Taking a walk in the country? Point out the different footprints you see in the mud. Are they bird, reptile, or amphibian? Next time you eat an egg, talk about the cell that it is. Use real words for body parts. Babies grow up in a uterus, not a tummy. Science is only a foreign language if it isn't used in real life.

When used one to two times a week, this book is a complete, rigorous, vocabulary-rich life science curriculum that needs no supplementation. It is not a collection of labs to do randomly and with no flow from one to the other, nor is it an overwhelmingly long progression of trivial facts to be memorized and forgotten (like we grew up with). This book is designed with the non-science parent in mind, so you can pick it up and follow along, with no need for further organizing or research. This is the story of life, beginning with the child's own body for reference. This book is a minds-on and hands-on program. If you hate to touch "bugs," wouldn't think about letting your child handle worms, and have no intention of getting gooey and dirty, RUN NOW! Science is about experimentation, but read-and-report science curricula do exist for the faint of heart. Are you still here? If so, roll up those sleeves and get ready to turn every household container into a critter keeper.

For every notebook page in this book, children will do one to four activities that build upon and reinforce what they have heard. Labs also teach new material, so it is important to try to do all of the labs included. In addition, we have included journaling ideas plus book and website suggestions (www.pandiapress.com/rso-life-1-weblinks) for a complete indoor and outdoor experience, which will allow your child to dig into whatever he finds most fascinating. You will notice that many labs are infused with age-appropriate math. Science is very mathematical for measuring, graphing, and calculating. If your child struggles with the math or with writing the results, don't let the lab papers overwhelm the lesson. The idea is to enjoy science. Much of the learning comes from doing and discussing. Read the questions to the pre-writing child and have him dictate the answers back to you, or if you both find them tedious, skip them altogether.

A few words about big words: You know the ones I mean: monocot, chloroplast, echinoderm – EEEK! It's enough to make a person drop their science book and run in fear. Now, let me share a few more with you. How about Tyrannosaurus Rex, Triceratops, and Velociraptor? All very long words that we have learned right along with our 3- and 4-year-olds. Show no fear in the face of these Latin-based words, and you too will be referring to arachnids at your next park day!

## GETTING STARTED

1. If you are a computer person, log onto Pandia's weblinks page for RSO Life to view science videos and helpful websites: www.pandiapress.com/rso-life-1-weblinks.
2. If you are a book person, pull out the library book list (page 16) and go over it a few weeks before you do any given section. Leave it in your library book bag or by your computer so you can check on the availability of the books.
3. If you are a nervous "Did I teach my child enough stuff" type of person, go over the "What's the Big Idea" pages in this book. It will tell you what sorts of things your child should know by the end of the course. Use it with a grain of salt. Remember, the key here is exposure and fun.
4. Look ahead to what material you will need for the upcoming week or year if you're an uber-planner! It could be an egg, a piece of tagboard, or an earthworm. All required materials are listed on pages 10–11 for easy reference. Be prepared. A few items need to be ordered as much as three weeks in advance.

5. Read the lesson pages to yourself once so you know how to pronounce the new words given there. Pronunciation of all words that I think you might not know are included right there so you can read them as you go.
6. Curl up under that weeping willow or in front of the fire and read the lesson page to your child, even if they can read by themselves. There is one for each major topic. Pause to do whatever it tells you to—looking at a fish, finding a spider, etc. The lesson pages are written to your child and can be saved in their own notebook. They are purposely short so you can go right from the lesson page to the first activity if you would like.
7. There is a Suggested Weekly Schedule on page 12 that plots out the course, based on teaching science once a week. But you should adapt the schedule to work for your family; maybe you will choose to read the lesson page on day one, and each activity on a separate day for three shorter doses of science each week.
8. Follow up with a day of nature journaling, reading from the extra reading list, or drawing. Drawing is an important skill for many scientists. Have fun. And did I mention you should have fun?

**SOME UNIQUE HELPERS IN THIS BOOK**

STUDENT PAGES (lesson pages and lab sheets):

1. All student pages have a boxed outline around the material presented. That way it is easy to identify what is for the child and what is for the teacher.
2. You'll find all new vocabulary words underlined. You'll notice that most of the vocabulary doesn't have a classic dictionary definition. Instead, the explanation is usually given in context, so it is "felt" and not memorized.
3. All vocabulary is also listed in alphabetical order at the back of the book. This way, if you want a "dictionary definition" you can find it there.
4. Pandia Press offers "Extra Student Pages" which is just as it sounds, an extra set of all the lesson pages and lab sheets. These are intended for those using the program with more than one child. You also have the publisher's permission to copy any pages of this book for use with your child.

INSTRUCTION PAGES:

1. The instruction page is really for the parent/teacher, but the procedure is written as if for the student. I have no way of knowing how capable your child is, so I leave it up to you to decide which steps you want your child to participate in (disclaimer).
2. Each instruction page includes a prompt to read aloud to your child. This is for the parent who wants it. If you hate those prompts, don't sweat it. You can summarize the information for your child.

# WHAT'S THE BIG IDEA?

Whenever you study a subject, you have main ideas to learn and little details to study as well, which are a nice bonus. It's true that science has a lot of new vocabulary and information. If you are using a classical education approach to teaching, you will cover every subject three times throughout your child's education. Because of this, don't sweat the small stuff. There are many challenging words in here that are used because they are the right words, and after hearing them over and over they will "sink in." They are not here for your child to memorize the first time around.

This outline gives you the big idea that your child should get from each section, and the small stuff that is an added bonus. If you and your child are timid scientists, just have fun as you try to learn the big ideas. If you and your child have a strong science background, work on learning the small stuff as well as the big ideas. Use these difficult words and science concepts gently, not with force, and your child will enjoy his science experience.

BI = BIG IDEA SS = SMALL STUFF

**WHAT IS LIFE:**

BI = You can tell living things from nonliving things by what they can do.

SS = All Living things 1. Take in energy 2. Get rid of waste 3. Move 4. Grow 5. Reproduce 6. Have circulation 7. Have respiration 8. Respond to their environment 9. Are made of cells

**LIVING THINGS ARE MADE OF CELLS:**

BI = Living things are made of cells.

Cells come in many different sizes and shapes but are usually too small to see.

SS = Plant cells are usually rectangular and animals cells are typically rounded.

Plant cells have chloroplasts that make the plant green and make food for the plant.

The nucleus is the control center of the cell.

**SKELETAL AND MUSCULAR SYSTEMS:**

BI = Bones support you and make up the skeletal system. Muscles move you and make up the muscular system.

Muscles can only pull, not push. Therefore, they work in pairs to pull back and forth.

SS = Some of the major bones are the skull, ribs, humerus, femur, vertebrae, pelvis, and patella.

**CIRCULATORY SYSTEM:**

BI = Your circulatory system is made of your heart, arteries, and veins. Your heart is a muscle that forces blood to every part of your body.

Blood carries food, water, and oxygen to the cells.

The harder you exercise, the harder your heart works.

Blood is a mixture of 4 different things.

SS = Arteries carry blood away from your heart. Veins carry blood back to your heart. White blood cells fight bacteria. Red blood cells carry oxygen. Plasma carries food.

Platelets seal up cuts to stop the bleeding.

**RESPIRATORY SYSTEM:**

BI = You breathe oxygen into your lungs.

This oxygen goes into your blood and then to every part of your body.

The harder you exercise the more oxygen you need, so the faster you breathe.

SS = Air goes into your trachea and then to your lungs.

Carbon dioxide is traded for the oxygen in your lungs. You breathe out carbon dioxide.

**DIGESTIVE SYSTEM:**

BI = Your teeth, esophagus, stomach, and intestines make up your digestive system.

Your digestive system is much longer than you are tall. It is twisted and coiled to fit into your body.

Your digestive system takes the food you eat, saves the nutrients and water that your body needs, and sends the rest back out of your body.

SS = The digestive system uses special chemicals to help dissolve food.

Your body needs a variety of nutrients, so eating a balanced diet is important.

**NERVOUS SYSTEM:**

BI = Your brain, spinal cord, and nerves make up your nervous system.

Your nervous system's job is to take in information and to tell your body what to do about the information.

Your five senses gather information. With your five senses you see, hear, smell, taste, and feel the world around you.

SS = People rely on some senses more than others.

All animals have different senses that they favor.

**GROWTH AND GENETICS:**

BI = Your body grows in stages.

Special messages in your cells determine how you will look and grow.

You inherit characteristics from your parents.

Except for identical twins, no two people are exactly alike.

SS = Genes carry the messages you inherit from your parents.

You get a mix of genes from your mom and dad, so you may show characteristics from each.

Everybody has a different set of fingerprints. No two people's are alike.

**SIX KINGDOMS:**

BI = Living things are grouped based on their characteristics.

Grouping living things helps us name, understand, and communicate about them.

SS = There are six kingdoms, or groups of living things. Two are the plant and animal kingdoms.

Every living thing (discovered) has a scientific name which tells us its species.

**CNIDARIA:**

BI = Some simple animals have no organs and look like plants.

SS = Cnidarians are simple animals, much like a hollow sack with stinging tentacles.

Corals, sea jellies, and sea anemones are cnidarians.

Sea jellies go through metamorphosis and change from polyp form to medusa form.

**WORMS:**

BI = Worms are long like a string and have no legs.

Earthworms are very helpful to people.

SS = Worms can be flat, round, or segmented.

Worms have organs inside.

Earthworms can tell many things about their environments.

**MOLLUSKS:**

BI = Soft-bodied animals like snails and octopi are grouped together.

Some of these soft-bodied animals have shells.

SS = Soft-bodied animals are called mollusks. Most have a shell either inside or outside.

Mollusks include snails, slugs, octopi, squids, clams, and oysters.

Mollusks have complex organs like people do.

**ECHINODERM:**

BI = Sand dollars, sea stars, and sea urchins have spiny skin and are grouped together.

Spiny-skinned animals have bodies that can be divided into 5 parts.

SS = Spiny-skinned animals are called echinoderms.

**ARTHROPOD:**

BI = Insects, spiders, and lobsters all have jointed legs and divided bodies.

Insects have 6 legs and 3 body parts, and most insects have wings. Spiders have 8 legs, 2 body parts, and no wings. Lobsters and isopods have more than 8 legs.

Insects and some other animals go through metamorphosis.

SS = Arthropods all have jointed legs, segmented bodies, and an exoskeleton.

The major groups of arthropods are insects, arachnids, and crustaceans.

Stages of complete metamorphosis are: egg, larvae, pupae, adult.

Spiders, ticks, and scorpions are all arachnids.

Crustaceans have gills and most live in water.

**CHORDATA:**

BI = Invertebrates have no backbones. Vertebrates have backbones.

Animals with backbones are fish, amphibians, reptiles, birds, and mammals.

SS = Backbones are called vertebrae. Vertebrae protect your spinal cord.

**FISH:**

BI = Fish have fins and scales, lay eggs, and breathe through gills.

Fish are cold-blooded.

SS = Cold-blooded animals have the same temperature as the surrounding air or water.

Fish float at different depths by adjusting the amount of air in their swim bladders.

**AMPHIBIANS:**

BI = Frogs, toads, and salamanders are amphibians.

Frogs and toads go through incomplete metamorphosis.

Amphibians are cold-blooded and lay eggs. When they are young they have fins and gills, but when they are grown they have legs and lungs. Amphibians must stay near water.

SS = Amphibians must stay near water because they will dry out. Their skin is porous because they breathe through it.

Amphibian eggs must be laid in water because they have no shell.

**REPTILES:**

BI = Lizards, snakes, turtles, and alligators are reptiles.

Reptiles have scales and lungs, are cold-blooded, and most lay eggs.

SS = Reptile eggs have a leathery shell, so they can be laid away from water.

Reptiles can live far from water because their skin isn't porous.

**BIRDS:**

BI = Only birds and mammals are warm-blooded.

Birds have beaks, feathers, and wings and lay eggs with hard shells.

Birds' feet, beaks, and body shapes tell a lot about how the bird lives and where.

SS = Feathers are for flying and also help the bird stay the proper temperature.

Birds keep their feathers waterproof by spreading special oils on them with special oils from a gland near the base of their tails.

**MAMMALS:**

BI = Mammals nurse their young, don't lay eggs (there are three exceptions), have hair or fur, and are warm-blooded.

People are mammals.

Mammals have ways to stay warm in winter and cool in summer.

Good common names of animals help us to identify them.

SS = "Mamma" is Latin for "breast."

Mammals have breasts for nursing their young.

Polar bears, whales, and other marine mammals have thick blubber to keep themselves warm.

**FLOWERS:**

BI = Flowers attract animals to pollinate them.

Seeds are made when flowers are pollinated.

SS = The female part of the flower is the pistil. The male part is the stamen. The petals attract pollinators and the sepals protect the flower before it opens.

Flower parts (petals, stamens etc.) vary greatly in number and size.

**SEEDS:**

BI = Seeds grow into plants.

Some seeds split into two parts, some stay as one.

The seed is a tiny baby plant; the seed's stored food will start it growing.

Seeds have interesting ways to spread around so they find space and water to grow.

SS = Monocots have one seed part, dicots have two. Each seed part is a cotyledon.

Each seed has a seed coat, an embryo, and one or two cotyledons.

Seeds must soak up water before they can sprout.

Seeds spread by wind, water, or sticking and being eaten as part of a fruit or berry; and then by getting dropped in a new place.

**LEAVES:**

BI = Leaves contain chloroplasts which make the plant green. Chloroplasts take sunlight and make energy.

Plants that don't get light cannot grow very well.

Leaves look solid green but are really just dots of green chloroplasts.

SS = Without plants there would be no life. Animals need plants in order to survive.

Without sun, chloroplasts turn yellow.

**STEMS AND ROOTS:**

BI = Roots suck water up from the ground and hold the plant up.

Stems have tubes that carry food and water through the plant.

SS = Water can only enter a plant through the roots.

# SUPPLY LIST

Supplies are listed by unit in the order in which it is first needed. + means it will be needed for later units also. The amounts listed are totals for the entire course. Most items are common household items. * means it requires some explanation. Ordering explanations are given on page 11.

| UNIT | ITEM | AMOUNT |
|---|---|---|
| 1+ | Plant with many healthy leaves | 1 |
| 1 | Rock to observe (optional) | 1 |
| 1 | Wild area to study (field, forest, etc.) | |
| 1 | String | 4 meters |
| 1+ | Meter/yardstick combination | 1 |
| 1+ | Clipboard 1 | |
| 1+ | Large clear jar with lid (32 oz. or more) | 1 - 4 |
| 1+ | Hand lens (magnifying glass) | 1 |
| 1 * | Field guides to local insects, animal tracks,plants | |
| 2+ | Small plates | 3 |
| 2+ | Small round bowl (to hold 2 cups) | 2 |
| 2 | Small square pan (to hold 2 cups) | 1 |
| 2 | Chicken egg | 1 |
| 2 | Light-colored gelatin (lemon) | |
| 2 | Green grapes | 20 |
| 2 | Strawberries or orange slices | 2 |
| 3+ | Glue gel (like Elmer's School Glue Gel) | 1 |
| 3+ | Hole punch | 1 |
| 3+ | Scissors | 1 |
| 3+ | Colored pencils, crayons, markers | |
| 3+ | Stapler | |
| 3+ | 12" x 12" colored cardstock | 8 |
| 3 | 12" x 18" construction or other heavy paper | 1 |
| 3+ | Yarn-any color | 12 yds |
| 4 | White or gold pen (to mark on black) | 1 |
| 4+ | Ruler with centimeters and inches 1 | |
| 4 | 8 1/2" x 11" black construction paper | 1 |
| 4 | 8 1/2" x 11" tagboard or thick paper | 1 |
| 4+ | Metal fastener (brad) | 2 |
| 4 | Thin string or thick thread | 28" |
| 4+ | Tape | |
| 5 | Tennis ball | 1 |
| 5+ | Watch with second hand | 1 |
| 5+ | Spoons (at least one metal) | 2 |
| 5 | Light corn syrup | 1/2 cup |
| 5 | Red Hot candies | 1/2 cup |
| 5+ | Dry large lima beans | 6 |
| 5 | Dry lentils or split yellow peas | 1 Tbl |
| 6 | Long tube (wrapping paper, vacuum cleaner, etc.) | 1 |
| 6+ | 8 1/2" x 11" white paper | 6 |
| 6 | Small colored counters-blue and red 10 each | |
| 7+ | 3" x 5" index cards (white) | 7+ |
| 8+ | Small jars with lids (see-through) | 3 |
| 8 | Dry erase marker | 1 |
| 8 | Paper towels | 15 |
| 8 | Items to test senses: coins, cotton swab, paper clips, vinegar, garlic, chocolate chips, banana, etc. | |
| 8+ | Paper sacks (4 lunch size) (1 large) | 4 |
| 11+ | Various art supplies-stamps, stickers etc. | |
| 12 | Styrofoam cups (stacking) | 4 |
| 13+ | Clear plastic jar | |
| 13 | Shredded carrot, lettuce, fruit | 1 cup |
| 13+ | Aluminum foil | |
| 13 | Vinegar | 1/4 tsp. |
| 13+ | Flashlight | 1 |
| 13 | Red cellophane (optional) | 4" x 4" |
| 13 | Pitchfork (to dig up worms) | 1 |
| 13+ | Mister with water | 1 |
| 13 | Garden soil, sand, and mulch | 3 cups |
| 13+ | Tray with sides (or food storage container) | 9" x 9" |
| 13 | Sandpaper-rough | 9" x 9" |
| 14+ | * Gram scale or triple beam balance | 1 |
| 14 | Snail food (lettuce, cabbage, ivy, cucumber) | |
| 15 | Banana | 1 |
| 15+ | Kitchen knife | 1 |
| 16+ | * Butterfly house (bought or made) | 1 |
| 18 | Small piece of rotting log for critter keeper | |
| 18 | Chalkboard or whiteboard (or butcher paper) | 1 |
| 18 | Heating pad or hot water bottle | 1 |
| 18+ | Zipper-type plastic bags | 3 |
| 18 | Ice | |
| 19 | Card stock or construction paper 18" x 12" | 1 |
| 19 | Magazines with animal pictures | 1 - 4 |
| 20 | Fish net-small for netting goldfish | 1 |
| 20+ | * Thermometer-science type | 2 |
| 20 | Thermometer-sterile, human type | 1 |
| 20+ | Glass eyedropper | 1 |
| 21 | Metal Slinky toy | 1 |
| 21 | Metal pie pan | 1 |
| 21 | Salt | 1 Tbl. |
| 21 | Manila file folders | 2 |

| | | |
|---|---|---|
| 22 | Cookie sheet | 1 |
| 22 | Waterproof marker | 1 |
| 23+ | Zoo or wildlife center for study | |
| 23 | *Binoculars (optional) | 1 |
| 23 | Vegetable oil | 2 Tbl. |
| 24 | Shortening or lard | 1/2 cup |
| 24 | Butcher paper | 3' x 6' |
| 24 | Samples of animals studied: shells, plastic critters, live insects, pictures, dried coral or sea star, etc. | |
| 25 | Tweezers (optional) | 1 |
| 26 | Computer with Internet access (optional) | |
| 25 | Flower (gladiolus is best) | 1 |
| 26 | Corn seeds | 11 |
| 26 | Dried kidney beans | 11 |
| 26 | Socks-big, old | 2 |
| 26 | Cranberry and other fruit (to show seeds) | 26 |
| 26 | Seeds that travel by wind- maple, dandelion, elm | |
| 28 | Identical, upright plants in small pots | 2 |
| 28 | Clear drinking glasses | 3 |
| 28 | Clock | 1 |
| 28 | Stalk of celery with leaves on top | 1 |
| 28 | White carnation | 1 |
| 28 | Food coloring-red and blue | |
| 28 | Salad dressing | |
| 28 | Salad ingredients of your choice | |

CRITTERS

| | | |
|---|---|---|
| 13+ | * Earthworms (found or bought) | 6 |
| 14+ | *Garden snails | 5 |
| 16+ | * Butterfly larvae (gathered or bought) | 5 |
| 17+ | * Spider to observe (real or photos) | 1 |
| 18+ | * Isopods (AKA roly-polies or pill bugs) | 10 |
| 20 | Fish–a goldfish works well | 1 |

## SPECIFIC EQUIPMENT: HINTS AND ORDERING

1. Gram scale or triple beam balance: Either of these will weigh items in grams. Gram scales are easier to use. Triple beam balances are frequently used in many laboratories so it may be worth purchasing one and learning how to use it. Gram scales are available at many drug stores. Either can be purchased from a science supply store.
2. Butterfly house: can be made from a box with netting over one side. Look for specific instructions on the internet. Plan about three weeks ahead if you want to buy one. You can purchase one from Insect Lore, and it will come with a certificate to get five butterfly larvae. You just send in the certificate (and a few dollars for shipping) about a week before you are ready to start your butterfly unit.
3. Thermometer: The mercury in a good science thermometer goes down on its own like a room thermometer. Remember, the mercury in a human thermometer must be shaken down. You will need a thermometer that isn't a permanent part of a decoration and that has the temperatures marked right on it. Some food thermometers are built right but don't go very low, as they are used for hot cooking. You need one to go down to 3O°F, or 0°C. If all else fails, order one from Home Science Tools or another science supply store.
4. Binoculars: 7 X 35 is a nice choice to get for bird-watching. I would avoid the $10 ones, as you won't see much, but you don't have to spend $100 on a set for children either. Whatever you get, look through them first. The optics can vary from one pair to another. Look in the sports or electronics department.
5. Garden snails: The care sheet provided (page 16) gives hints on finding and housing snails.
6. Earthworms, butterfly larvae, spiders (optional), and isopods (pill bugs): Finding and housing them is explained in the labs where they are first needed.

## SOURCES FOR SCIENCE MATERIALS

Home Science Tools offers a vast array of science materials from frogs to magnets). They also offers a materials kit for RSO Life: www.homesciencetools.com

Insect Lore (fun equipment for learning about and raising critters—crabs to ants) www.insectlore.com

# SUGGESTED WEEKLY SCHEDULE FOR RSO LIFE LEVEL 1

The following schedule is suggested for those wishing to complete this course in a 36-week school year, teaching science one day a week (add a second day to a week to finish up anything not completed). General supplies needed for each week are listed. Refer to the lesson or supply list for specifics on supplies including quantities. * Indicates lab or activity.

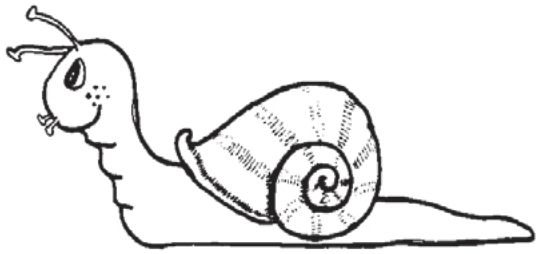
| Week | Lesson / Lab | Supplies Needed for the Week | Dates / Notes |
|---|---|---|---|
| 1 | What Is Life?<br>*Signs of Life | Plant, Rock | |
| 2 | *Plot Study | Field or meadow, String, Clipboard, Jar, Magnifying glass, Meter stick, Stakes, Hammer or mallet, Field guides | |
| 3 | The Cell<br>*An Egg Is a Cell<br>*Plant and Animal Cells Differ | Colored pencils, Magnifying glass, Chicken egg, Dish, Yellow gelatin, Round bowl, Square pan, Green grapes, Orange slices or strawberries | |
| 4 | The Human Body<br>*Human Body Folder | 12" x 12" Cardstock, 12" x 18" Construction paper, 3- Hole punch, Glue, Stapler, Scissors, Yarn, Colored pencils | |
| 5 | Skeletal and Muscular Systems<br>*My Skeleton Holds Me Up<br>*Muscles Aren't Pushy | Scissors, Glue, Black construction paper, White or gold paint pen, Tagboard, Hole punch, Metal fastener, String, Tape, Ruler | |
| 6 | Circulatory System<br>*Your Heart Rate<br>*Blood Model | Watch w/ second hand, Crayons, Jar, Spoon, Light Karo syrup, Red Hot candies, Dry lima beans, Dry lentils or split peas | |
| 7 | Respiratory System<br>*Breathing Rate<br>*I Need Oxygen | Watch w/ second hand, Crayons, Colored pencils, Paper or paper plates, Long tube (like vacuum cleaner or wrapping paper tube), Red and blue math counters or chips, Helper/teacher | |
| 8 | Digestive System<br>*Digestive Diagram<br>*Food Travels Far | Colored pencils, Yarn, Yard stick, Index cards, Stapler | |
| 9 | Nervous System<br>*Reaction time<br>*I'm Sensible | Ruler, Colored pencils, Various items to identify with senses (refer to I'm Sensible lab sheet), Paper sacks, Paper plates, Spoons, Jars, Paper towels, Dry-erase marker | |
| 10 | Growth and Genetics<br>*I'm the Only Me! | Parents, siblings, or two other close relatives available. | |
| 11 | *My Own Fingerprints | Transparent tape, Extra people for fingerprinting, Magnifying glass | |
| 12 | Six Kingdoms of Living Things<br>*Classifying Critters | Scissors, Colored pencils | |

| Week | Lesson / Lab | Supplies Needed for the Week | Dates / Notes |
|---|---|---|---|
| 13 | Animal Kingdom<br>*Prepare Animal Kingdom Book | 12" x 12" Cardstock, Hole punch, Glue, Stapler, Scissors, Colored pencils, Stickers or other decorations | |
| 14 | Cnidaria<br>*Sea Jellies Change<br>*Animal Kingdom Book: Cnidaria | Colored pencils, Styrofoam cups, Yarn, Dry beans or seeds, Tape or glue, Scissors, Art supplies, Nature encyclopedia | |
| 15 | Worms<br>*The Great Worm Hunt<br>*Earthworms Aren't Senseless | Soil, Jar, Leaves (and other worm food), Flashlight, Red cellophane, Pitchfork, Earthworm, Baking pan, Food container, Paper towels, Aluminum foil, Hot and cold water, Vinegar, Sandpaper, Folder | |
| 16 | *Earthworm Composting<br>*Animal Kingdom Book: Worms | Earthworms, Clear jar, Paper grocery sack, Measuring tape, Garden soil, Sand, Mulch, Shredded fruit and vegetables, Timer, Water mister, Glue, Scissors, Art supplies, Nature encyclopedia | |
| 17 | Mollusks<br>*Mollusk? Who Me? | Snails, Jar, Hand lens | Order butterfly house for Week 20 (see p. 175). |
| 18 | *Snail Anatomy<br>*Animal Kingdom Book: Mollusks | Snail, Centimeter ruler, Gram scale, Hand lens, Vegetable to feed snail, Glue, Scissors, Art supplies, Nature encyclopedia | |
| 19 | Echinoderms<br>*Give Me Five<br>*Animal Kingdom Book: Echinoderms | Banana, Knife, Glue, Scissors, Art supplies, Nature encyclopedia | Order butterfly larvae for next week (see p. 175). |
| 20 | Arthropod – Insects<br>*Butterfly Metamorphosis<br>*Caterpillar to Butterfly<br>(See lab for weather planning.) | Butterfly larvae, Butterfly house, Centimeter ruler, Hand lens, Colored pencils | It takes 18 days to complete the butterfly labs. Start this week and finish Week 22. |
| 21 | Arthropod: Arachnids<br>*The Spider Song<br>*Insect or Spider | Scissors, Glue, Pictures of spiders and insects | |
| 22 | Arthropod: Crustaceans<br>*Isopod Hunt<br>*Roly-Poly Poetry | Jar, Moist soil or sand, Piece of rotting log, Water mister, Hand lens, Colored pencils, Chalkboard or butcher paper | |
| 23 | *A Home for Isopod<br>*Animal Kingdom Book: Arthropods | Gallon-size baggie, Isopods, Water source, Tray, Paper towels, Heating pad, Flashlight, Ice, Glue, Scissors, Art supplies, Nature encyclopedia | |
| 24 | Vertebrates: Introduction<br>*Invertebrate or Vertebrate | Scissors, Magazines with animal pictures, Glue | |
| 25 | Vertebrates: Fish<br>*Measure a Fish<br>*Fish Floaters | Live fish, Jar, Gram scale, Small fish net, Room thermometer, Human thermometer, Watch, Centimeter ruler, Plastic drink bottle with cap, Eye dropper, Water, Colored pencils | |

| Week | Lesson / Lab | Supplies Needed for the Week | Dates / Notes |
|---|---|---|---|
| 26 | Vertebrates: Amphibians<br>*Complete and Incomplete Metamorphosis<br>*No "Ear" in Hearing | Manila file folders, Scissors, Metal fastener (brad), Glue, Colored pencils, Metal Slinky toy, Metal pie pan, Metal spoon, Salt, Eye dropper, Water, Smooth floor surface, Table | |
| 27 | Vertebrates: Reptiles<br>*How Dry I Am<br>*Lizard Poem | Cookie sheet, Waterproof marker, Paper towels, Water, Zipper-type plastic baggie, Colored pencils | |
| 28 | Vertebrates: Birds<br>*Birds of a Feather<br>*How Ducks Stay Dry | Access to a zoo, Binoculars, Small paper sacks, Sink or bowl, Vegetable oil, Water, Mister | |
| 29 | *Are You My Brother?<br>*My Wild Bird Life List | Scissors, Colored pencils | |
| 30 | Vertebrates: Mammals<br>*What's In a Name?<br>*Coat of Blubber | Clipboard, Zoo, Ice water, Small plastic bags, Science thermometers, Lard or shortening, Colored pencils (red and blue) | |
| 31 | *Animal Kingdom Book: Vertebrates<br>*Animal Kingdom Summary: What Am I? | Glue, Scissors, Art supplies, Nature encyclopedia, Butcher paper, Samples from the animal phylum | |
| 32 | Plant Kingdom: Flowers<br>*Color The Flower<br>*What Makes Up a Flower? | Crayons or colored pencils (blue, orange, green, pink, and brown), Black marker, Flower, Clear tape, Centimeter ruler, Tweezers, Hand lens | |
| 33 | Plant Kingdom: Seeds<br>*Inside The Seed<br>*Traveling Seeds | Cup, Corn seeds, Dry kidney beans, Water, Dish, Centimeter ruler, Crayons (blue and orange), Big socks, Hand lens, Cranberry or coconut, Fresh fruit, Seeds that travel by wind, Tweezers, Kitchen knife | |
| 34 | Plant Kingdom: Leaves<br>*What Makes a Leaf Green<br>*Color Me Green | Cartoon section of the newspaper, Hand lens (or microscope), Markers (green, blue, yellow, red, and black), Index cards, White paper, Plant, Crayons, Foil | |
| 35 | Plant Kingdom : Stems and Roots<br>*Water Please | Identical potted plants, Foil, Spray mister with water, Centimeter ruler | |
| 36 | *Stems Move Water<br>*Plant Summary: Plant Parts Salad | Celery, White carnation, Clear glasses, Water, Clock, Kitchen knife, Plate, Food coloring (red and blue), Colored pencils (blue, green, and red), Salad bowl, Salad dressing, Trip to the grocery store | |

# Critter Care Sheet

## COLLECTING AND HOUSING GARDEN SNAILS



FINDING: Garden snails are easiest to find in lush gardens, woodlands, or parks right after a rain (or watering). They also are easiest to find at night. If you don't have a garden, or know anybody with a snail problem (lucky you!) try a park or nursery where they grow plants.

HOUSING: Snails can be kept in a solid-walled critter keeper, large jar, or small aquarium. Snails climb well so make sure the lid is on and that it has plenty of breathing holes. Put a little soil in the bottom, and add a nice piece of rotting log. Keep the soil moist—but not wet—by misting daily. Add a small dish of water to keep the air humid.

FEEDING: If you can, add the leaves on which you found the snail. Also feed it lettuce and cucumber. Avoid any leaves that have been sprayed with chemicals.

# ADDITIONAL READING SUGGESTIONS

Some great, supplemental books you could use for several sections of this book are given below. They are listed under each topic with the appropriate page numbers for that topic. Books marked * are literature with a science theme.

**Unit 2: THE CELL: p. 33**

*Greg's Microscope* – Millicent E. Selsam

**Unit 3: THE HUMAN BODY: p. 43**

*What's Inside You* – Susan Meredith (Usborne Starting Point Science)

*Science and Your Body* – Rebecca Heddle (Usborne Science Activities)

*SOMEBODY: Five Human Anatomy Games* – Fun games to help teach anatomy

*The Magic School Bus Inside the Human Body* – Joanna Cole

*Me and My Amazing Body* – Joan Sweeney

*Your Insides* – Joanna Cole

*Easy Make and Learn: The Human Body* – Donald Silver and Patricia Wynne

**Unit 4: THE SKELETAL AND MUSCULAR SYSTEMS: p. 47**

*The Skeleton Inside You* – Philip Balestrino

**Unit 5: CIRCULATORY SYSTEM: p. 59**

*Your Blood and Its Cargo* – Sigmund Kalina

*A Drop of Blood* – Paul Showers

**Unit 7: DIGESTIVE SYSTEM / NUTRITION: p. 79**

*Good Enough To Eat* – Lizzy Rockwell

*Eat Healthy Feel Great* – William Sears, M.D, et. al.

**Unit 8: NERVOUS SYSTEM: p. 89**

*The Magic School Bus Explores the Senses* – Joanna Cole

*My Five Senses* – Aliki

**Unit 9: GROWTH AND GENETICS: p. 99**

*When an Animal Grows* – Millicent Selsam (about nonhuman animal growth)

*Me and My Family Tree* – Paul Showers

**Unit 10: CLASSIFYING LIFE: p. 109**

*Usborne Illustrated Encyclopedia of the Natural World*

*QUICKPIX Not Just An Animal Game* – Aristoplay

*Benny's Animals and How He Put Them in Order* – Millicent E. Selsam

*Animals of the Sea* – Millicent Selsam

**Unit 12: CNIDARIA: p. 121**

*Usborne Illustrated Encyclopedia of the Natural World*

*Jellyfish* – Leighton Taylor

**Unit 13: WORMS: p. 131**

*Usborne Illustrated Encyclopedia of the Natural World*
*Worm Day* – Harriet Ziefert
*Earthworms* – Dorothy Childs Hogner

**Unit 14: MOLLUSCA: p. 149**

*Usborne Illustrated Encyclopedia of the Natural World*
*Are You a Snail* – Judy Allen

**Unit 15: ECHINODERMATA: p. 163**

*Usborne Illustrated Encyclopedia of the Natural World*

**ARTHROPODA**

**Unit 16: Insects: p. 173**

*Usborne Illustrated Encyclopedia of the Natural World*
*Usborne Complete First Book of Nature*
*The Magic School Bus Gets Ants in Its Pants* – Joanna Cole
*The Magic School Bus Inside a Beehive* – Joanna Cole
*Zoobooks: Butterflies* – The Knowledge Company (distributor)
*Butterflies* – Karen Shapiro (Scholastic "Hello Reader!" book)
*The Butterfly House* – Eve Bunting
*Waiting for Wings* – Lois Ehlert
*Are You a Butterfly?* – Judy Allen
*Are You a Ladybug?* – Judy Allen
*Are You an Ant?* – Judy Allen
**Crickwing* – Janell Cannon
*Ma Jiang and the Orange Ants* – Barbara Ann Porter
*Terry and the Caterpillars* – Millicent Selsam

**Unit 17: Arachnids: p. 183**

*Usborne Illustrated Encyclopedia of the Natural World*
*Are You a Spider?* – Judy Allen

**Unit 18: Crustaceans: p. 193**

*Usborne Illustrated Encyclopedia of the Natural World*
*A House for Hermit Crab* – Eric Carle
*Pagoo* – Holling C. Holling
**Kermit The Hermit* – Bill Peet

**CHORDATA**

**Unit 20: Fish: p. 215**

*Usborne Illustrated Encyclopedia of the Natural World*
*Usborne Complete First Book of Nature*

*Plenty of Fish* – Millicent Selsam
**Swimmy* – Leo Lionni

**Unit 21: Amphibians: p. 225**
*Usborne Illustrated Encyclopedia of the Natural World*
*Song of La Selva* – Joan Banks
**Frog and Toad Are Friends* – Arnold Lobel
**Frog and Toad Together* – Arnold Lobel
**Frog and Toad* – Arnold Lobel

**Unit 22: Reptiles: p. 235**
*Usborne Illustrated Encyclopedia of the Natural World*
*Imagine You Are a Crocodile – Karen Wallace*
*The Moon of the Alligators – Jean Craighead George*
**Verdi – Janell Cannon*

**Unit 23: Birds: p. 243**
*Usborne Illustrated Encyclopedia of the Natural World*
*Usborne Complete First Book of Nature*
*Tony's Birds* – Millicent Selsam
*See How They Grow – Owl* – Kim Taylor
**Make Way for Ducklings* – Robert McCloskey

**Unit 24: Mammals: p. 259**
*Usborne Illustrated Encyclopedia of the Natural World*
*Nature Detective* – Millicent Selsam
**Stellaluna* – Janell Cannon

**THE PLANT KINGDOM**
*Usborne Illustrated Encyclopedia of the Natural World*
*Usborne Complete First Book of Nature*
**Franklin Plants a Tree* – Paulette Bourgeois

**Unit 25: FLOWERS: p. 281**
*Usborne Illustrated Encyclopedia of the Natural World*
*Usborne Complete First Book of Nature*
*The Reason For a Flower* – Ruth Heller

**Unit 26: SEEDS: p. 293**
*Seeds and More Seeds* – Millicent Selsam
*The Tiny Seed* – Eric Carle
**The Carrot Seed* – Ruth Kraus

**Unit 27: LEAVES: p. 303**
*Usborne Illustrated Encyclopedia of the Natural World*

**Unit 28: STEMS AND ROOTS: p. 311**

*Usborne Illustrated Encyclopedia of the Natural World*

**OTHER LIFE SCIENCE TOPICS**

**Evolution / Natural Selection**

*The Story of Life on Earth* – Margaret Munro

*Evolution* – Joanna Cole

*Evolution – The Beast in You* (an activity book) – Marc McCutcheon

**Prehistoric Life**

*The Story of Life on Earth* – Margaret Munro

*Wild and Wooly Mammoths* – Aliki

*Dinosaur Bones* – Aliki

*Digging Up Dinosaurs* – Aliki

*My Visit To The Dinosaurs* – Aliki

*Patrick's Dinosaurs* – Carol Carrick

*What Happened To Patrick's Dinosaurs?* – Carol Carrick

**Reproduction**

*Everybody Has a Bellybutton* – Laurence Pringle

*How You Were Born* – Joanna Cole

*Before You Were Born* – Ann Douglas

**FIELD GUIDE SUGGESTIONS**

**Insects**

*Insects* (Peterson Field Guide Series) – Donald J. Borror / Richard E. White

**Birds**

*Field Guide to the Birds of North America* (National Geographic Society) – Shirley L. Scott

*Stokes Field Guide to Birds* (by region) – Donald and Lillian Stokes

*Field Guide to Western* (or Eastern) Birds (Peterson Series) – Roger Tory Peterson

*Birds of North America* (Golden Guide) – Chandler S. Robbins et al

**Reptiles and Amphibians**

*A Field Guide to Western (*or *Eastern) Reptiles and Amphibians* (Peterson Field Guide Series) – Robert C. Stebbins

**Mammals**

*A Field Guide to the Mammals of America North and Mexico* (Peterson Field Guide Series) – William H. Burt / Richard P. Grossenheider

**Care of Unusual Pets**

*Pets in a Jar* – Seymour Simon

*Animal Care From Protozoa to Small Mammals* – F. Barbara Orlans *Creepy*

*Crawlies and the Scientific Method* – Sally Kneidel

# KEEP A SCIENCE JOURNAL

Nature is beautiful and amazing, but it's not a video game. The action in nature is far more subtle (usually) but well worth looking at and waiting for. Life, death, greed, compassion, and romance are all just waiting to be discovered by the observant and the patient. Writing it all down is a skill worth developing. Sketching and saving samples of the common things you find along the way all add up to you producing a journal you can be especially proud of and will want to cherish your whole life. For a satisfying nature experience, grab that journal and that pencil, maybe a hand lens (magnifying glass), and a pair of binoculars and hit the trail, or the backyard or park. You don't need to have a plan when you go out; but to get you started, we have provided, in no particular order, a few hints as to what might go into a nature journal. These are just ideas to get your creative juices flowing. Writing in your journal should be like writing to yourself. Don't worry about spelling, sentence structure, or grammar. Now go out, observe, draw, listen, describe, compare—journal! Remember, the more you put into it, the more you will get out of it. For each journal entry remember to put: • The date • The weather (temperature, clouds, rain, wind, etc.) • Who you went with

AUTUMN:

- Make a leaf rubbing. Place a leaf under one journal page. Choose a color that matches the leaf. Rub the crayon over the paper where it covers the leaf. In your journal, describe the plant it came from and what it looks like at this time of year. Repeat this in the spring.
- Sit by a tree. What things might that tree be used for if it were cut down? What might it be used for if it were to grow? In its lifetime, how many more animals might be able to enjoy it as it grows? What species is the tree? If you know, write it down. Sketch a picture of the tree.
- Use your sense of hearing. Close your eyes. What do you hear? What do you think it means? Write a factual or fictional story about what you hear.
- Find an insect of any kind. Draw it. Describe what it is doing. Don't disturb it in any way. Watch what it does when it is not disturbed.
- Check out a clear night sky. Can you find any constellations? Satellites? Bats?
- Pick up two different rocks. Describe them. Compare weight, shape, texture, color. . .
- This is a safe time to find a nest, as they will be empty at this time of year. How is it made? What material was used? How was it put together? What feathers are nearby?
- Describe the weather changes you see. Draw the clouds, take the temperature, feel the wind.
- Which trees are losing their leaves first? Which in clumps? Does size matter? Species (kind of tree)? Location?
- In the autumn, pick a tree to draw. Tie a colorful ribbon or string around a large branch to help you remember which tree you drew. Draw the same tree in the winter, spring and summer.

WINTER:

- Describe a deciduous tree (one that loses its leaves in the winter) and an evergreen tree (one that stays green all year). How are they shaped? How different do they look at this time of year? Is one easier to see in the winter?
- Look for predators (meat eaters). Winter is a hard time of year for them. Look for hawks, owls, weasels, and coyotes. How do they look? What do you see that they could find to eat? There is a different kind of silence when it is snowy or foggy. Sit, listen, and describe a snowy or foggy day. What do you hear? How does it sound different than it does on a clear summer day?
- Finish the sentence "I'm so cold I could. . ." How do animals and plants survive the cold?
- Describe and sketch the nearest mountains. What covers them? Who uses them?

- When it rains, watch how the water washes dirt down a hill. Can you see it start to form tiny rivers? What does the water do when it meets up with sticks, rocks, and leaves?
- Use your nose after a rain. How does the world smell? How is that different from usual?
- Put a stick in the ground. Measure its shadow morning, noon, and evening. Draw your stick clock in your journal. Show where the shadow is at different times of the day.
- How do birds look in winter? Describe what they do, where they perch, what they say.

SPRING:

- Find a pond or lake. Sketch it and the surrounding area in your journal. Color in where you would expect to find: fish—in blue; amphibians—in green; and reptiles—in brown.
- Find a pond or puddle. Look closely for animal tracks. Sketch them in your journal. Can you determine where each animal went and what it was doing? Tell a story of the events that lead to the footprints.
- Find a flower, the bigger the better. Watch and see if any animal visitors come to pollinate it. Write and sketch about what you see.
- Carefully draw a flower. How is it built to draw in pollinators? Guess by its size and shape what animals might pollinate it.
- Listen to the birds. Birds sing to claim a territory and advertise for a mate. Describe their songs. Are they sweet? Flat? Enthusiastic? Impressive?
- Try to write a bird's song in words. A quail's call is written as "Chi-ca-go." A chickadee's name comes from its call—"Chicka-dee-dee."
- Don't forget to journal at night. Describe the life attracted by a porch light at night.
- Use your nose. What can you smell? Sit and smell, then look for things that make smells—flowers, trees . .
- Find a butterfly. Describe its color, patterns, flight. Where are its wings when it is resting? Now find a moth (easiest at night) and compare.

SUMMER:

- Go outside. Watch seeds move, fly, pop open. Write and sketch about what you see.
- Find a column of ants. Don't bother them in any way. Where are they going? What are they carrying? Can you find individual ants with different jobs? How quickly are they moving? Follow and time one ant to find the speed of the column.
- Sit quietly and observe the birds. What birds do you have in your area? Draw, describe, and name them when you can.
- Walk through a field of stickers. Pull them out of your socks, sketch and describe them. How many ways can you find that seeds have of sticking? Find the seed in each sticker.
- Finish the thought "I'm so hot I could. . ." How do animals and plants adjust to the heat?
- Describe the plants and animals near a river or stream. How is life different here than just a little ways away from the water?
- Find an animal path in nature. What animals do you think use it? How worn is it? How tall are the animals that use it? Look for prints, hair, droppings, feathers.
- Find a feather. Draw it and describe its shape, structure, texture, color. Flap the air with it. Is it noisy or silent? Guess what bird might have left it there.
- Visit a flower in the morning, at noon, in the evening, and again at night. How does it change throughout the day? Notice its texture, droop, color, how open it is.

NAME _____ DATE _____

## What Is Life?

You are alive, aren't you? How about dogs and cats? They are alive, too. You probably just know this without knowing exactly why. How about worms, trees, or coral? You are going to be learning about a lot of different living things, but first let's learn to tell if something is alive.

Scientists have found that all living things are made of tiny building blocks called cells (selz). Just like you might build a castle out of Legos of different sizes and shapes, living things are made of stacks of different cells. Unfortunately, most cells are too tiny to see so we will learn other ways to tell if something is a living thing. Think of your own body when you read this list of living characteristics.

All living things 1. take in energy (we do this by eating) and 2. get rid of the waste. They all 3. move, although some, like plants, move very slowly. All living things 4. grow and can 5. reproduce or make babies. All living things have some type of 6. circulation – like our blood moving in our bodies, and some type of 7. respiration – like our breathing. The last thing is, all living things 8. respond to what's around them. Many objects that aren't alive do some of these things, but only living things do all of them. For instance, a car isn't alive but it moves and gets rid of waste (exhaust). Think about your own body now. Can it do all of the things on this list? Yes, it can because you are alive!

# Living Lab #1: SIGNS OF LIFE – instructions

**Materials:**

- Lab sheet, pencil
- Plant and rock to observe (optional)

**Aloud: All living things are made of building blocks called cells. Unfortunately, cells are usually too small to see without a microscope, so we have to use other features like growth, respiration (a fancy word for breathing) and movement. In the activity today, you will think about 4 things you have seen before and decide if they are alive by using a checklist of characteristics. Living things will do all of the things on the list. Things that aren't alive can often do some of the things on the list. Some things, like circulation, are hard to see. Do your best, and through the year as we study living things you will learn how to look for circulation, respiration, and other signs of life.**

**Procedure:**

1. Before going through the checklist of living characteristics, guess which of the four items you think are alive.
2. Do your best to fill in the chart. HINTS FOR PARENTS:

   FOR BIKE AND ROCK:
   Let kids use their imaginations, but guide them to understand that bikes and rocks only move with help from gravity, being pushed etc., and they don't reproduce (make another whole bike or rock). They don't show circulation, respiration, or a response to the environment, but kids may come up with creative ways to say they do, which is fine.

   PLANTS:
   Take in energy = although they don't eat, plants get energy from the sun.

   Give off waste = plants give off oxygen (a waste product) just like we give off carbon dioxide.

   Movement = plants move slowly to face the sun: some flowers and leaves open and close at night.
   Circulation = plants have tubes that carry water up and food down and throughout the plant. We will be looking at these later in the year, but for now you can check out the tubes when you "string" your celery.

   Respiration = plants breathe in carbon dioxide and breathe out oxygen (the reverse of what people do).

   Respond to Environment = plants lose their leaves in the winter, give off electrical impulses when cut, sprout when the rain and temperature are just right, etc.
3. Finish lab sheet.

**Possible Answers:**

1. The easiest characteristics are usually growth (it's easy to see that your bike and a rock aren't growing) and reproduction. Even though a piece of rock splits off of a bigger rock, that piece will never grow up to make full-sized rocks of its own.
2. If you look at a living thing under a microscope, you will see it is made of cells.

**Conclusion / Discussion:**

– Obviously, people and plants are alive, but not bikes and rocks. Your chart might show a different answer, which is fine, as some characteristics are hard to see. The object isn't to get it right, as much as to start to look for living characteristics in other things such as sponges, corals, worms, etc. This takes practice.

*continued*

**For More Lab Fun:**

If this was easy and fun for the kids, challenge them to explain why a computer, a car, a river, or a fire are not alive. All of these show living characteristics.

NAME _____ DATE _____

# Living Lab #1: SIGNS OF LIFE

Are the items on the line below alive? On the line next to each one write Y for yes or N for no.

MY GUESS BEFORE DOING THE LAB

People _____ Bike _____ Rock _____ Plant _____

On the chart below, put an X in the box if the object has the characteristics listed. If not, leave it blank. Put a ? if you're unsure.

| CHARACTERISTIC | PEOPLE | BIKE | ROCK | PLANT |
|---|---|---|---|---|
| Takes in energy (e.g. food, minerals) | | | | |
| Gets rid of waste (e.g. sweating, urinating) | | | | |
| Moves (by itself) | | | | |
| Grows | | | | |
| Reproduces (can make babies) | | | | |
| Circulation (blood, water, etc. moves inside) | | | | |
| Respiration (takes in and gives off gases), Breathing | | | | |
| Responds to environment (e.g. moves toward the light, runs from danger) | | | | |

For something to be alive it must be able to do all the things listed on the chart. After doing the lab, do you think the things on the list are alive? On the line next to each one write Y for yes and N for no.

People _____ Bike _____ Rock _____ Plant _____

1. Some characteristics are hard to see like circulation and respiration. Which characteristics from the list are the easiest to observe?

_____

2. If you could look at any living thing under a microscope, what would you see it was made up of? _____

# Living Lab #2: PLOT STUDY – instructions

**Materials:**

- Lab sheet, pencil
- Field, overgrown lot, or other wild area at least 1 meter square to do your study
- String: over 4 meters long
- 4 stakes or sticks (to mark the four corners of the plot)
- Hammer or rubber mallet (if needed, to pound stakes into the ground)
- Meter stick
- Clipboard and pencil
- Small clear jar or critter keeper
- Hand lens / magnifying glass (optional but highly recommended)
- Field guides of local insects, animals tracks, plants (optional)

**Aloud: Today we will do a plot study. This means we will mark off an area, called a plot, outside and look closely at the living and nonliving things that make up that plot. Scientists do this to compare the features of one area with another. By doing so, they can learn the kinds of areas certain plants and animals can grow. It also helps to tell scientists when an area is becoming unhealthy. We will be looking for living and nonliving things in our study plot. You may have to look closely, but I'm sure that you will be surprised at how much life you will find! There are many living things so tiny we walk right over, and ON them without even knowing they are there.**

**Procedure:**

1. Choose a good, preferably wild, area to study. A field, overgrown garden, or empty lot works well. Try to avoid a manicured lawn. There won't be much plant diversity there.
2. Measure an area that is four meters square, pounding a stake into the ground at each corner. Wrap or tie the string around each stake creating your plot study area. All study takes place in the square. No fair writing down what you see out of the square, even if it is neat-o, but your plot can go as high into the air or as deep into the soil as you wish.
3. Make a list of living and nonliving things you see in the plot. Every species should be listed on a separate line. Don't just put "weed." Put "dandelion" or "small plant with yellow flowers and spiky leaves." Describe what you can't name. Use as much detail as possible. Under living, put the insects, worms, plants, leaves, etc. For nonliving, list the different rocks you see, soil types, any man-made objects, water. Twigs and leaves were once living so they go there. Nonliving is not the same as dead.
4. After looking closely with a hand lens (you might be amazed at how pretty "dirt" can be), inspect under rocks, leaves, and branches. These are great places to find beetles, worms, and other interesting creatures. Every item turned over should be placed back exactly how it was so its inhabitants will not be displaced. Look up into the sky. Is there a tree above your plot? Birds flying over? The more you can get your children to just spend time looking, the more they will get out of this activity.
5. Choose a living and nonliving thing to draw. Put the living thing in the container while you draw it.
6. Finish your lab paper. For question 3, if you have a plot with a tree, estimate its height, otherwise measure.

**Conclusion / Discussion:**

1. Discuss your list of living and nonliving things. What did you have more of? How would that be different on a beach or in the rainforest?

*Continued*

2. Discuss the signs of life passing through. Did you find footprints, droppings etc.? Did you find any signs of human damage?

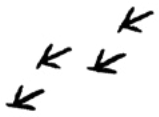
**For More Lab Fun:**

Start a nature journal. Write a description of the living and nonliving things you come across. Tape in samples of leaves or common plants you come across. Include drawings to help you remember what you have seen.

NAME _____ DATE _____

# Living Lab #2: PLOT STUDY

List the major living and non-living things in your study area.



| LIVING | NON-LIVING |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Signs of living things visiting my plot (droppings, tracks, partly eaten leaves...):

_____

_____

Signs of humans visiting my plot (footprints, writing, trash...):

_____

_____

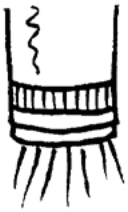
Choose one living and one non-living thing from your plot to draw. Look very closely at them. Draw them in as much detail as possible.

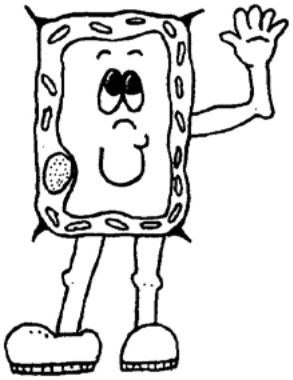
| LIVING | NON-LIVING |
|---|---|
| | |

1. Choose one word to describe your plot (forest, grassy...)_____
2. Choose one word for the soil in your plot (rocky, sandy...) _____
3. How tall is the tallest plant in your plot? _____

NAME _____ DATE _____

# LIVING THINGS ARE MADE OF CELLS





All living things are made of cells, just like all snowmen are made of snowflakes. Like snowflakes, most cells are too tiny to see, but if you put enough of them together you can make something big enough to see. Some living things are made of only one cell, but you are made of way too many to count. In your body there are many different kinds of cells to do lots of different jobs. Your blood has round, candy-shaped cells that carry oxygen, and blobby cells that can change shape to attack diseases in your body. Most animal cells are sort of round, and most plant cells are rectangles that are held together like blocks in a wall to hold the plant up.

Another difference between animal and plant cells is that plant cells have football-shaped things called chloroplasts (**klor**-o-plasts). Have you ever heard that plants can make food from sunlight? The green chloroplasts in the plant cells do that job. There are so many of them that they make almost the whole plant look green. Most cells also have a nucleus (**new**-klee-us). This is a very important part of the cell. It is the control center. Just like your brain controls what your body does, the nucleus controls what the cell does, how it moves, and how it looks.

# Cell Lab #1: AN EGG IS A CELL – instructions

**Materials:**

- Lab sheet, pencil
- Colored pencils: orange, yellow, blue, green, and brown
- Chicken egg
- Hand lens
- Small dish

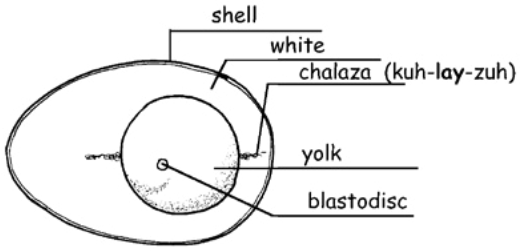
**Aloud: What is every living thing made of? Cells, right? Most cells are far too tiny to see. It takes a lot of different types of cells to make all the different parts of all the different living things on earth. Some of those cells are visible without a microscope. We are going to look at one cell that is big enough to see without expensive equipment. An egg is a cell with a very special purpose: beginning a new life. Let's look and learn about cells and this special, life-giving cell.**

**Procedure:**

1. Inspect the shell with a hand lens. It has very tiny holes to allow air and water to enter and leave the cell.
2. Gently break open the egg. Try to not break the yolk. Pour the contents and place the shell onto a small dish. Compare the egg to the egg diagram, finding the parts listed. Inspect the yolk very closely to find the very tiny, white blastodisc. It is a very important part of the cell and contains all of the cell parts except the food storage for the growing chick.
3. Use what you know and the clues from the chart to label the parts of the egg. Color the parts as indicated.
4. Draw the actual cell parts (hint: there are only 2) in the box provided.

**Possible Answers:**

#1 The yolk and the blastodisc are the actual cell parts.




**Conclusion / Discussion:**

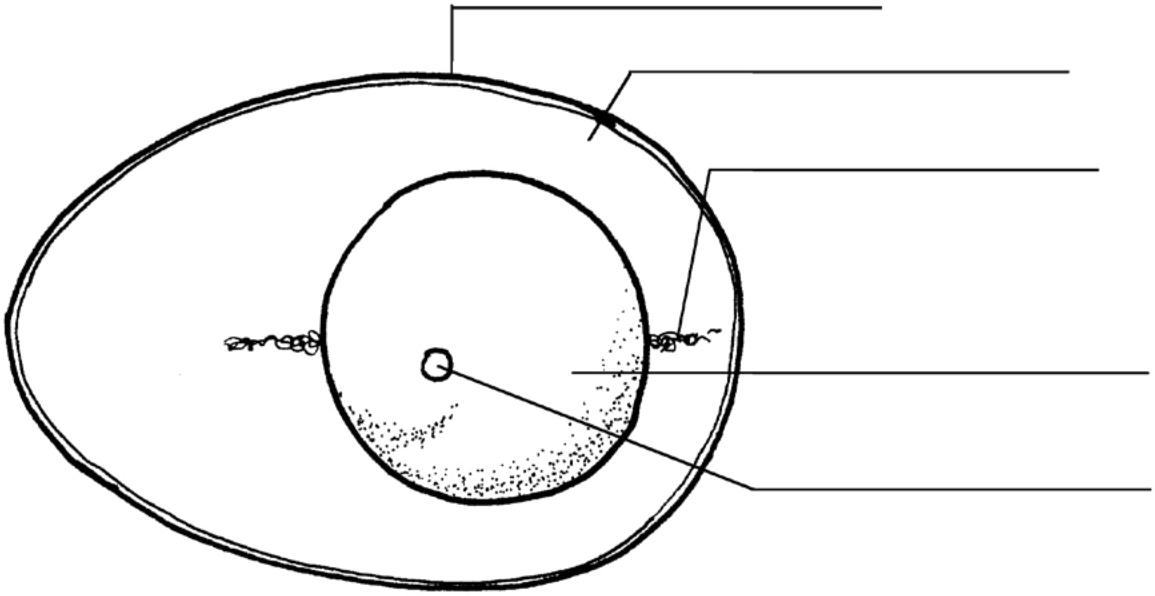
1. Why would this type of cell be so well protected? What might happen if it weren't surrounded by a shell and white gooey liquid?
2. Eventually a chick could hatch out of a fertilized egg. The yolk will have disappeared by then. Where do you think it might have gone? (To feed the growing chick.)
3. How could you tell just by looking that this is an animal cell and not a plant cell? (Plant cells are usually rectangular and have green chloroplasts.)

**For More Lab Fun:**

1. Find out which animals lay eggs with a hard shell and which lay eggs without a shell.
2. Host a cell party. Have a cell (egg) and spoon race and a cell toss. Serve deviled cells and cell salad sandwiches.

NAME _____ DATE _____

# Cell Lab #1: AN EGG IS A CELL



| | | | |
|---|---|---|---|
| non-cell parts | shell | Protects the egg cell. | brown |
| | white | Cushions the egg cell. | yellow |
| | chalaza | Rope like strands that anchor the cell in place. | green |
| cell parts | yolk | Largest part of the cell. Food storage for the developing chick. | orange |
| | blastodisc | Contains most cell parts including the nucleus. | blue |

1. In the box below sketch the actual cell parts of your egg.

# Cell Lab #2: PLANT AND ANIMAL CELLS DIFFER – instructions

**Materials:**

- Lab sheet, pencil
- 6 oz. box light-colored gelatin (pineapple or lemon)
- Small, square pan (to hold 2 cups of gelatin)
- Round bowl (to hold another 2 cups of gelatin)
- 20 or so green grapes (for chloroplasts), cut into half lengthwise
- 2 orange slices or 2 whole strawberries (for the nucleus of each cell)

**Aloud: Even when you can find a cell big enough to see, you really can't see its parts very well without a microscope. Today we are going to make a model of a plant cell and a model of an animal cell to show how they are different and how they might look if you were shrunk down many sizes. Maybe for dinner you can sink your teeth into science.**

**Procedure:**

1. Do the "BEFORE THE LAB" section of the lab sheet.
2. Prepare gelatin as instructed on the box. Pour 2 cups into the square pan and 2 cups into the round pan.
3. After gelatin is mostly set, have students determine which pan represents the plant cell (the square one). Add the grapes (chloroplasts) to the plant cell. Stir them around into the gelatin.
4. Add one orange slice or strawberry to each bowl, pushing it into the middle of each one.
5. Complete lab. If desired, label the gelatin cell parts with flags on toothpicks. Make sure to include a label for the chloroplast, nucleus, and cell membrane.

**Possible Answers:**

1. The rectangular one is the plant cell. The round one is the animal cell.
2. Chloroplasts go into the plant cell.
5. A plant cell is rectangular and has chloroplasts.

**For More Lab Fun:**

1. Find other things to make cell models out of. How about Legos or K'Nex?
2. Act out the different parts of the cell. The cell membrane keeps out intruders (bacteria, toxins etc.) and keeps the cell together, the nucleus is the control center (boss) of the cell, and the chloroplasts make food.
3. To help children understand the function of the cell parts, let them call the family boss (dad or mom) "nucleus" for a day. Maybe you have a dog that keeps out intruders. Let him be called the "cell membrane" for the day. Whoever is usually the cook can be called "chloroplast" for the day. Encourage your children to feed the "cell membrane" and help the "chloroplast" get dinner ready. Don't forget, when the "nucleus" tell you to clean your room, you better do it!

NAME _____ DATE _____

# Cell Lab #2: PLANT AND ANIMAL CELLS DIFFER

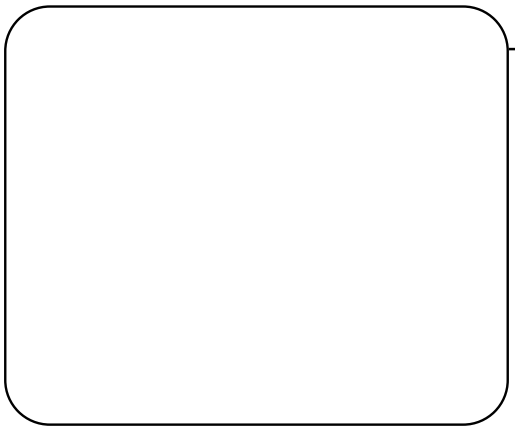
BEFORE THE LAB:

1. Label the shapes below either "Animal Cell" or "Plant Cell."
2. In which cell will you put the chloroplasts (grapes)? _____

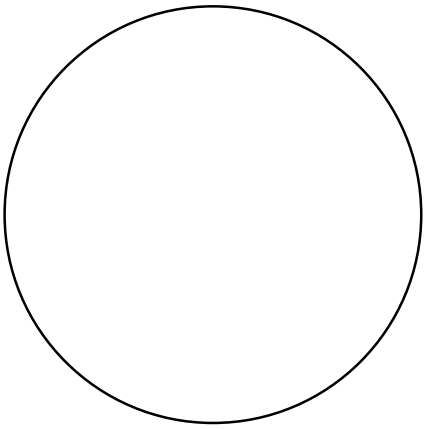
AFTER MAKING THE CELLS:

3. Draw the cells that you made.
4. Label the cell membrane, nucleus, and chloroplasts. The first pointer is drawn to show you how.

_____ CELL



_____ CELL



5. I can tell a plant cell from an animal cell because a plant cell _____

_____

and _____ .

# THE HUMAN BODY

by

_____

# HUMAN BODY FOLDER – instructions

**Materials:**

- The Human Body cover sheet (page 43), pencil
- 12” x 12” Colored cardstock (I like scrapbooking paper as it lasts longer and doesn’t fade)
- 12” x 18” Construction paper or good, thick drawing paper
- 3-Hole punch
- Glue gel (Elmer’s School Glue Gel – we call it blue glue because it is)
- Stapler
- Scissors
- Yarn
- Colored pencils

**Aloud: We are going to start studying the human body – your body. Every part in your body helps you to stay alive. We will be learning what many of these parts do and how they work together. Can you imagine riding a bike if the wheels were missing? What if it had no pedals? Just like the different parts of a bike, your body parts must work together. If just one part is missing, or not doing its job, your body can stop working for you. Groups of body parts that help do a job together are called body systems. One body system keeps you fed, another keeps your blood moving. Before we learn about these systems, we are going to put together a folder to store all of your human body information. It will be a folder of how your own body works.**

**Procedure:**

1. Decorate and color “The Human Body” divider page. Add your name to it. Glue it to the 12” x 12” page to make the front cover for your folder.
2. Fold up the bottom 6” of the 12” x 18” piece of paper so that you form a 12” x 12” page with a pocket at the bottom. Staple the right side closed. The pocket will be inside the folder.
3. With the 12” x 12” cover in front and the pocket inside, three hole punch the left side of both pages. Tie yarn in the holes to hold the folder together.
4. As you do the human body units, add any pages to your folder that you wish. Lab pages can be tied in with the yarn, paper models (like a muscle model and skeleton “puzzle” you will be making) can be put into the pocket.
5. Have fun learning all about how your body works!

NAME _____ DATE _____

# SKELETAL AND MUSCULAR SYSTEMS

Why aren't you just a gooey blob like a sea jelly? Because you have bones. These bones protect delicate organs like your heart, brain, and lungs, and they support you so that you can stand up and move. Did you know that most animals don't have any bones at all? Insects, worms, slugs, sea jellies, and many others have no bones. Run your hands around your ribs. You can follow them from your vertebrae or backbones all the way around to the front by your chest. All of your ribs together form your rib cage. Why do you think they call it a "cage"? Feel the bony plate where your ribs meet in front. This is your sternum (**str**-nuhm) and it protects some very important organs inside of you. Bones are connected to each other in remarkable ways that allow us to move around, but without muscles to pull our bones back and forth we would be as still as a puppet with no strings. Bend your arm at the elbow. When you do this, the muscle on the front of your upper arm pulls to become shorter. When you straighten your arm again, the muscle in *back* pulls and shortens. These muscles that move you around aren't the only muscles in your body. Your heart is one special kind of muscle but there are many others. Muscles help with everything from breathing to digesting food to moving your eyes.

So, with bones to hold you up and muscles to get you moving, you can go places no sea jelly could ever imagine.

# Skeletal System Lab: MY SKELETON HOLDS ME UP – instructions

**Materials:**

- Lab sheet
- Scissors
- Glue gel (Elmer's School Glue Gel)
- 1 – 8 1/2" x 11" Black (or other color of choice) construction paper
- White or gold pen that will mark on black paper

**Aloud: Your skeleton is a framework of bones that gives you shape and holds you up. It also protects delicate organs from bumps and bruises. Bones have funny names but they aren't really hard ones to learn. You probably already know that your brain is protected by your skull. You may even know that hips are wide bones called the pelvis. When you hit your arm just right it sends an icky tingle down your arm doesn't it? So it isn't very humorous to hit your humerus, is it? Your femurs are the longest bones in your body. Can you find which ones those are? Have fun cutting out and gluing your skeleton puzzle together and as you go, think about in which part of your body each bone lies.**

**Procedure:**

1. Cut around each section of bones. The black around each one gives little hands a little room for error.
2. Lay the bones on the black paper where you think they should go. Check arms and legs, feet and hands on the sample is in the corner of the lab sheet.
3. Once everything is where it belongs, remove and glue the pieces down one at a time.
4. If you wish, use a white or gold pen to label the major bones.

**Possible Answers:**

See sample on lab sheet for correct bone placement

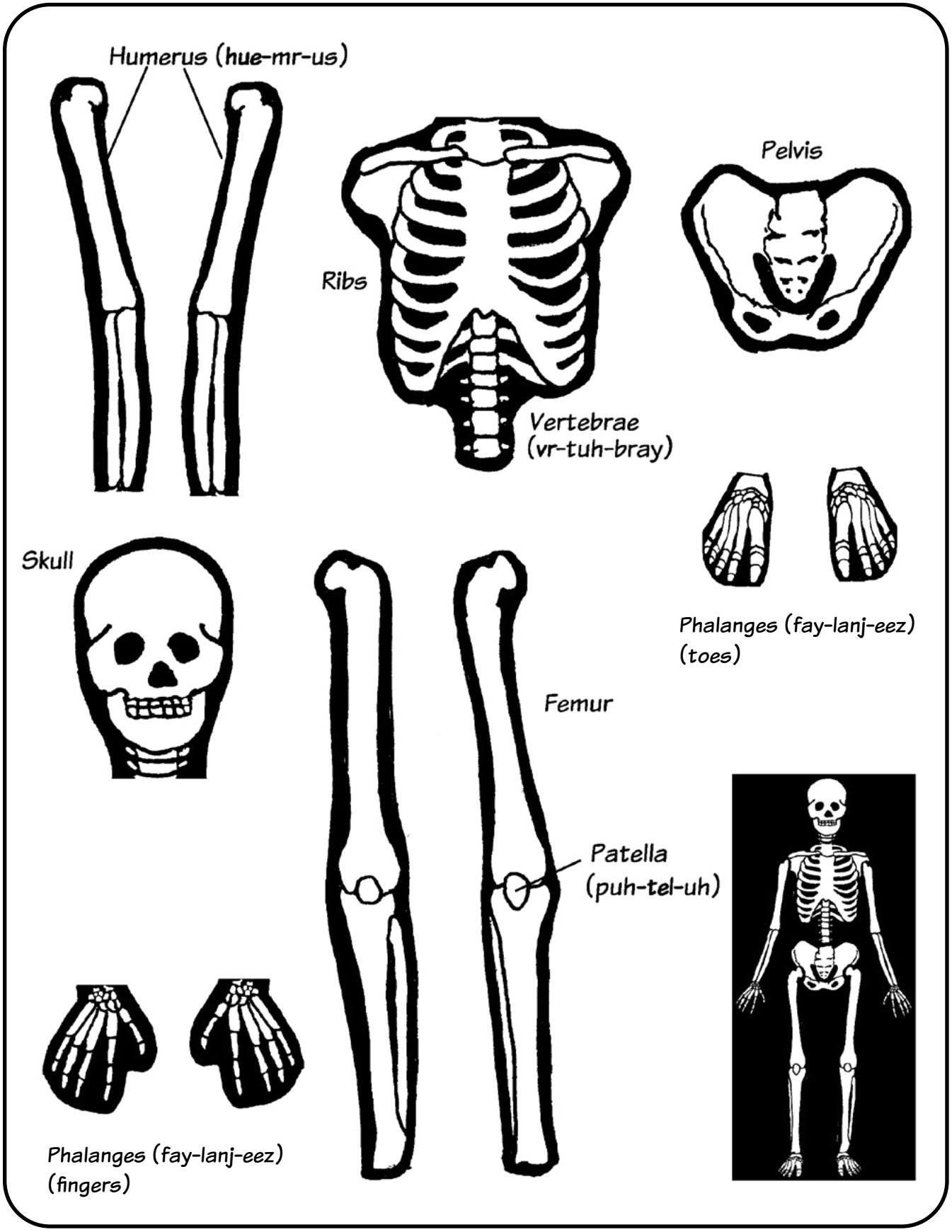
**Conclusion / Discussion:**

1. Without bones animals can't get very tall, or must live in water so the water can hold them up. Sea jellies are tall but they float in water. On land the tallest invertebrate (boneless animal) is probably an insect. Doesn't compare to human height, does it?
2. How do we know there will never really be monstrously large spiders and scorpions like we see in science-fiction movies?

**For More Lab Fun:**

1. Play Simon Says using the names of bones. You can pat your skull or touch your patellas, tickle your ribs, or thump your sternum.
2. Next time you pull apart a chicken or turkey for dinner, take a good look at the bones. Compare them to human bones.
3. Older children may want to identify and label the following bones as well:
   Lower arm bones are the radius and ulna
   Lower leg bones are the tibia and fibula
   Fingers and toes are all phalanges
   Your jaw is your mandible
   Your shoulder blades are called scapulae
   Your collar bone is your clavicle

# Skeletal System Lab: MY SKELETON HOLDS ME UP



# Muscle Lab: MUSCLES AREN'T PUSHY – instructions

**Materials:**

- Lab sheets (3 pages), pencil
- Tagboard or very heavy copy paper – 8 1/2" x 11"
- Scissors
- Hole punch
- Metal fastener
- String or thread 70 cm. long (about 28") cut in half
- Tape
- Ruler

**Aloud: Bones hold us up but without muscles to move those bones we'd be a lot like a tree – stuck in one spot. Muscles pull to move bones but they can't push. Because of this, muscles have to work in twos. To bend your arm, one muscle pulls. To straighten your arm back out, a muscle on the other side has to pull. We're going to make a model of an arm and show how two muscles work together to move it.**

**Procedure:**

MAKE YOUR ARM MODEL

1. Trace or photocopy pattern of upper and lower arm onto thick paper. Cut out.
2. Punch holes at circles and at center of X's. You will have 3 holes in piece Q and 1 hole in piece Z.
3. Place pieces Q and Z as indicated in top diagram on page 58. Push metal fastener into holes at the X's to secure pieces.
4. Thread one piece of string from back, through each hole at the top of Q and tape them down onto piece Z where indicated in bottom diagram.

USING YOUR MODEL

5. With arm in position shown in diagrams, pull slack from strings and then measure and record length from end of hole to start of tape. Record on line labeled "Beginning."
6. Carefully pull string #1 until arm can't move any further. Again, measure both strings and record on chart. Compare lengths with those from the beginning to fill in all answers in the row for "String #1 pulled."
7. Pull string #2. Repeat measurements and record.
8. Finish filling in chart for "String #2 pulled."
9. Answer lab questions.

**Possible Answers:**

#1. Lower arm and hand or forearm.

#2. Upper arm

#3. Muscles

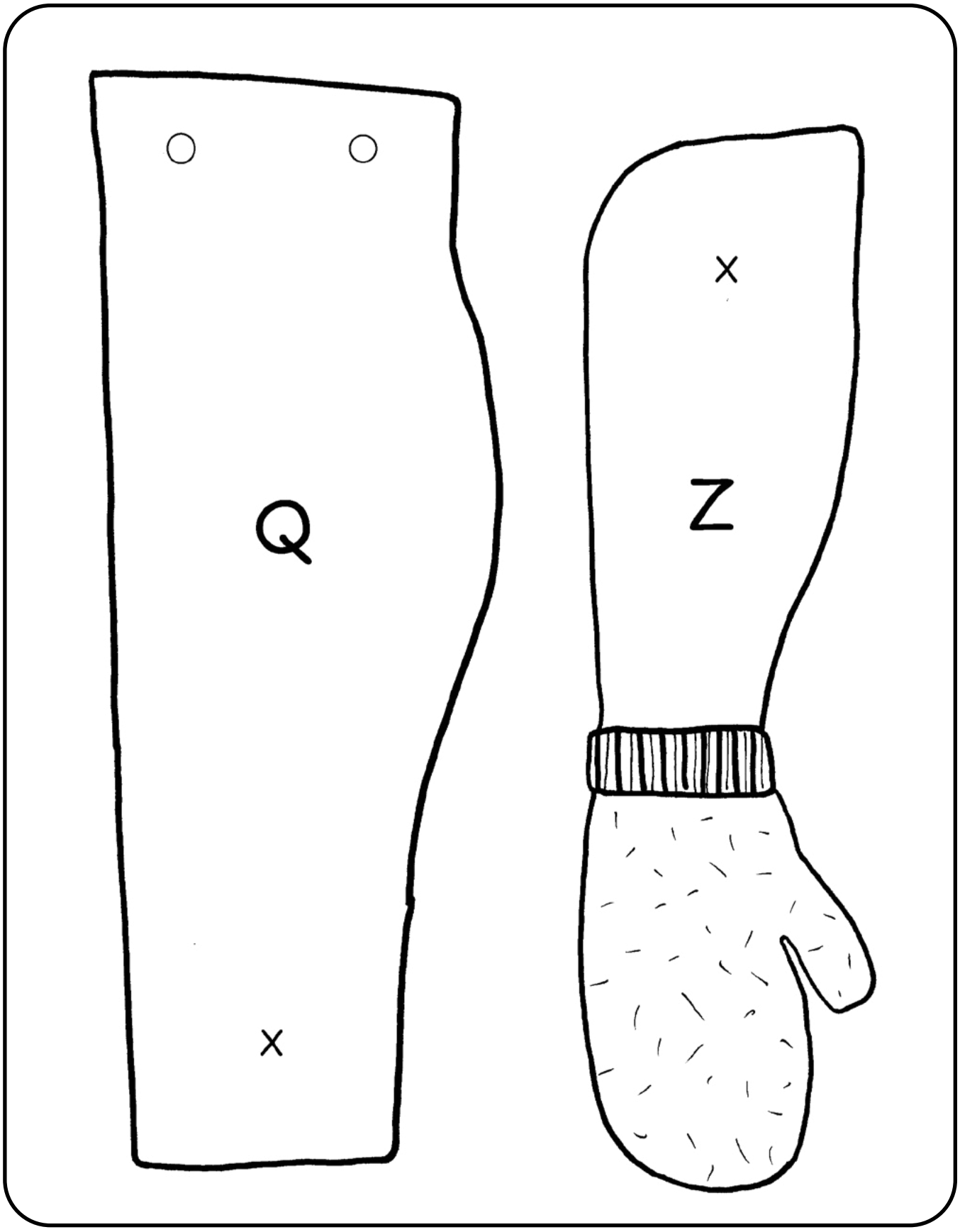
#4. 2

#5. Front

**Conclusion / Discussion:**

Help children notice that as a muscle pulls it is actually becoming shorter. When the opposing muscle (the one that does the opposite motion) pulls, the original muscle relaxes and gets longer.

# Muscle Lab: MUSCLES AREN'T PUSHY – p. 1



NAME _____ DATE _____

# Muscle Lab: MUSCLES AREN'T PUSHY – p. 2

| | Length of String #1 | Length of String #2 | String #1 gets (Shorter or longer) | String #2 gets (Shorter or longer) | Arm (bends or straightens) |
|---|---|---|---|---|---|
| Beginning | cm. | cm. | _____ | _____ | _____ |
| Pull String #1 | cm. | cm. | | | |
| Pull String #2 | cm. | cm. | | | |

1. What part of your body is part Z supposed to be? _____

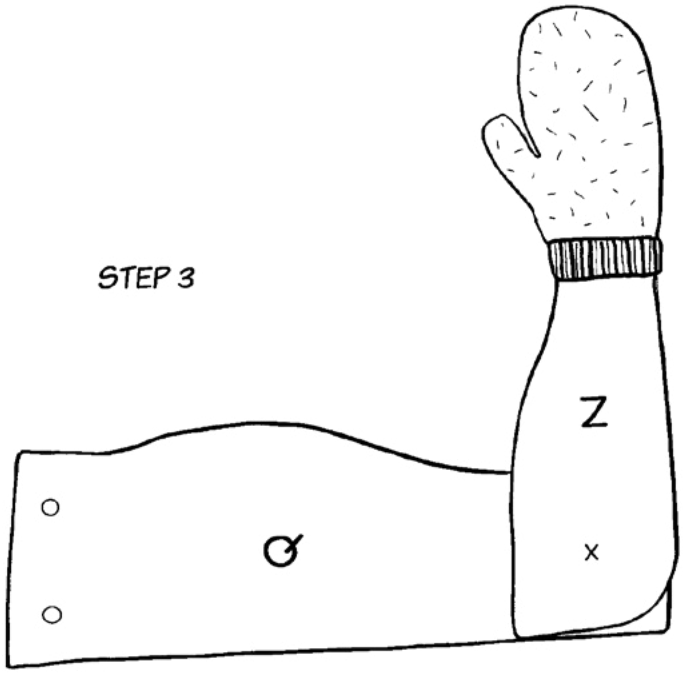
2. What part is part Q supposed to be? _____

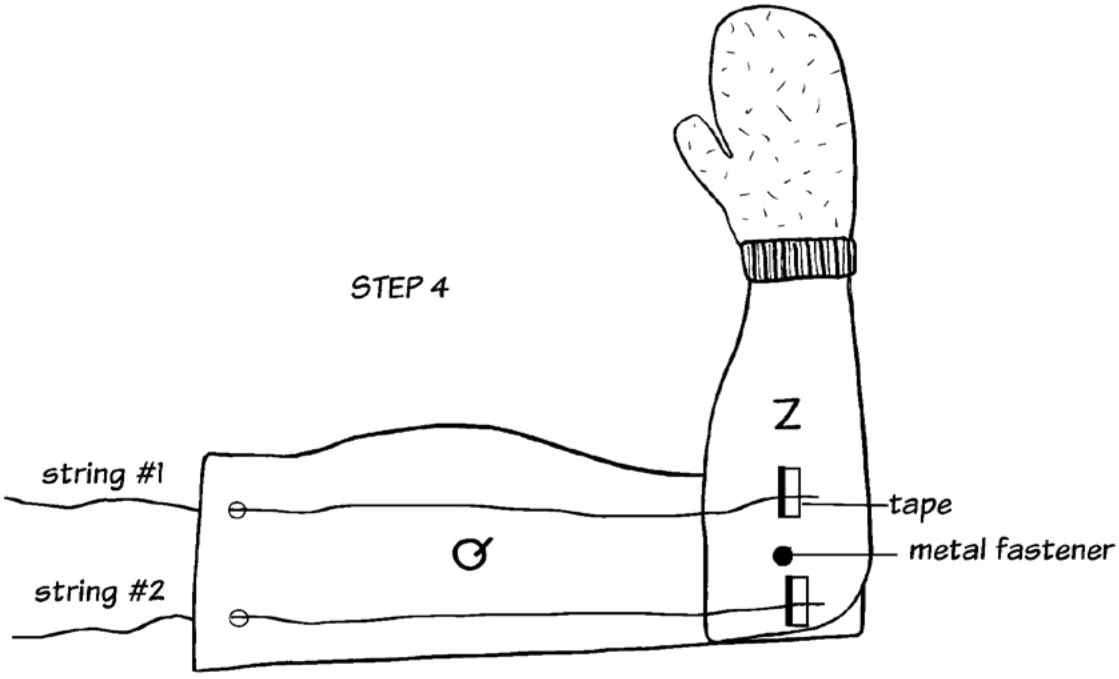
3. The strings are supposed to be _____

4. How many muscles does it take to move an arm up and down? _____

5. When your elbow bends which muscle is getting shorter, the muscle in the front or the one in the back of your arm? _____

# Muscles Lab: MUSCLES AREN'T PUSHY – p. 3




*Side of tape shown in dark should be about even with metal fastener.*
*Be careful tape doesn't hang over and stick to part Q.*

NAME _____ DATE _____

# CIRCULATORY SYSTEM – YOUR HEART AND BLOOD

You know that muscles are important body parts, but which muscle is the MOST important? Your heart would probably have to take that prize. Your heart is a muscle that pushes blood all through your body. This blood carries oxygen, food, and water, and it carries special cells that fight diseases. Blood travels through tubes called blood vessels. The vessels going away from your heart are called arteries (**ahr**-tuh-reez). The vessels going back to your heart are called veins (vaynz). How long are all these vessels? Well, if you could lay them all end to end they would go all the way around the world. Now, hold up your hand and make a fist. Your fist is about the size of your heart. Not very big, for all the work it does, is it? Your heart may not be very big but it sure is powerful. Try to squeeze a tennis ball hard enough for it to squish in. That's how hard your heart squeezes and it does that between 80 and 100 times each minute. Now that is a powerful muscle! So, your circulatory system moves blood all through your body. The heart is the muscle that pushes the blood away through arteries and then back again through veins. Along the way, blood carries oxygen, food, and water as well as cells that fight diseases. By drinking water, eating right, and exercising regularly you can help keep this amazing system healthy for many years. Now that doesn't seem like too much to ask for something that works that hard for you, does it?

# Circulatory System Lab #1: YOUR HEART RATE – instructions

**Materials:**

- Lab sheets (2 pages), pencil
- Watch with second hand
- Crayons – 6 colors

**Aloud: Your heart works hard to supply your whole body with the food, water, and oxygen it needs. Your body needs these things just like a car needs gasoline. Without fuel, your body will stop working. In fact, the harder your body works, the faster it uses up its fuel. When you are exercising hard, your heart pumps faster to hurry food, oxygen, and water to all the parts of your body. When you slow down, so can your heart because your body doesn't need as much of these things. In this lab you will compare how fast your heart is working when you are resting with how fast it works when you are exercising. Let's see just how well your heart can tell how much work your body is doing.**

**Procedure:**

1. Fill in questions 1 – 4 on lab page 1.
2. PARENTS: It might be easiest if you to take your child's pulse for him. Younger children often lose count easily.
3. Practice finding your (or your child's) pulse. One easy place to find a pulse is on the wrist. Using your index and middle fingers but NOT your thumb (which has its own pulse), find the stiff ridge that runs down the inside of the wrist on the thumb side. Place two fingers on the thumb side of this ridge. Push down slightly and you should find a pulse.
4. Sit very still and quiet for a minute. Take pulse for 20 seconds. Continue with activities and checking pulse. Fill in beats per 20 seconds. For exercise #10 choose your own favorite. Depending on math level, either add pulse three times (for example, if you count 60 heartbeats in 20 seconds, you would add 60 + 60 + 60) or multiply pulse by 3 (60 x 3) to find pulse for one minute. Finish page one.
5. Fill in and color graph to show comparison between resting and working heart rates. Complete lab.

**Possible Answers:**

#4. My heart pumps faster when I am working hard because my body needs more fuel when it is working.

**Conclusion / Discussion:**

How did the difficulty of the exercise compare to the heart rate? Why is this?

***F*or More Lab Fun:**

1. Take pulse every minute after exercising. See how long it takes pulse to return to normal. Graph the results.
2. Take a field trip to a blood bank. See how they screen donors and take blood. Learn about blood types.
3. Learn the basics of CPR.

NAME _____ DATE _____

# Circulatory System Lab #1: YOUR HEART RATE – p. 1

Of the activities below, I think:

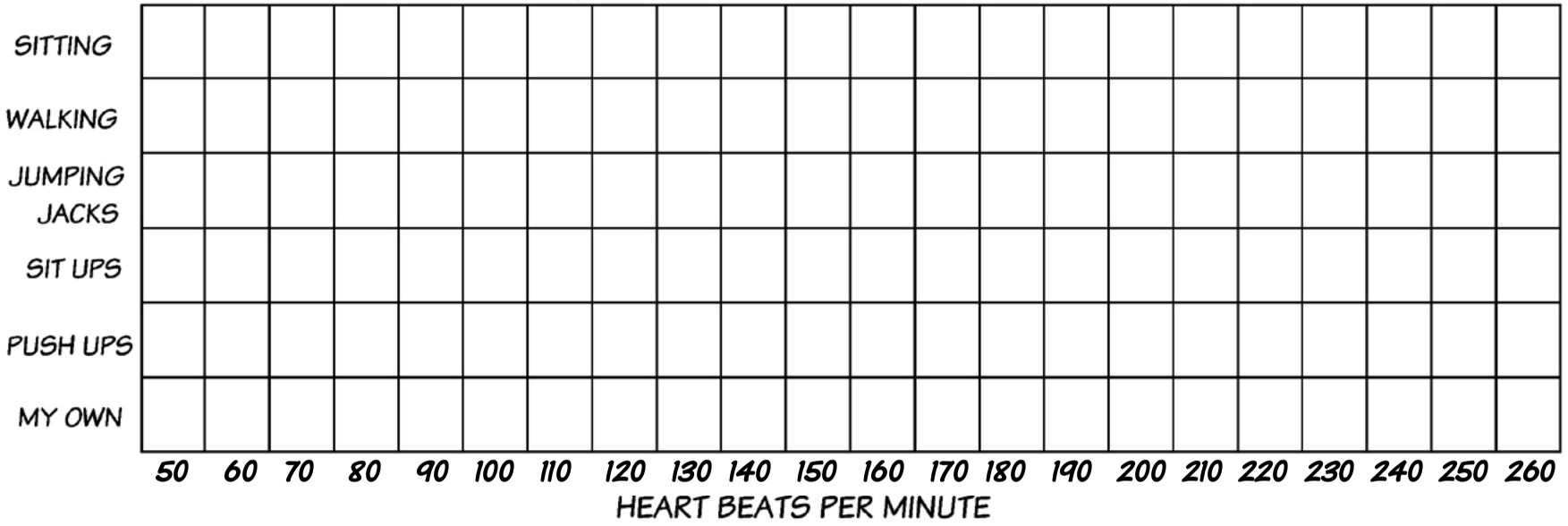
1. _____ will be the easiest and
2. _____ will be the hardest.
3. I think my heart will beat fastest when I _____
4. I think my heart will beat slowest when I _____

My heart rate for 20 seconds of:

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. Sitting still | = _____ beats | X | 3 | = _____ | beats each minute |
| 6. Walking (1 minute) | = _____ beats | X | 3 | = _____ | beats per minute |
| 7. Jumping Jacks (10) | = _____ beats | X | 3 | = _____ | beats per minute |
| 8. Sit ups (10) | = _____ beats | X | 3 | = _____ | beats per minute |
| 9. Push ups (10) | = _____ beats | X | 3 | = _____ | beats per minute |
| 10. _____ (exercise of my choice) | = _____ beats | X | 3 | = _____ | beats per minute |

# Circulatory System Lab #1: YOUR HEART RATE – p. 2

Enter the heart rates you calculated onto the graph below.
Color in the graph using a different crayon for each activity.




1. _____ was the easiest for me to do. My heart beat slowest when I did _____

2. _____ was the hardest for me to do. My heart beat fastest when I did _____

3. _____ exercises that make me work hardest, make my heart pump faster.
(The same or Different)

4. My heart pumps faster when I am working hard because _____

_____

# Circulatory System Lab #2: BLOOD MODEL – instructions

**Materials:**

- Lab sheets (2 pages), pencil
- Crayons – tan, blue, yellow, red
- 1 ½ cup (or larger) clear jar with wide mouth
- Stirring spoon
- ½ cup Light Karo syrup (PLASMA) (plaz-muh)
- ½ cup Red Hots candies (RED BLOOD CELLS)
- 5 dry large lima beans (WHITE BLOOD CELLS)
- 1 tablespoon dry lentils or split yellow peas (PLATELETS) (playt-lets)

**Aloud: Blood looks like a smooth, red liquid, but it's not. Blood is actually a straw-colored liquid with tiny cells mixed in it. Your lab today will show you the main blood parts so you can learn what they are for and what they look like. Blood parts are so tiny you can't see them without a microscope so, after coloring the blood picture, we will be making a model of blood to show how the parts look close up.**

**Procedure:**

1. Color in the blood picture as indicated. Make sure to read all of the information on this sheet.
2. Measure out the amounts of Karo syrup, Red Hots, lima beans, and lentils indicated above. Pour them into the jar, one at a time, calling them the blood parts they represent. For instance, don't say "Pour in the Karo syrup." Instead say, " Pour in the Plasma."
3. Mix gently with spoon and compare to real blood.

**Possible Answers:** (to page 66)

Red Hots = red blood cells Karo syrup = plasma

Dry lima beans = white blood cells Dry lentils = platelets

Plasma keeps things moving and transports food Red blood cells carry oxygen

White blood cells fight diseases by eating harmful bacteria Platelets plug up wounds to help clot the blood

**Conclusion / Discussion:**

Discuss the following: Is blood all red? (No). What part of blood gives it its red color? (red blood cells). How many major parts make up blood? (4).

**For More Lab Fun:**

Make a round cake. Frost it with yellow frosting (plasma). Decorate with white jelly beans (white blood cells), red M&Ms (red blood cells), and silver cake decorating balls (platelets). Put on a vampire cape and share your blood with your friends.

***F*or Your Information:**

1. Blood is red because red blood cells have iron in them. Iron mixed with oxygen becomes red. On the way back to the heart, after giving up its oxygen, blood is a bluish color. Insects and other animals have different-colored blood because their blood cells aren't iron-based.
2. Arteries carry blood away from the heart so they usually contain red, oxygenated blood. Veins carry blood back to the heart so they usually carry blood with no oxygen.

NAME _____ DATE _____

# Circulatory System Lab #2: BLOOD MODEL – p. 1

*This is what a drop of blood looks like under a microscope. Read the clues below and color the parts of the blood as indicated. Next, read the jobs each blood part performs. Write the name of that blood part.*

*White Blood Cells: I am the biggest cell in your blood. I have a nucleus that is often split into 2 or 3 parts. Color me tan.*

*Plasma: I am mostly water. I make up about half of your blood. Color me yellow.*

*Platelets: I am the tiniest part in your blood. Color me blue.*

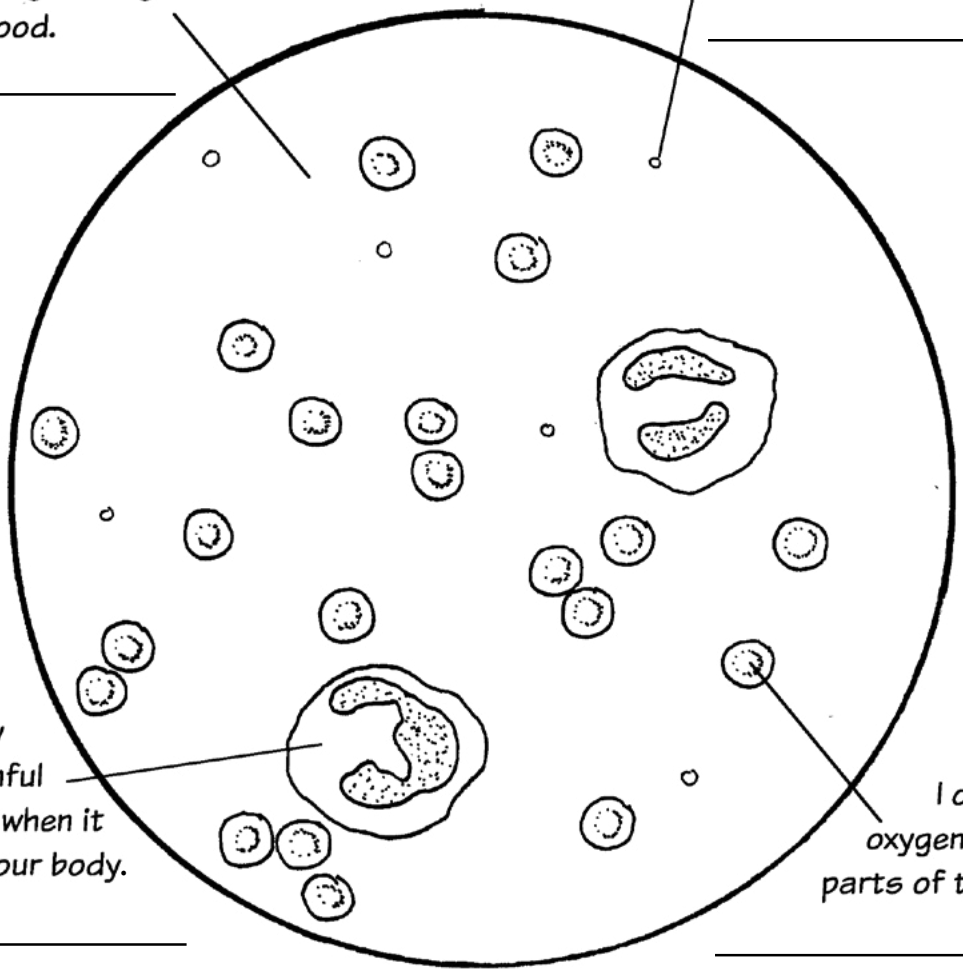
*Red Blood Cells: I am shaped like a round candy, dented in on both sides. There are more of me than any other blood cells. You can color me red.*

*I am the liquid that keeps everything moving. I also carry food.*

_____

*I plug up cuts to stop them from bleeding.*

_____



*I actually eat harmful bacteria when it enters your body.*

_____

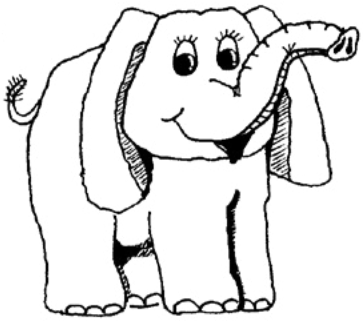
*I carry oxygen to all parts of the body.*

_____

# Circulatory System Lab #2: BLOOD MODEL – p. 2

Draw your blood model in the square below.

A person's heart weighs about 1 pound.
An elephant's heart weighs about 44 pounds!




What am I and what am I delivering?

Which blood part does each item represent?

Red hots candies =_____

Karo syrup = _____

Dry Lima Beans = _____

Dry Lentils = _____

In the spaces below, write the job done by each part of your blood.

Plasma _____

Red Blood Cells _____

White Blood Cells _____

Platelets _____

NAME _____ DATE _____

# YOUR RESPIRATORY SYSTEM BREATHES FOR YOU

What surrounds you all the time but you cannot see it, feel it, hear it, taste it, or smell it? Air! There is nothing more important to your body than air. Air is a mixture of many things but the oxygen in air is what your body needs most. Oxygen is a gas that your body combines with the food you have eaten to make energy. When you run, your body needs more energy, doesn't it? Because of this, when you exercise, you breathe faster to get more oxygen to make more energy. When you slow down, your breathing can slow down, too.

When you inhale or breathe in, air goes in your nose or mouth, down a tube called a trachea (**tray**-kee-uh), and into your 2 lungs. Your lungs are big bags made of a bunch of tiny bags that fill with air. Blood is pumped in tubes all around these tiny air sacs. Oxygen from the air goes into the blood, and carbon dioxide, a waste your body makes, comes from your blood and goes into the air sacs. When you breathe out, the carbon dioxide leaves your body. In with the good and out with the bad. It's a great system and it shows how all of our body systems work together to keep us alive.

Your respiratory system breathes in air, and passes the oxygen to your circulatory system—which combines it with food from your digestive system to make energy for your muscular system. Whew! And I thought breathing was so simple!

# Respiratory System Lab #1: BREATHING RATE – instructions

**Materials:**

- Lab sheets (2 pages), pencil
- Completed Circulatory System lab – "YOUR HEART RATE" pages 63-64 (for reference)
- Watch with second hand
- Crayons – 6 colors

**Aloud: When you breathe your body takes in oxygen. This oxygen is carried to all the cells in your body. Oxygen is needed by your cells to turn food into fuel. Without this fuel your body wouldn't be able to grow and do work. If oxygen is needed for your cells to do work, how do you think your breathing will change when your body is working harder than normal? We are going to do a lab to find out how hard work and exercise affect the way you breathe.**

**Procedure:**

1. Fill in questions 1 – 4 on lab page 1.
2. PARENTS: It is probably easiest if you count your child's breaths. Younger children often lose count easily.
3. Sit very still and quiet for a minute. Count the breaths you take for 30 seconds. Continue with activities and checking breathing rates. Fill in breaths per 30 seconds. For exercise #10 choose your own favorite exercise. Depending on math level, either add breaths two times (for example, if you take 20 breaths in 30 seconds you would add 20 + 20 ) or multiply breaths by 2 (20 x 2) to find breathing rate for one minute. Finish page one.
4. Fill in and color graph to show comparison between resting and working breathing rates. Complete lab. Refer to YOUR HEART RATE lab page 64 to answer question #3 (hardest exercise for my heart).

**Possible Answers:**

#4. My heart and lungs work together to take oxygen from outside the body and move it to all the cells in my body**.**

**Conclusion / Discussion;**

1. Discuss results. How did the difficulty of the exercise compare to the breathing and heart rates? Why is this?
2. Discuss how the circulatory, respiratory, and digestive systems are interconnected. They all do their part to provide the body with the chemicals it needs to survive.

**For More Lab Fun:**

1. Learn the basics of the Heimlich maneuver.
2. Develop an exercise routine that conditions your muscles as well as your heart and lungs.

NAME _____ DATE _____

# Respiratory System Lab #1: BREATHING RATE – p. 1

Of the activities below, I think:

1. _____ will be the easiest and
2. _____ will be the hardest.
3. I think my breathing will be slowest when I _____
4. I think my breathing will be fastest when I _____

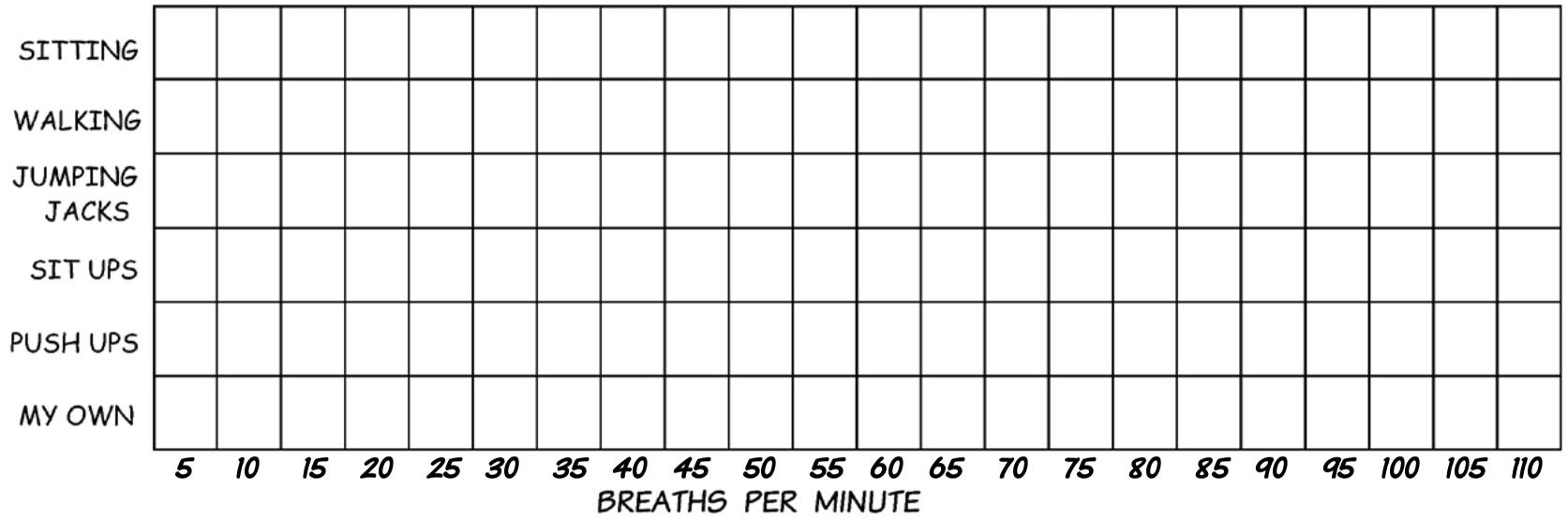
My breathing rate for 30 seconds of:

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. Sitting still | = _____ breaths | X | 2 | = _____ | breaths per minute |
| 6. Walking (1 minute) | = _____ breaths | X | 2 | = _____ | breaths per minute |
| 7. Jumping Jacks (10) | = _____ breaths | X | 2 | = _____ | breaths per minute |
| 8. Sit ups (10) | = _____ breaths | X | 2 | = _____ | breaths per minute |
| 9. Push ups (10) | = _____ breaths | X | 2 | = _____ | breaths per minute |
| 10. _____ | = _____ breaths | X | 2 | = _____ | breaths per minute |

(exercise of my choice)

# Respiratory System Lab #1: BREATHING RATE – p. 2

*Enter the breathing rates you calculated onto the graph below. Color in the graph using a different crayon for each activity.*




1. _____ was the easiest for me to do. I breathed slowest when I did _____

2. _____ was the hardest for me to do. I breathed fastest when I did _____

3. The hardest exercise for me was _____. The hardest exercise for my breathing was _____ and the hardest for my heart was _____

4. My heart and lungs work together to _____

_____

# Respiratory System Lab #2: I NEED OXYGEN – instructions p. 1

**Materials:**

- Lab sheet, pencil
- 4 Pieces of 8 1/2" x 11" paper or paper plates
- Long tube (like vacuum cleaner tube or wrapping paper tube) – label the tube "trachea"
- Red and blue math counters or chips (about 10 each color)
- Colored pencils – various colors
- A helper/teacher (acting as the giant)

**Aloud: Today you get to be a red blood cell (RBC) carrying oxygen through the body of a giant. You are going to start your journey in the giant's heart. From there you will go to the lungs, pick up some oxygen, and go back to the heart. The giant's heart will pump hard enough to get you all the way to the giant's foot. Because the giant is walking, his foot will be using up oxygen and making carbon dioxide—a waste product. You will need to trade your oxygen for the carbon dioxide, and take it to the heart so it can send you back to the lungs. Once in the lungs the giant will breathe out, sending the carbon dioxide out of his body. You will pick up more oxygen and go back around again. It's a long way to go for a little blood cell, like yourself, but you know it is a job that must be done for the giant to live.**

**Procedure:**

1. Using your highly developed artistic abilities, draw a big nose on one paper, a heart on another, a lung on another, and a foot on another. Label each one. Color them, if you would like.
2. TEACHER: Lay out the papers as shown on the Respiratory Setup on back of this page (page 74). Lay the tube between the nose and the lungs. Spread the others out so that the entire giant is about 10 feet tall. The tube is the trachea. Place 5 blue chips on the foot plate.
3. GIANT: (inhales, bringing oxygen into his lungs) – slide 1 red chip down the trachea onto the paper lungs.
4. RBC: 1) Start in the heart 2) Go to the lungs to pick up one oxygen 3) Back to the heart 4) Out the heart and down to the foot. At the foot, trade your oxygen for one carbon dioxide there 5) Head back to the heart with the carbon dioxide 6) And finally back to the lungs to get rid of your carbon dioxide.
5. GIANT: (exhale) slide the blue chip up toward the nose so it can leave the body. Inhale again, sliding another red chip onto the lung.
6. Repeat as often as you would like, to get children to understand the pathways of the blood, oxygen, and carbon dioxide.
7. Have children complete the lab sheet, using the appropriate colored pencil (red or blue) to color in the path of the oxygen and carbon dioxide.

**Possible Answers:**

See page 76

**For More Lab Fun:**

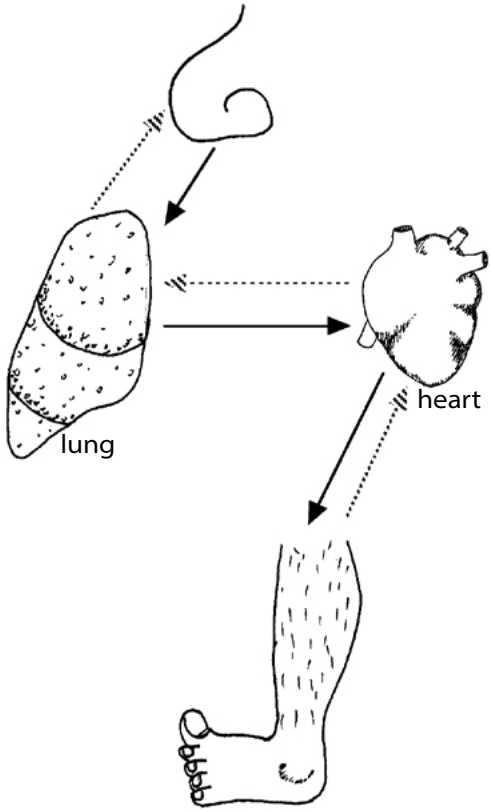
Continue with the giant breathing but start with all 10 blue chips on the plate and "breathe" faster, sliding the red chips onto the plate more quickly. Ask your child what he thinks is happening (the giant is exercising and using up more oxygen). The blood has to get moving to keep up with the oxygen demands. Go faster and slower, asking what might be going on (The giant could be riding a bike, watching a scary movie, sleeping, etc.)

*Continued*

**Setup:**

Set up your giant as shown below. Make sure the parts are fairly far apart (about 10' total).

Arrows are the answers for questions #1 and #2 of the lab. Don't show them to the students!




**Possible Answers:**

#1 (solid lines = red = oxygen) Note: Oxygen makes the hemoglobin in blood turn red so oxygenated blood becomes red.

#2 (dashed lines = blue = carbon dioxide) Note: Deoxygenated blood (blood without oxygen) has a bluish color.

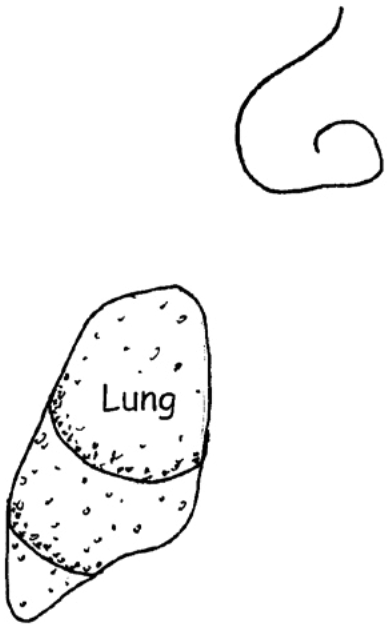
#3 When you exercise, your body is using more oxygen and producing more carbon dioxide, so RBCs have to deliver them faster.

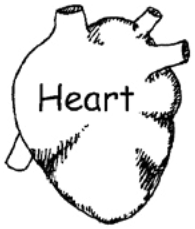
#4 Your RBCs are moving faster because your heart is pumping faster. You can feel your heart, breathing, and pulse speed up.

NAME _____ DATE _____

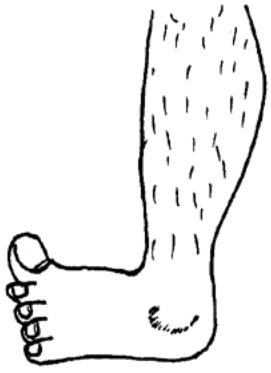
# Respiratory System Lab #2: I NEED OXYGEN

1. With a red pencil, use arrows to show the path oxygen takes from where it enters the body until it reaches the foot.
2. With a blue pencil, use arrows to show the return journey made by carbon dioxide.







3. Why do your RBCs have to move faster when you are exercising?

_____

4. How can you tell your RBCs are moving faster? Can you feel them?

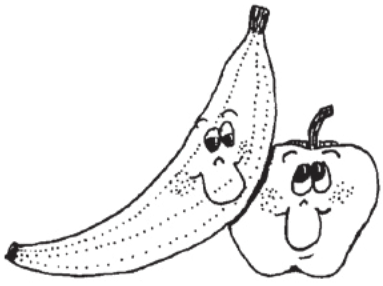
_____

NAME _____ DATE _____

# THE DIGESTIVE SYSTEM FUELS YOUR CELLS

What is your favorite fruit? How about your favorite vegetable? Did you know that the food you eat is used to make new cells so your body can grow and repair itself? It also provides energy to your body cells to do work. Do you remember how your heart and breathing get faster as you work harder? That's because the cells all over your body need more oxygen and food as you work harder. Your blood delivers that oxygen and food. When you eat, you know that food goes to your stomach, but do you know that it also goes to your brain, skin, and every other part of your body? Yes! Food, water, and oxygen go to all parts of your body to make new cells and to keep the cells you already have healthy. Have you heard the saying "You are what you eat"? It's really true. When you eat a handful of peanuts, new cells all over your body will be made of tiny parts from those peanuts. It takes chewing, sloshing, mixing, and a lot of time to turn those peanuts into the parts needed to make cells. In fact, food can stay inside your body for 2 days. Your digestive system is more than just a stomach. It starts at your teeth, goes to your esophagus (ih-**sohf**-uh-guhs), stomach, small and large intestines (in-**tehs**-tihns), and ends at your anus, (**ay**-nuhs) where the waste leaves your body.

So, let's find out what it takes to make a bunch of broccoli into a batch of body cells.



# Digestive System Lab #1: DIGESTIVE DIAGRAM – instructions

**Materials:**

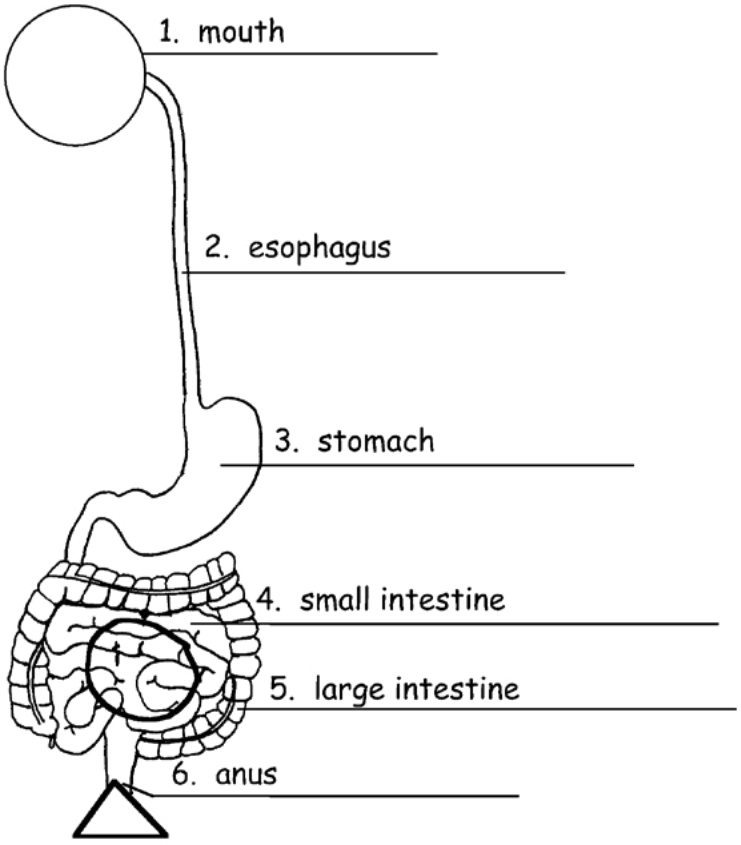
- Lab sheet, pencil
- Digestive System Notebook page (for reference)
- Colored pencils (blue, green, yellow, red, brown)

**Aloud: It takes a lot of work to make food into energy for your body. We learned what some of the parts of the digestive system are called. Now let's color in a diagram of the digestive system to learn what those parts look like.**

**Procedure:**

1. Follow the instructions on the lab sheet. Label each part as numbered and then color in as indicated.
2. Follow the instructions at the bottom of the page.

**Answers:**

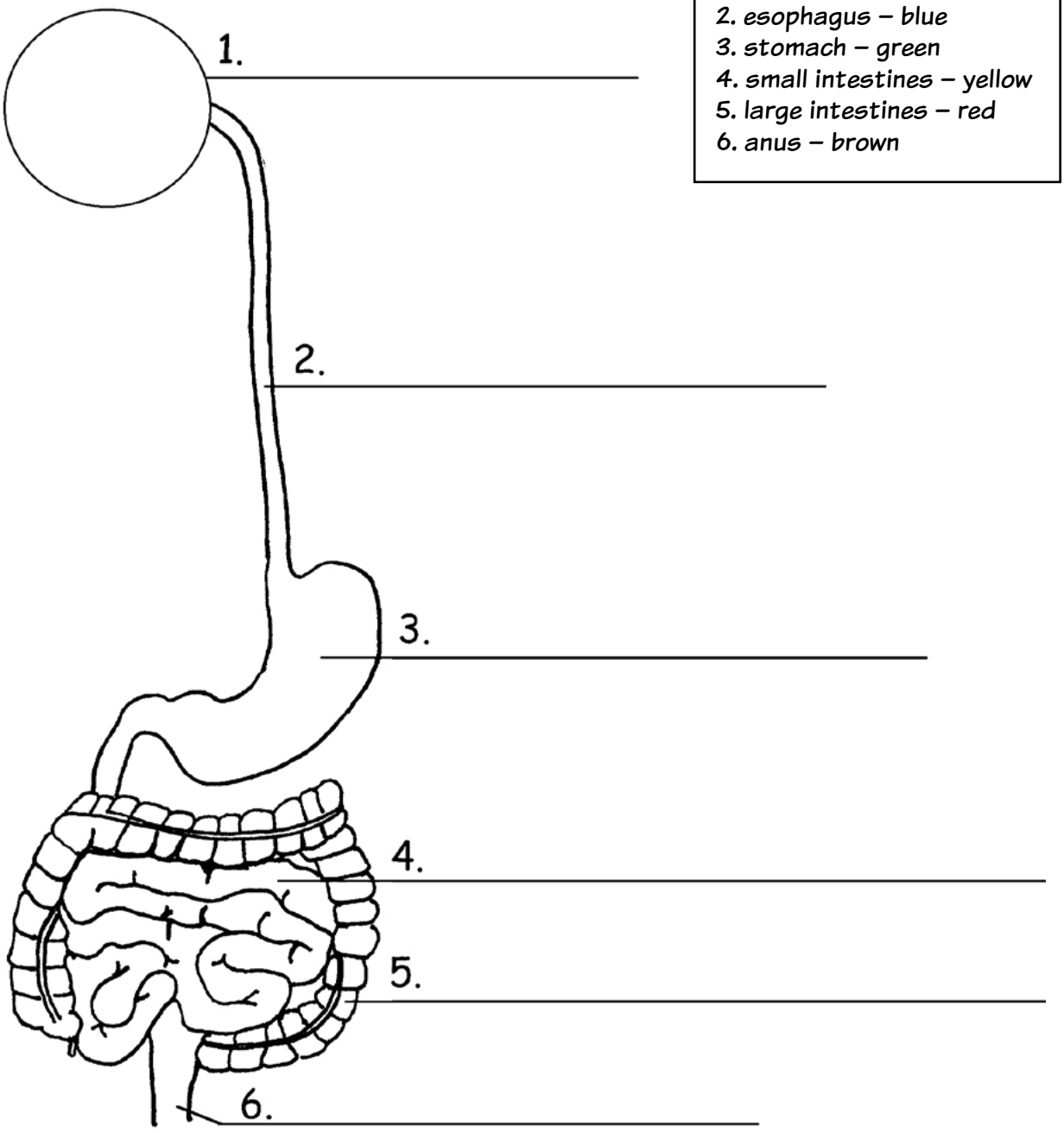


NAME _____ DATE _____

# Digestive System Lab #1: DIGESTIVE DIAGRAM

*Use the key to label the parts of the digestive system and then color them in with the colors indicated.*

1. mouth – leave uncolored
2. esophagus – blue
3. stomach – green
4. small intestines – yellow
5. large intestines – red
6. anus – brown




*Draw silly teeth in the circle to show where food is first broken down.*
*Draw a circle on a coiled part of the digestive system.*
*Draw a triangle showing where undigested food and waste leave the body.*

# Digestive System Lab #2: FOOD TRAVELS FAR! – instructions

**Materials:**

- Lab sheet, pencil
- Yarn – about 22' long
- Yard stick
- 3" x 5" Index cards
- Stapler

**Aloud: "Mmmm. Great muffin. Thank you." The food you eat takes a longer journey through your body than you might expect. After you finish chewing up that muffin, your tongue pushes it back to be swallowed and it goes into a long tube called the esophagus. The esophagus squeezes the now smashed-up muffin down into your stomach where it is mixed and mashed some more. After about 3 hours the muffin will leave your stomach and enter your small intestines. From there it will go on to the large intestines before leaving your body. Let's find out just how long your digestive tract is.**

**Procedure:**

1. Complete the "Hypothesis" section of the lab.
2. From one end of the yarn, mark off 3 inches. This is the length of the average child's mouth. Tie a knot in the yarn at that mark and label the index card "Mouth – 3 inches." Staple card to that section of the yarn.
3. From the first knot, measure and mark off 10 inches for the esophagus. Tie a knot and label the next index card "Esophagus – 10 inches."
4. Food dumps from the esophagus into the stomach. Measure 6 inches for the length of a child's stomach. Knot the yarn and label this section "Stomach – 6 inches."
5. The small intestine is the shocker. Measure off 15 feet for the small intestines. Food can spend about 3 hours in the small intestines, where digestion is completed and from which the nutrients from the food can be absorbed. Knot and label this section "Small intestine – 15 feet."
6. Finally, measure off an additional 4 feet for the large intestines, where water will be absorbed into the body. Cut the yarn at this point and label this section "Large intestine – 4 feet."
7. Stretch out your entire digestive system. Were you surprised at how long it is?
8. Enter actual lengths on #4. For #5, add lengths together, rounding to the nearest foot (total = 21').
9. Subtract your guess from the actual length to find how far off you were. Discuss the difference. Were you surprised? Were you close?
10. For #7 divide length of yarn by height of child OR have child lay next to yarn, mark where his head reaches. Then have child move the yarn up to that spot, and repeat until he has figured out how many body lengths long his yarn (digestive tract) is.
11. For #8: At three meals a day, in three days your child will have eaten 3 x 3 = 9 meals before his last one is all the way through his digestive tract.

**Conclusion / Discussion:**

1. Discuss how many steps and how far food travels before it is completely digested.
2. Discuss the fact that at any one time a person has 9 past meals somewhere within their digestive tract. It's amazing we EVER feel hungry!

*Continued*

**For More Lab Fun:**

Eat an apple (or anything else). Throughout the day, announce the times it reaches each new point as follows: Esophagus in 15 seconds, stomach in 10 more seconds, small intestine in 3 hours, large intestine in 3 more hours and anus (exit) in about 2 days. You will need a calendar for the last one. In 2 days I want you to call out, “Hey everybody! The apple’s done!”

NAME _____ DATE _____

# Digestive System Lab #2: FOOD TRAVELS FAR

HYPOTHESIS (MY BEST GUESS):

1. My height to the nearest foot (measure) _____
2. The length of my digestive tract (estimate) _____ feet
3. The time it will take a muffin to be digested _____

TEST:

4. Length of the:


mouth + _____

esophagus + _____

stomach + _____

small intestine + _____

large intestines + _____

5. Length of the entire digestive tract rounded to the nearest foot = _____

RESULTS:

6. Actual length – My guess = Amount I was off

_____ – _____ = _____

CONCLUSION:

7. I would have to lay _____ of me down, end to end, to make the length of my digestive tract.

8. My muffin will be finished digesting in about 3 days. I will have eaten _____ more meals by that time.

NAME _____ DATE _____

# MY NERVOUS SYSTEM IS IN CONTROL

Can you pat your head and rub your tummy at the same time? Well, that may be a bit tricky, but I bet you can walk across the floor and eat an apple at the same time. Your brain is doing an incredible number of things to make all this happen, from controlling 2 legs that are moving at opposite times, to moving your arms, to telling you when to bite, chew, and swallow. I bet you can even tell me how the apple tastes and looks. Your body is taking in a lot of information, sending this information through nerves to your spinal cord, up to your brain to be figured out, and then a response is sent back to the proper muscles. I can't imagine a computer handling this much information this quickly. Before all of this can happen though, information has to come into your body. You have five senses that bring in information. You have eyes, ears, a nose, a mouth, and skin so you can see, hear, smell, taste, and feel what's around you. Even when you are sleeping your brain is handling information. When you feel a feather, the information runs from your fingertips, through nerves, which are special, long cells that go to your spinal cord. Your spinal cord runs through the hollow center of your vertebrae and leads right up to your brain. Your nervous system is like a tiny super highway for messages.

# Nervous System Lab #1: REACTION TIME – instructions

**Materials:**

- Lab sheet, pencil
- Standard (inch) ruler
- Colored pencil (for graphing)

**Aloud: Your nervous system works incredibly fast to keep your hand from burning when you accidentally touch something that is too hot. Sometimes we are moving our hand away from danger even before we know it hurts. Your nervous system is also in charge of letting you taste good food as you are eating. All of this happens very quickly. Today we are going to do a lab to show how quickly a message can get from your eyes, along a system of nerves to your brain, and then along another set of nerves all the way out to your hand. We are also going to see if, with practice, you can increase the speed.**

**Procedure:**

1. Circle "Yes" or "No" for the Hypothesis part of the lab.
2. Have a helper hold the ruler about 1" above the catcher's hand with the zero end pointing down. Catcher should have their hand ready to pinch the ruler as it falls between his thumb and fingers (see diagram on lab sheet).
3. Helper drops the ruler with no warning. Catcher tries to catch the ruler as quickly as possible.
4. Note the point at which the catch was made (how many inches along the ruler). A smaller number means a quicker catch. Write the number on the chart.
5. Repeat above steps 4 more times.
6. To make a line graph, transfer data to the graph in the following manner: For catch #1 follow the horizontal line next to the label "CATCH #1," until you get to the inch mark where the ruler was caught. Place a dot there. Do this for each catch. Connect the dots to show how the reaction time changed. If the line goes right, reaction time got slower: if the line goes left, reaction time got faster (better).
7. Complete #4 with "got better," "stayed the same," or "got worse."

**Conclusion / Discussion:**

1. How did your reaction time change with practice? Can you train your nervous system to work faster?
2. Why do you think some people have quicker reactions to danger than others?

**For More Lab Fun:**

1. Test people of various ages. Does reaction time change with age? Compare and chart your results.
2. Test reaction time before and after exercise. Does exercise have an effect on reaction time?
3. Have the helper say, "Now," as they let go of the ruler. Does reaction time improve when you can "hear" the ruler drop?

NAME _____ DATE _____

# Nervous System Lab #1: REACTION TIME

HYPOTHESIS:

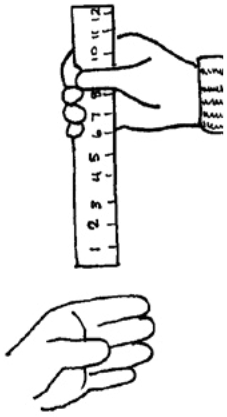
1. Do you think you can teach your body to react more quickly with practice?

YES NO

TEST:

2. On the chart below, write the inch mark where you caught the ruler.

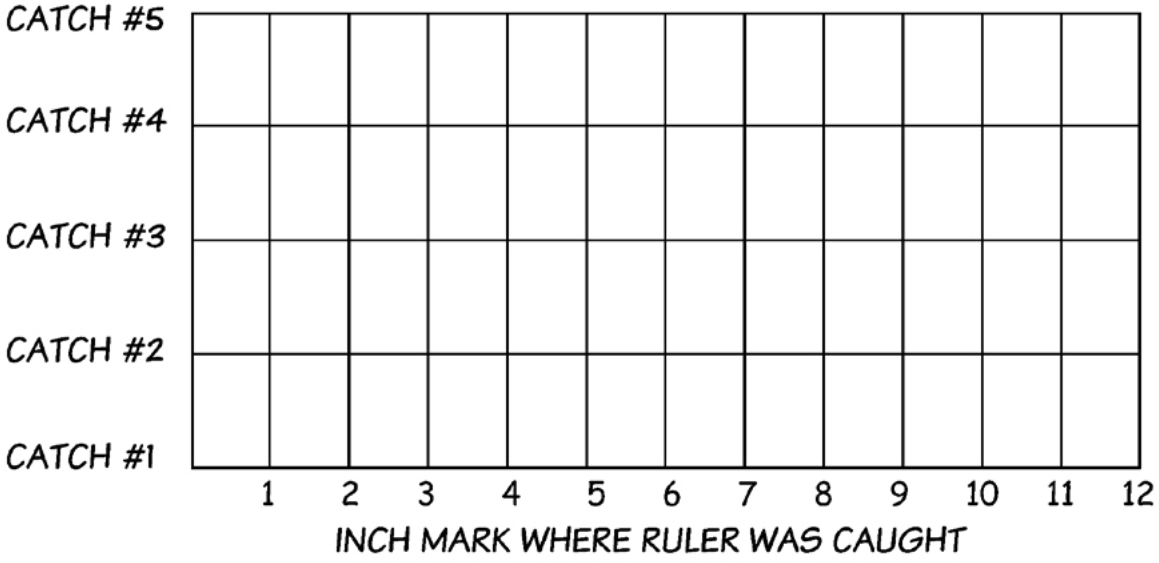
| CATCH #1 | CATCH #2 | CATCH #3 | CATCH #4 | CATCH #5 |
|---|---|---|---|---|
| | | | | |



RESULTS:

3. Use the information from your chart above to make a line graph. For each catch, go across the graph and make a dot at the inch mark where you caught the ruler. Draw a line to connect all five dots.

GRAPH OF MY REACTION TIMES




CONCLUSION:

4. My reaction time _____ with practice.

# Nervous System Lab #2: I'M SENSIBLE – instructions p. 1

**Materials:**

*This lab takes awhile to set up, but I have yet to meet a child (or adult!) who doesn't enjoy this lab.

- Lab sheets (2 pages), pencil
- Items to identify by taste, touch, etc. This is a list of ideas. Use what you have and what your kids know. Touch–cotton swab, paper clips  Sight–orange, white vinegar  Smell–vinegar, garlic  Hear–jingle bells, coins  Taste–chocolate chip, banana slice
- 4 Small paper sacks to hide the touch and hearing items
- 3 Small paper plates
- 2 Spoons
- 3 Small jars with lids – at least one MUST be see-through
- 4 Paper towels to cover (hide) some of the items
- Dry-erase marker

**Aloud: Step on a tack and you will jump away quickly. Smell cinnamon rolls and you will probably smile. A message has to get to your brain to tell you what is there and what to do about it. We talked about the long path the message has to take, but how does the message get into your body? You have 5 senses that bring information to your nerves. You have nerve endings all along your skin to tell you what you have touched, eyes to tell you what you have seen, a nose to tell you what you are smelling, ears to tell you what you are hearing, and a tongue to tell you what you taste. All of these features bring information into your body, take that information to your brain, and then tell your body what to do about it. And remember, it doesn't take very long. Today you are going to test your 5 senses to see how well they work to inform your brain of what is around you. Do your best but most important, follow directions and have fun!**

**Procedure:**

FOR TEACHER/PARENT TO READ

1. You will be setting up lab "stations" with different items to test. Try to keep them in line along a countertop or around a table.
2. On two paper sacks write "Touch." Place one touch item in each of the two bags, and roll down the tops of the bags. These are stations 1 and 2.
3. Place the orange on a plate and about 1/4 c. of vinegar in a well-sealed, see-through jar. Screw the lid down so no smell escapes. With the dry-erase marker, write "Sight" on the plate and on the jar. These are stations 3 and 4.
4. Put 1/4 cup more vinegar into the second jar, and some smashed garlic into the third. Cover these jars with a paper towel and write "Smell only – No Peeking" on the towels. When it's time to test these, you need to have the students close their eyes while you open the jars so they can smell what's inside. These are for stations 5 and 6.
5. On the other two sacks, write "Hearing." Place the hearing items inside each sack and roll the tops down for stations 7 and 8. Allow the children to shake these when it's time to test them.
6. On each of the last two plates place a spoon with the taste item in the spoon. You will need to spoon them into the children's mouths (with their eyes closed) for the test. Cover these with a paper towel also.
7. Go through the test with each child, assisting as needed to prevent "peeking."
8. Complete lab sheet.

*Continued*

# Nervous System Lab #2: I'M SENSIBLE – instructions p. 2

**Possible Answers:**

Which sense is the most keen for each animal?

Owl – hearing because they hunt at night, often in complete darkness

Vulture – smell because they eat rotting meat and must smell it from miles away

Bat – hearing because they also hunt at night and use their hearing to locate flying insects

Bald eagle – sight because they hunt during the day and use their sight to find prey

Bloodhound – smell because they are specifically bred to find a scent and follow it. Their skin folds even cover their eyes when they put their heads down so they don't become distracted by what they see.

**Conclusion / Discussion:**

How would it be to lose one of your senses? Try walking blindfolded (with a helper, for safety). Imagine eating without being able to taste your food. How would that be good or bad?

**For More Lab Fun:**

1. Kids always love to check out optical illusions to see how our senses often fool us.
2. Read a book about Helen Keller, who lost both sight and hearing at a very young age. How different was her world from your own?
3. Watch one of your own pets. Try to discover by watching them which sense is the most important for them. Does your dog hear sounds that you cannot? What about your guinea pig? What seems to frighten him the most, a quick movement or a loud noise?

NAME _____ DATE _____

# Nervous System Lab #2: I'M SENSIBLE – p. 1

*For each station, use only the sense listed. Write what you think you have found and then write what other senses might have helped you to identify it.*

| A<br>Station<br># | B<br>Sense<br>to Use | C<br>Item<br>(Name or Describe) | D<br>Sense I would<br>like to use |
|---|---|---|---|
| 1 | touch | | |
| 2 | touch | | |
| 3 | sight | | |
| 4 | sight | | |
| 5 | smell | | |
| 6 | smell | | |
| 7 | hearing | | |
| 8 | hearing | | |
| 9 | taste | | |
| 10 | taste | | |

# Nervous System Lab #2: I'M SENSIBLE – p. 2

1. For each sense, this is how many I got right:

   touch _____ sight _____ smell _____ hearing _____ taste _____

2. It looks like my sense of _____ is the most accurate.

3. This is how many times I wish I could have used each sense (column "D")

   touch _____ sight _____ smell _____ hearing_____ taste _____

4. I wanted to use my sense of _____ most often. This is the sense I trust the most.

5. (Circle one) The sense I trust the most is: **different than / the same as** the sense that was the most accurate during this lab.

6. Every animal has a sense that is more keen than the others. This is their "dominant" sense. For each of the animals listed below, see if you can figure out which sense is the dominant sense.

Owl _____ because _____

Vulture _____ because _____

Bat_____ because _____

Bald eagle_____ because _____

Bloodhound _____ because _____

NAME _____ DATE _____

# GENES GUIDE YOUR GROWTH

Have you ever been told you were having a growth spurt? It's true that your body doesn't grow and change at a smooth rate. Growth and body changes happen in spurts. From the time you are born until the time you are very old, your body will go through many amazing changes. Even before you are born the cells in your body carry the plans that determine when and how your body changes will occur. If you practice healthy eating and good exercise habits, these plans can proceed at the proper rate and time. From the helpless baby you were at birth you have learned to walk, talk, and dress yourself. At about 10 years old a body begins its journey to becoming its adult form. By around 18 – 20 years old most body systems are fully developed and upward growth stops. By continuing to make good, healthy choices you can keep your body fit and active throughout your adult life and well into old age. These plans in your cells are determined by your genes (jeenz). Genes are the special messages you get or inherit from your parents. Your genes help determine everything from how tall you are to how curly your hair is. Unless you have an identical twin, not one other person in the whole world has inherited the exact same body plan you have. From your one-of-a-kind fingerprints to your body's plans for your future growth, you are the only YOU there will ever be. Now that's a gift worth taking extra care of!

# Genetics Lab #1: I'M THE ONLY ME! – instructions

NOTE: If your child is adopted or otherwise does not have knowledge of thier birth parents, I recommend you adapt this lab rather than skip it. Your child could choose a subject: someone who has access to and knowledge of thier birth parents. The student could gather data and complete the lab based on the subject. Actually, scientists are rarely the subject of their own experiments, so using a third party is a completely legitimate way to conduct this lab.

**Materials:**

- Lab sheets (2 pages), pencil

**Aloud: Your life started when one cell from your mom combined with one cell from your dad. These cells have tiny parts inside called genes. Your genes determine your hair color, sex, height, and many other features. Except for identical twins, no two people share the exact same features; but you will share many features with your parents, because you inherit half of your genes from each one. Let's look at some traits to see what you have inherited.**

**Procedure:**

1. Examine the features listed for you and your parents (or siblings!) and fill in the chart. Explanation of some characteristics:

   Cleft chin – chin with a deep "crease" down the middle

   Free earlobes have a section at the bottom where they don't attach to the side of the head. Attached earlobes are attached to the head clear to the bottom of the earlobe. Tongue rollers can curl their tongue into a "U" shape. This is not something a person can learn to do if they are born without the gene to do it!

   Widow's peak is where the hairline forms a V down the forehead (think Eddie Munster). Hairy knuckles refers to hair on the middle section of each finger, between the joints, not actually the knuckles.

2. For page 103, which of the traits do you share with your mother ONLY? Which do you share with your father ONLY? How many of the traits showed in neither parent and ended up showing in you?

3. Fill in the graph at the bottom. Color in how many traits you got from:

   Line 1: Mom ONLY,

   Line 2: Dad ONLY,

   or Line 3: from Mom and Dad – meaning they both show it (a dominant trait or they both do not show it (a recessive trait).

**For More Lab Fun:**

1. Make a chart to compare other relatives' features with your own. Which side of the family seems to have the strongest genes?
2. Start a family tree. Check old family photos to see if your ancestors had the same traits you have. How far back does that widow's peak go?
3. Visit a Labrador Retriever breeder. Can two black labs have yellow puppies? Can two yellows have black puppies? Which color seems to be weaker (recessive)?
4. Do you have a pen pal or friend from another country? Ask them to fill in the graph and chart the differences from one family-culture-geographic location to your own.

*Continued*

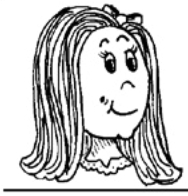
**For Your Information:**

1. Weak traits are called “recessive.” Strong traits are called “dominant.”
2. The traits given show a simple form of dominance. Some traits (not mentioned in this lab) are much more complex, some are linked to the sex chromosome, and some traits blend.

NAME _____ DATE _____

# Genetics Lab #1: I'M THE ONLY ME! – p. 1

*All of the features below are determined by the genes you inherit from your mom and dad. Color in the blanks for each feature you have and compare.*

| | | ME | MOM | DAD |
|---|---|---|---|---|
|  | CLEFT CHIN | | | |
| | SMOOTH CHIN | | | |
|  | DIMPLES | | | |
| | NO DIMPLES | | | |
|  | FREE EARLOBE | | | |
| | ATTACHED EARLOBE | | | |
|  | TONGUE ROLLER | | | |
| | NON-TONGUE ROLLER | | | |
|  | WIDOW'S PEAK | | | |
| | ROUNDED HAIRLINE | | | |
|  | FRECKLES | | | |
| | NO FRECKLES | | | |
|  | HAIRY KNUCKLES | | | |
| | BALD KNUCKLES | | | |

# Genetics Lab #1: I'M THE ONLY ME! – p. 2

I share these traits with my mom:

_____ _____

_____ _____

_____ _____

_____

I share these traits with my dad:

_____ _____

_____ _____

_____ _____

_____

Weak (recessive) traits (like dimples) can be carried by your parents but not show. If you get the same weak trait from both of your parents, even though it doesn't show in them, it will show in you.
These traits were secretly hiding in Mom and Dad and showed up in me!

_____ _____

_____ _____

_____ _____

I got this many traits from:

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Mom | | | | | | | |
| Dad | | | | | | | |
| Both | | | | | | | |

I am exactly like.....ME!

# Genetics Lab #2: MY OWN FINGERPRINTS – instructions

**Materials:**

- Lab sheet, pencil
- 1" wide transparent tape
- 3 extra people (to provide additional thumbprints)
- Hand lens (optional)

**Aloud: Do you know what you have that nobody else in the world has? You have your own set of fingerprints that are unlike anybody else's in the whole world! With all the people in the world, it's hard to imagine that no two people would have the same fingerprints. Today you are going to analyze your fingerprints and see if you can match up a "mystery print" to the person it came from.**

**Procedure:**

1. On a piece of scratch paper, color in a heavy area of pencil. Make it dark enough so that the pencil rubs off onto your finger. You may have to "reload" this area as you go along with the lab.
2. Starting with your left hand, rub your pinky in the pencil lead until it is coated. Have a helper tear off about a 1" piece of tape. Put the tape on the finger so that the print transfers to the tape. Remove from finger and tape it down in the first oval on your lab sheet.
3. Do the same for each finger on the left hand and then do the same for the right hand in the ovals on the line below.
4. Analyze each print. You may want to use a hand lens to help you. On the lines under each print, write whether that print is an arch, loop, or whorl. (There are others, but these are the major ones. If your child has something different, choose the closest and call it good)
5. For #1, write how many of each print type you have.
6. Have 3 other people each do a right thumbprint for you and place in the boxes below. Write the name of each print donor on the line below their print.
7. TEACHERS: Get an extra, mystery print from one of the donors – preferably the most unusual so it will be easier for the students to distinguish.
8. Compare the known prints with the mystery print. Write who you think the print belongs to on the line provided.

**Conclusion / Discussion:**

1. How can having individual prints help us?
2. How do we use fingerprints in our society? Could we do these things if people shared the same fingerprints?

**For More Lab Fun:**

1. Do fingerprint art with one of Ed Emberley's Print Drawing books.
2. Do fingerprints from both of your parents. Next, do fingerprints of some friends or neighbors. Count how many arches, loops, and whorls your parents have and then how many your friends have. Do your parents' prints have more similarities to yours or not? Why might your prints be more like your parents'?

NAME _____ DATE _____

# Genetics Lab #2: MY OWN FINGERPRINTS

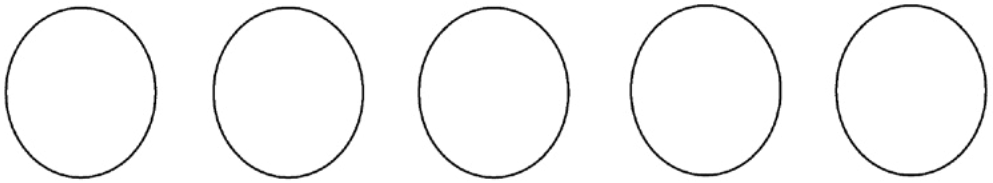
*These are the three basic types of fingerprints:*

Arch

Loop

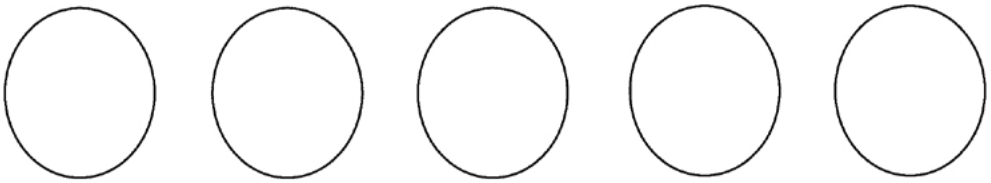
Whorl

My Left Hand



_____ _____ _____ _____ _____

My Right Hand

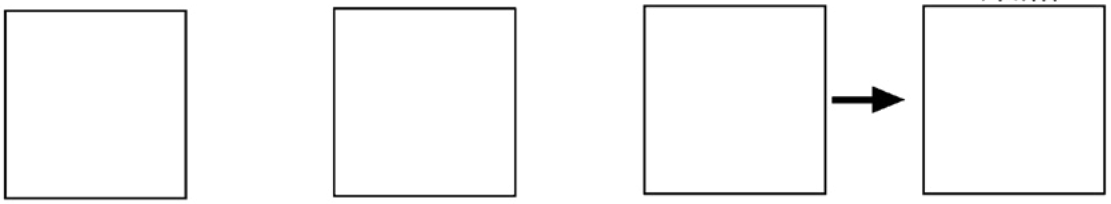


_____ _____ _____ _____ _____

1. I have _____ arches _____ loops _____ whorls.

This is the right thumbprint of:

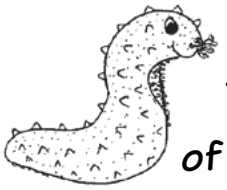
Mystery Print!



_____ (Name) _____ (Name) _____ (Name) ? _____

2. I think the mystery print belongs to _____

NAME _____ DATE _____



# SIX KINGDOMS OF LIVING THINGS

You are about to learn about many different kinds of living things. You will also learn how to find, gather, and investigate some common ones. To learn and share information about living things, scientists decided they needed to be able to group them somehow. To understand how important this is, imagine going to a store with no groupings. If there was no specific area for meat or bread, you would have to search the whole store to find what you wanted. One loaf of bread might be next to a steak, while the kind you want is under some broccoli. There are many more living things than there are items in a grocery store, so organizing them is vital. Most scientists agree that all living things can be split into six main groups called kingdoms. The two kingdoms we are going to learn about this year are the Plant Kingdom and the Animal Kingdom. Every kind of animal from a worm to an eagle is in the animal kingdom. Each kingdom can be split into smaller and smaller groups until you get to each species, (**spee**-sheez) like a dog, a bald eagle, or a person. "Species" is a grouping, like kingdom, but living things of the same species are very much alike. Bald eagles are one species. Every living thing has a scientific name, which tells scientists what species it is. Tyrannosaurus rex is a scientific name that means "tyrant lizard." The scientific name of a person is Homo sapiens. That's you. The scientific name of an octopus is easy to remember. It's Octopus.

We will learn about many incredible living things, but first let's learn how scientists put all these different things in order.

# Six Kingdoms Lab: CLASSIFYING CRITTERS – instructions

**Materials:**

- Lab sheets (3 pages), pencil
- Scissors
- Colored pencils (optional)

**Aloud: Classifying animals is not as easy as it looks. Scientists do their best, but there are plenty of mistakes made, and there will be plenty still left to discover when you are grown. Some animals look very much alike but are not the same species of animal. Other times, animals that are the same species don't look alike at all. Does a caterpillar look at all like the butterfly it will grow up to become? Male and female animals of the same species often look very different. Imagine a friend, exploring the planet Blobonia, sends you Blobonian life forms in separate containers, and it is your job to pair up the male and female of each species. You will struggle to do your best but luckily, your friend has since had time to study the creatures in their natural habitat. Just in time, he sends along a classification key to help you in your quest. Use the key to learn how scientists divide animals into groups based on their characteristics.**

**Procedure:**

1. Carefully cut around each of the Blobonian life forms on page 1 of the lab. Make sure not to cut off the number near each one.
2. Complete the hypothesis lab page 2. Pair up the creatures as best you can and write your guesses down on the sheet.
3. Lo and behold, the "Classification Key to Blobonian Life" arrives in your lab. Using one creature at a time, start on the left and follow the path that leads to the identity of each creature. When you get to where the creature belongs, write his/her number in the circle provided.
4. Complete the lab sheet.

**Possible Answers:**

#2. Animals pair as follows: 2 and 10; 8 and 9; 4 and 11; 1 and 6; 7 and 12; 3 and 5.

#4. By studying nature, scientists can find out what animals eat, how they live, and which animals are the same species. They can find out how animals live with each other, how they find food, and how they avoid becoming food.

**Conclusion / Discussion:**

1. How important is it to observe living things in order to study them? People used to shoot things and study the bodies. What were they missing?
2. Without some system of grouping animals we wouldn't even have names like "bears" or "birds." Try to describe an animal like a beaver without using its name or any group names. How about describing a moose without using any group names (even names like horse or deer)?
3. How difficult would it be for people to share information about animals if we didn't have a classification system?

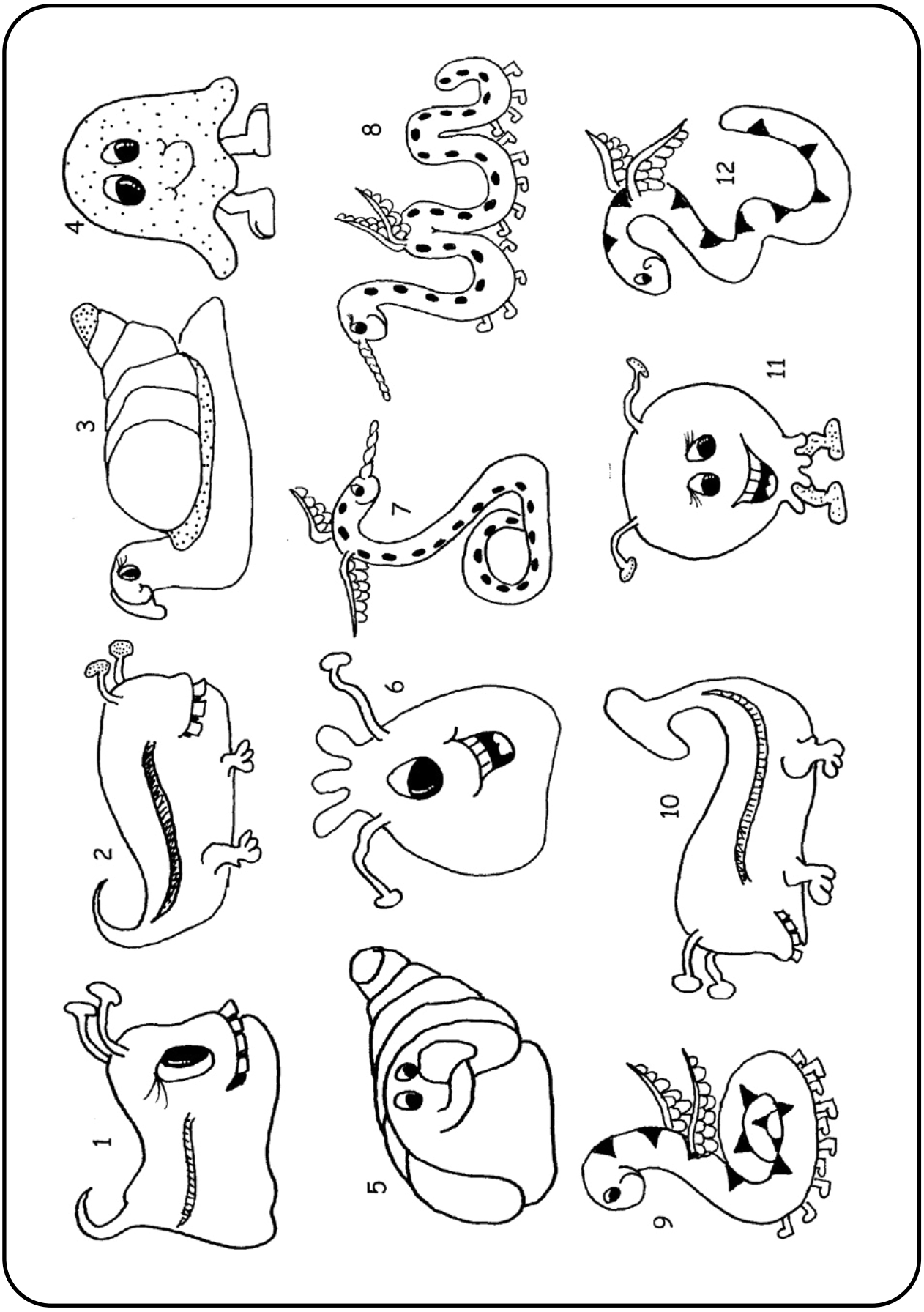
**For More Lab Fun:**

1. Imagine what the Blobonian world might be like. Color the Blobonians and glue them to a decorated background.

*Continued*

2. Spread a big piece of butcher paper on the floor or table. Using the key as a guide, make your own classification key for several shoes. Start with all shoes together. Choose a characteristic to divide them in about half. Split each group further, writing down the characteristic you have chosen. Continue until you have each shoe in its own place. Bring in a "guest," give them a partner of one of the shoes and see if the key leads them to the correct shoe.

# Six Kingdoms Lab: CLASSIFYING CRITTERS – p. 1



NAME _____ DATE _____

# Six Kingdoms Lab: CLASSIFYING CRITTERS – p. 2

HYPOTHESIS:

1. By looking at the specimens sent to me I would pair them up like this:

Pair #1: Number _____ and _____ Pair #2: Number _____ and _____

Pair #3: Number _____ and _____ Pair #4: Number _____ and _____

Pair #5: Number _____ and _____ Pair #6: Number _____ and _____

RESULTS:

2. In reality, the critters should be paired up like this:

Pair #1: Number _____ and _____ Pair #2: Number _____ and _____

Pair #3: Number _____ and _____ Pair #4: Number _____ and _____

Pair #5: Number _____ and _____ Pair #6: Number _____ and _____

CONCLUSION:

3. My pairing was **ALL CORRECT** **NOT ALL CORRECT**

4. These are some things a scientist can learn by observing living things in their own homes:

_____

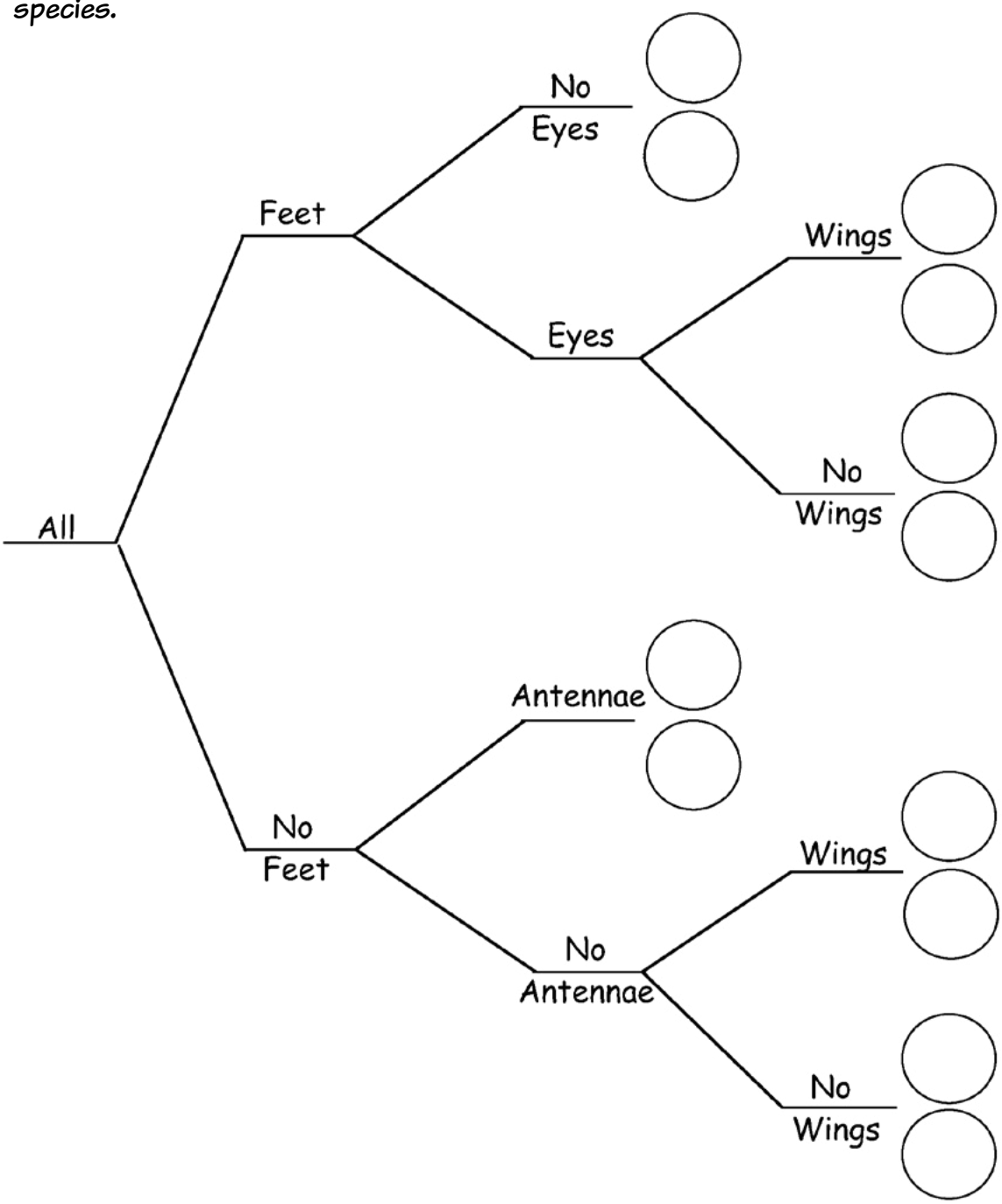
_____

_____

# Six Kingdoms Lab: CLASSIFYING CRITTERS – p. 3

## CLASSIFICATION KEY TO BLOBONIAN LIFE:

*Use the key below to classify your critters. Once you know where each critter belongs, put its number in the circle provided. Each circle should have a different number in it. The two critters that end up together are the male and female of one species.*



Thank you for previewing RSO Life. We hope you are enjoying the course so far!

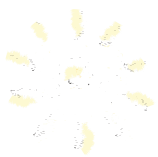
To purchase a print or ebook copy of RSO Life, please visit:

www.pandiapress.com

Thank you for previewing RSO Life (level one). We hope you are enjoying the course so far!

To purchase a print or eBook copy of RSO Life (level one), please visit:

www.pandiapress.com



www.pandiapress.com