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TAXONOMY TRAIL

An Interactive Classification Unit Focusing on the Snail

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The nationwide movement for high standards has not only determined what students should learn, but also has mandated that students *demonstrate* what they know. TAXONOMY TRAIL is a standards-based program addressing Science Education Standards and English Language Arts Standards. TAXONOMY TRAIL provides many opportunities for performance assessments as students classify objects and organisms, identify external and internal anatomy, observe and experiment with snails, conduct research, and play an interactive game. The cooperation and teamwork necessary for students to take care of their “preserve” address many Applied Learning standards.

National Science Education Standards K–8

Standard A: Science as Inquiry

As a result of activities in grades K–8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Standard C: Life Science

As a result of activities in grades K–4, all students should develop an understanding of:

- The characteristics of organisms
- Life cycles of organisms
- Organisms and environment

As a result of activities in grades 5–8, all students should develop an understanding of:

- Structure and function in living systems
- Populations and ecosystems
- Diversity and adaptations of organisms

Standard G: History and Nature of Science

As a result of activities in grades K–8, all students should develop an understanding of:

- Science as a human endeavor

NCTE Standards for the English Language Arts

Standard 3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experiences, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features.

Standard 8: Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

STANDARDS

Standard 12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

California Applied Learning Standards

Standard 6: Students will understand how to apply communication skills and techniques. Students will demonstrate ability to communicate orally and in writing.

Standard 8: Students will understand the importance of teamwork. Students will work in teams to achieve objectives.

TABLE OF CONTENTS

Purpose	1
Overview	2
Setup Directions	3
Unit Components	12
Assessment	15
Bibliography	18
Resources	19
Unit Time Chart	20
Daily Directions	
Day 1	23
Day 2	29
Day 3	36
Day 4	39
Day 5	44
Day 6	48
Day 7	51
Day 8	56
Day 9	59
Day 10	62
Teacher Reference	
Taxonomy Background	65
Pre/Posttest Key	70
Reproducible Masters	
PRE/POSTTEST 1	73
PRE/POSTTEST 2	75
SAMPLE SORTING GRID	79
GLOSSARY	80
SORTING GRID	81
SAFE SNAIL HANDLING	82
PRESERVE TEAM ROLES AND RUBRIC	83
SNAIL EXTERNAL ANATOMY	84
SNAIL INTERNAL ANATOMY	85
SNAIL ICON—EXTERNAL	86
SNAIL SHELL	87

STUDENT NO

TABLE OF CONTENTS

CONTENTS

SNAIL BODY.....	88
SNAIL ICON—INTERNAL	89
SNAIL INTERNAL ORGANS	90
SNAIL TRAIL 1.....	91
SNAIL TRAIL 2.....	93
SNAIL FAMILY TREE: UNCLE MOLLUSCA?	95
FAMILY TREE.....	96
SNAIL PICTURES.....	99
FANTASTIC SNAIL FACTS!	103
SNAIL BIO.....	105
SNAIL BIO CHECKLIST AND RUBRIC	106
KINGDOM KIT	107
BINGO BOARD.....	110
ORGANISM CARDS.....	111
GAME BOARD CARDS.....	118
QUESTION CARDS	120
SAVE THE ECOSYSTEM CARDS	127
SAVE THE ECOSYSTEM RULES.....	129
SCORE CARD	131
TOURNAMENT GRID	132
SAVE THE ECOSYSTEM SCORE.....	133
CERTIFICATE	134
WRITING RUBRIC.....	135

Helping students develop a clear understanding of taxonomic classification can be a daunting task. This is a field that is in a constant state of flux, particularly now that DNA testing is rewriting the map detailing how organisms are related to one another. TAXONOMY TRAIL is designed to convey, first, that all that exists is intrinsically related, and, second, that there are ways that scientists have agreed to “sort” or classify organisms in our world. The material is streamlined and simplified so that even young students can readily grasp the underlying structure of their larger environment.

TAXONOMY TRAIL combines auditory, visual, and kinesthetic learning styles. Students work in cooperative groups to master both the basic concepts and the terminology of taxonomic classification. TAXONOMY TRAIL combines a series of high interest activities including a hands-on science lab, student-generated quizzes, and a “high-stakes” board game to guide students in acquiring the following:

Knowledge

- The basic units used to distinguish life forms and their relationships, specifically:
 - Kingdom
 - Phylum
 - Class
 - Order
 - Family
 - Genus
 - Species
- Strategies for determining how to classify a particular organism
- Learning why even familiar organisms have scientific names
- Scientific method—Question, Hypothesis, Observation/Experimentation, Recording Information, Conclusion
- Awareness of the complexity and diversity of life
- The principle that the greater the number and diversity of the species that survive, the healthier the environment

Skills

- Identifying the Kingdom to which an organism belongs (classification)
- Working cooperatively in groups
- Treating lab animals with care and compassion
- Recording observations
- Conforming to rules in a learning game

Attitudes

- Developing a positive and inclusive attitude about all life forms
- Satisfaction in grappling with a vast and complex field of knowledge
- Understanding the power of teamwork

ESOPURPOSE

OVERVIEW

OVERVIEW

In TAXONOMY TRAIL, a variety of activities, observations, and games are used to reinforce and demonstrate mastery of the basic concepts and categories of taxonomic classification. Preserve Teams work together to sort everything from beans to living organisms according to their physical characteristics. Two lessons involving observations of live snails add the dimension of sorting species by behaviors, as well as both external and internal physical characteristics. The culminating activity is a board game where teams answer questions in order to progress towards the goal of preserving as much diversity in the ecosystem as possible.

TAXONOMY TRAIL begins with a sorting activity designed to help students think inclusively and globally, and ends with a game that allows them to demonstrate both their concrete and conceptual knowledge about the diversity of life. Preserve members are given roles and group social skills are reinforced throughout the unit. Prior to observing and experimenting with snails, students learn the proper treatment of these live specimens. Students are exposed to taxonomic vocabulary and learn about taxonomic classification by completing a variety of increasingly detailed activities. Preserve Teams research a snail and write a Snail Bio as they discover the diversity of snails. Finally, Preserve members work together as they play an interactive game in an attempt to *Save the Ecosystem*.

Differentiation

Like all Interact units, TAXONOMY TRAIL provides differentiated instruction through its various learning opportunities. Students learn and experience the knowledge, skills, and attitudes through all domains of language (reading, writing, speaking, and listening). Adjust the level of difficulty as best fits your students. Assist special needs students in selecting activities that utilize their strengths and allow them to succeed. Work together with the Resource Specialist teacher, Gifted and Talented teacher, or other specialist to coordinate instruction.

1. Before you Begin

Carefully read through the entire Teacher Guide so that you understand the objectives and sequence of TAXONOMY TRAIL. Decide how you will use the unit in your classroom. Throughout the Teacher Guide, Interact employs certain editorial conventions to identify materials.

- In preparing materials, *class set* means one per student.
- One Day on the **Unit Time Chart** is the length of a normal *class period*—45 minutes to an hour.
- All transparency masters and student handouts are listed by name using ALL CAPITAL LETTERS.
- Teacher reference pages are named in **Bold**.
- Special events are named using *Italics* (e.g., *Save the Ecosystem*).

2. Timing Options

This unit as presented will take 10 days for grades 3–5, and possibly 1–2 days longer for grade 2 to accommodate developing skills in following directions and in writing responses. If you select extension activities, there could be an additional 3–4 days of instruction (see **Daily Directions—Day 1, Setup #1** on page 24 for some suggested preserve names).

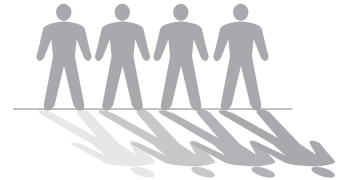


10+ days

3. Grouping Students

Divide your class into heterogeneous groups of four–five students, called Preserve Teams. Each team will be called by a different preserve name. These names add to the authenticity of the unit, as these are real preserve names. (See **Daily Directions—Day 1, Setup #1** on page 24 for some suggested preserve names.)

- Be sure to develop teams that are balanced academically, maximizing opportunities for peer teaching and learning.
- Encourage students to ensure that all their team members participate in recording observations, formulating conclusions, and creating acronyms, and that all members gain mastery of the characteristics of members of all five Kingdoms.
- Teach, monitor, and reinforce social skills throughout TAXONOMY TRAIL using the provided Preserve Team Rubric (found on PRESERVE TEAM ROLES AND RUBRIC, page 83).
- Once the unit is completed, students may be encouraged to play *Save the Ecosystem* in groupings of their own choice during free time.



Preserve Teams of 4–5 members

Groups of two–three students are recommended for Days 2 and 4. This is to insure a calmer atmosphere and the safety of live specimens during observations.

SETUP DIRECTIONS



One 20 oz. bag of dried bean soup mix is enough for 20 students. Use a coffee scoop for distributing the beans.

Order your Butterfly poster from the Department of Forestry ahead of time if you will complete this extension activity.

The Organism, Game Board, and Question Cards are reproduced from the masters and then cut out to create individual cards. See **Setup Directions #6, Preparing Materials (h., Save the Ecosystem Cards)** for more information.

4. Assigning Preserve Team Roles

Each member of the Preserve Team is referred to as a “docent” of the preserve. As a docent, it is each student’s responsibility to know about and take care of his/her preserve throughout the course of the unit. Within each Preserve Team, students assume a particular role. Assign each student one of the roles (Day 2) or allow students to select their roles.

- **Top Taxonomist**—The Top Taxonomist is the team leader responsible for seeing that all members are working cooperatively and completing each activity. The Top Taxonomist is responsible for keeping all team assignments in his/her Taxonomy Folder.
- **Classification Chronicler**—The Classification Chronicler is responsible for writing the work of the group.
- **Snail Docents (2 students)**—The Snail Docents are responsible for taking care of the snails. These students retrieve the snails from the enclosure, wake the snails if necessary by placing a drop of water on their undersides, keep watch of the snails while they are out of the enclosure, and return the snails to the enclosure.
- **Preserve Provider**—The Preserve Provider collects and returns all materials (except snails) to the designated areas. This member ensures that the team has what they need to complete the day’s work.

5. Materials

Prior to beginning TAXONOMY TRAIL, assemble the following materials in the quantities indicated in *Italics*.

- Beans (different types, colors, sizes; for sorting) — *one ounce per student*
- Butcher paper (6" x 36" to create Kingdom Scrolls) — *one per Preserve Team*
- Butterfly poster (for Snail Beauty Pageant extension activity—Day 6) — *one (Optional)*
- Cardstock (8.5" x 11"; colored; for Organism Cards) — *10 sheets per Preserve Team*
- Cardstock (8.5" x 11"; white; for Game Board Cards) — *two sheets per Preserve Team*
- Cardstock (8.5" x 11"; colored; for Question Cards) — *seven sheets per Preserve Team*
- Clear plastic (6" x 6"; rigid, for Day 2 Extension Activity) — *one per Preserve Team (Optional)*

SETUP DIRECTIONS

- Computer with Internet access or data already printed out from Internet — *several*
- Construction paper (12" x 18"; for Game Path Squares) — *five sheets per Preserve Team + five sheets for teacher sample*
- Construction paper (12" x 18"; for Taxonomy Folders) — *class set*
- Construction paper (9" x 12"; for Sorting activity) — *one per Preserve Team*
- Construction paper (9" x 12"; white) — *class set (for Primary students)*
- Construction paper (9" x 12"; colored) — *class set (for Primary students)*
- Construction paper (9" x 12"; brown) — *class set (for Primary students)*
- Construction paper (12" x 20") — *two per Preserve Team*
- Construction paper (cut into rectangles slightly larger than the Family Tree Labels and Organism names, for Day 5) — *12*
- Dice (four-sided) — *one per Preserve Team*
- Envelopes (for Kingdom Kits) — *one per Preserve Team*
- Food and water for snails (cornmeal, oatmeal, and fresh green leaves) — *one box of cornmeal + fresh green leaves + water*
- Game pieces — *one set per Preserve Team*
- Glue — *one per Preserve Team*
- Glue stick — *several per Preserve Team*
- Hat or lined basket (for selecting Preserve names) — *one*
- Highlighter pen — *class set (Optional)*
- List of 16 familiar objects — *one*
- Markers (for bingo board game) — *20 per student (optional)*
- Overhead projector — *one*
- Paints (watercolors; for Day 2 Extension Activity) — *several (Optional)*
- Paper (lined) — *several class sets*
- Paper (unlined) — *two class sets*
- Paper slips (small, scratch paper; for Preserve names) — *one per Preserve Team*
- Paper towels — *one roll per Preserve Team*
- Pencils (colored) — *one set per Preserve Team*
- Pen (dark for labeling) — *several per Preserve Team*
- Pens (colored set) — *class set*
- Pictures (of cells, tissues, and one-celled organisms—Amoeba, Euglena, Daphnia, Volvox) — *at least one of each category*
- Plastic container (stable container to fill half way with water) — *two per Preserve Team*



During Day 6, students look at pictures of various kinds of snails and create Snail Bios by completing research. Access to the Internet is very helpful.

*Use the 12" x 18" construction paper to create 42 2.5" x 3.5" paper squares. These are used to indicate the game board path. On the game board there are 42 spaces possible, however these spaces will not all be used. Preserve Teams may create a new path for each game. Consider limiting the number of Game Path Squares you provide. See **Setup Directions #6, Preparing Materials** (i., **Sample Game Board**) for an example.*

*See **Setup Directions #6, Preparing Materials** for more information on what types of food are appropriate for the snails and how to keep them hydrated.*

*See **Daily Directions—Day 1** for more information on creating the list of 16 familiar objects.*

Small yogurt containers work well.

SETUP DIRECTIONS



Many large discount stores carry the plastic pocket sheets in 10 sheet packs. They are used for baseball cards, etc.

Consider making a larger Snail Anatomy Poster by enlarging the External and Internal Anatomy masters and using a larger poster board.

Contact a biological supply company to order land snail specimens if students are unable to collect sufficient specimens from home gardens or school grounds.

See **Setup Directions #6, Preparing Materials** for more information on snail enclosures.

Seven 12" lengths of string are suggested for the Organism names and four 16" lengths of string for the Family Tree Labels.

Any source that sells snails will usually carry "Care Sheets." These provide useful information for students about the proper way to care for their "pets."

Establishing a long term environment for the snails—having on-going direct experience with the snail, its life cycle, and its habitat—satisfies a National Science Educational Standard.

- Plastic pocket sheets (with 9 pockets per sheet) — *five per Preserve Team + five for teacher sample*
- Poster board (20" x 24") — *one per Preserve Team*
- Poster board (17" x 22"; for Snail Anatomy Poster) — *one*
- Rulers — *one per Preserve Team*
- Scissors — *class set*
- Snails (land snails) — *at least two per Preserve Team*
- Snail enclosure (plastic storage container at least as large as a shoebox or a large jar) — *one*
- Stopwatch — *one for teacher OR one per Preserve Team*
- String (cotton string; thick enough to be visible by students; for hanging Family Tree Labels and Organism Names, Day 5) — *two yards*
- Tacks or pushpins (for hanging Family Tree Labels and Organism Names, Day 5) — *many*
- Tape (double-sided) — *one roll per Preserve Team*

6. Preparing Materials

a. Snails

- Collecting Snails
Prior to Day 2, obtain 20 snails. Consider these options:
 - Students bring them in from their home gardens
 - Conduct a snail hunt on school grounds (early morning is best)
 - Call a nearby nursery about relieving them of 20 vegetation-munching specimens
 - Order snails from a biological supply house
- Keeping Snails as classroom pets
Consider whether you want to keep the snails as classroom "pets" after the unit is complete. Most students maintain interest in their snails for 2–3 weeks (or until the novelty of feeding and cleaning the slime off the glass wears off). If you choose to keep the snails, pay special attention to creating the proper snail enclosure environment.
- Life cycle
The life cycle of the snail can be observed in the classroom. Adult snails can be recognized by a small lip that is added to the open end of their shell when growth is complete. Because snails are hermaphroditic (each snail has both male and female sex organs), any two snails can mate. Each fertilizes the eggs of the other. The snail digs a hole in the soil and lays the eggs. The eggs are translucent white and about the size of small peas.

b. Snail Enclosure

- Active snails can be kept for classroom viewing in a terrarium made from an aquarium, a large, wide mouth jar, or a fish bowl. The top should be securely covered with a screen or part of a nylon stocking. Lids that have holes punched in them do not allow adequate ventilation and the sharp edges on the interior are a safety risk. Snails “chew” their way out of containers covered with paper. The contents of the terrarium can be an elaborate re-creation of a garden environment, or something as sparse as only food and water, most will probably be between these two extremes.
- It’s possible to purchase a small plastic animal enclosure at any pet store. Snails can live in a jar (kept at room temperature out of direct sun) with air holes for three days, without apparent hardship (you need the snails for Days 2 and 4).
- Overcrowding should be avoided. Too many snails in too small a space, or inadequate ventilation can cause the humidity to rise to unacceptable levels and the snails to die.
- Cleaning to remove moldy food, the build up of mucus, and droppings, should be done on a regular basis.

c. Snail Food

- Snails are vegetarians and eat many kinds of plant material. Cornmeal, oatmeal, and fresh green leaves are all appropriate foods. Ask students to bring in greens for the snails. Spinach, chard, and beet greens tend to hold up the best. You can bring in a small ice chest or store the greens in the faculty room refrigerator to keep them fresh between the two observation days, Day 2 and Day 4.
- Chalk, eggshells, or empty snail shells should be crushed to powder and added to the food to provide the calcium necessary for healthy shells.
- Water can be supplied in a shallow plastic lid, in a deeper dish that contains a water soaked sponge, or by generously sprinkling lettuce or other fresh leafy food with water. Food can also be put into a shallow plastic lid.



As students bring in greens to “feed” their snail, consider turning this into a separate science experiment. The Question: Which greens do most snails prefer?

SETUP DIRECTIONS



Consider making a larger Snail Anatomy Poster by enlarging the External and Internal Anatomy masters and using a larger poster board.



Laminate the Save the Ecosystem cards for durability.

When creating the Organism Cards, consider using different colored cardstock to represent each Kingdom (e.g., green for Plantae Kingdom organisms).

Use different colored paper for the Organism Cards and Question Cards for easy identification (e.g., all Question Cards are Red).

d. **Snail Anatomy Poster**

Reproduce the SNAIL EXTERNAL ANATOMY and SNAIL INTERNAL ANATOMY masters. Using a poster board (at least 17" x 22" oriented so that it is 17" tall and 22" wide) mount the external anatomy onto the left side of the board and the internal anatomy onto the right side of the board. Leave room at the top and bottom for the headings. At the top of the poster board write the words "SNAIL ANATOMY." Centered underneath each 8.5" x 11" diagram write the words "External Anatomy" and "Internal Anatomy." Laminate for durability.

e. **Family Tree Labels and Organism names (Day 5)**

Reproduce FAMILY TREE (Classification Labels and Organism names; one set). Cut each out and attach to construction paper rectangles (slightly larger than the label/card). Attach string to the top of each label/card (except for Kingdom: Animalia).

f. **Kingdom Kits**

Reproduce KINGDOM KIT (one set per Preserve Team). Cut out the individual Kingdom labels and the individual bulleted characteristics. Place one set in each envelope. Set aside for each Preserve Team. Preserve Teams will use this information to create their Kingdom Scrolls (answer scrolls for the *Save the Ecosystem* Game).

g. **Snail Pictures**

Reproduce SNAIL PICTURES and cut out the individual Snail Pictures. Arrange these on the bulletin board. Preserve Teams select a snail to research for their Snail Bio assignment. Completed Snail Bios are attached underneath the snail picture on the bulletin boards.

h. **Save the Ecosystem Cards**

Reproduce the *Save the Ecosystem* card masters onto cardstock.

- ORGANISM CARDS (12 per Kingdom = 60 Organism Cards)

Beginning on page 111, you will find *two* pages of six organisms each for the Animalia Kingdom and Plantae Kingdom (for a total of 12 different organisms for these two kingdoms). For Kingdoms: Fungi, Protista, and Monera, there is only *one* page of six organisms each. Reproduce each of these pages twice, creating 12 cards for each of these three kingdoms (creating two Organism Cards for each of the six organisms).

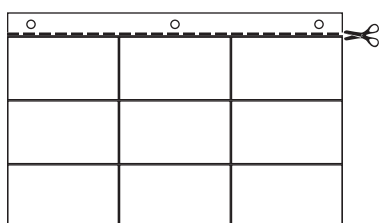
SETUP DIRECTIONS

- **GAME BOARD CARDS (17)**
Duplicate the two pages of GAME BOARD CARDS onto white cardstock and cut out each individual card.
- **QUESTION CARDS (38)**
Reproduce the seven pages of QUESTION CARDS (six cards per page). The final page has four blank cards. Use these blank cards by adding your own Questions and Answers prior to duplicating. Use colored cardstock (same color for all cards) for easy identification.
- When duplicating the ORGANISM CARDS and QUESTION CARDS, duplicate the SAVE THE ECOSYSTEM CARDS masters for the “back” side of each page. This creates realistic looking playing cards. Use different colored paper for the different cards so students can easily tell the difference (e.g., blue for Organism Cards and red for Question Cards).
- Create a maximum of 42 Game Path Squares per game. Using the 12" x 18" construction paper, create 2.5" x 3.5" construction paper squares. These are used to indicate the game board path.

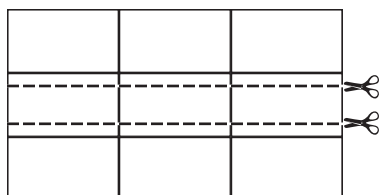
i. Sample Game Board

On the right side of the **Sample Game Board Chart** (22" x 34" Teacher Reference) create a Sample Game Board. You will need five plastic pocket pages, a maximum of 42 construction paper squares, GAME BOARD CARDS, and double-sided tape.

- Cut off the spine on each plastic pocket page.



- **Note:** four pocket pages remain intact. The fifth page is cut so that the top and bottom rows remain functional. You will need to cut into the middle row.



The Game Path Squares are used to indicate the game board path. On the game board there are 42 spaces possible, however these spaces will not all be used. Preserve Teams will have several unused squares. Consider limiting the number of Game Path Squares you provide.

SETUP DIRECTIONS



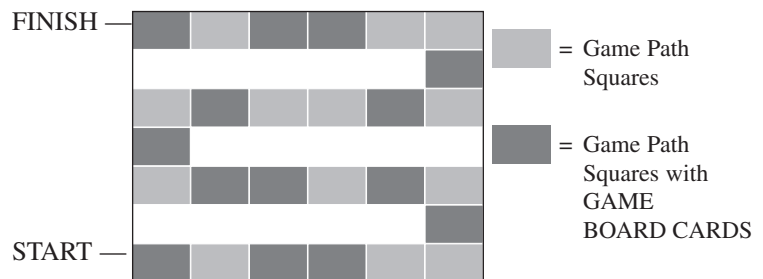
Blank spaces between the rows allows for easier game path visibility.



PRE/POSTTEST 1 is geared toward Primary students and 2 is geared toward Intermediate students. Select the one that works for your class.

In addition to using the GLOSSARY, consider some of the interactive vocabulary building activities discussed in **Unit Components #2, Taxonomy Vocabulary**.

- Tape the plastic pockets on the chart following the lines on the Sample Game Board. Leave a space down the center of your sample. (When students create their boards they will need to be folded for easier storage. This space allows for folding.)
- Using the construction paper squares, create a game path (you need to include a paper square at the upper left corner and lower left corner). You do not need to use all of these cards, some pockets can remain empty. Use the following diagram or create your own path.



- Using the GAME BOARD CARDS, place some or all of these along the game path. The START card is placed at the lower left corner and the FINISH card is placed at the upper left corner.

Preserve Teams use this sample as an example when creating their own game boards on Day 9.

7. Reproducible Masters

Duplicate the following in the quantity indicated in *Italics*:

Teacher Reference

- **Taxonomy Background**
- **Pre/Posttest Key**

General Reproducible Masters

- PRE/POSTTEST 1 — *two class sets*
—OR—
PRE/POSTTEST 2 — *two class sets*
- SAMPLE SORTING GRID — *teacher reference OR transparency or class set (Optional)*
- GLOSSARY — *class set*
- SORTING GRID — *one per Preserve Team*
- SAFE SNAIL HANDLING — *transparency + one to post*
- PRESERVE TEAM ROLES AND RUBRIC — *one per Preserve Team*
- SNAIL EXTERNAL ANATOMY — *one*
- SNAIL INTERNAL ANATOMY — *one*
- SNAIL ICON—EXTERNAL — *class set (for Intermediate students)*

SETUP DIRECTIONS

- SNAIL SHELL and SNAIL BODY (templates) — *class set (for Primary students)*
- SNAIL ICON—INTERNAL — *class set*
- SNAIL INTERNAL ORGANS — *class set*
- SNAIL TRAIL 1 — *class set*
- OR—
- SNAIL TRAIL 2 — *class set*
- SNAIL FAMILY TREE: UNCLE MOLLUSCA? — *class set*
- FAMILY TREE — *one set*
- SNAIL PICTURES — *one set*
- FANTASTIC SNAIL FACTS! — *class set*
- SNAIL BIO — *one per Preserve Team*
- OR—
- SNAIL BIO CHECKLIST AND RUBRIC — *one per Preserve Team*
- KINGDOM KIT — *one set per Preserve Team*
- BINGO BOARD — *class set (Optional)*
- ORGANISM CARDS — *one set per Preserve Team (60 cards)*
- GAME BOARD CARDS — *one set per Preserve Team + (17 cards) one for teacher sample*
- QUESTION CARDS — *one set per Preserve Team (38 cards + 4 blank)*
- SAVE THE ECOSYSTEM CARDS — *one per page of ORGANISM CARDS and QUESTION CARDS*
- SAVE THE ECOSYSTEM RULES — *one per Preserve Team*
- SCORE CARD — *two class sets*
- TOURNAMENT GRID — *one*
- SAVE THE ECOSYSTEM SCORE — *one*
- CERTIFICATE — *one per member of the winning Preserve Team*
- WRITING RUBRIC — *class set , one per Preserve Team, or transparency + one to post (Optional)*



The SNAIL SHELL and SNAIL BODY activity is especially good for second grade students. Use these masters to create templates.

SNAIL TRAIL 1 has the information already written in for Primary students. Students circle their hypothesis and conclusion. SNAIL TRAIL 2 is designed for Intermediate students and requires them to write in their responses.

Use SNAIL BIO for Primary students and SNAIL BIO CHECKLIST AND RUBRIC for Intermediate students.

Write in your own questions and answers on the four blank Question Cards.

The SAVE THE ECOSYSTEM CARDS masters are the “backs” of the Organism Cards and Question Cards. This creates realistic looking game cards. Use different colored paper for each different type of card (e.g., blue for the Organism Cards and red for the Question Cards).

UNIT COMPONENTS

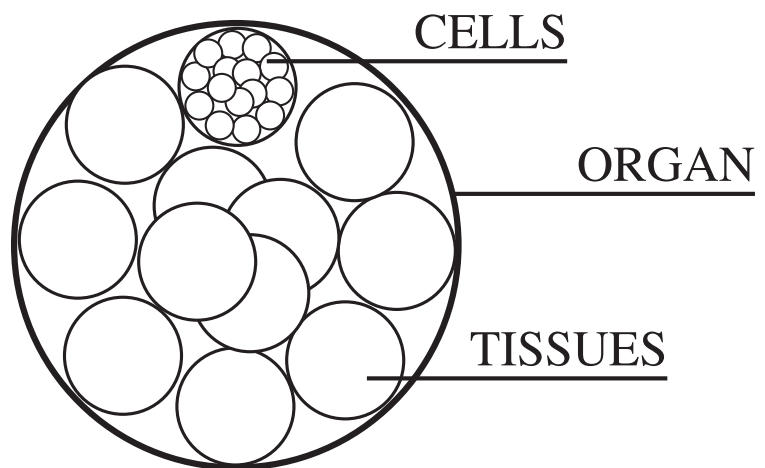
1. Cooperative Learning

Students work in cooperative learning groups (Preserve Teams) during TAXONOMY TRAIL. Working together they experience the satisfaction of achieving a common goal. A team can achieve more than a single student by pooling knowledge, creating team spirit, and providing encouragement to each other. This unit gives students of all abilities and learning styles a chance to excel. Set clear behavioral expectations for the cooperative learning groups. (See the **Assessment** section and Preserve Team Rubric found on PRESERVE TEAM ROLES AND RUBRIC for more information).

2. Taxonomy Vocabulary

Students are exposed to a large amount in new vocabulary throughout the unit. The GLOSSARY provides the definitions within the context of the unit. However, it is important that students learn the vocabulary. Consider one of the following vocabulary building activities.

- Vocabulary Bingo game—offered as an extension activity on Day 8. Students place the vocabulary words on their BINGO BOARD and then as the teacher reads off the definition of each term, students place a marker on their boards.
- Students “draw” vocabulary. The way the word is written helps the student remember it. Students sometimes make the letters as part of pictures. Examples include:
 - When discussing cells, tissues, and organs, students draw a circle and label it ORGAN. Inside the circle, they draw smaller circles labeled TISSUES. And inside the tissue circles, they make very small circles labeled CELLS.



— Other examples include:

ORNATE

h o ll o w

com **BUST** ible

- Students make flashcards and peer-teach the vocabulary.

3. Taxonomy Folders

During Day 1 students create Taxonomy Folders using 12" x 18" construction paper. Students keep all their work in these folders throughout the unit. Consider whether you will collect these daily or have students keep them. Check student work during the course of the unit, by collecting their Taxonomy Folders. It is important to provide students and teams with feedback, especially if the work is below expectations. Students need time to correct their work and build more understanding of the concepts.

4. *Save the Ecosystem* Tournament

- During Day 9 Preserve Teams create and learn the *Save the Ecosystem* game. On Day 10, Preserve Teams compete in a *Save the Ecosystem* tournament.
- Game tables are set up around the room, where a minimum of three and a maximum of six students play *Save the Ecosystem*. Each member of the Preserve Team is playing at a different table (no games are played with more than one member from a particular Preserve Team).
- Throughout the game, each student keeps track of the number of organisms gained in each kingdom by placing his/her ORGANISM CARDS on the table in front of him/her. At the end of the game, each student writes down his/her totals on his/her SCORE CARD. When all the games are over, each Preserve Team's total is calculated on the sheet labeled SAVE THE ECOSYSTEM SCORE. The team with the most organisms in the most kingdoms wins.
- Consider the following options when establishing student placement for the *Save the Ecosystem* tournament:
 - Students sign up on the TOURNAMENT GRID
 - Pre-assign each student to a game table (using the TOURNAMENT GRID)
 - Students pick numbers (1-??; based on the number of game tables played in the tournament) from a hat (e.g., if you have six game tables, students pick numbers from 1-6).

UNIT COMPONENTS

5. **Extensions**

Note the selection of Extensions that are offered. These are provided as enrichment. This allows for students of differentiated learning abilities. These activities can be chosen by students or assigned by you.

6. **Teacher Background Information**

Prior to beginning the unit read the information provided in **Taxonomy Background** (found on pages 65–69). These pages provide information about taxonomic classification as well as snails and their “relatives.” Also, included within the Daily Directions you will find sections titled, “**Teacher Background Information.**” Here you will find specific information that is important for that lesson/activity.

TAXONOMY TRAIL provides a variety of opportunities for assessing individual and group achievement.

1. Performance Assessments

- a. TAXONOMY TRAIL offers many opportunities to assess students' academic and social skills through teacher observation of both individual and group work. The products of completed activities present more opportunities to assess written language and science skills. There are Rubrics in the Reproducible Masters of this Teacher Guide for cooperative group work and written work.
- b. Share Rubrics with your students before they begin any work. Go over the Rubric orally and ask if there are any questions. Post the Rubric in the classroom. When students ask, "Is this good enough?" refer them to the Rubric.
- c. Under standards-based learning, require students who do not complete work at standard (**Expected** level) to redo that work. To meet standard, a student might only need to recopy the work more neatly. On the other hand, it might mean that a student or team must redo an entire task.
- d. Work with the Resource and TAG teachers within your school to optimize the experience and assessment of all students.

2. Determine Assessment Standards

TAXONOMY TRAIL is designed for students from second through fifth grades. Therefore, establish your own definition of what "meets the standard" for your grade level. "Meeting the standard" for fifth grade may mean more elaboration on the following criteria:

- a. "Meeting the standard" on the Sorting Grid activity requires students to understand and use the basic elements of classification.
- b. "Meeting the standard" on Safe Snail Handling requires students to follow the specific instructions listed on SAFE SNAIL HANDLING (e.g., low voice and slow movements when around the snails).
- c. "Meeting the standard" on the external anatomy activity requires students to learn and identify the external physical characteristics of the snail.
- d. "Meeting the standard" on the internal anatomy activity requires students to learn and identify the internal organs of the snail and trace the digestive system.



Use the generic WRITING RUBRIC for any written assignments.



Holding students accountable reinforces the importance of quality work.

- e. “Meeting the standard” on the Snail Trail experiment requires students to work together as a team to conduct, observe, and draw conclusions from an experiment.
- f. “Meeting the standard” on the Snail Bio requires students to conduct accurate and thorough research; write the bio using correct form, with logical and organized information; present facts clearly, use correct spelling, grammar, and punctuation; write in complete and clear sentences.
- g. “Meeting the standard” on the Snail Quiz activity requires students to understand the various facts related to snails.
- h. “Meeting the standard” on the Kingdom Scroll activity requires students to work together to identify and glue the appropriate characteristics following each corresponding Kingdom label.
- i. “Meeting the standard” on the *Save the Ecosystem* game requires students to answer the questions on the Question Cards correctly to acquire the maximum number of organisms.
- j. “Meeting the standard” on the Posttest requires students to increase their correct responses from that of the Pretest.
- k. Students who do *not meet the standard* on any part of the assessment must be required to redo that section. Sometimes students need a second chance to demonstrate what they know. For written work, consider allowing students to rewrite their work after reviewing with you. Also consider allowing students to provide their responses orally.

3. What do Rubric Scores Mean?

When completing performance assessments, focus on “student work.” This work is *not* limited to written work. It includes demonstrated skills, oral exchanges, processes, strategies, and any other evidence that proves that the students have learned the targeted content or skill and can apply what they know.

4 – Exemplary

Generally this rating describes *exemplary* student work that exceeds the standard for the activity because it is significantly beyond what was expected or asked in the directions. The descriptor includes words such as “consistently,” “complete,” “with detail,” “actively,” and “willingly.” Students who earn a “4” demonstrate leadership and knowledge during participation in the simulation.

3 – Expected

Generally this rating describes *expected* student work that meets the standard with quality. The descriptors lack some of the positive adjectives of a “4,” but this student has mastered the content or skill has completed all the tasks required and can demonstrate his/her understanding in an application setting.

2 – Nearly there

Generally this rating describes student work that almost meets the standard. Sometimes inconsistent effort or a misconception of the content will result in a “2” rating. This student needs a little re-teaching, needs to try a little harder, or needs to revise his/her work in order to meet the standards described.

1 – Incomplete

Generally this rating describes student work that has not yet met the standard in content and/or skill. This student will require more instruction and another opportunity to demonstrate a knowledge or skill, or will require alternative instruction and assessment.

4. Vocabulary Assessment Options

Consider assessing students’ vocabulary knowledge throughout the unit. Consider using the following options:

- a. Vocabulary Bingo—offered as an extension activity for Day 8.
- b. Drawing the vocabulary
- c. Creating vocabulary flash cards and peer-teaching
- d. Developing their own vocabulary games

5. Cooperative Group Assessment

In addition to assessing content knowledge and skills TAXONOMY TRAIL includes a Rubric to assess cooperative group work (see Preserve Team Rubric on TEAM ROLES AND RUBRIC, page 83). Individual students working well within their Preserve Team may strive to achieve a score of “4” using this Rubric.



Use this rubric whenever necessary to encourage and reinforce positive group behavior.

BIBLIOGRAPHY

Day 2

http://www.accessexcellence.org/AE/AEC/AEF/1994/liu_snails.html

Day 3

<http://www.geocities.com/Heartland/Valley/6210/anat.htm>

Day 6

Names of Different Snails

<http://members.aol.com/dropnet/Snails.html>

Grove snail

http://www2002.stoke.gov.uk/museums/pmag/nathist/education/keystage/content/grove_snail-keystage_1.htm

Roman Snail

<http://members.lycos.co.uk/Mollusks/Schnecken/weinberg.html>

<http://brian.cave.free.fr/newsletters/september2001.html>

Cone Snail

http://www.wikipedia.org/wiki/Cone_snail

<http://www.gemmedelmare.net/conus/>

<http://grimwade.biochem.unimelb.edu.au/cone/more.html>

Triton Turbo Snail

<http://kidd.park.edu/Athena/invertebrates.htm>

Flamingo Tongue Snail

<http://www.reefnews.com/reefnews/photos/flamtong.html>

Day 7

Cells

<http://www.parabola.org/magazine/backissues/2702/2702.html>

<http://www.x-ald.nl/biochemistry.htm>

Tissues (epithelial)

<http://www.uoguelph.ca/zoology/devobio/210labs/epithelial1.html>

One-celled animals

Amoeba,

<http://www.le.ac.uk/biology/teach/mod103/mulecs/amoeba.gif>

Euglena,

<http://www.sc2000.net/~czaremba/images/euglena.jpg>

Daphnia,

<http://www.blockenviron.com/>

Volvox,

<http://www.entmclassess.umd.edu/lamp/bsci467/pages/volvox.htm>

Photosynthesis

<http://photoscience.la.asu.edu/photosyn/education/learn.html>

Snail ordering available from:

Carolina Biological Supply Company (to order land snail specimens)

www.carolina.com

800 334-5551

800 222-7112 FAX

Nasco

www.enasco.com

800 558-9595

They will ship live snails out of state!



UNIT TIME CHART

DAY 1: Everything in the World

- Introduce unit
- Group students into Preserve Teams
- Teams practice sorting and formulate governing questions
- PRE/POSTTEST
- SAMPLE SORTING GRID
- GLOSSARY
- SORTING GRID
- **Vocabulary:** preserve, docent, vertebrate, invertebrate, taxonomy
- **Extension**
Research Preserve names

DAY 2: Wake the Snail

- Use governing questions in the game of twenty questions
- Learn the names of the external anatomy of a snail
- Discuss the proper treatment and handling of the snails
- Teams record the external characteristics of the snails
- Complete written assignment labeling the parts of the snail
- SNAIL SHELL and SNAIL BODY
—OR—
- SNAIL ICON—EXTERNAL
- SAFE SNAIL HANDLING
- PRESERVE TEAM ROLES AND RUBRIC
- **Vocabulary:** shell, apex, foot, head, mouth, tentacle, eye, radula, mollusk, anatomy, respiratory pore
- **Extensions**
Watercolor Snail Icon
Observe snail mouth and radula
Generate questions for further experimental study

DAY 3: Snail Anatomy Maze

- Learn that scientists classify or sort organisms using more criteria than just their external characteristics
- Learn the distinctions between cells, tissues, and organs
- Color and label internal organs
- Trace through the digestive system of the snail
- SNAIL ICON—INTERNAL
- SNAIL INTERNAL ORGANS
- **Vocabulary:** vertebrate, invertebrate, cell, tissue, organ

DAY 4: Off to the Races!

- Learn the five steps of the scientific method
- Follow the scientific method in observing and recording snail behavior
- Learn that classification is determined by behavior as well as by physical characteristics
- SNAIL TRAIL
- **Vocabulary:** mobile, ingest, photosynthesis, chlorophyll
- **Extensions**
Students develop Snail Haikus (individually or as a team)

UNIT TIME CHART



DAY 5: Uncle Mollusca?

- Discuss the concept of a family tree
- Brainstorm some close “relatives” of snails
- “Mirror” bulletin board displaying the snail’s “family tree”
- SNAIL FAMILY TREE: UNCLE MOLLUSCA?
- FAMILY TREE
- **Vocabulary:** Kingdom, Phylum, Class, Mollusca, Gastropoda, Bivalve, Cephalopoda

DAY 6: Stump Your Parents!

- Explore the exceptional diversity and beauty of snails
- Introduce scientific names
- Learn some facts about snails that are “stranger than fiction”
- Research and create snail bios
- Devise parent quizzes to reinforce knowledge
- Add species diversity to student understanding and to bulletin board
- SNAIL PICTURES
- FANTASTIC SNAIL FACTS!
- SNAIL BIO
—OR—
- SNAIL BIO CHECKLIST AND RUBRIC
- **Vocabulary:** scientific names
- **Extension**
Students conduct a Snail Beauty Pageant.

DAY 7: Take Me to Your Kingdom!

- Review and distinguish cells, tissues, and organs
- Learn about photosynthesis
- Discuss different ways organisms obtain food
- Learn the names and main characteristics of the five Kingdoms
- Become familiar with how scientists came up with the five Kingdoms
- Perform an activity which reinforces and organizes this knowledge
- Create an answer scroll for *Save the Ecosystem* game
- KINGDOM KIT

DAY 8: King Phillip Commands Order for Goofy Shoes

- The seven levels of taxonomy classification are introduced: Kingdom/Phylum/Class/Order/Family/Genus/Species
- Learn taxonomic classifications for cat and dog
- Teams develop acronyms to help them remember the seven levels
- **Extension**
Vocabulary Bingo



UNIT TIME CHART

DAY 9: *Save the Ecosystem*

- Assemble and learn to play *Save the Ecosystem*
- Reinforce Kingdom characteristics
- Increase awareness of the principle that the more diversity of organisms, the healthier the ecosystem
- ORGANISM CARDS
- GAME BOARD CARDS
- QUESTION CARDS
- SAVE THE ECOSYSTEM RULES
- SCORE CARD

DAY 10: Award-Winning Preserve

- Reinforce and test knowledge of Kingdom characteristics
- Celebrate and gain recognition for the investigation of a complex field of knowledge
- Release the snails (if they were collected by students)
- TOURNAMENT GRID
- SAVE THE ECOSYSTEM SCORE
- SCORE CARD
- CERTIFICATE
- PRE/POSTTEST

Day 1

Everything in the World

Objectives

- Introduce unit
- Group students into Preserve Teams
- Teams practice sorting activities
- Students formulate governing questions
- **Vocabulary:** preserve, docent, vertebrate, invertebrate, taxonomy

Materials

- PRE/POSTTEST 1 or 2 — *class set*
- **Pre/Posttest Key** — *teacher reference*
- SAMPLE SORTING GRID — *teacher reference OR transparency or class set (Optional)*
- GLOSSARY — *class set*
- SORTING GRID — *one per Preserve Team*
- WRITING RUBRIC — *class set, one per Preserve Team, or transparency + one to post (Optional)*
- Beans (different types, colors, sizes; for sorting) — *one ounce per student*
- Construction paper (12" x 18"; for Taxonomy Folders) — *class set*
- Construction paper (9" x 12"; for Sorting activity) — *one per Preserve Team*
- Glue — *one per Preserve Team*
- Hat or lined basket (for selecting Preserve names) — *one*
- Highlighter pen — *class set (Optional)*
- List of 16 familiar objects — *one (Create a list of familiar items students can observe within the classroom and outside looking through the windows.*

Sample list:

<i>apple</i>	<i>begonia plant</i>
<i>chair</i>	<i>desk</i>
<i>fern</i>	<i>fly</i>
<i>guinea pig</i>	<i>lizard</i>
<i>pen</i>	<i>pencil</i>
<i>pencil sharpener</i>	<i>pinecone</i>
<i>plastic ruler</i>	<i>poster</i>
<i>stapler</i>	<i>tarantula</i>

- Overhead projector — *one (Optional)*
- Paper slips (small, scratch paper, for Preserve names) — *one per Preserve Team*



Prior to beginning the unit, be sure to read Taxonomy Background (Teacher Reference).

PRE/POSTTEST 1 is geared toward Primary students and 2 is geared toward Intermediate students.

The SAMPLE SORTING GRID shows how 16 familiar objects are sorted. Use this as a reference or as part of the whole class sorting. If you choose to use it with the class consider making a transparency and having students follow along as you uncover the various sections or reproduce this page and have the class follow along as you work to sort these 16 objects.

*As you expose students to the new words, consider having them highlight each word on their Glossary. See **Unit Components #2, Taxonomy Vocabulary** for suggestions on ways for students to learn the vocabulary presented in this unit.*

One 20 oz. bag of dried bean soup mix is enough for 20 students. Use a coffee scoop for distributing the beans.

DAILY DIRECTIONS

DAY 1



To locate the preserves in your state visit the Nature Conservancy website: <http://nature.org/wherewework/northamerica/states/>.

Setup

1. Select Preserve names for the unit. Locate preserves in your state or use the ones offered here (from the state of California):
 - The Cosumnes River Preserve
 - Santa Cruz Island Reserve
 - Sequoia Foothills Project
 - Herbert Wetland Prairie Preserve
 - Kaweah Oaks Preserve
 - Lewis Hill Preserve
 - Rancho Cuyamaca
 - McCloud River Preserve
 - Ring Mountain Preserve
 - Santa Rosa Plateau Preserve
2. Write out the Preserve names on small slips of paper for team drawing (see **Procedure #5**).
3. Draw a sorting grid on the chalkboard or on a large piece of butcher paper.
4. Create a list of 16 familiar objects. Write these 16 familiar objects within the first tier (top of the grid) of the Grid you drew on the board or butcher paper (see SAMPLE SORTING GRID for an example).
5. Divide beans into fairly equal, but unsorted piles for each team.

Procedure

1. Give a brief overview of TAXONOMY TRAIL. Explain to students that they will be talking about “everything in the world,” and how everything in the world is connected in some way to everything else.
2. Distribute PRE/POSTTEST and administer. Allow time for students to complete. If you want, include question #21 for extra credit (see below; see **Pre/Posttest Key** on page 70 for more information).

Extra Credit

21. What do you think the organism in Question #19 is? What makes you think this?



Correct the Pretest and keep for later evaluation of learning (compare with the Posttest—Day 10). See the **Pre/Posttest Key**.

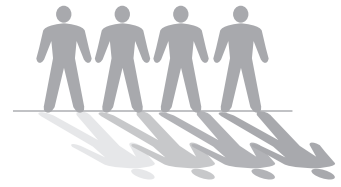
3. Group students into Preserve Teams of four–five students each (see **Setup Directions #3, Grouping Students** for more information).

4. Read or tell the following:

All over the world, people are recognizing the need for preserving the world's life forms and their habitats. (The habitat is where plants and animals live.) World governments have decided to create **Preserves**. Preserves are special, protected land areas. There can be no development and industry on a preserve. Therefore, in these special areas, all the different kinds of organisms that live there can flourish in their natural habitat. There are thousands of preserves around the world. They prevent the extinction of species. They also stop the destruction of critical habitats. By protecting a greater diversity of life (different kinds of organisms) we can expect a stronger, healthier planet.

There are volunteers in the preserve called **Docents**. They educate the public about the organisms and habitats within the preserve. As we work on this unit, we will be working as docents on Preserve Teams. As docents, we will become educated about how scientists group and sort the living things in the world. We can also increase the awareness of the people around us about the need to preserve habitats that support a diversity of life. At the end of the unit, your Preserve Team will compete with the other Preserve Teams in a fascinating board game to *Save the Ecosystem*!

5. One Preserve Team member selects a preserve name from a hat or lined basket.
6. **Teacher Background Information**
 - Biological diversity means the variety of life on Earth. This diversity is an essential condition for the survival of humans and all living creatures.



Preserve Teams of 4–5 members



DAILY DIRECTIONS

DAY 1



If you chose to use *SAMPLE SORTING GRID*, have students follow along on the transparency or on their pages as you sort the 16 objects.

For more information on how the sorting grid works to sort the 16 familiar objects, see *SAMPLE SORTING GRID*.

- A fundamental property of ecological systems is a certain mixture, or *diversity* of living things: we cannot expect to find deer or ducks in the wild in the absence of the interconnected web of other plants and animals on which their lives depend. Biological diversity, or *biodiversity*, is a term that is now commonly used to describe the variety of living things and their relationships to each other and interactions with the environment.
7. Direct students' attention to the list of 16 familiar objects (written in the first tier of the Grid you drew on the board).
 8. Ask students to raise their hands if they see a way to sort the objects on the list into two different groups.
 9. Ask the class what makes these two groups different. (It's almost inevitable that the class will divide the list into **living** and **non-living**; if not, keep asking for distinctions until this one arises.) Tell the class that this difference signals a basic *characteristic* of the objects on the list. Write the two characteristics at the top of the Grid you drew on the chalkboard or on a large piece of butcher paper (see **Setup #3**).
 10. Move to the second tier of the Grid; ask the class to consider the items on the list that are living. Ask them to sort again. Listen for the response, **plant** and **animal**. Write these on the Grid in the **living** column.
 11. Direct the class' attention to the section of the grid (within the third tier) which you titled "Animal." Inform the class that now the sorting gets harder. When we look at the animals, there are several ways that they are the same (they have eyes and mouths and legs; they breathe), and also several ways that they are different (for example, a fly has wings, a guinea pig has four legs, etc.). Tell the students that scientists have decided that one *governing question* to ask when classifying animals is "Does the animal have a backbone?" Introduce the scientific term for this characteristic: *vertebrate* versus *invertebrate*. Add this heading to the Grid on the next tier under **animal**. Continue to sort to the individual level (see *SAMPLE SORTING GRID* for an example).

12. Teacher Background Information

Some additional background information may be needed here to assist students in sorting.

- Vertebrates (organisms with a backbone)
 - Mammals (guinea pig) = warm blooded, fur, mammary glands, most have live birth
 - Reptiles (lizard) = cold blooded, scales, lay eggs
 - Birds = warm blooded, lay eggs, feathers
 - Amphibians = moist skin, cold blooded, lay eggs in water, adults live on land
- Invertebrates (no backbone, have an exoskeleton)
 - Insects (fly) = six legs, three body parts
 - Spiders (tarantula) = eight legs, two body parts

13. Distribute construction paper and have students fold the paper in half to create Taxonomy Folders. Write **TAXONOMY** on the board and instruct students to write “their name’s Taxonomy Folder” (e.g., *Jennifer’s Taxonomy Folder*) on the front of their folder. Explain that *taxonomy* means ***the study of how all living things are related and sorted***. This folder is where students will keep all their work during this unit. (See **Unit Components, #3 Taxonomy Folders**).

14. Distribute GLOSSARY to students. Discuss how you have chosen to use this throughout the unit. The terms learned today include: docent, preserve, vertebrate, invertebrate, and taxonomy. Students place this in their Taxonomy Folders for later reference.

15. Distribute the beans, glue, construction paper, and SORTING GRID to each Preserve Team. Instruct teams to glue their SORTING GRID to the construction paper to make it sturdier. Each Preserve Team writes their Preserve name at the top of their paper.

16. Instruct teams to glue one of each kind of bean in the top panel of the SORTING GRID (in the same way you listed all 16 of the familiar objects prior to sorting them into separate categories).

17. Instruct the teams to work together to begin sorting the beans, first into *only two groups*. Be sure to inform them that there is more than one “right” way to perform this step. Ask them to glue representative beans in the appropriate boxes in the divided second tier of the SORTING GRID.



For kinesthetic learners consider cutting out the list names and students place beans in piles as sorting progresses.

DAILY DIRECTIONS

DAY 1



Each Preserve Team should be able to identify the criteria that they are using to divide beans. This is a characteristic, e.g., “These beans are all dark,” “These are spotted,” “They are solid,” etc.

For Intermediate students consider having them write a word or two in the box where the beans are glued describing the characteristic/governing question.



Establish grade appropriate expectations for the Preserve Paper. Use the generic WRITING RUBRIC for evaluation.

18. Ask teams to assign one member to report what *characteristic* they chose in order to make their first sorting (e.g., color, size, shape, smoothness, whole or broken, etc.).
19. Ask teams to identify their *governing question*. For example: Is this bean a darker or lighter color?
20. Instruct teams to break into two groups of 2–3 students, and continue the sorting process again, each sub-team working to sort one of the sub-groups of beans. For example, one sub-team sorts the darker beans and the other sub-team sorts the lighter beans. Ask them to record their classification decision on the SORTING GRID by again gluing representative beans on the SORTING GRID.
21. Once again, ask for the *characteristic* and *governing question* that determined how the beans would be sorted.
22. As a class, explore the different choices different teams made. Explain that scientists, too, have to come to agreements about what characteristics they would use to sort what we see all around us. Read or tell the following:

Scientists have found out what we found out; there are often no “right” ways to sort, and it’s easy to come up with different groupings of the same items.
23. Keep the Sorting Activity going until at least some beans are in a group of their own; in other words, until the students classify all the way down to “individuals.”
24. Collect the SORTING GRIDS and assess whether teams understand the basic concepts governing sorting/classification. Give teams feedback as necessary.
25. **Extension**

Preserve Teams research their preserve names.

 - Teams report information to the class.
 - Students write an individual Preserve Paper on the information their team gathers.

Day 2
Wake the Snail

Objectives

- Use governing questions in the game of twenty questions
- Learn the names of the external anatomy of a snail
- Discuss the proper treatment and handling of the snails
- Teams record the external characteristics of the snails
- Complete written assignment labeling the parts of the snail
- **Vocabulary:** shell, apex, foot, head, mouth, tentacle, eye, radula, mollusk, anatomy, respiratory pore

Materials

Primary Students

- SNAIL SHELL and SNAIL BODY (templates for Primary students) — *class set*
- Construction paper (9" x 12"; white; for Primary students) — *class set*
- Construction paper (9" x 12"; colored; for Primary students) — *class set*
- Construction paper (9" x 12"; brown; for Primary students) — *class set*
- Glue sticks — *several per Preserve Team*
- Pens (dark) — *several per Preserve Team*
- Scissors — *several per Preserve Team*

Intermediate Students

- SNAIL ICON—EXTERNAL (icon for Intermediate students) — *class set*

General Activities

- SAFE SNAIL HANDLING — *transparency + one to post*
- PRESERVE TEAM ROLES AND RUBRIC — *one per Preserve Team*
- Food for snails (cornmeal, oatmeal, and fresh green leaves—spinach, chard, and beet greens hold up best) — *many*
- Overhead projector — *one*
- Paper towels — *two per Preserve Team*
- Snail enclosure (plastic storage container at least as large as a shoebox, large jar, or small plastic animal enclosure — *one*
- Snail Anatomy Poster (created using SNAIL EXTERNAL ANATOMY and SNAIL INTERNAL ANATOMY and 17" x 22" poster board) — *one*
- Snails (land snails) — *at least two per Preserve Team*
- Watercolors (for Extension Activity) — *several (Optional)*



Timing Icon
60+ minutes

Day 2 takes a minimum of 60 minutes to complete. If you do not have this amount of time, break this lesson into two consecutive days (end the first day at Procedure step #12).



The SNAIL SHELL and SNAIL BODY activity is especially good for second grade students. Use these masters to create templates.

DAILY DIRECTIONS

DAY 2



For additional snail anatomy background information and photos, go to www.teachinteract.com.

If students assisted in obtaining the snails, be creative in how you play the game of Twenty Questions.

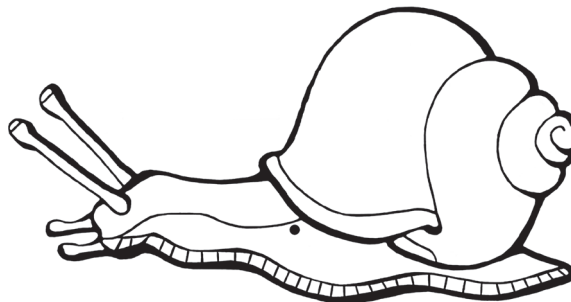
With younger students, you may need to introduce some good questions and related definitions before you begin the game. Also, have some hints ready (e.g., “It mostly comes out at night” or “It likes to raid vegetable gardens.”)

Setup

1. Prior to class, obtain 20 land snails, establish a snail enclosure, and gather snail food [see **Setup Directions #6, Preparing Materials (a. Snails, b. Snail Enclosure, and c. Snail Food)** on pages 6–7 for more information].
2. Create the Snail Anatomy Poster [see **Setup Directions #6, Preparing Materials (d. Snail Anatomy Poster)** on page 8 for more information]. Display only the External Anatomy side for Day 2 (by covering the Internal Anatomy side).

Procedure

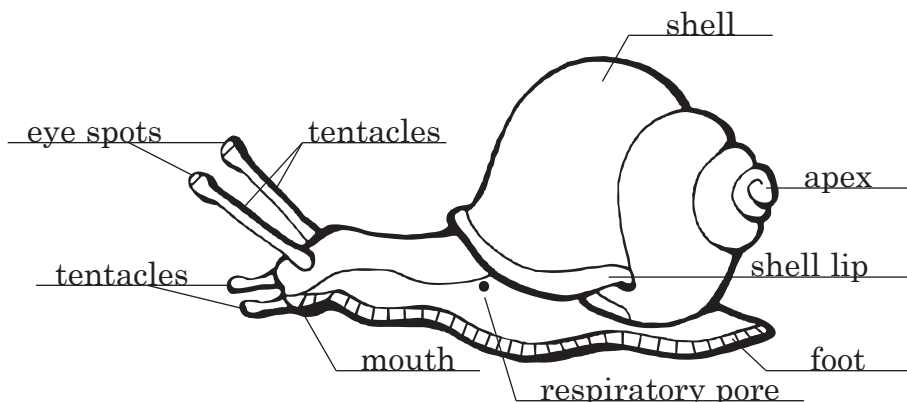
1. Remind students of the game of Twenty Questions and how it is played. Often younger students don’t know that the game begins with the question, “Is it animal, mineral, or vegetable?” Give examples of each category.
2. Begin by saying: “I’m thinking of something that is hidden in the classroom.”
3. Students raise hands and are called to ask governing questions. For example:
 - “Is it animal, mineral, or vegetable?”
 - “Is it living or non-living?”
 - “Is it larger or smaller than a cat?”
 - “Do you normally find it outside or inside?”
 - “Is it carnivorous or omnivorous?”
4. Once students have guessed correctly, allow some time for them to express their excitement and/or aversion.
5. Draw a diagram of a snail on the board. (It should include a shell, head, and foot. The head should have four tentacles, two long and two short, with eye spots at the ends of the longest tentacles, see the diagram below.)



6. Inform students that they will first learn about the anatomy of the snail and then observe the snails.
7. Ask the class if anyone knows the name of any of the parts of the snail drawn on the board. Write all responses to the side. After a list has been generated, circle all those parts the students will be learning. Ask leading questions if they have left off any of these terms: *shell*, *apex*, *head*, *mouth*, *tentacles*, *eye spot*, *foot*. (E.g., if *foot* is missing, ask them to name the part of the body that many animals walk upon). Introduce correct terms where needed. (If they volunteered *feelers*, explain the correct term is *tentacles* and write the correct term on the board.)
8. Point to the first circled term and ask if anyone knows where it is on the snail. Have students come up and point to the correct location. Write the term and then draw a line from the anatomical term to the location. (E.g., if they know the correct location of the shell, write the word shell with a line pointing to the shell.) Assist students in finding the correct location for each anatomical term.
9. Explain that snails have parts that are special to snails. Write *respiratory pore*, *apex*, and *radula* on the board. Ask if anyone knows these words and can explain what they are.
10. Draw the *respiratory pore* on the foot of the snail and label it. Explain that this is an opening that allows the snail to breathe. It also breathes through its moist skin.
11. Draw the *apex* on the shell if you didn't already do it and label it. Explain that this is the tip of the shell, where it started as a hatchling and continued to grow as the snail grew.



For Primary students, consider how much anatomical information they can handle. You may need to change the Pre/posttest if you change what you expect your students to know.



DAILY DIRECTIONS

DAY 2



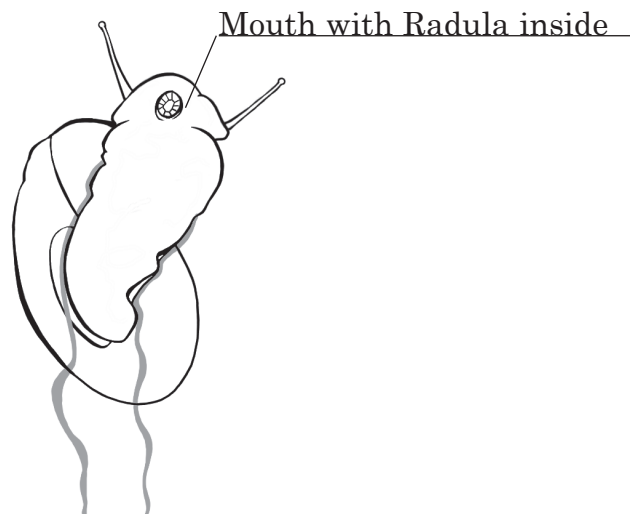
If you are completing Day 2's lesson in two days, end your first day following the anatomical labeling and before observing the live snails.

Before students get the snails, demonstrate proper snail handling. Show students how to pick up and hold the snail, as well as how to deal with a slime trail on your hand.



Decide ahead of time how roles will be determined (teacher determined or students choose).

12. Draw the bottom of the foot as if looking at it as it was climbing a pane of glass. At the tip draw and label the *mouth* and *radula*. Explain that we can't see the radula easily because it's inside the mouth. The radula is like a series of teeth that scrape food like algae. (If the students watch a snail on a pane of glass they may be able to see the snail using its radula. It's also a great way to see the muscles of the foot in action.)



13. Inform students that it is time to observe the snails. Pose the question: How can we make sure that none of the snails are harmed in any way as we observe them? Using the overhead projector discuss SAFE SNAIL HANDLING.
14. Distribute PRESERVE TEAM ROLES AND RUBRIC. Assign Preserve Team roles and review the Preserve Team Rubric.
- **Top Taxonomist**—The Top Taxonomist is the team leader responsible for seeing that all members are working cooperatively and completing each activity. The Top Taxonomist keeps the team assignments in his/her Taxonomy Folder.
 - **Classification Chronicler**—The Classification Chronicler is responsible for writing the work of the group.
 - **Snail Docents (2 students)**—The Snail Docents are responsible for taking care of the snails. These students retrieve the snail(s) from the enclosure, wake the snails if necessary by placing a drop of water on their undersides, keep watch of the snails while they are out of the enclosure, and return the snails to the enclosure.

DAILY DIRECTIONS

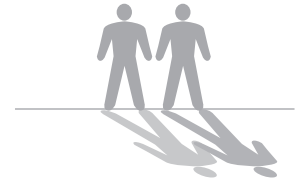
DAY 2

- **Preserve Provider**—The Preserve Provider collects and returns all materials (except snails) to the designated areas. This student ensures that the team has what they need to complete the day's work.

15. For this activity, Preserve Teams break into two sub-groups of 2–3 students each. Sub-group 1 consists of the Classification Chronicler and one Snail Docent. Sub-group 2 consists of the Top Taxonomist, one Snail Docent, and the Preserve Provider.
16. Instruct Classification Chroniclers to take out pencil and lined paper and Preserve Providers to gather paper towels (two per team). Instruct Snail Docents to retrieve one snail each. If snails are asleep remind Snail Docents to wake the snail by carefully turning the snail upside down and dropping one drop of water on its underside.
17. **NOTE:** Poking, movement, and loud noises will hinder waking the snail. Encourage students to be aware of their actions and how they influence the actions of the snail. (Caution: snails eat paper towels. Allow the students to make this discovery. Finding holes in the towel is fun!)
18. Top Taxonomists lead a team discussion about their observations of the snails. Classification Chroniclers write down as many observations as they can about their snail. Snail Docents watch snails (making sure that snails do not fall off the table, etc.). Allow 10–15 minutes for this activity.
19. Snail Docents collect their snails, put them away, and feed them as appropriate. Students immediately wash their hands.
20. Each Classification Chronicler reads their team's observations aloud while the teacher makes a master list on the board, eliminating any duplication.

For Primary Students Only (specifically grade 2)

1. Preserve Providers gather Snail Shell and Snail Body templates, construction paper (brown, colored, and white—one of each to each student), glue, and scissors. Display the Snail Anatomy Poster (with only External Anatomy displayed).



Groups of 2–3 students work better when handling the snails. Groups from the same team work next to each other, so they are still working together.

Consider having sub-groups of two members each, with the Top Taxonomist leading both groups.



Snails that withdraw into their shells during class can usually be coaxed out by a brief dip in a shallow container of water. The lids from frozen juice cans are convenient to use because they hold enough water to wet the snail, but hold so little water that spills are not a problem.

DAILY DIRECTIONS

DAY 2

2. Lead the class as they trace and cut the snail body from brown construction paper and the shell from the colored paper. Instruct students to glue the body to the white construction paper (leaving room for the shell).
3. Instruct students to write “Docent:” and their name on the paper. Students then write “Snail Anatomy” at the top of their white paper. Instruct students to glue the shell to the top of the body so that it looks like a snail.
4. Ask students to look at the Snail Poster to see what is missing (four tentacles and eyespots). Draw the four tentacles and eyespots in with pen/pencil. Instruct students to label the shell, foot, tentacles, eyespots, and respiratory pore.
5. Display the snails around the class or place in the Taxonomy Folders. Top Taxonomists place the PRESERVE TEAM ROLES AND RUBRIC in their Taxonomy Folders.

For Intermediate Students Only (appropriate for grades 3–5)

1. Preserve Providers gather SNAIL ICON—EXTERNAL and distribute to each student.
2. Review the anatomy.
3. Instruct students to recall the parts of the snail they saw by labeling the external characteristics that have been noted during team observations.
4. Display the Snail Anatomy Poster (with only External Anatomy displayed) and lead the class in making any corrections necessary.
5. Instruct students to place their completed Snail Icon in their Taxonomy Folders. The Top Taxonomists place the PRESERVE TEAM ROLES AND RUBRIC in their Taxonomy Folders.
6. **Extension 1**
Watercolor the Snail Icon and use as a bulletin board border or as cover art for their Taxonomy Folders.

7. Extension 2

Obtain small (6" x 6") pieces of clear plastic, so that students can place snails on them, carefully turn them over (snails will adhere themselves to the glass), and observe the mouth containing the **radula** as well as the undulating motion of the muscles as it moves.

8. Extension 3—Advanced Study

Encourage students to generate questions for further study. For example:

- Why do snails eat paper?
- What is paper made of?
- Is paper “bad” for the snails?

DAILY DIRECTIONS

DAY 3



Day 3

Snail Anatomy Maze

Objectives

- Learn that scientists classify or sort organisms using more criteria than just their external characteristics
- Learn the distinctions between cells, tissues, and organs
- Color and label internal organs
- Trace through the digestive system of the snail
- **Vocabulary:** vertebrate, invertebrate, cell, tissue, organ

Materials

- SNAIL ICON—INTERNAL — *class set*
- SNAIL INTERNAL ORGANS — *class set*
- Snail Anatomy Poster — *one*
- Scissors — *class set*
- Glue — *one per Preserve Team*
- Pen (dark pen for labeling) — *one per Preserve Team*
- Pencils (colored) — *one set per Preserve Team*

Procedure

1. Read or tell the following:

Scientists sometimes need to look at more than how an organism looks to determine to which group it belongs. For example, elephants are related to monkeys in certain ways, but it's hard to explain unless you understand how they are the same inside their bodies.

2. Write the following words on the board: ***Invertebrate, vertebrate.***
3. Explain that scientists use internal, as well as external, characteristics to classify or group living things. One such important characteristic is the presence of a backbone. Some animals have a backbone while others do not. Ask if anyone can give an example of an animal with a backbone. List these animals under "Vertebrate." Ask if anyone can name an animal without a backbone, and list these under "Invertebrates." (Did they remember to list their snail?) Add to their list if necessary.

Example:

<u>Vertebrate</u>	<u>Invertebrate</u>
cat	worm
frog	cricket
lion	snail
rabbit	fly
bird	crab
fish	octopus
human	jellyfish

- t 4. Write these words on the board: **cell**, **tissue**, **organ**. Give a brief definition of each and write it next to each word.

5. Teacher Background Information

- A **cell** is the basic unit of life. All living things (except viruses) are made up of cells. They are too small to see with the naked eye. A microscope is needed to see cells. (If a microscope is available, purchase prepared slides of human epithelial or muscle cells for the students to see.)
- A **tissue** is a group of the same type of cells working in the same function or “job.” For instance, skin tissue is a group of skin cells. When the skin is sunburned it can peel. This is skin tissue.
- An **organ** is a group of tissues that work together to perform a function. For example, the heart is made up of several different tissue types: cardiac muscle tissue, connective tissue, nervous tissue and other types all working together to perform the function of pumping the blood throughout the body.

6. Instruct students to get their GLOSSARYs from their Taxonomy Folders. Students review the definitions for vertebrate and invertebrate (discussed previously during Day 1). Read/highlight the definitions of cells, tissues, and organs.

7. Vocabulary Building Extension

Students graphically make definitions of the terms cells, tissues, and organs. Instruct students to draw a circle and label it ORGAN. Inside the circle, draw smaller circles labeled TISSUES. And inside the tissue circles, make very small circles labeled CELLS.



See the diagram on page 12 for this Vocabulary Building Extension.

DAILY DIRECTIONS

DAY 3



If you feel that this information is too much for your primary students limit the number of organs they locate. Be sure to include the following (those which show the digestive system): mouth, crop, stomach, intestine, digestive gland, anus.



In the diagram the connection between the mouth, crop, and stomach is clear. The path from the stomach to the intestine, by the digestive gland to anus is not as clear. Have students imagine where this internal path moves.

8. Direct the class' attention to the Snail Anatomy Poster. Point out that your snails have cells (that we can't see, they are microscopic) and tissues and organs (which we can see). Explain that you will be coloring some of the organs of the snail.
9. Preserve Providers gather SNAIL ICON—INTERNAL, SNAIL INTERNAL ORGANS, colored pencils, scissors, glue, and labeling pens for their team.
10. Instruct the students to color the organs as stated in the Internal Organs Key on their SNAIL ICON—INTERNAL page.
 - a. **Primary students**—select one organ at a time. For instance, say to the class, “Who can find the stomach on the diagram? Color it brown.”
 - b. **Intermediate students**—students follow the directions and work within their Preserve Teams/independently.

Internal Organs Key:

Radula	pink
Mouth	label only
Crop	orange
Lung	grey
Heart	red
Kidney	green
Stomach	brown
Digestive gland	blue
Intestine	yellow
Shell	your choice of color
Eye	label only

11. Have the students trace through the digestive system (like tracing through a maze). Systems are several organs that work together to perform a function, such as the digestion of food. Ask them to place a yellow colored pencil at the mouth of the snail icon. Without picking up the pencil continue down the body to the crop (food is stored), then on towards the stomach. Next to the intestine, then digestive gland, and finally to the anus. **Note:** food does not actually go INTO the digestive glands, it goes by them.
12. Students add this Snail Icon into their Taxonomy Folder.

Day 4
Off to the Races!

Objectives

- Learn the five steps of the scientific method
- Follow the scientific method in observing and recording snail behavior
- Learn that classification is determined by behavior as well as by physical characteristics
- **Vocabulary:** mobile, ingest, photosynthesis, chlorophyll

Materials

- SNAIL TRAIL 1 or 2 — *class set*
- Construction paper (12" x 20") — *two per Preserve Team*
- Paper towels — *one roll per Preserve Team*
- Plastic container (stable container to fill half way with water) — *two per Preserve Team*
- Snails (land snails) — *at least two per Preserve Team*
- Stopwatch — *one for teacher OR one per Preserve Team*

Setup

1. It's important to make sure snails are well fed before this experiment, because they will sometimes eat, rather than travel on the paper if they are hungry.
2. Prepare water containers. Small yogurt containers work well. Be sure not to overfill containers to minimize spills.

Procedure

1. Read or tell the following:

Observing organisms' behaviors is another way scientists sort living things. For example, one way we can tell animals from plants is that animals usually move from place to place—they are **mobile**—and plants usually do not. Another way to distinguish animals is that they **ingest** (take in) food, unlike plants that create food through the process of **photosynthesis**. The recipe for photosynthesis is minerals in the soil, carbon dioxide (the stuff we breathe out), water, sunlight, and **chlorophyll** (which is what makes plants green).

Write the following recipe on the board:

Minerals + CO₂ + H₂O + Sunlight + chlorophyll → simple sugars



There are two versions of SNAIL TRAIL. Version 1 has three of the five scientific method steps completed. The other two steps need minimal writing to complete. Version 2 requires students to write all the information out.



DAILY DIRECTIONS

DAY 4

2. Teacher Background Information

- Green plants are the basis for life on the planet. All animals, in some way, depend on green plants for their food. Some animals directly depend on the green plants. These animals eat the plants (herbivores). Other animals indirectly depend on the green plants—they eat the herbivores (carnivores). Still other animals eat both green plants and animals that eat green plants (omnivores).
- Sunlight provides the energy needed for plants to produce their own food, through a process called photosynthesis. In this way sunlight is essential to life on the planet.
- Green plants are distinguished from other organisms in that they contain a substance (chlorophyll) located in the chloroplast. Carbon dioxide from the air (taken in through pores in the leaves) and water (taken up through the roots and sometimes absorbed through the leaves) are combined to make glucose (the food) and oxygen (a waste product).

3. Teach the five steps of the scientific method. Write the following five steps on the board:

- **Question or Problem**
- **Hypothesis** (best guess)
- **Observation or Experimentation**
- **Recording Information**
- **Conclusion**

4. Instruct Preserve Providers to gather SNAIL TRAIL (one for each member).

5. Using the following information, walk students through the scientific method the class will use today. If using SNAIL TRAIL 2 students will need time to write out the information for the first three steps on their pages (Question, Hypothesis—written as a statement, and Observation). Allow time for teams to hypothesize whether they think snails will prefer wet or dry surfaces. Students will record their observations and draw a conclusion based on their observations during the actual experiment.

- **Question or Problem:** “Do snails prefer wet or dry surfaces?”
- **Hypothesis** (best guess): Either, “We hypothesize snails prefer wet surfaces” or “We hypothesize snails prefer dry surfaces.”
- **Observation or Experimentation:** “We will be testing our hypothesis.”

DAILY DIRECTIONS

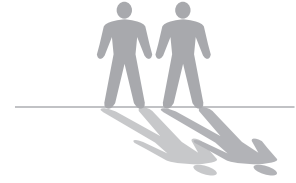
DAY 4

- **Recording Information:** We will record the results we observe.
- **Conclusion:** Based on our observations we will conclude that snails prefer wet or dry surfaces.

- For this activity, Preserve Teams break into two sub-groups of 2–3 students each. Sub-group 1 consists of the Classification Chronicler and one Snail Docent. Sub-group 2 consists of the Top Taxonomist, one Snail Docent, and the Preserve Provider.
- Instruct Preserve Providers to gather construction paper (two sheets per team—one per sub-group).
- Show students how to fold the paper so that it becomes a grid with sixteen squares. (This requires folding the paper four times.)
- Instruct students to write “Wet” on the eight squares on the right and “Dry” on the eight squares on the left (see SNAIL TRAIL).

Dry	Dry	Wet	Wet
Dry	Dry	Wet	Wet
Dry	Dry	Wet	Wet
Dry	Dry	Wet	Wet

- Distribute or have Preserve Providers and Classification Chroniclers retrieve the half-filled water containers and the paper towels (each sub-group needs one container).
- Instruct Preserve Providers and Classification Chroniclers to moisten the right side (the side that says “Wet;” eight squares of the construction paper grid on the right) by dipping a sheet of paper toweling into the water, squeezing out the excess water so they don’t drip on the dry side, and spreading the moisture on the wet side.



Groups of 2–3 students work better when handling the snails. Groups from the same team work next to each other, so they are still working together.

Consider having sub-groups of two members each, with the Top Taxonomist leading both groups.



It’s important to work carefully, but also to moisten the wet side well, so that the snail has a clear choice.

DAILY DIRECTIONS

DAY 4

12. Instruct students to look at the grid on their SNAIL TRAIL page. Explain that students will record the snails movements on this grid by placing an X on the corresponding place where the snail is on the construction paper “grid” at 10 second intervals. The intervals will be called out by the teacher, saying “Where is it now?” or by the Top Taxonomist every 10 seconds (dependent on the number of stopwatches).
13. Review SAFE SNAIL HANDLING (See Day 2 for more information). Instruct Snail Docents to retrieve their snails and wake if necessary.
14. Inform Snail Docents that while the experiment is going, they keep watch of the snail, so snails do not plummet to the floor. They will not be able to record the snail movements during the experiment. The Classification Chroniclers and the Preserve Providers will perform this function for each sub-group during the experiment. Each sub-group member will copy the information following each individual experiment.
15. Instruct the Classification Chroniclers and Preserve Providers to remoisten the wet side of the construction paper (if necessary— it should be wet when the experiment begins). At the same time, instruct the Snail Docents to select a snail and take it to their grid. Wake the snail, if necessary by placing a drop of water on its underside.
16. Inform the class that when everyone is ready the Snail Docents will hold the snail in the center of the paper, but *facing towards neither the wet nor the dry side* until you say, “Release your snail.” Remind the Snail Docents to keep watch over the snail so it stays well away from the edge of the table or desk.
17. **Important!** *Snail Docents cannot touch the snail or influence it’s movement in any way while it remains on the grid. Once the snail moves beyond the grid, that portion of the experiment is over.*
18. Instruct the Snail Docents to get ready, holding their snail in the center of the paper, but facing towards neither the wet nor the dry side. Say, “Release your snail!” as you start the stopwatch. Call out, “Where is it now? Mark an X on your grid” at 10-second intervals until all snails that are moving have reached the edge of the grid.



Students make the X on their own Grid (on the back of their SNAIL TRAIL page) not on the grid the snails are on.

19. Instruct Classification Chroniclers and Preserve Providers to connect the Xs on their paper and label this “Trail #1.” The other sub-group member(s) record Trail #1 onto their SNAIL TRAIL grids.
20. Repeat the above experiment, re-moistening the wet half before each trial, as many times as possible, leaving 10 minutes of class time for conclusions to be written. Instruct Classification Chroniclers and Preserve Providers to label each trail in ascending order (i.e., Trail #2, Trail #3, etc.). The other sub-group member(s) record the corresponding trail following each experiment.
21. Call time, and instruct the Snail Docents to return their snail to the enclosure.
22. Instruct all students to wash their hands.
23. Instruct students to write or circle their conclusion on their SNAIL TRAIL page (“Based on our observations, snails prefer wet surfaces” OR “Based on our observations, snails prefer dry surfaces”). Take hands to tally how many teams concluded that snails prefer wet surfaces, and how many concluded that snails prefer dry surfaces.
24. Students place their SNAIL TRAIL in their Taxonomy Folders.
25. **Extension 1**
Preserve Teams work together to build a list of adjectives that describe the snails’ behavior in the races. (They may also want to name the snail they’ve observed.)
26. **Extension 2**
Following Extension 1, teach haiku format. Students use any adjectives on their list to compose their haiku.
27. **Extension 3**
Following Extensions 1 and 2, bind and display snail poetry book in the classroom, near the snail enclosure or add poems to Taxonomy Folders.



*If you are planning to release your snails, consider doing so after today’s lesson. See **Daily Directions for Day 10, Snail Release** for more information.*

DAILY DIRECTIONS

DAY 5



See the Interact website (www.teachinteract.com) for website resources on Phylum: Mollusca and Classes: Gastropoda, Cephalopoda, and Bivalves.

Seven 12" lengths of string are suggested for the Organism names and four 16" lengths of string for the Family Tree Labels. Decide where you will place the organism pictures (above or below the organism's name).



Day 5

Uncle Mollusca?

Objectives

- Discuss the concept of a family tree
- Brainstorm some close “relatives” of snails
- “Mirror” bulletin board displaying the snail’s “family tree”
- **Vocabulary:** Kingdom, Phylum, Class, Mollusca, Gastropoda, Bivalve, Cephalopoda

Materials

- SNAIL FAMILY TREE: UNCLE MOLLUSCA? — *class set*
- FAMILY TREE — *one set*
- Construction paper (cut into rectangles slightly larger than the Family Tree Kingdom Labels and Organism names) — *12*
- String (cotton; thick enough to be visible by students; for hanging Family Tree Labels and Organism names) — *two yards*
- Tacks or pushpins — *many*

Setup

1. Reproduce FAMILY TREE (Kingdom Labels and Organism names—one set of each).
2. Cut each out and attach to construction paper rectangles (slightly larger than the Family Tree Kingdom Labels and Organism names).
3. Attach string to the top of each Family Tree Label and Organism name (except Kingdom: Animalia).

Procedure

1. Read or tell the following:

We all have a family tree, made up of brothers and sisters, cousins, parents, aunts and uncles, grandparents, great grandparents, great uncles and great aunts, and so on.

This is one kind of family, but today we are going to talk about a much bigger family—the family of ALL living organisms. We’re going to be looking at how our snails fit into this larger family tree. I think you will be surprised how little our snails’ resemble their “relatives!”

2. Place the “Snail” picture and Organism name at the bottom, left of the bulletin board. Read or tell the following:

Snails, are related to other snails, but who can think of a relative of the snail that has a foot and antennae, but no shell?

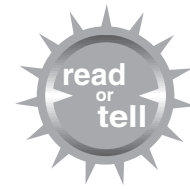
Usually, students will respond with “slug,” to which you respond, “Correct!” and place the Slug picture and name next to the Snail on the bulletin board.

3. Read or tell the following:

The other “relatives” of the snail are much harder to guess. This is because scientists based their sorting less on what we can see (external characteristics) and more on what we cannot see (internal characteristics) and on behaviors they share. These relatives include: *the cuttlefish, the octopus, the squid, and bivalves like clams, and oysters.*

Add these Organism pictures and names to the bulletin board.

4. Inform your class that the snail and the slug belong to the class called **Gastropoda** which means “stomachfoot.” Twist the strings that are attached to the Slug and Snail cards together and tack them up to the Gastropoda card.
5. The octopus, the squid, and the cuttlefish belong to a class called **Cephalopoda** which means “headfoot.” Twist the strings that are attached to the Octopus, Squid, and Cuttlefish cards together and tack them up to the Cephalopoda card.
6. The clam and oysters belong to a class called **Bivalves** which means “two shells.” Twist the strings that are attached to the Clam and Oyster cards together and tack them up to the Bivalve card.



See **Procedure #7** on page 46 for a diagram of where to place each organism.

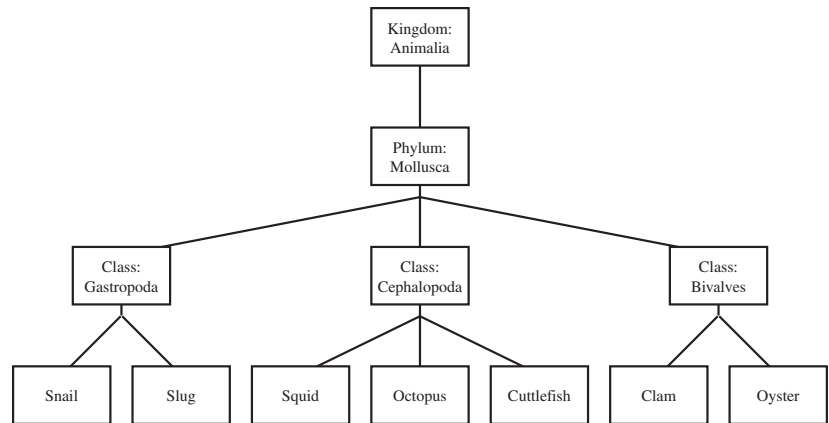


Have students use their GLOSSARY as you define and discuss these new terms.

DAILY DIRECTIONS

DAY 5

7. Continue by connecting the strings from the three Class cards up to the Phylum: Mollusca card and connecting the Mollusca card string to the Kingdom: Animalia card.



You will use this Family Tree bulletin board display on Day 8. If possible, keep it on the bulletin board until Day 8.

8. Distribute **SNAIL FAMILY TREE: UNCLE MOLLUSCA?** and instruct students to draw lines that mirror the strings onto their page. Have them work down from Kingdom, to Phylum, to Class, to Organism. As they draw their lines discuss that you are “sorting/classifying” snails and their “relatives” within the Animalia Kingdom.

9. Ask students to name some other members of the Kingdom Animalia. This is the most familiar kingdom, so keep answering hands until students name some mammals, insects, spiders, reptiles, and amphibians, as well as humans. Point out that these organisms would belong to a different phylum and class than snails and their relatives.



In the example used today, students classify seven organisms through Kingdom, Phylum, and Class. The Order, Family, Genus, and Species information is not included.

10. Teacher Background Information

- There are five kingdoms, each of which is divided into smaller groups called phyla. Phyla are divided into classes, classes are divided into orders, orders are divided into families, families are divided into genus, and genus are divided into species.
- The Phylum Mollusca is made up of over 150,000 diverse species appearing very different but sharing certain basic characteristics.

- Mollusks are important to humans and other animals as food, and their shells are a major source of calcium for birds. Mollusks play essential ecological roles. As common herbivores, they have a significant impact on the plant species present in the area. As predators, they may have a similar effect on small animals. As prey, they provide food for a large number of organisms, including many vertebrates.
- Class Gastropoda are the largest group of mollusks, with between 40,000 and 75,000 species including snails and slugs. These are also the only mollusks that live on land. However, Class Gastropoda includes marine animals like the sea slug.
- Class Cephalopoda includes the octopus, squid, nautilus, and cuttlefish. These marine animals differ very much from other mollusks because they are built for speed and agility. They have large brains. In fact, cephalopods have the most complex brain of any invertebrate.
- Class Bivalvia (a.k.a. class Pelecypoda) includes bivalves such as the familiar clams, oysters, and scallops. These are marine animals with a hinged shell divided into two laterally pressed halves.

11. Students add their SNAIL FAMILY TREE: UNCLE MOLLUSCA? to their Taxonomy Folders.

DAILY DIRECTIONS

DAY 6

Day 6 Stump Your Parents!

Objectives

- Explore the exceptional diversity and beauty of snails
- Introduce scientific names
- Learn some facts about snails that are “stranger than fiction”
- Research and create snail bios
- Devise parent quizzes to reinforce knowledge
- Add species diversity to student understanding and to bulletin board
- **Vocabulary:** scientific names

Materials

- SNAIL PICTURES — *one set*
- FANTASTIC SNAIL FACTS! — *class set*
- SNAIL BIO — *one per Preserve Team (Primary students)*

—OR—

- SNAIL BIO CHECKLIST AND RUBRIC — *one per Preserve Team (Intermediate students)*
- WRITING RUBRIC — *class set, one per Preserve Team, or transparency + one to post (Optional)*
- Computer with Internet access (or snail data already printed out from Internet) — *several*
- Overhead projector — *one (Optional)*

Setup

1. Prepare SNAIL PICTURES for display. Reproduce and cut out the individual snail pictures. Place them on a bulletin board.
2. If students do not have access to computers, research and print snail data from the Internet. Students need this information for their research activity. Be sure to include information on all the snails pictured in SNAIL PICTURES.

Procedure

1. Ask students if they think the snail they find in their garden is the only kind of snail that lives in the world. NOTE: if there are no snails in your area, then use some other reference (e.g., refer to the snails you have in your classroom).



Use SNAIL BIO for Primary students and SNAIL BIO CHECKLIST AND RUBRIC for Intermediate students.



Be sure to find color versions of SNAIL PICTURES. Contrast the ordinary brown garden snail with the beautiful colors and large sizes of some members of this amazing group of mollusks.

2. Direct students' attention to the bulletin board where you placed the Snail Pictures. Together, look at each picture and read the scientific name of each snail.
3. Distribute FANTASTIC SNAIL FACTS! and read aloud or ask students to read aloud some of the unusual snail characteristics and behaviors.
4. Point out to the students that, obviously, the word "snail" is not enough of a name to identify all of these different snails. This is why scientists came up with **scientific names** for organisms. The scientific name is always two words, and the first one only is capitalized. Inform the students that they will learn more about scientific names in a couple of days.
5. Preserve Teams choose a snail to research from those pictured. Once they have completed their research, teams create a team "snail bio." This Snail Bio is then attached underneath their snail picture and placed on the bulletin board.
 - a. **Primary students**—write out responses on SNAIL BIO
 - b. **Intermediate students**—complete their bio using the SNAIL BIO CHECKLIST AND RUBRIC
6. Instruct Preserve Providers to distribute SNAIL BIO (Primary students) or SNAIL BIO CHECKLIST AND RUBRIC (Intermediate students). Be certain that teams are clear on what they are to do.
7. Top Taxonomists turn in their team's Snail Bio once teams complete the activity.
8. Instruct students to use the FANTASTIC SNAIL FACTS! page to create a True/False Snail Quiz for their parents, interspersing false—but, in some cases, more reasonable—facts to see if they can fool their parents. They can copy questions from each other, but each team member is required to submit at least two independent questions.
9. Students add FANTASTIC SNAIL FACTS! to their Taxonomy Folders.



An overhead projector is a good way to make sure students can see each snail well. Students can also be brought together in a clear area in the classroom where they can sit closely on the floor.



Be sure that teams are not researching the same snail(s). The more types of snails researched the more information available to your students.

Top Taxonomists lead their teams while completing this assignment. Every member is responsible for gathering information, discussing the information, and deciding what information to include on the team's SNAIL BIO. Classification Chroniclers write out the team's SNAIL BIO.

DAILY DIRECTIONS

DAY 6



Consider having students take FANTASTIC SNAIL FACTS! home with them as well, to share with parents. This is a great opportunity for students to “teach” their parents something new.

10. Students take their Snail Quizzes home and have their parents take them. On Day 7 students share their parents’ responses.

11. **Extension**

Students conduct a Snail Beauty Pageant.

- a. Order a Butterfly Poster from The Department of Forestry.
- b. Tell students that another class in _____(a nearby city or town) is studying butterflies, and they think butterflies are more beautiful than snails.
- c. Teams create a Snail Poster to put them straight.

Day 7

Take Me to Your Kingdom!

Objectives

- Review and distinguish cells, tissues, and organs
- Learn about photosynthesis
- Discuss different ways organisms obtain food
- Learn the names and main characteristics of the five Kingdoms
- Become familiar with how scientists came up with the five Kingdoms
- Perform an activity which reinforces and organizes this knowledge
- Create an answer scroll for *Save the Ecosystem* game

Materials

- KINGDOM KIT (precut kingdom labels and characteristics) — *one set per Preserve Team*
- Butcher paper (approximately 6" x 36"; to create Kingdom Scrolls) — *one per Preserve Team*
- Envelopes (for Kingdom Kits) — *one per Preserve Team*
- Glue — *one per Preserve Team*
- Overhead projector — *one*
- Paper (unlined) — *two class sets*
- Pencils (colored) — *several per Preserve Team*
- Pictures (of cells, tissues, and one-celled organisms—Amoeba, Euglena, Daphnia, Volvox) — *at least one of each category*
- Rulers — *one per Preserve Team*

Setup

1. Obtain pictures of cells, tissues, and one-celled organisms (Amoeba, Euglena, Daphnia, Volvox).
2. Prepare the Kingdom Kits [see **Setup Directions #6, Preparing Materials (f. Kingdom Kits)** on page 8 for more information]].

Procedure

1. Students share parents' responses to Snail Quiz. Discuss as a class.
2. **Teacher Background Information**
 - Cells are the basic building blocks of living organisms. All living things (except viruses) are made of cells. Some organisms are made up of only one cell, such as the Amoeba, Euglena, or Daphnia. No matter how old they get, they never grow more than one cell. One-celled or unicellular animals can be found in fresh and salt water. Some of these unicellular organisms can make us ill if we drink or eat them. All of them play an important part in the food chain as food for larger



Obtain pictures of organisms from the Internet or other resources. See the Interact website for suggestions on appropriate Internet resources.

DAILY DIRECTIONS

DAY 7

organisms. Without unicellular organisms we couldn't have larger, multi-cellular organisms like fish.

- Some one-celled organisms, such as Volvox, live in groups called colonies. Each cell is an individual organism but they live grouped together. The multi-cellular coral is like this. If you inspect a piece of dried coral you will see the tiny holes where the individuals lived when alive. Each one helps to make the calcium carbonate shell that we know as coral.
- Multi-cellular animals, like humans, have cells, too. Billions of them. They are organized together into tissues. Multi-cellular organisms have many different types of cells such as skin cells, muscle cells, and nerve cells. Tissues are groups of the same type of cell such as connective tissue, skin tissue, nerve tissue. Organs are different tissues that perform a particular function. The heart for example is an organ made up of nerve tissue, muscle tissue, connective tissue and others that all work together to move the blood around the body.
- There are many ways living things obtain nutrients or food. Green plants make their own food through the process of photosynthesis. In the presence of sunlight, green plants can convert Carbon Dioxide and water into glucose. Food! Animals that eat the green plants are herbivores. Carnivores eat the herbivores and omnivores eat both plants and herbivores! Organisms that make their own food are called *autotrophs*. (*Auto* meaning self, and *troph* meaning food.) Organisms that have to get their food by eating another organism are called *heterotrophs* (*hetero* = other, *troph* = food). Some heterotroph organisms lack the mouthparts or mobility to eat other organisms. They can't make their own food because they have no chlorophyll. How do they eat? They absorb it. Fungi, some orchids and Indian pipe get their food by absorption. These organisms are called *saprophytes* (*sapro* = dead, *phyte* = *plant*).

3. Display the pictures of cells, tissues, and one-celled organisms as you discuss the information in the Teacher Background Information. Post the pictures on the board or on the overhead projector for greater visibility.
4. Model for students how to draw the pictures. Draw them on the board, copying each from the picture you located. Perfection or artistic ability is not required. Accurate observation is the goal.

5. Preserve Providers gather two pages of unlined paper per member. Instruct students to make drawings of a cell, tissue, and at least one one-celled organism on their first piece of paper. They need to label each drawing.
6. On the second piece of paper, instruct students to draw and label an imaginary picture of their choice. It could be in any natural environment (the woods or a field) or an imaginary environment. They need to illustrate the following terms in their drawing:
 - green plant
 - photosynthesis (include sun, water, carbon dioxide, and oxygen)
 - autotroph (any green plant)
 - heterotroph (any organism other than a green plant)
 - saprophyte (mushrooms, orchid, Indian pipe plant)
7. Before students begin to draw, ask them for ideas of what they could draw to illustrate a green plant, photosynthesis, etc. Discuss each term.
8. Students add these pages to their Taxonomy Folders.

9. Tell the following story writing the Kingdom words across the board as they occur:

When scientists first tried to sort all the things that are alive, they noticed that some were mostly mobile and some were not. They called the mobile ones **Animalia** and the immobile ones **Plantae**. Then they noticed that some plants required sunlight to thrive and some did not. So, they created a new category for those plants that do not need sunlight. They called them **Fungi**. When microscopes were invented they found that there were two more groups that were neither clearly plants, nor animals, nor fungi. One was a group of plants and animals that consisted of only one cell (they are unicellular). They called this group **Protista**. The other group called **Monera** includes bacteria.

10. Distribute or have Preserve Providers gather the butcher paper (scroll), glue, rulers, and Kingdom Kit envelopes for each team. Inform students that they are going to create Kingdom Scrolls (answer scrolls) for the *Save the Ecosystem* game they will be playing in a few days.



DAILY DIRECTIONS

DAY 7



As you read the characteristics of organisms within each kingdom, use this opportunity to see what students remember (before telling them which kingdom you are referring to).



11. Instruct students to divide the scroll into five equal spaces (6-inch intervals). Draw a line or make a fold at each 6-inch division.
12. Instruct students to glue *Kingdom Animalia* at the top of the first section. At the top of the second section, glue *Kingdom Plantae*. Repeat for each remaining kingdom: Protista, Fungi, Monera.
13. Inform students that you will be talking about the differences or characteristics that scientists use to distinguish each of these Kingdoms. Remind students about the bean sorting activity and the decisions they made about dividing the beans. Scientists continually look at living things and make decisions about grouping just as they did with the beans.
14. Read the characteristics of organisms that belong in Kingdom Animalia listed below. As you read each characteristic have teams find that characteristic and glue it under “Kingdom Animalia.” Make sure to leave enough room for all the characteristics. Continue until all characteristics have been glued into the correct Kingdom section.
Animalia
 - Multi-cellular with distinct tissues and organs
 - Ingests food
 - Most are mobile
 - Includes sponges, sea anemones, snails, insects, fish, reptiles, amphibians, birds, mammals
15. Read the characteristics of organisms that belong in Kingdom Plantae listed below. As you read each characteristic have teams find that characteristic and glue it under “Kingdom Plantae.” Make sure to leave enough room for all the characteristics. Continue until all characteristics have been glued into the correct Kingdom section.
Plantae
 - Multi-cellular with distinct tissues
 - Have chloroplasts for photosynthesis
 - Green in color
 - Includes mosses, ferns, pines, and flowering plants
16. Read the characteristics of organisms that belong in Kingdom Fungi listed below. As you read each characteristic have teams find that characteristic and glue it under “Kingdom Fungi.” Make sure to leave enough room for all the characteristics. Continue until all characteristics have been glued into the correct Kingdom section.

Fungi

- Mostly multi-cellular, some unicellular, reproduce by spores
- Includes mushrooms, yeasts, and molds
- Mushrooms are umbrella-shaped, do not photosynthesize, and can grow in the dark
- Yeasts are unicellular and cause fermentation
- Molds are shapeless, fuzzy, and flat
- Reproduce by spores

17. Read the characteristics of organisms that belong in Kingdom Protista listed below. As you read each characteristic have teams find that characteristic and glue it under “Kingdom Protista.” Make sure to leave enough room for all the characteristics. Continue until all characteristics have been glued into the correct Kingdom section.

Protista

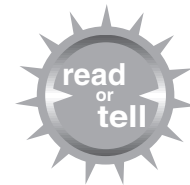
- Unicellular with a nucleus
- Some live together in colonies
- Many are mobile
- Some have chlorophyll for photosynthesis
- Includes protozoa (Paramecium, Amoeba, Euglena) and algae (diatoms, dinoflagellates, Volvox, and seaweed groups)

18. Read the characteristics of organisms that belong in Kingdom Monera listed below. As you read each characteristic have teams find that characteristic and glue it under “Kingdom Monera.” Make sure to leave enough room for all the characteristics. Continue until all characteristics have been glued into the correct Kingdom section.

Monera

- Unicellular organisms without a nucleus
- Rod-shaped, round, or coiled
- No internal organelles
- Help with digestion, cause disease, or aid decomposition
- Includes bacteria

19. Students should be able to refer to the Kingdom Scroll as needed.



Tape or tack the completed scrolls on the walls or bookcase near each Preserve Team.

DAILY DIRECTIONS

DAY 8



Any type of marker will work for the Bingo game. Students just need something to place on the squares of their BINGO BOARD as definitions are called out.

Clear the board for writing out the taxonomy of cats and dogs.

Day 8

King Phillip Commands Order For Goofy Shoes

Objectives

- The seven levels of taxonomy classification are introduced: Kingdom/Phylum/Class/Order/Family/Genus/Species
- Learn taxonomic classifications for cat and dog
- Teams develop acronyms to help them remember the seven levels

Materials

- BINGO BOARD — *class set (Optional)*
- Markers (for Bingo board game) — *20 per student (Optional)*
- Paper — *class set*
- Pens (colored) — *class set*

Procedure

1. Direct the class' attention to the bulletin board and point out that it shows the Kingdom, Phylum, and Class to which our friends, the snails, belong (from Day 5—Family Tree). Explain that there are actually four more classification categories to which snails belong. We were simplifying for the purposes of illustration. The entire classification system is called **Taxonomic Classification**.

Kingdom

Phylum

Class

Order

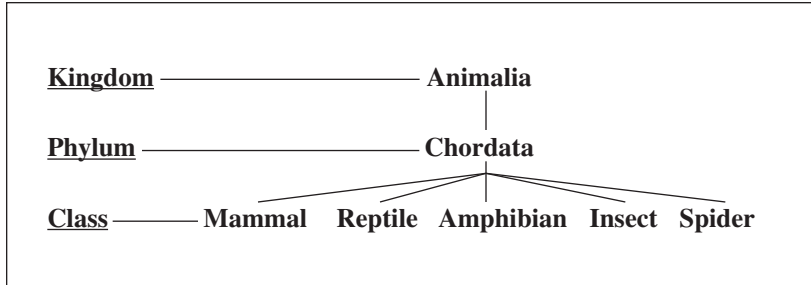
Family

Genus

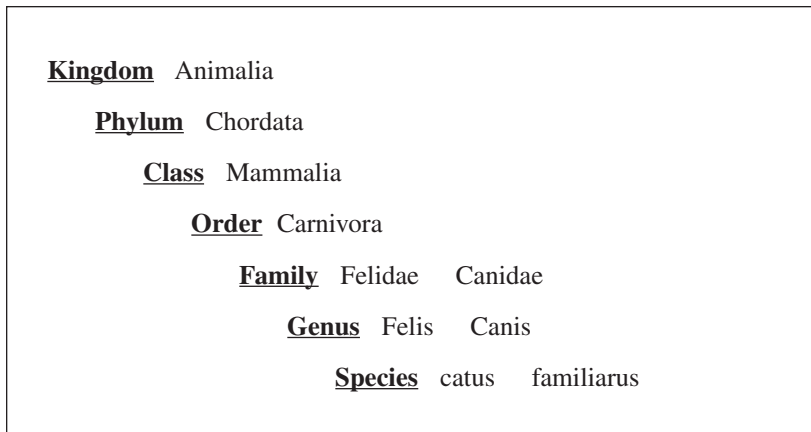
Species

Write this list to the far left on the board spreading them to extend the length of the board.

- Remind the class of when they named different groups in the Kingdom Animalia (Day 5). Explain that these (mammal, reptile, amphibian, insect, spider) are different Classes within different Phylums.



- Ask the class to raise hands and name a household pet. Take dog and cat as examples to take all the way down through Kingdom, Phylum, Class, Order, Family, Genus, and Species.
- Draw this out on the board so that it corresponds to the taxonomic categories to the left of the board:



Kingdom Animalia

Phylum Chordata*

Explain that unlike our snail friends in Phylum Mollusca, animals in the Phylum Chordata **have a spinal cord.*

Class Mammalia

Remind students that mammals have fur, give milk, and most give birth to live young, not eggs

Order Carnivora

Ask students if they know what this means (eats meat)

DAILY DIRECTIONS
DAY 8

Family	Felidae	Canidae
Note that this is where cats and dogs split into different families		
Genus	Felis	Canis
Species	catus	familiarus

- 5. Note that the scientific name for cat is Felis catus, and the scientific name for dog is Canis familiarus. Teach students that scientific names are always composed of the organism’s genus capitalized, followed by the species in lower case letters.
- 6. Read the students the acronym that is the title for this lesson: **King Phillip Commands Order For Goofy Shoes**. Explain that acronyms can help people remember the order of the taxonomic categories.
- 7. Preserve Teams work together to create their own acronym using K-P-C-O-F-G-S using a different color pen for each letter.
- 8. Share acronyms with the class, and post around the classroom.
- 9. **Extension**
Students play Vocabulary Bingo. Using BINGO BOARD, students select 24 words from the glossary list and put then in the 24 blank boxes. Using the GLOSSARY, you read the definitions and students place markers over the corresponding boxes. The game is played like BINGO. When students have five in a row, in any direction, they call out “Taxonomy Trail.”

Day 9
Save the Ecosystem

Objectives

- Assemble and learn to play *Save the Ecosystem*
- Reinforce Kingdom characteristics
- Increase awareness of the principle that the more diversity of organisms, the healthier the ecosystem

Materials

- ORGANISM CARDS — *one set per Preserve Team (60 cards)*
- GAME BOARD CARDS — *one set per Preserve Team (17 cards)*
- QUESTION CARDS — *one set per Preserve Team (38 cards + 4 blank)*
- SAVE THE ECOSYSTEM CARDS — *one per page of ORGANISM CARDS and QUESTION CARDS*
- SAVE THE ECOSYSTEM RULES — *one per Preserve Team*
- SCORE CARD — *class set*
- Kingdom Scrolls (created by Preserve Teams on Day 7) — *one per Preserve Team*
- Dice (four-sided) — *one per Preserve Team*
- Construction paper (2.5" x 3.5"; for Game Path Squares) — *maximum of 42 per Preserve Team + maximum of 42 for teacher sample*
- Game pieces — *one set per Preserve Team*
- Plastic pocket sheets (with 9 pockets per sheet) — *five per Preserve Team + five for teacher sample*
- Poster board (20" x 24") — *one per Preserve Team*
- Tape (double-sided) — *one roll per Preserve Team*

Setup

1. Create a sample game board for student reference. You will need the **Sample Game Board Chart**, five plastic pocket pages, a maximum of 42 construction paper squares, GAME BOARD CARDS, and double-sided tape. [See **Setup Directions #6, Preparing Materials (i. Sample Game Board)** on pages 9–10 for more information.]
2. Create the *Save the Ecosystem* game cards [Organism Cards, Question Cards, and Game Board Cards; See **Setup Directions #6, Preparing Materials (h. Save the Ecosystem Cards)** on pages 8–9 for more information.]



Refer back to **Setup Directions #6, Preparing Materials (h. Save the Ecosystem Cards and i. Sample Game Board)** on pages 8–10 for specific information on how to prepare for Day 9.

Game pieces can be anything students can use to mark their placement on the game board. Consider pebbles, shells, or colored aquarium beads found at craft stores.

Many large discount stores carry the plastic pocket sheets in 10 sheet packs. They are used for baseball cards, etc.

If you choose to use colored paper for the Organism Cards, to represent each kingdom, also consider using these colors on the Score Card for easy identification.

DAILY DIRECTIONS

DAY 9



Hang the Sample Game Board so that it is highly visible.



When playing, it is important that students do not total their organisms on their Score Card until the game is over. During the game there are opportunities for players to take other players' organisms.

Procedure

1. Inform students that they are going to create their own games. The object of the game is for their Preserve to hold as many representatives of the five Kingdoms as possible, so that they can contribute to saving the ecosystem.
2. Show students the Sample Game Board. Explain how to arrange and trim the pocket sheets so that the pockets remain functional. Instruct students to leave a space down the center so that the board can be folded for easier storage. Instruct them to use short pieces of the double-sided tape to attach the plastic sheets to the board.
3. Distribute or have Preserve Providers collect the poster board, the plastic pocket sheets, scissors, and tape. Allow time for the teams to create the game boards.
4. Explain that they will receive the colored construction paper squares (Game Path Squares) next. These fit into the pockets and they can be arranged in any way they wish. **Note: START is at the lower left corner and FINISH is at the upper left corner.** They should expect to have some cards left over, but give them this hint: *If you use too few cards to get from start to finish, you won't have time to accumulate the Organism Cards you will need to win.*
5. Distribute or have Preserver Providers gather the Game Path Squares and allow Preserve Teams to create their game path.
6. Distribute or have Preserver Providers gather the GAME BOARD CARDS and instruct teams to place these within their game path. Inform teams to read through the cards and decide where best to place each card along the game path they chose. Begin by placing START in the lower left corner and FINISH in the upper left corner.
7. Distribute SAVE THE ECOSYSTEM RULES. Read the rules aloud, taking time for any questions. **Note:** there are abbreviated rules on the **Sample Game Board Chart** for student reference while playing the game.

8. Read or tell the following:

More biological variety (also called Biodiversity) is healthier for the environment therefore each of you will try to obtain as many Organism Cards in all five kingdoms as possible. Greater biological diversity equals a stronger environment which equals a healthier Nature Preserve!



9. **Teacher Background Information**

- Biodiversity is the variation of different life forms on the planet. This includes all the races and variations of an organism (i.e, the entire gene pool).
- A fundamental property of ecological systems is a certain mixture, or *diversity* of living things: we cannot expect to find deer or ducks in the wild in the absence of the interconnected web of other plants and animals on which their lives depend.

10. Distribute or have Preserve Providers gather the dice, the Question Cards and the Organism Cards, and the SCORE CARDS. Make sure each team has access to the Kingdom Scrolls they compiled on Day 7.
11. Allow students time to play the game. Reassure students that they will have more time to play during Day 10.

DAILY DIRECTIONS

DAY 10

Day 10

Award-Winning Preserve

Objectives

- Reinforce and test knowledge of Kingdom characteristics
- Celebrate and gain recognition for the investigation of a complex field of knowledge
- Release the snails

Materials

- Completed *Save the Ecosystem* Game Boards and all game materials
- TOURNAMENT GRID (with table assignments already made) — *one*
- SAVE THE ECOSYSTEM SCORE — *one*
- SCORE CARD — *class set*
- CERTIFICATE — *one per member of the winning Preserve*
- PRE/POSTTEST — *class set*

Setup

1. Using the TOURNAMENT GRID, establish student placement for the *Save the Ecosystem* tournament (minimum of three players per game/maximum of six players per game).
 - Students select game table
 - Teacher assigned
 - Students select a number (from 1–??; based on the number of game tables)

Write in each Preserve's name in the top boxes. Then write in the docent names at the appropriate table assignment.

2. Randomly assign a game board to each game table for the tournament. Set out games ahead of time so students have the maximum time to play and develop strategies. Place the appropriate number of SCORE CARDS at each game table (one per player).

Procedure

1. Show students the CERTIFICATE that the winning Preserve Team will win at the end of the period.



If teams had ample time to play on Day 9, consider removing the Kingdom Scrolls to better test student mastery of Kingdom characteristics.

2. Post the TOURNAMENT GRID and instruct students to go to their assigned game table.
3. Review the Tournament Rules found on SAVE THE ECOSYSTEM RULES.
4. Begin the tournament! Students play the *Save the Ecosystem* game (following SAVE THE ECOSYSTEM RULES).
5. As soon as each player completes the game, he/she writes the total number of organisms in each kingdom and takes his/her SCORE CARD to the teacher so that his/her scores can be added to those of his/her other Preserve members. Record and calculate the final scores next to each Preserve Team name on SAVE THE ECOSYSTEM SCORE. The winning Preserve is the one that has the greatest number of tallies (representing organism cards) in the greatest number of Kingdom categories—the greatest diversity for the strongest, healthiest Preserve!
6. Call winning Preserve Team members up to the front of the class to receive their CERTIFICATES.
7. Distribute PRE/POSTTEST and administer. Allow time for students to complete. If you want, include question #21 for extra credit (see below; see **Pre/Posttest Key** on page 70 for more information).

Extra Credit

21. What do you think the organism in Question #19 is? What makes you think this?

Snail Release

Depending on how you acquired your snails either release your snails or keep them as classroom pets.

1. If you plan to release your snails, consider the following:
 - a. If snails were collected on school grounds, inform Preserve Teams regarding where they may release their snail(s).
 - b. If snails were collected by students from home instruct students to return their snails to the same location.
 - c. Remind students that snails prefer moist, dark areas where they are not exposed to full sunlight.



You need a minimum of three students and a maximum of six students at each game table.



If you did not play Bingo on Day 8, now is a good time to play it.

DAILY DIRECTIONS

DAY 10

2. Animals should always be released to the location where they were obtained. Those obtained from animal supply houses or pet shops should never be released into the local environment. **States have very strict laws about this.** This could be an opportunity to teach about native vs. non-native animals and the trouble we have gotten into with introduced species. For example, feral pigs in Hawaii, or on Santa Cruz Island, Ca., starlings from England, noxious weeds, fire ants, Africanized bees, to name but a few.
3. **Teacher Background Information**
 - Invasive alien species are considered to be the most important threat to biological diversity loss after habitat destruction. All ecosystems—from forests and grasslands to marshes and coastal zones—are vulnerable to invasive alien species. Every country in the world has experienced invasions. Isolated areas such as islands are particularly vulnerable.

TAXONOMY BACKGROUND

(TEACHER REFERENCE)

Taxonomy Background

Biological Diversity

Biological diversity means the variety of life on Earth. This diversity is an essential condition for the survival of humans and all living creatures. A fundamental property of ecological systems is a certain mixture, or *diversity*, of living things: we cannot expect to find deer or ducks in the wild in the absence of the interconnected web of other plants and animals on which their lives depend. Biological diversity, or *biodiversity*, is a term that is now commonly used to describe the variety of living things and their relationships to each other and interactions with the environment.

All over the world, people are recognizing the need for preserving the world's life forms and their habitats. World governments have decided to create Preserves. There are thousands of preserves around the world. They help prevent the extinction of species. They also stop the destruction of critical habitats. By protecting a greater diversity of life (different kinds of organisms) we can expect a stronger, healthier planet.

The following background information is organized by the day that you will be teaching the information to your students.

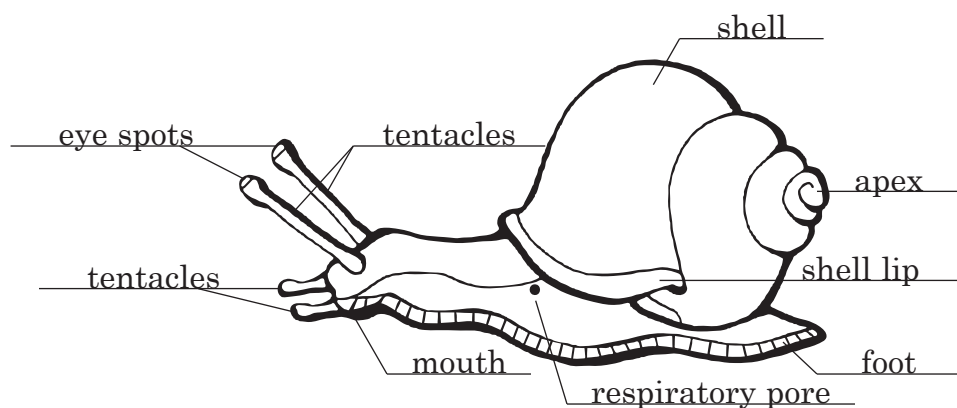
Day 1: Sorting—Vertebrate and Invertebrates

- Vertebrates (organisms with a backbone)
 - Mammals = warm blooded, fur, mammary glands, most have live birth (dogs, deer, whales, bats, humans)
 - Reptiles = cold blooded, scales, lay eggs (lizards, turtles, alligators)
 - Birds = warm blooded, lay eggs, feathers (owls, parrots, penguins)
 - Amphibians = moist skin, cold blooded, lay eggs in water, adults live on land (frogs, toads, salamanders)
 - Fish = breathe through gills, live in water, most are cold-blooded, most lay eggs (salmon, halibut, shark)
- Invertebrates (no backbone, have an exoskeleton)
 - Arthropods = largest group of invertebrates, segmented bodies supported by a hard external skeleton (crabs, centipedes, spiders, bees)
 - Mollusks = soft-bodied animals, most live in hard shells (octopus, mussels, snails)
 - Echinoderms = live in seawater, have external skeletons (starfish, sea urchins)
 - Protozoa = very primitive, live in water (most in seawater), do not move around, filter organisms out of the water for food (sponges)
 - Coelenterates = mouths take in food and get rid of waste, mouths surrounded by stinging tentacles (jellyfish, sea anemones, corals)
 - Annelids = worms, live in all sorts of habitats (earthworms, flukes)

TAXONOMY BACKGROUND

(TEACHER REFERENCE)

Day 2: External Anatomy of the Snail



Day 3: Internal Anatomy—Distinguishing Cells, Tissues, and Organs

- A **cell** is the basic unit of life. All living things (except viruses) are made up of cells. They are too small to see with the naked eye. A microscope is needed to see cells. (If a microscope is available, purchase prepared slides of human epithelial or muscle cells for the students to see.)
- A **tissue** is a group of the same type of cells working in the same function or “job.” For instance, skin tissue is a group of skin cells. When the skin is sunburned it can peel. This is skin tissue.
- An **organ** is a group of tissues that work together to perform a function. For example, the heart is made up of several different tissue types: cardiac muscle tissue, connective tissue, nervous tissue and other types all working together to perform the function of pumping the blood throughout the body.

Day 4: Sorting by Behavior—Plants versus Animals

Observing organisms’ behaviors is another way scientists sort living things. For example, one way we can tell animals from plants is that animals usually move from place to place—they are mobile—and plants usually do not. Another way to distinguish animals is that they ingest food, unlike plants that create food through the process of photosynthesis. The recipe for photosynthesis is minerals in the soil, carbon dioxide (the stuff we breathe out), water, sunlight, and chlorophyll (which is what makes plants green).



Plants (Kingdom Plantae)

- Green plants are the basis for life on the planet. All animals, in some way, depend on green plants for their food. Some animals directly depend on the green plants. These animals eat the plants (herbivores). Other animals indirectly depend of the green plants—they eat the herbivores (carnivores). Still other animals eat both green plants and animals that eat green plants (omnivores).

TAXONOMY BACKGROUND (TEACHER REFERENCE)

- Sunlight provides the energy needed for plants to produce their own food, through a process called photosynthesis. In this way sunlight is essential to life on the planet.
- Green plants are distinguished from other organisms in that they contain a substance (chlorophyll) located in the chloroplast. Carbon dioxide from the air (taken in through pores in the leaves) and water (taken up through the roots and sometimes absorbed through the leaves) are combined to make glucose (the food) and oxygen (a waste product).

Day 5: Taxonomic Classification—Learning about the snail’s family tree

There are five kingdoms, each of which is divided into smaller groups called phyla. Phyla are divided into classes; classes are divided into orders; orders are divided into families; families are divided into genera; and genera are divided into species.

Phylum Mollusca

The Phylum Mollusca is made up of over 150,000 diverse species appearing very different but sharing certain basic characteristics. Mollusks are important to humans and other animals as food, and their shells are a major source of calcium for birds. Mollusks play essential ecological roles. As common herbivores, they have a significant impact on the plant species present in the area. As predators, they may have a similar effect on small animals. As prey, they provide food for a large number of organisms, including many vertebrates.

Class Gastropoda

Class Gastropoda are the largest group of mollusks, with between 40,000 and 75,000 species including snails and slugs. These are also the only mollusks that live on land. However, Class Gastropoda includes marine animals like the sea slug.

Class Cephalopoda

Class Cephalopoda includes the octopus, squid, nautilus, and cuttlefish. These marine animals differ very much from other mollusks because they are built for speed and agility. They have large brains. In fact, cephalopods have the most complex brain of any invertebrate.

Class Bivalvia

Class Bivalvia (a.k.a. class Pelecypoda) includes bivalves such as the familiar clams, oysters and scallops. These are marine animals with a hinged shell divided into two laterally pressed halves.

Day 6: Fantastic Snail Facts

The largest land snail ever found was 15 inches long and weighed 2 pounds. Some snails have been known to live up to 15 years. The fastest snails are the speckled garden snails. They can move up to 55 yards per hour. Compare this with 23 inches per hour covered by most other land snails.

Snails’ bodies produce a thick slime. The suction created by their slime makes it possible for a snail to crawl upside down. Not only that, but a snail’s slime makes it possible for it to crawl across the edge of a razor and not get hurt.

TAXONOMY BACKGROUND (TEACHER REFERENCE)

Garden snails evolved from sea snails about 800 million years ago. Humans are new arrivals compared to snails. Snails are hermaphrodites, they have both male and female reproductive organs. Snails usually travel in irregular paths, often traveling in a circle. Snails mainly rely on their sense of touch and smell to find food. They have very poor eyesight. Snails cannot hear. Snails can retract one or both of their tentacles at a time. Snails are nocturnal, which means they are more active at night.

Because garden snails mainly eat garden plants and vegetables, they are considered pests. However, they also eat decaying plants and soil. This helps gardeners, because the decaying matter and soil passing through their systems returns very fertile material to the soil. Garden snails hibernate during the winter, living on their stored fat. Garden snails breathe with lungs.

The garden snail is cooked and eaten as a delicacy called “escargot.” May 24th is National Escargot Day. What kind of a celebration are you going to have?!

Day 7: Definitions and Interconnections

When scientists first tried to sort all the things that are alive, they noticed that some were mostly mobile and some were not. They called the mobile ones Animalia and the immobile ones Plantae. Then they noticed that some plants required sunlight to thrive and some did not. So, they created a new category for those plants that do not need sunlight. They called them Fungi. When microscopes were invented they found that there were two more groups that were neither clearly plants, nor animals, nor fungi. One was a group of plants and animals that consisted of only one cell (they are unicellular). They called this group Protista. The other group called Monera includes bacteria.

Unicellular Organisms

Cells are the basic building blocks of living organisms. All living things (except viruses) are made of cells. Some organisms are made up of only one cell, such as the Amoeba, Euglena, or Daphnia. No matter how old they get, they never grow more than one cell. One-celled or unicellular animals can be found in fresh and salt water. Some of these unicellular organisms can make us ill if we drink or eat them. All of them play an important part in the food chain as food for larger organisms. Without unicellular organisms we couldn't have larger, multi-cellular organisms like fish.

Unicellular Colonies

Some one-celled organisms, such as Volvox, live in groups called colonies. Each cell is an individual organism but they live grouped together. The multi-cellular coral is like this. If you inspect a piece of dried coral you will see the tiny holes where the individuals lived when alive. Each one helps to make the calcium carbonate shell that we know as coral.

Multi-cellular organisms

Multi-cellular animals, like humans, have cells, too. Billions of them. They are organized together into tissues. Multi-cellular organisms have many different types of cells such as skin cells, muscle cells, and nerve cells. Tissues are groups of the same type of cell such as connective tissue, skin tissue, nerve tissue. Organs are different tissues that perform a particular function. The heart for example is an organ made up of nerve tissue, muscle tissue, connective tissue and others that all work together to move the blood around the body.

TAXONOMY BACKGROUND

(TEACHER REFERENCE)

Interconnections

There are many ways living things obtain nutrients or food. Green plants make their own food through the process of photosynthesis. In the presence of sunlight, green plants can convert Carbon Dioxide and water into glucose. Food! Animals that eat the green plants are herbivores. Carnivores eat the herbivores and omnivores eat both plants and herbivores! Organisms that make their own food are called *autotrophs*. (*Auto* meaning self, and *troph* meaning food.) Organisms that have to get their food by eating another organism are called *heterotrophs* (*hetero* = other, *troph* = food). Some heterotroph organisms lack the mouthparts or mobility to eat other organisms. They can't make their own food because they have no chlorophyll. How do they eat? They absorb it. Fungi, some orchids and Indian pipe get their food by absorption. These organisms are called *saprophytes* (*sapro* = dead, *phyte* = plant).

Day 8: Taxonomic Classification—from Kingdom to Species

Taxonomy is the scientific discipline of categorizing various species of organisms into a convenient sized group which share common, identifiable traits. To accomplish this, taxonomists have defined a hierarchy, each level of which is given a Latin name. This hierarchy provides a minimum of seven Latin names for each species. For the animal kingdom, they are ranked as follows (the plant kingdom uses slightly different terminology, using “division” instead of “phylum.”):

Kingdom
Phylum
Class
Order
Family
Genus*
species*

* Scientific names are always composed of the organism's genus capitalized, followed by the species in lower case letters.

Day 10: Native versus Non-native species

Invasive alien species are considered to be the most important threat to biological diversity loss after habitat destruction. All ecosystems—from forests and grasslands to marshes and coastal zones—are vulnerable to invasive alien species. Every country in the world has experienced invasions. Isolated areas such as islands are particularly vulnerable.

PRE/POSTTEST KEY (TEACHER REFERENCE)

Taxonomy Basics

True/False: Circle your answer.

- True False 1. Plants, snails, elephants, and bacteria are examples of living things.
- True False 2. Snails are related to squids.
- True False 3. The word “organism” can be used to describe any living thing.
- True False 4. Taxonomic Classification is a system of organizing all living things.
- True False 5. The largest and most general category is “Species”.

Multiple Choice: Circle the correct answer for questions 6–15.

6. Scientific names are made up of:
- a. genus and species
 - b. genus and specials
 - c. genus and kingdom
 - d. kingdom and species
7. Which animal is most closely related to snails:
- a. clam
 - b. octopus
 - c. slug
 - d. snakes
8. Snails are members of Kingdom _____.
a. Plantae
b. Animalia
c. Monera
d. Fungi
9. Unicellular animals have _____.
a. U-shaped body
b. one eye
c. many cells
d. one cell
10. The five kingdoms are:
- a. Plantae, Animalia, Fungi, Crabicus, and Monera
 - b. Monera, Fungi, Plantae, Animalia, and Protista
 - c. Fungi, Monera, Protutae, Animalium, and Delicious
 - d. Animalia, Plantae, Fungi, and Yeast

NOTE: Only four options are listed in “d” to check for student attention to detail

PRE/POSTTEST KEY (TEACHER REFERENCE)

11. In order for an organism to produce its own food, it needs to have:
- chlorophyll**
 - grass
 - a gardener
 - worms
12. All green plants _____.
- make their own food
 - photosynthesize
 - are in Kingdom Plantae
 - all of the above**
13. Bacteria are in the Kingdom _____.
- Monera**
 - Plantae
 - Fungi
 - Animalia
14. Bacteria are _____.
- very small, can cause disease, and can be rod-shaped, round, or coiled**
 - always very dangerous
 - in the Kingdom Protista
 - all of the above
15. Which of the following is true about snails:
- Snails need moist skin to breathe.
 - The body of a snail is called the foot.
 - Land snails have 4 antennae.
 - all of the above**
16. Name the 5 Kingdoms and 1–3 organisms that belong in each group.
(Answers in this column will vary)
- | | |
|--------------------|------------------------------------|
| 1. <u>Animalia</u> | <u>Dog, cat, snail</u> |
| 2. <u>Plantae</u> | <u>Moss, trees, ferns</u> |
| 3. <u>Monera</u> | <u>bacteria</u> |
| 4. <u>Fungi</u> | <u>molds, mushrooms, and yeast</u> |
| 5. <u>Protista</u> | <u>Paramecium, Amoeba, Algae</u> |

PRE/POSTTEST KEY (TEACHER REFERENCE)

17. Compare two advantages and two disadvantages of using a taxonomic classification system.

Advantages:

- Scientists use a taxonomic classification system because it simplifies a huge task, making sense of the enormous number of living things on the planet.
- By organizing organisms into groups based on common characteristics we can see similarities and differences more easily.

Disadvantages:

- Scientists change their mind about the classification of an organism. If new information is discovered the classification may change.
- Scientists don't always agree on the classification of an organism.

18. Show the organization of the classification system by naming all the categories in order from general to specific or from largest to smallest.

1. Kingdom
2. Phylum
3. Class
4. Order
5. Family
6. Genus
7. Species

19. You found an organism while on a camping trip in California. You looked at its body and watched it for a couple minutes. What kingdom do you think this organism belongs to?

- It is about 45 cm long.
- It has dry, scaly skin.
- It has a long blue tail, but its back is the color of leaves.
- It moves very fast.

This organism belongs to Kingdom Animalia because it is mobile, multicellular, and is a vertebrate (because of its tail). It is most likely a reptile because it has dry scaly skin.

20. Imagine your friend wants to play a prediction game. He puts pictures of several organisms into separate envelopes and tells you to pick two. You do not look inside. Your friend tells you that the organisms you chose are in the same Kingdom, Phylum, and Class. Do the envelopes have pictures of the same organism? Explain your answer.

It is possible the pictures are the same organism, but not necessarily. It is also possible that the pictures might be different organisms, but are relatives of each other.

NOTE: this question asks students to interpret and explain the relationship that the three most general categories of taxonomy represent (Kingdom, Phylum, and Class).

21. Extra Credit: What do you think the organism in Question #19 is? What makes you think this?

The Western Skink. It has a distinctive bright blue tail. Once you have seen one, you do not forget it.

NOTE: this question is not included in the PRE/POSTTEST, but is an optional extra credit question if you choose to use it. For those students who have spent time hiking wild places in California, many will have seen it. It is very shy, small, and fast. Once you see it you do not forget it or get it mixed up with other lizards due to its distinctive blue tail.

PRE/POSTTEST 1

Name _____

True/False: Circle your answer.

- True False 1. Plants, snails, elephants, and bacteria are examples of living things.
- True False 2. Snails are related to squids.
- True False 3. The word “organism” can be used to describe any living thing.
- True False 4. *Taxonomic Classification* is a system of organizing all living things.
- True False 5. The largest and most general category is “Species.”

Multiple Choice: Circle the correct answer for questions 6–15.

6. Scientific names are made up of:
- a. genus and species
 - b. genus and specials
 - c. genus and kingdom
 - d. kingdom and species
7. Which animal is most closely related to snails:
- a. clam
 - b. octopus
 - c. slug
 - d. snake
8. Snails are members of Kingdom _____ .
- a. Plantae
 - b. Animalia
 - c. Monera
 - d. Fungi
9. Unicellular animals have _____ .
- a. U-shaped body
 - b. one eye
 - c. many cells
 - d. one cell
10. The five kingdoms are:
- a. Plantae, Animalia, Fungi, Crabicus, and Monera
 - b. Monera, Fungi, Plantae, Animalia, and Protista
 - c. Fungi, Monera, Protutae, Animalium, and Delicious
 - d. Animalia, Plantae, Fungi, and Yeast

PRE/POSTTEST 1

11. In order for an organism to produce its own food, it needs to have:
- a. chlorophyll
 - b. grass
 - c. a gardener
 - d. worms
12. All green plants _____ .
- a. make their own food
 - b. photosynthesize
 - c. are in Kingdom Plantae
 - d. all of the above
13. Bacteria are in the Kingdom _____ .
- a. Monera
 - b. Plantae
 - c. Fungi
 - d. Animalia
14. Bacteria are _____ .
- a. very small, can cause disease, and can be rod-shaped, round, or coiled
 - b. always very dangerous
 - c. in the Kingdom Protista
 - d. all of the above
15. Which of the following is true about snails?
- a. Snails need moist skin to breathe.
 - b. The body of a snail is called the foot.
 - c. Land snails have 4 antennae.
 - d. all of the above
16. Name the 5 Kingdoms and 1–3 organisms that belong in each group.

Kingdom	Organisms
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

PRE/POSTTEST 2

Name _____

True/False: Circle your answer.

- True False 1. Plants, snails, elephants, and bacteria are examples of living things.
- True False 2. Snails are related to squids.
- True False 3. The word “organism” can be used to describe any living thing.
- True False 4. *Taxonomic Classification* is a system of organizing all living things.
- True False 5. The largest and most general category is “Species.”

Multiple Choice: Circle the correct answer for questions 6–15.

6. Scientific names are made up of:
- | | |
|-----------------------|------------------------|
| a. genus and species | c. genus and kingdom |
| b. genus and specials | d. kingdom and species |
7. Which animal is most closely related to snails:
- | | |
|------------|----------|
| a. clam | c. slug |
| b. octopus | d. snake |
8. Snails are members of Kingdom _____ .
- | | |
|-------------|-----------|
| a. Plantae | c. Monera |
| b. Animalia | d. Fungi |
9. Unicellular animals have _____ .
- | | |
|------------------|---------------|
| a. U-shaped body | c. many cells |
| b. one eye | d. one cell |
10. The five kingdoms are:
- | |
|--|
| a. Plantae, Animalia, Fungi, Crabicus, and Monera |
| b. Monera, Fungi, Plantae, Animalia, and Protista |
| c. Fungi, Monera, Protutae, Animalium, and Delicious |
| d. Animalia, Plantae, Fungi, and Yeast |

PRE/POSTTEST 2

11. In order for an organism to produce its own food, it needs to have:
- a. chlorophyll
 - b. grass
 - c. a gardener
 - d. worms
12. All green plants _____.
- a. make their own food
 - b. photosynthesize
 - c. are in Kingdom Plantae
 - d. all of the above
13. Bacteria are in the Kingdom _____.
- a. Monera
 - b. Plantae
 - c. Fungi
 - d. Animalia
14. Bacteria are _____.
- a. very small, can cause disease, and can be rod-shaped, round, or coiled
 - b. always very dangerous
 - c. in the Kingdom Monera
 - d. all of the above
15. Which of the following is true about snails:
- a. Snails need moist skin to breathe.
 - b. The body of a snail is called the foot.
 - c. Land snails have 4 antennae.
 - d. all of the above
16. Name the 5 Kingdoms and 1–3 organisms that belong in each group.

Kingdom	Organisms
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

PRE/POSTTEST 2

17. Compare two advantages and two disadvantages of using a taxonomic classification system.

18. Show the organization of the classification system by naming all the categories in order from general to specific or from largest to smallest.

1.

2.

3.

4.

5.

6.

7.

PRE/POSTTEST 2

19. You found an organism while on a camping trip in California, You looked at its body and watched it for a couple minutes. What Kingdom do you think this organism belongs to?

- It is about 45 cm long.
- It has dry, scaly skin.
- It has a long blue tail, but its back is the color of leaves.
- It moves very fast.

This organism belongs to Kingdom _____

because _____

20. Imagine your friend wants to play a prediction game. He puts pictures of several organisms into separate envelopes and tells you to pick two. You do not look inside. Your friend tells you that the organisms you chose are in the same Kingdom, Phylum, and Class. Do the envelopes have pictures of the same organism? Explain your answer.

SAMPLE SORTING GRID

<u>Objects</u> Pencil Pencil sharpener Desk Chair Poster Fly Begonia plant Tarantula Fem Guinea pig Stapler Apple Pinecone Plastic ruler Lizard											
<u>Living</u> Begonia plant Tarantula Fem Lizard				Apple Pinecone Guinea pig Fly				<u>Nonliving</u> Pencil Pen Plastic ruler Desk			
<u>Plant</u> Begonia Fem Apple Pinecone				<u>Animal</u> Guinea pig Tarantula Fly Lizard				<u>Wood</u> Pencil Desk Chair Poster			
<u>Whole Plant</u> Begonia Fem				<u>Part Plant</u> Apple Pinecone				<u>Not Wood</u> Pen Plastic ruler Stapler Pencil Sharpener			
<u>Invertebrate</u> Fly Tarantula				<u>Vertebrate</u> Lizard Guinea pig				<u>Metal</u> Stapler Pencil sharpener			
<u>Flowering</u> Begonia				<u>Non-flowering</u> Fem				<u>Plastic</u> Pen Plastic ruler			
<u>Fruit</u> Apple				<u>Not Fruit</u> Pinecone				<u>Flat</u> Plastic ruler			
<u>Spider</u> Tarantula				<u>Insect</u> Fly				<u>Has no hole</u> Stapler			
<u>Mammal</u> Guinea pig				<u>Reptile</u> Lizard				<u>Has a hole</u> Pencil sharpener			
<u>For sitting</u> Chair				<u>For Writing</u> Desk				<u>Cylindrical</u> Pen			
<u>Paper</u> Poster				<u>Tool</u> Pencil							

GLOSSARY

Docent Name _____

Anatomy — the structure of living things

Apex — the tip of the shell

Bivalve — a class of mollusks having two shells hinged together, like the oyster, clam, etc.

Cell — the basic unit of living things

Cephalopoda — (“headfoot”) a class of mollusks having tentacles attached to the head, like the cuttlefish, squid, and octopus

Class — part of the system of classification (taxonomy); a subdivision of a phylum, usually including several orders

Digestive Gland — a place where food is broken up and converted into something that can be used by the body

Docent — volunteers in a preserve; they educate the public about the organisms and habitats within the preserve

Excretory Pore — the opening in the body where wastes are eliminated

External Characteristics — all the parts of a living organism that are visible from the outside

Eye Spot — an organ that senses light

Foot — the organ of movement for some mollusks, like the snail

Gastropoda — (“stomachfoot”) a class of mollusks, like the snails, slugs, etc.

Head — the foremost part or front end of an organism

Heart — a hollow, muscular organ which moves the blood throughout the body

Ingest — to take in food

Internal Characteristics — all the parts of a living organism that are not visible from the outside

Intestine — an organ that digests and absorbs nutrients

Invertebrate — an organism without a backbone

Kingdom — one of five divisions of all living organisms: Animalia, Plantae, Fungi, Protista, and Monera

Lung — a sack-like organ that allows for breathing and puts oxygen into the blood

Microscopic — so small that it is invisible or difficult to see without the use of a microscope

Mobile — able to move

Mollusca — the phylum comprising mollusks

Mollusk — invertebrates with shells of one, two, or more pieces that cover a soft body, like snails, clams, squids, etc.

Mouth — the opening where food is ingested

Organs — groups of different tissues that work together to perform a specific function, e.g., the heart is an organ that pumps blood

Phylum — a major subdivision of a Kingdom

Preserve — special, protected land areas, where plants and animals live in their habitat, with no development and industry

Radula — a hard, tooth-like part in the mouths of mollusks that allow them to eat by scraping

Respiratory Pore — the opening where a snail takes in air

Shell — the hard, outer covering of a mollusk

Shell Lip — the rim of the shell

Stomach — an organ that stores, dilutes, and digests food

Taxonomy — the study of how all living things are related and sorted

Tentacles — slender, flexible “arms” that serve as sensory organs

Tissues — groups of similar cells

Vertebrate — an organism with a backbone

[illegible]

SAFE SNAIL HANDLING

Rules of Safe Snail Handling

1. Never scare a person with an animal, even if you are just pretending.
2. No one has to touch anything they do not want to touch.
3. Keep your voices low, and your movements slow.
4. Teams are going to be performing scientific observations of their snail. There will be little need to touch the snail unless it gets too close to the edge of the desk or table.
5. If the snail does get too close to the edge, pick it up by the shell only, and very slowly. Snails tend to hold onto surfaces. They should never be abruptly lifted.
6. The snails should never be placed on any other part of the body, only the hand.
7. Never push food or any other objects on the snail.
8. Wash your hands immediately after handling a snail.



PRESERVE TEAM ROLES AND RUBRIC

PRESERVE TEAM ROLES

Each of you is a docent of your Preserve. That means that it is your responsibility to take care of your preserve. While working on TAXONOMY TRAIL, you will each have a role. Each role has different jobs to help the group finish all the activities.

Top Taxonomist (Team Leader)

- Help your Preserve Team work cooperatively.
- Lead group discussions.
- Help members when they are having trouble.
- Keep all team assignments in your Taxonomy Folder.

Classification Chronicler (Group Writer)

- Record work during group activities.
- Give team assignments to the teacher for assessment.

Snail Docents (2 students)

- Take care of the snails.
- Retrieve the snails from the enclosure.
- Wake the snails if necessary by placing a drop of water on their undersides.
- Keep watch of the snails while they are out of the enclosure.
- Return the snails to the enclosure.

Preserve Provider

- Pick up everything (except snails) you and your Preserve Team use.
- Put away everything you and your Preserve Team use and leave a clean working area.

PRESERVE TEAM RUBRIC

Level 4 — Exemplary

You consistently and actively help the group achieve its goals by encouraging the group to work together, and by willingly accepting and completing the necessary daily work.

Level 3 — Expected

You usually help the group achieve its goals by communicating with other group members, by encouraging the group to work together, and willingly accepting and completing daily work.

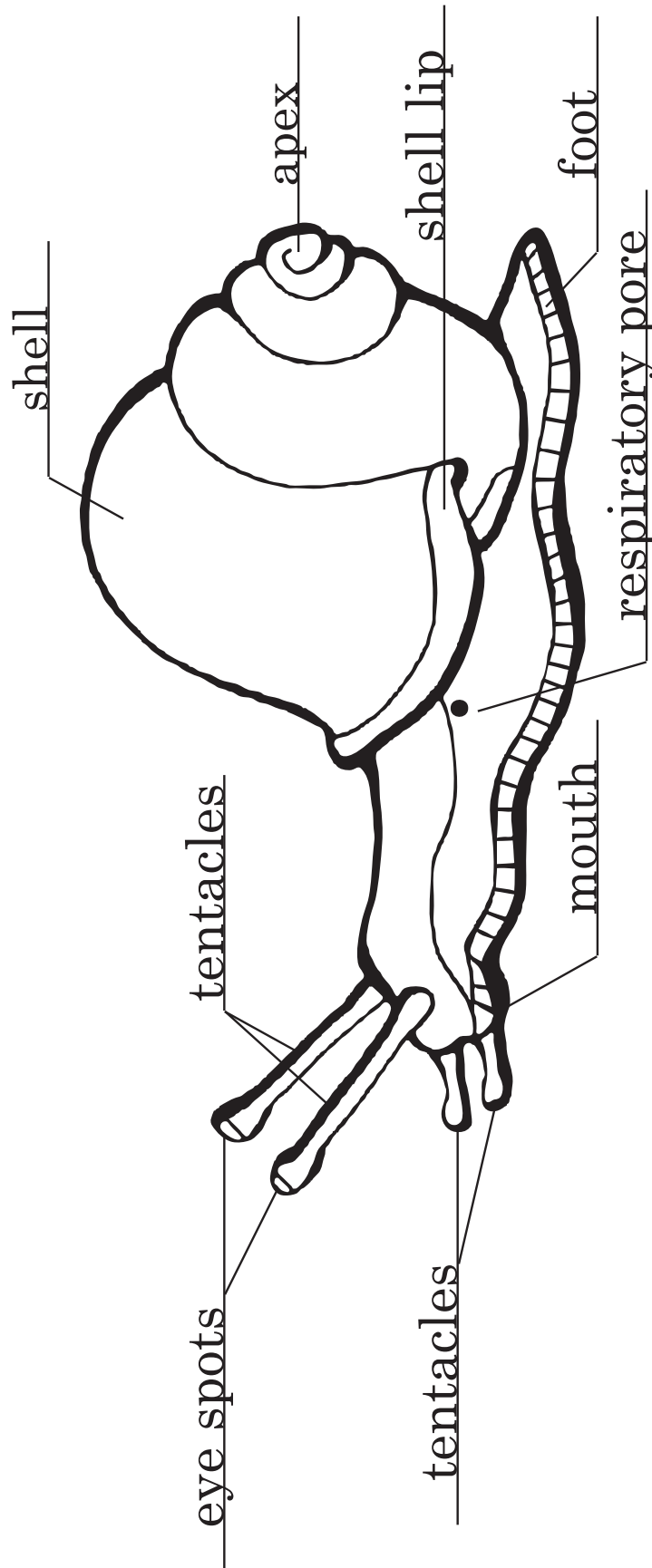
Level 2 — Nearly There

You sometimes help your group achieve its goals.

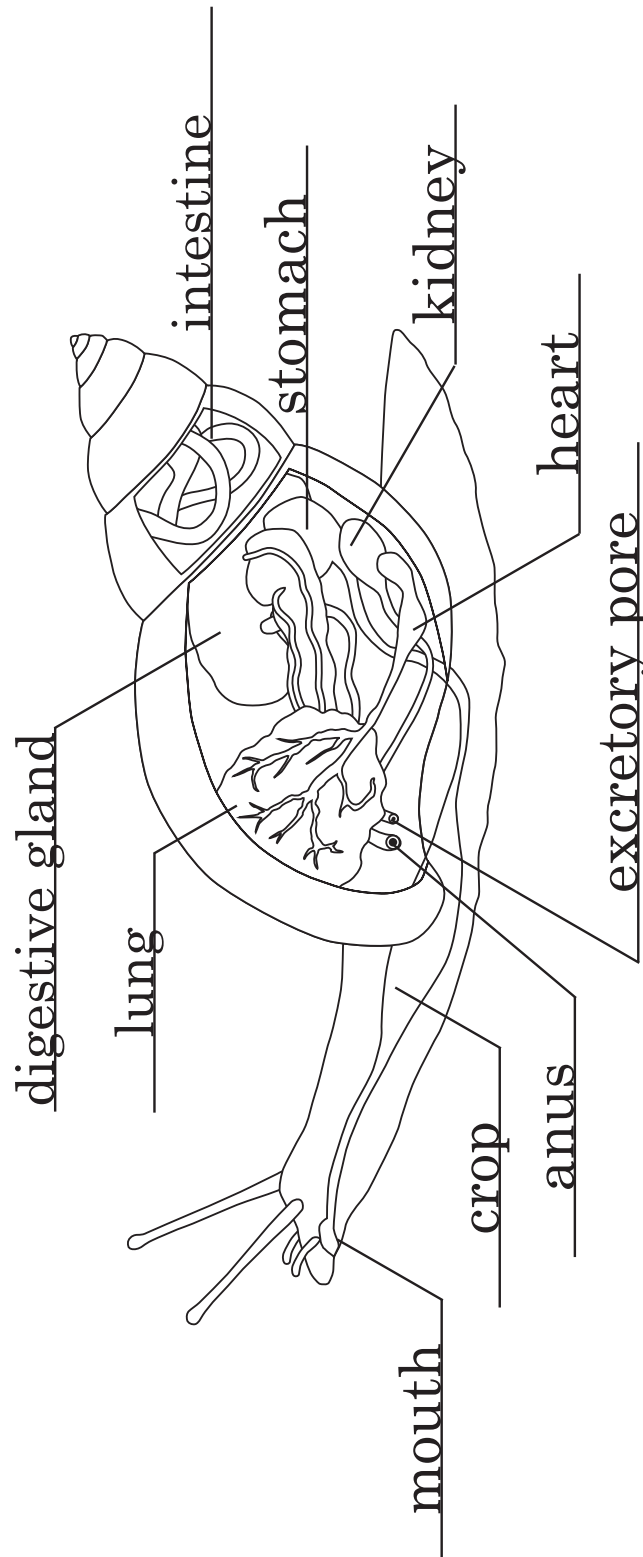
Level 1 — Incomplete

You do very little to help your group achieve its goals.

SNAIL EXTERNAL ANATOMY



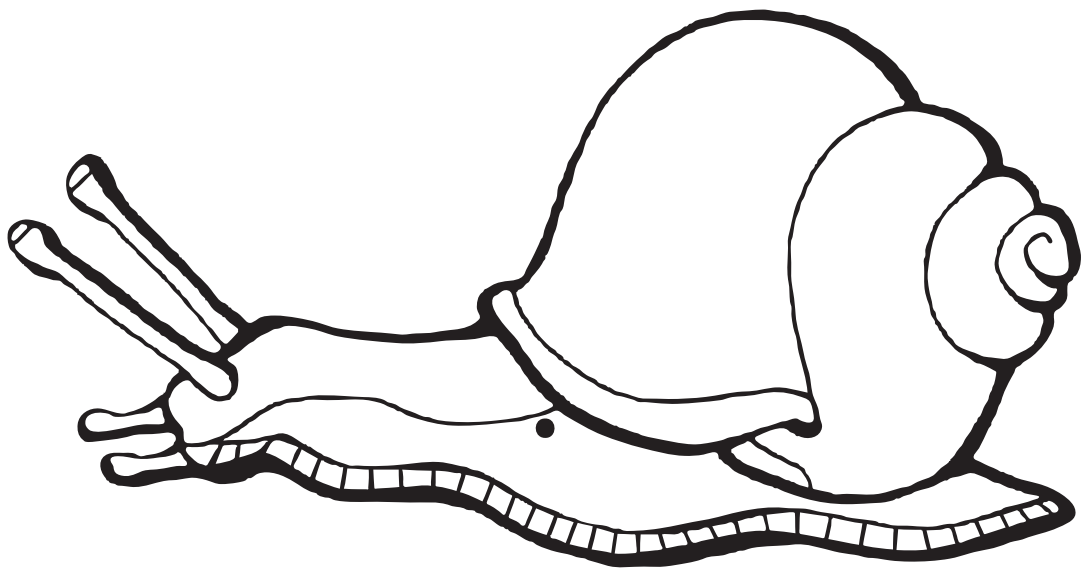
SNAIL INTERNAL ANATOMY



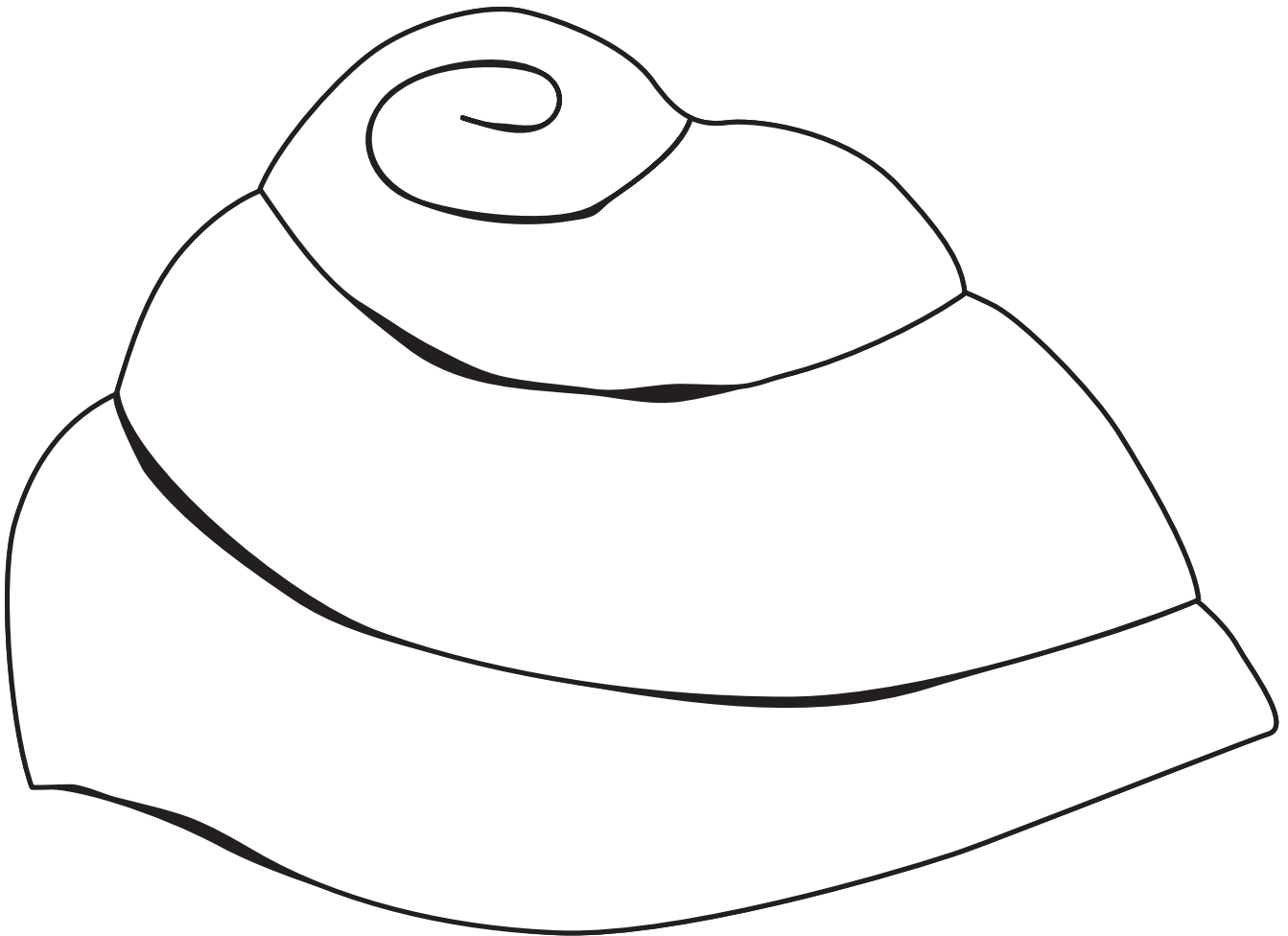
SNAIL ICON-EXTERNAL

Docent Name _____

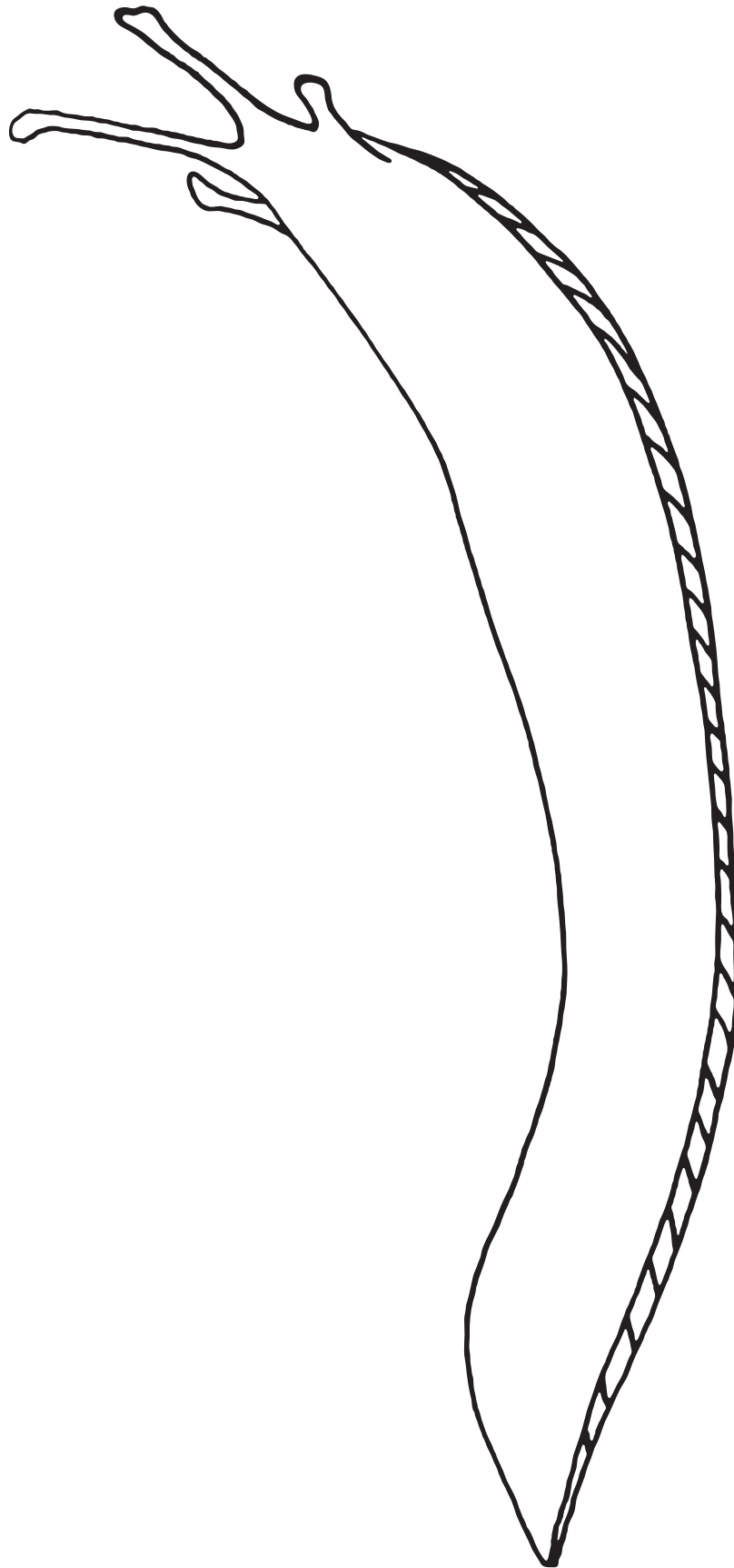
Preserve Name _____



SNAIL SHELL



SNAIL BODY

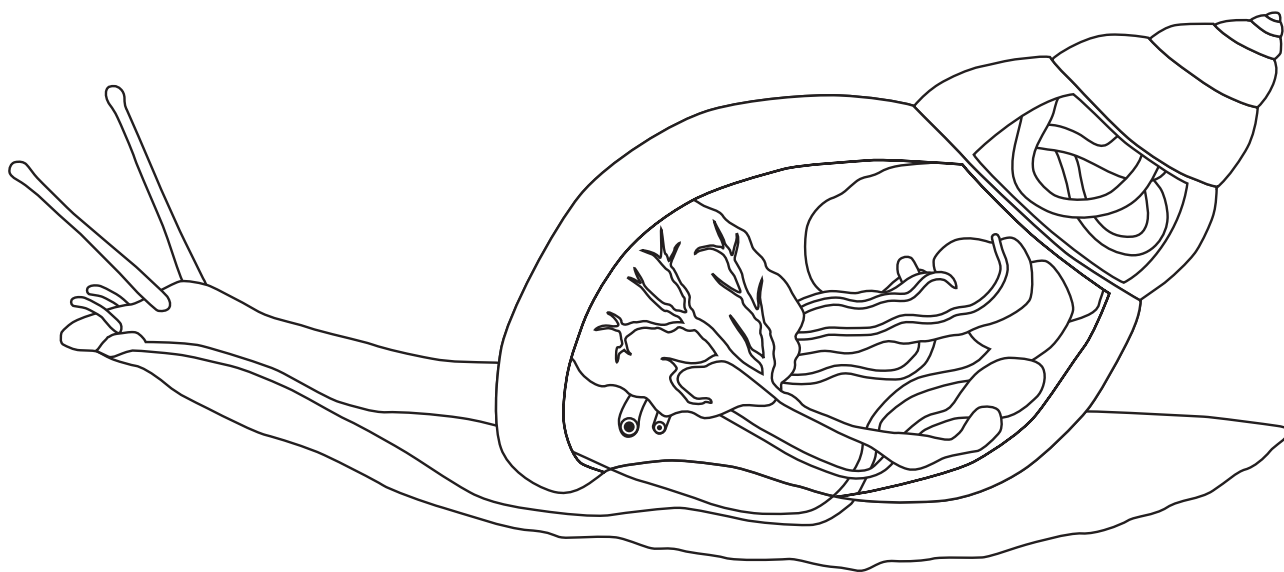


SNAIL ICON-INTERNAL

Docent Name _____

Preserve Name _____

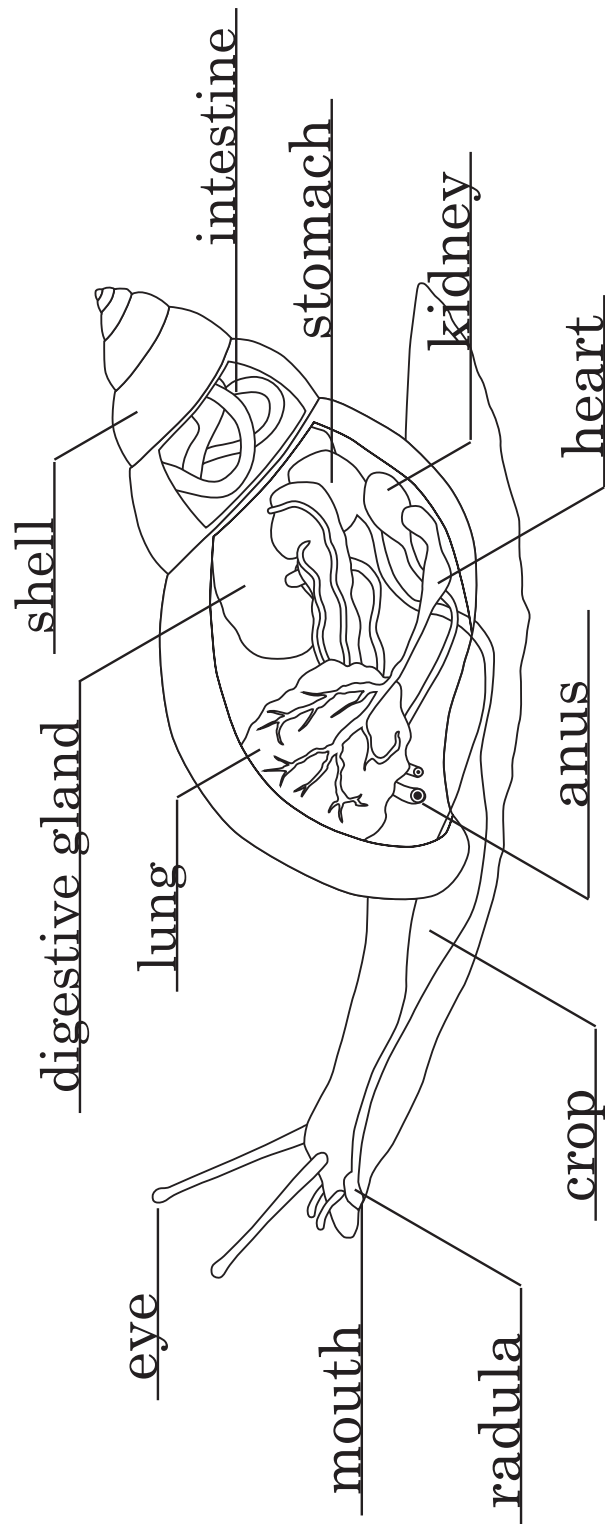
Directions: Using the Internal Organs Key, color each of the snail's internal organs.



Internal Organs Key:

Radula	pink
Mouth	label only
Crop	orange
Lung	grey
Heart	red
Kidney	green
Stomach	brown
Digestive gland	blue
Intestine	yellow
Shell	your choice of color
Eye	label only

SNAIL INTERNAL ORGANS



SNAIL TRAIL 1

Docent Name _____

Preserve Name _____

1. **Question or Problem:** “Do snails prefer wet or dry surfaces?”

2. **Hypothesis** (best guess): Circle your hypothesis, either:

We hypothesize snails prefer wet surfaces.

OR

We hypothesize snails prefer dry surfaces.

3. **Observation or Experimentation:** We will be testing our hypothesis.

4. **Recording Information:** We will record the results we observe on the Snail Trail Grid on the back of this page.

5. **Conclusion:** Circle your conclusion:

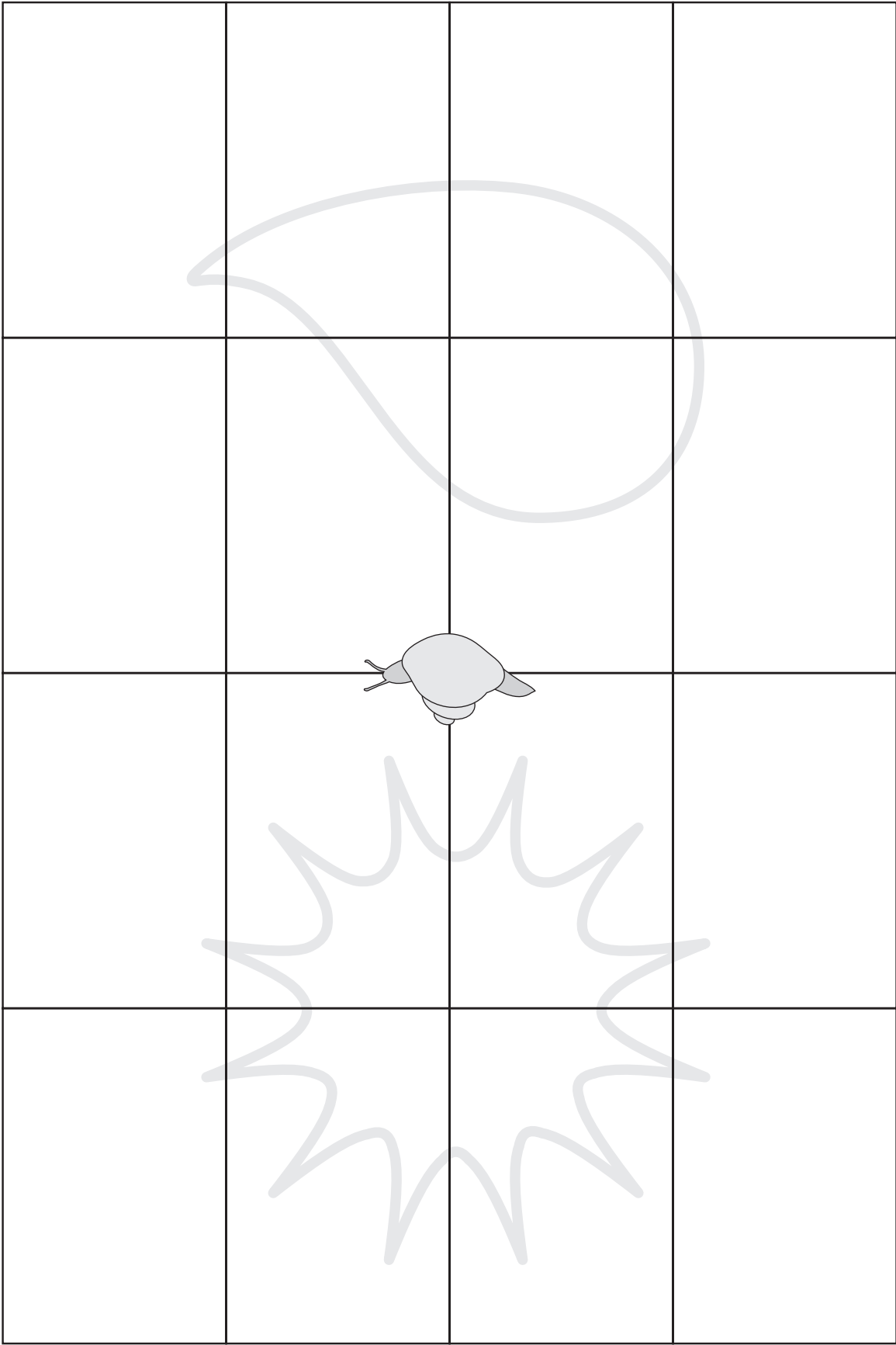
Based on our observations, snails prefer wet surfaces.

OR

Based on our observations, snails prefer dry surfaces.

SNAIL TRAIL 1

SNAIL TRAIL GRID



WET

DRY

SNAIL TRAIL 2

Docent Name _____

Preserve Name _____

1. **Question or Problem:** _____

2. **Hypothesis** (best guess): _____

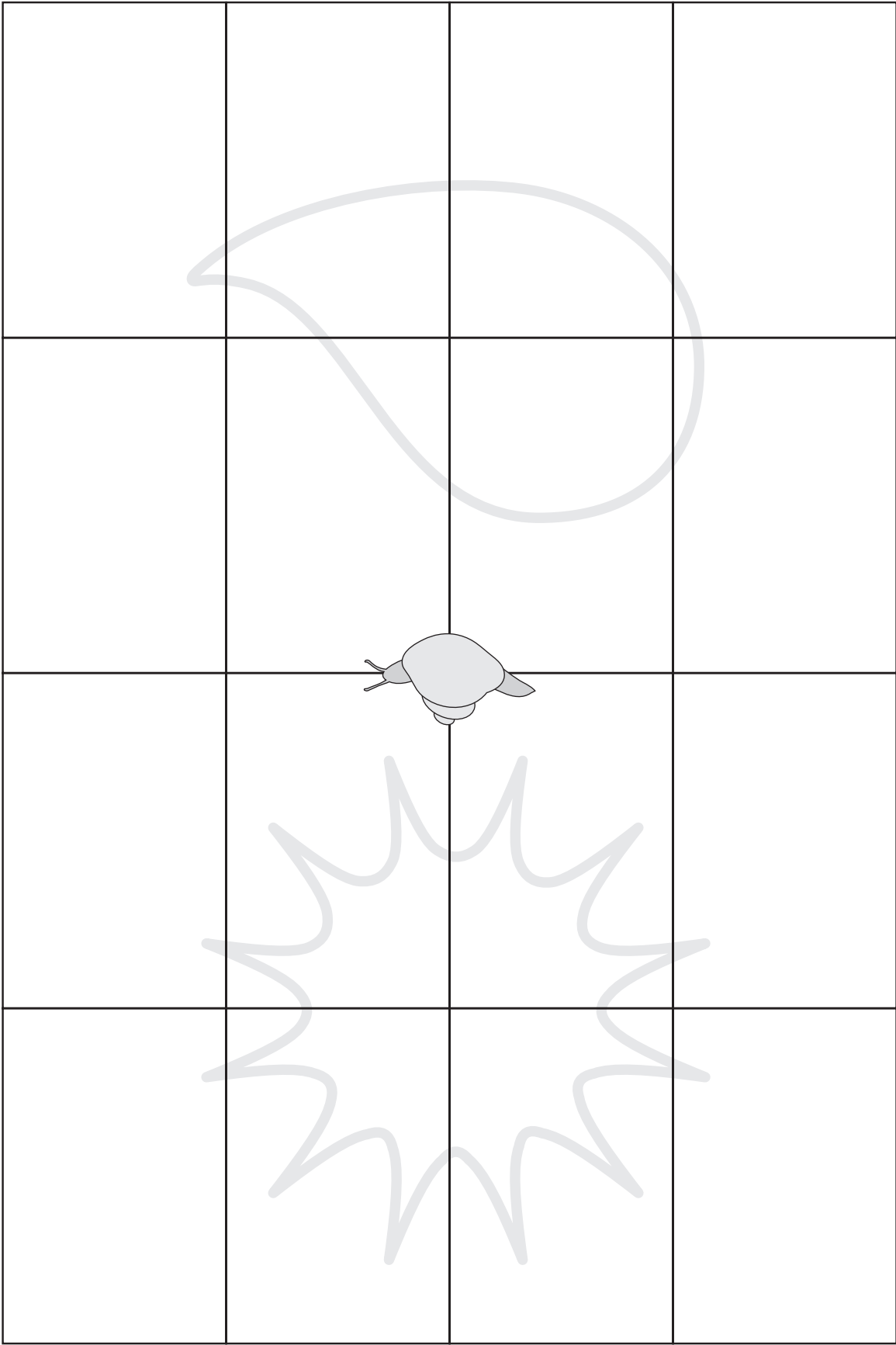
3. **Observation or Experimentation:** _____

4. **Recording Information:** Record the results you observe on the Snail Trail Grid on the back of this page.

5. **Conclusion:** _____

SNAIL TRAIL 2

SNAIL TRAIL GRID



WET

DRY

SNAIL FAMILY TREE: UNCLE MOLLUSCA?

Kingdom:
Animalia

Phylum:
Mollusca

Class:
Gastropoda

Class:
Cephalopoda

Class:
Bivalves

Snail

Slug

Squid

Octopus

Cuttlefish

Clam

Oyster

**FAMILY TREE
CLASSIFICATION LABELS**

Kingdom: Animalia

Phylum: Mollusca

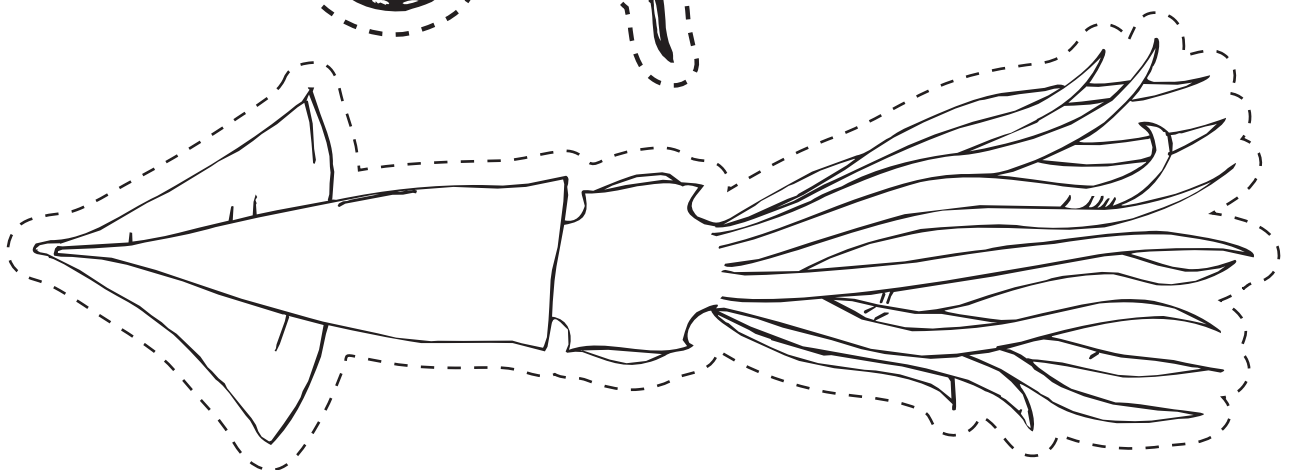
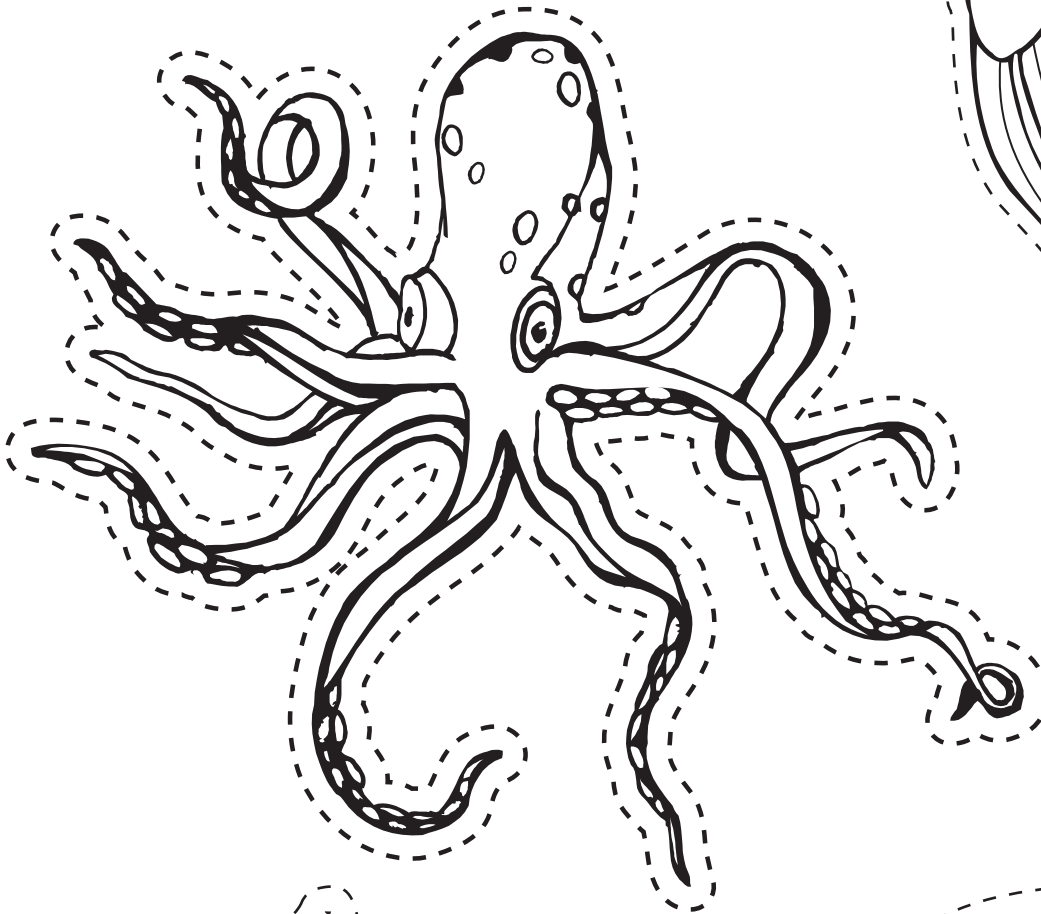
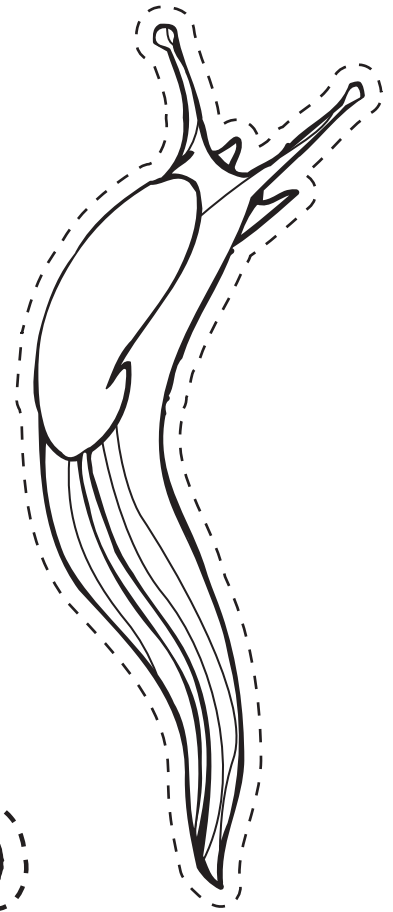
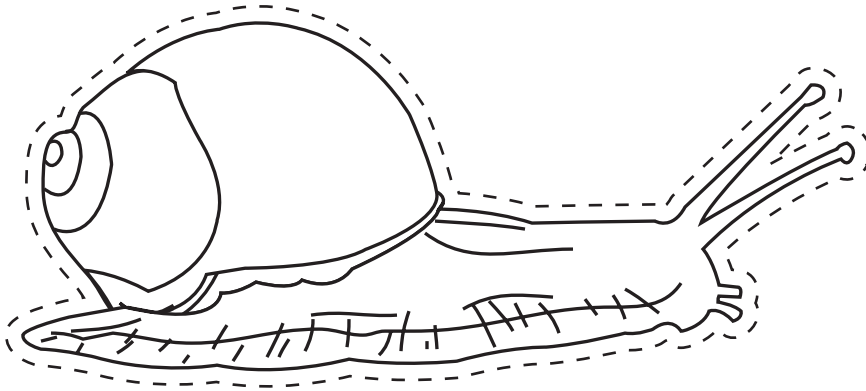
Class: Gastropoda

Class: Cephalopoda

Class: Bivalves

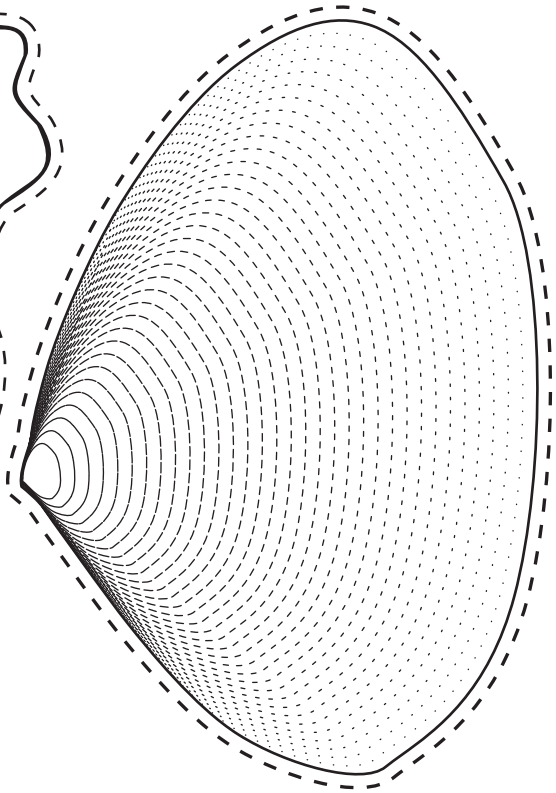
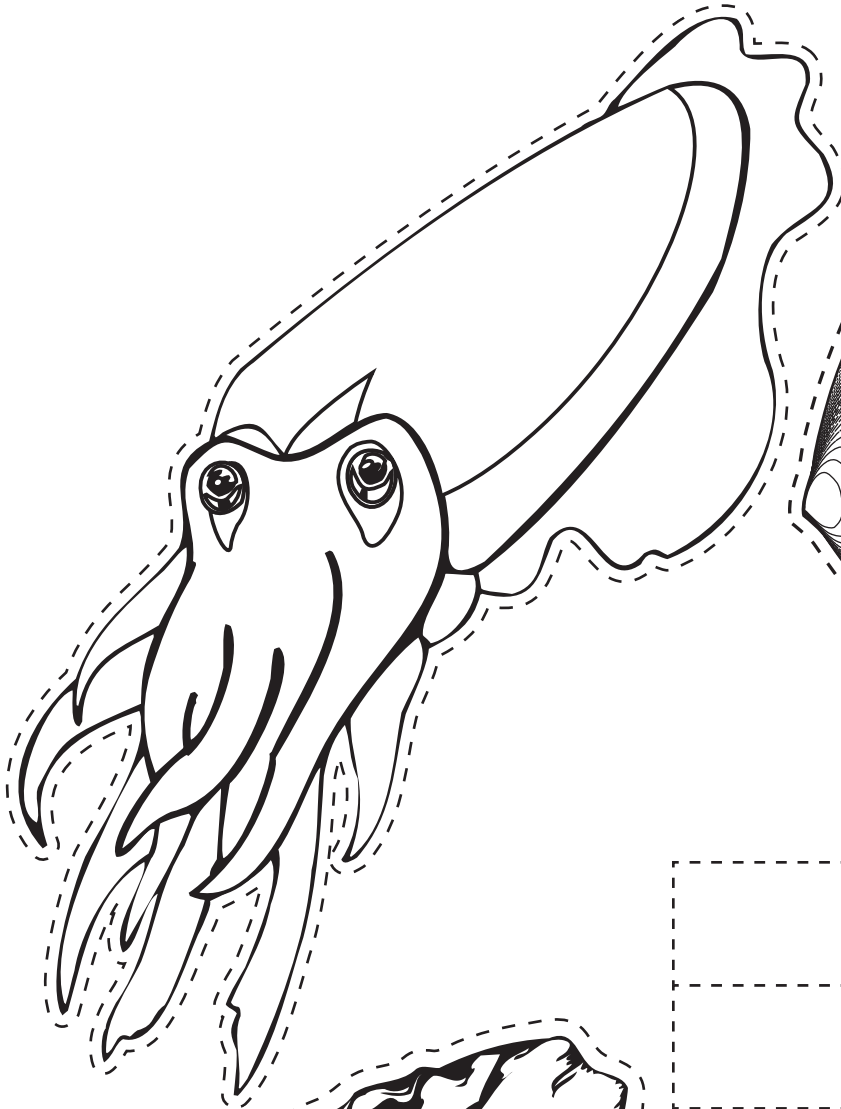
FAMILY TREE

ORGANISM NAMES



FAMILY TREE

ORGANISM NAMES



Snail

Slug

Squid

Octopus

Cuttlefish

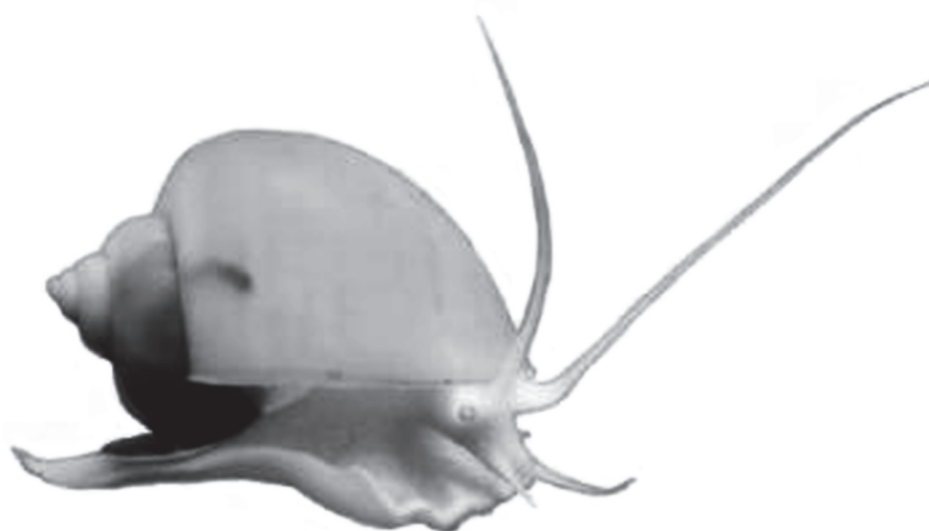
Clam

Oyster

SNAIL PICTURES



Helix pomatia
Roman Snail



Pomacea (pomacea) bridgesii
Apple Snail

SNAIL PICTURES

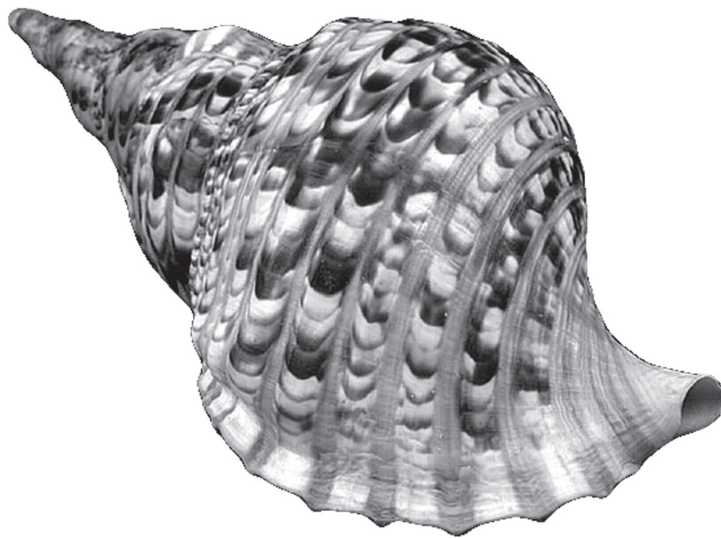


Conus textile
Cone Snail



Cassis tuberosa
King Helmet Snail

SNAIL PICTURES

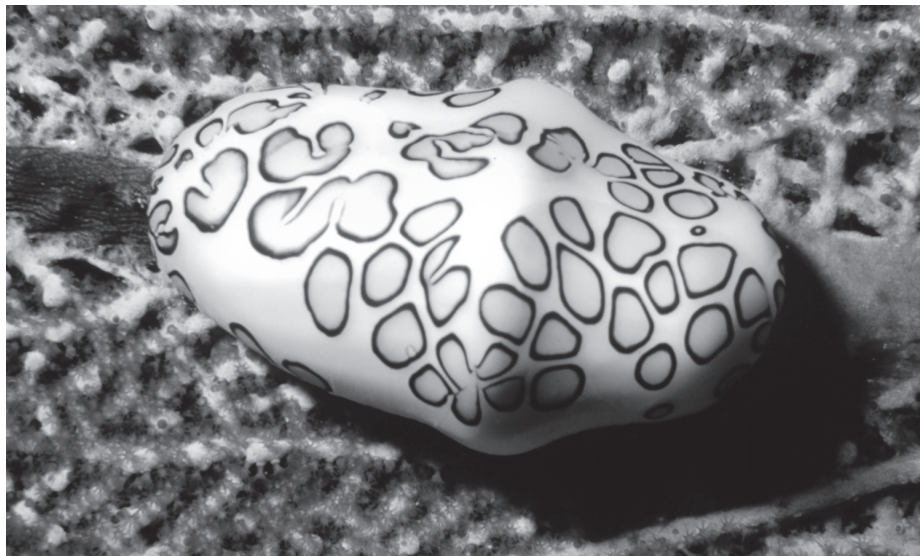


Charonia tritonis
Triton's Trumpet Snail



Pleuroploca gigantea
Horse Conch Snail

SNAIL PICTURES



Cyphoma gibbosum
Flamingo Tongue Snail

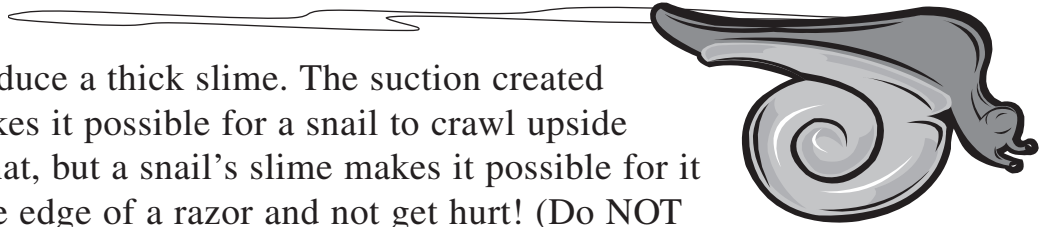


Fasciolaria tulip
True Tulip Snail

FANTASTIC SNAIL FACTS!

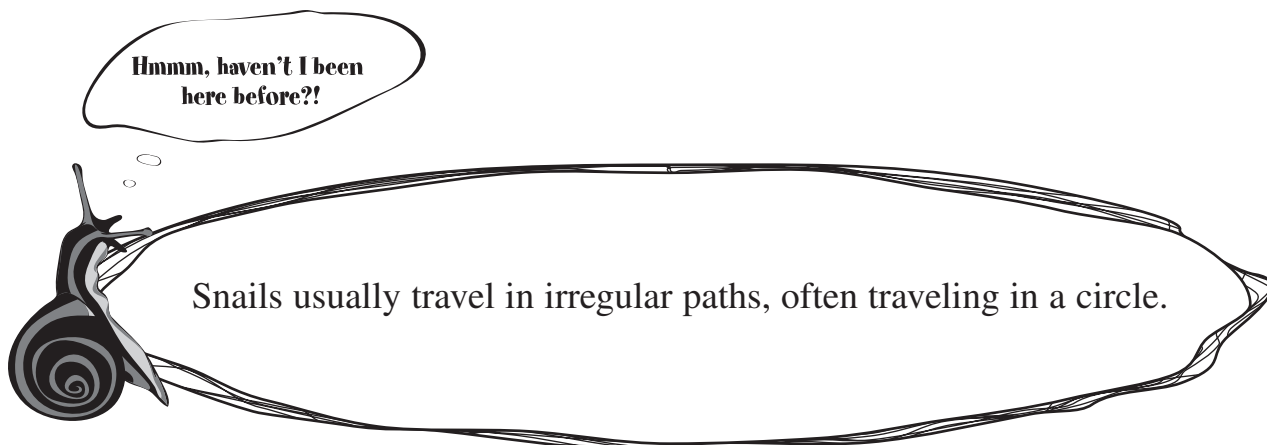
The largest land snail ever found was 15 inches long and weighed 2 pounds!

Snails' bodies produce a thick slime. The suction created by their slime makes it possible for a snail to crawl upside down! Not only that, but a snail's slime makes it possible for it to crawl across the edge of a razor and not get hurt! (Do NOT try this at home!)



Some snails have been known to live up to 15 years!

Snails are **hermaphrodites**, which means that they have both male and female reproductive organs. If you had a pet snail, you would be able to refer to it as both a "he" and as a "she."



Snails mainly rely on their sense of touch and smell to find food. They have very poor eyesight. Snails cannot hear.

Snails can retract one or both of their tentacles at a time.

Snails are **nocturnal**, which means they are more active at night.

FANTASTIC SNAIL FACTS!

Because garden snails mainly eat garden plants and vegetables, they are considered pests. However, they also eat decaying plants and soil. This helps gardeners, because the decaying matter and soil passing through their systems returns very fertile material to the soil.



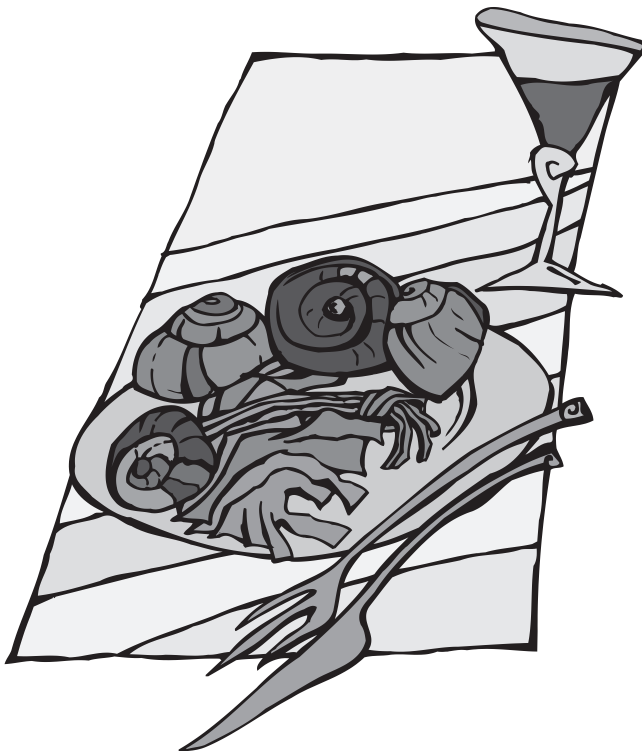
The fastest snails are the speckled garden snails. They can move up to 55 *yards* per hour! Compare this with 23 *inches* per hour covered by most other land snails!



Garden snails hibernate during the winter, living on their stored fat.

Garden snails breathe with lungs.

Garden snails evolved from sea snails about 800 million years ago! Humans are new arrivals compared to snails!



The garden snail is cooked and eaten as a delicacy called “escargot.”

May 24th is National Escargot Day. What kind of a celebration are you going to have?!

SNAIL BIO

Preserve Name _____

1. What is the name of your snail?

a. Common name _____

b. Scientific name _____

2. What are the physical characteristics of your snail?

a. Size _____

b. Color _____

c. Description of the body _____

d. Description of the shell _____

3. Where does your snail live?

a. Country _____

b. Habitat _____

c. Location found (e.g., mountaintop, valley, under a rock, etc.) _____

4. What are some interesting facts about your snail? What makes your snail different from other snails?

SNAIL BIO CHECKLIST AND RUBRIC

SNAIL BIO CHECKLIST

- _____ Research: Accurate and thorough
 - _____ Includes common and scientific name of snail
 - _____ Includes physical characteristics of snail
 - _____ Size
 - _____ Color
 - _____ Description of the body
 - _____ Description of the shell
 - _____ Includes information on where the snail lives
 - _____ Country
 - _____ Habitat
 - _____ Location (e.g., mountain top, valley, under a rock, etc.)
 - _____ Includes interesting facts about snail (things that make your snail different from other snails)
- _____ Form: Logical, organized information
- _____ Clarity: Clear facts, ideas
- _____ Language Usage: Correct spelling, grammar, punctuation/complete, clear sentences

SNAIL BIO RUBRIC

4— EXCEEDS!!! We did a great job!!!

- We have followed the Snail Bio Checklist, but also have gone significantly beyond what was expected or asked.
- We have presented the assignment in an appealing and/or eye-catching way.
- We have very few, if any, significant errors in spelling or grammar.

3 — MEETS!! We did a good job!!

- We have followed the Snail Bio Checklist.
- We have presented the assignment neatly.
- We have few, if any, significant errors in spelling or grammar.

2 — NEARLY THERE. Oops, we forgot something!

- We have followed all but one of the directions in the Snail Bio Checklist.
- We need to correct our work and resubmit it as soon as possible.

1 — Back to the drawing board.

- We have not followed the Snail Bio Checklist.
- We need to see the teacher immediately for a plan of action.

KINGDOM KIT (1)

Kingdom Animalia

- Multi-cellular with distinct tissues and organs
- Ingests food
- Most are mobile
- Includes sponges, sea anemones, snails, insects, fish, reptiles, amphibians, birds, mammals

Kingdom Plantae

- Multi-cellular with distinct tissues
- Have chloroplasts for photosynthesis
- Green in color
- Includes mosses, ferns, pines, and flowering plants

KINGDOM KIT (2)

Kingdom Fungi

- Mostly multi-cellular, some unicellular, reproduce by spores
- Includes mushrooms, yeasts, and molds
- Mushrooms are umbrella-shaped, do not photosynthesize, and can grow in the dark
- Yeasts are unicellular and cause fermentation
- Molds are shapeless, fuzzy, and flat

Kingdom Protista

- Unicellular with a nucleus
- Some live together in colonies
- Many are mobile

KINGDOM KIT (3)

- Some have chlorophyll for photosynthesis

- Includes protozoa (Paramecium, Amoeba, Euglena) and algae (diatoms, dinoflagellates, Volvox, and seaweed groups)

Kingdom Monera

- Unicellular organisms without a nucleus

- Rod-shaped, round, or coiled

- No internal organelles

- Help with digestion, cause disease, or aid decomposition

- Includes bacteria

BINGO BOARD

		TAXONOMY TRAIL		

Directions: Choose 24 words from the list below and put them in the boxes above. You may put them in any order, in any box. The center box is free. Play this game like Bingo. Your teacher will read the definitions from the **Glossary** and you place a marker on the corresponding box. When you have *five* in a row, in any direction, call out “Taxonomy Trail!”

Anatomy	Eye Spots	Lung	Respiratory Pore
Apex	Foot	Microscopic	Shell
Bivalve	Gastropoda	Mobile	Shell Lip
Cell	Head	Mollusca	Stomach
Cephalopoda	Heart	Mollusk	Taxonomy
Class	Ingest	Mouth	Tentacles
Digestive Gland	Internal Characteristics	Organs	Tissues
Docent	Intestine	Phylum	Vertebrate
Excretory Pore	Invertebrate	Preserve	
External Characteristics	Kingdom	Radula	

ORGANISM CARDS:

ANIMALIA (1)



Bottlenose Dolphins
Animalia



Red Fox
Animalia



Box Turtle
Animalia



Tree Snake
Animalia



Mallard Duck
Animalia



Red-winged Blackbird
Animalia

ORGANISM CARDS:

ANIMALIA (2)



Frog
Animalia



Fiddler Crabs
Animalia



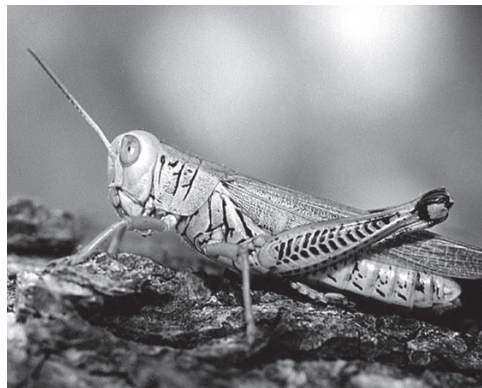
Bull Shark
Animalia



Atlantic Salmon
Animalia



Earthworms
Animalia



Grasshopper
Animalia

ORGANISM CARDS:

PLANTAE (1)



Prickly Pear Cactus
Plantae



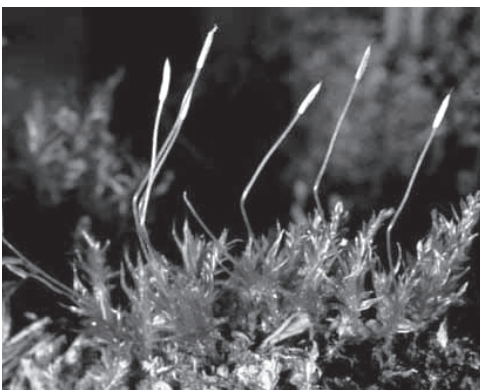
Tulips
Plantae



Water Lilly
Plantae



Sunflowers
Plantae



Moss
Plantae



Lichen
Plantae

ORGANISM CARDS:

PLANTAE (2)



Noble Fir Trees
Plantae



Oak Tree
Plantae



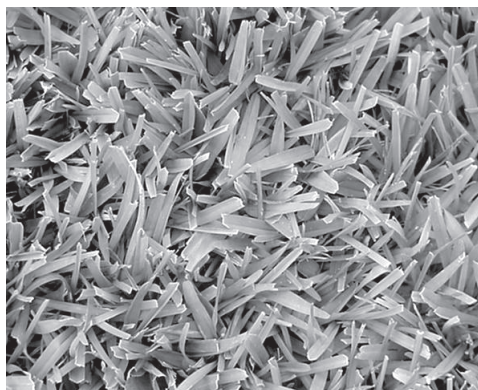
Palm Tree
Plantae



Joshua Tree
Plantae



Bermuda Grass
Plantae



St. Augustine Grass
Plantae

ORGANISM CARDS:

FUNGI



Bracket
Fungi



Clavicornia
Fungi



Dacrymyces
Fungi



Marasmiellus
Fungi



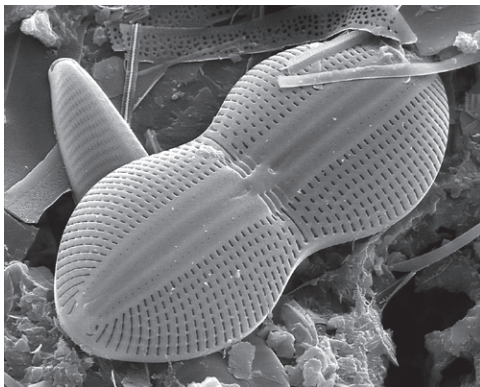
Morel
Fungi



Stereum
Fungi

ORGANISM CARDS:

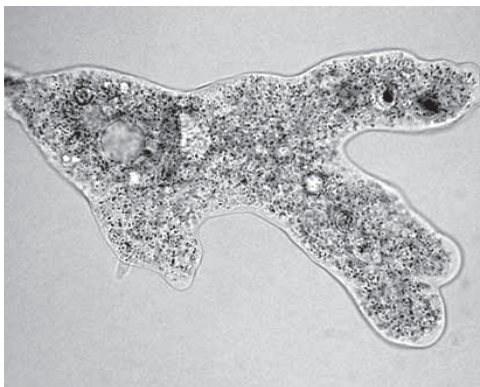
PROTISTA



Diploneis
Protista



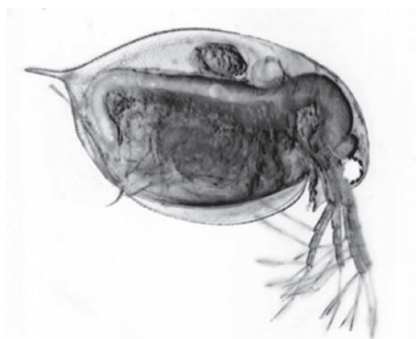
Euglena
Protista



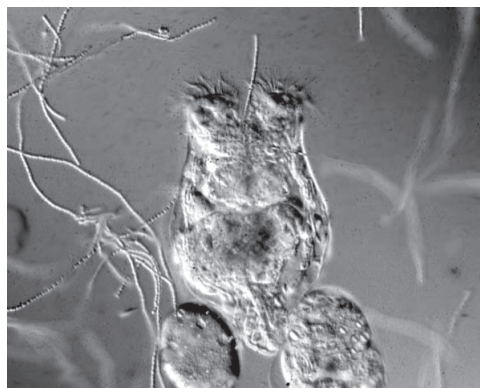
Amoeba
Protista



Diatoms
Protista



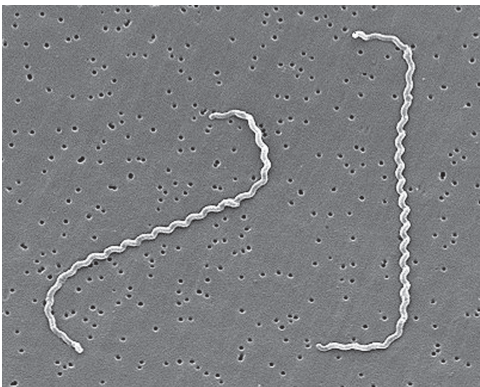
Daphnia
Protista



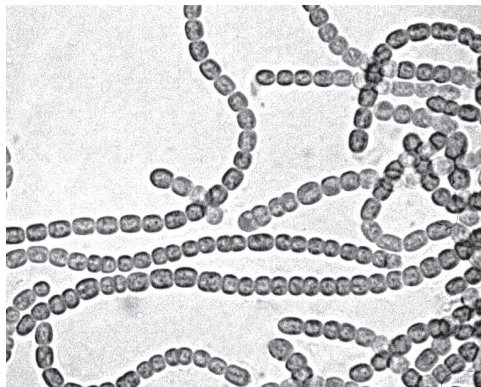
Rotifera
Protista

ORGANISM CARDS:

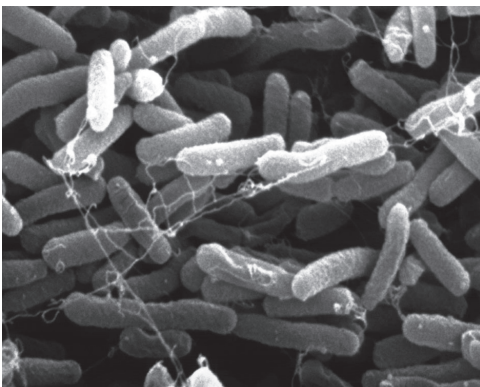
MONERA



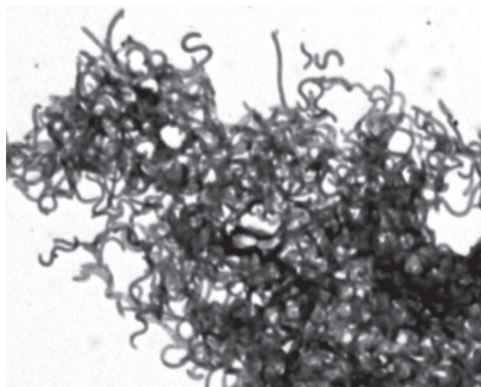
Leptospira
Monera



Anabaena
Monera



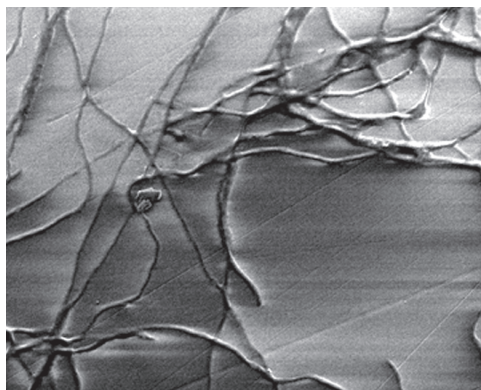
Escherichia coli
Monera



Rhodospirillum
Monera



Cyanobacteria
Monera



Streptomyces
Monera

GAME BOARD CARDS

<h2>START</h2>	<h2>FINISH</h2> <p>(First to Finish—Take 2 Organism Cards)</p>	<p>Your preserve makes good financial decisions. Move Ahead 1 Space or Take 1 Organism Card</p>
<p>Your preserve has successfully bred an endangered species. Move Ahead 2 Spaces or Take 1 Organism Card</p>	<p>A forest fire burned 10 acres of your preserve. Go Back 1 Space or Lose a Turn</p>	<p>Unseasonable rains flood most of the preserve. Lose 1 Organism Card or Go Back 3 Spaces</p>
<p>Picnickers leave trash behind. Lose a Turn or Lose 1 Organism Card</p>	<p>Local teenagers volunteer to help clear the trails on the preserve. Move Ahead 1 Space</p>	<p>A member of your Board of Directors serves on the local planning commission and helps to preserve open space in town. Move Ahead 5 Spaces or Take 3 Organism Cards from any player</p>

GAME BOARD CARDS

<p>One organism is listed as Endangered. Go Back 1 Space or Lose 1 Protista</p>	<p>You receive a donation of 10,000 acres. Take 2 Turns or Take 2 Organism Cards from any player</p>	
<p>Poachers have been sighted on your preserve. Go Back 2 Spaces or Lose 1 Animalia</p>	<p>Oil Spill. Lose a Turn or Lose 1 Monera</p>	<p>A newly introduced species to your preserve dies unexpectedly. Lose a Turn or Lose 1 Organism Card</p>
<p>Your preserve restores a vernal pool. Move Ahead 5 Spaces or Take 3 Organism Cards</p>	<p>Poachers found on your preserve are arrested. Move Ahead 2 Spaces or Take 1 Organism Card from any player</p>	<p>Slugs and snails are devouring rare native plants on your preserve. Go Back 5 Spaces or Lose 1 Organism Card</p>

QUESTION CARDS

Where are the eyes located on a garden snail?

(At the end of the tentacles)

Paramecium, Amoeba, and Euglena belong to this Kingdom.

(Protista)

Name the Kingdom for protozoa and algae.

(Protista)

Seaweeds belong to this Kingdom.

(Protista)

The organisms in this Kingdom are multi-cellular and have distinct tissues and organs.

(Animalia)

Most of the organisms in this Kingdom are mobile.

(Animalia or Protista)

QUESTION CARDS

True or False: Molds and bacteria belong to the same Kingdom.

(False: Molds = Fungi,
Bacteria = Monera)

True or False: A pond turtle is in the Kingdom Animalia.

(True)

To which Kingdom do mammals belong?

(Animalia)

To which Kingdom do sponges belong?

(Animalia)

Ferns and mosses belong to which Kingdom?

(Plantae)

Chloroplasts allow organisms in this Kingdom to make food.

(Plantae or Protista)

QUESTION CARDS

Molds, yeasts, and mushrooms belong to which Kingdom?

(Fungi)

This Kingdom is made up of mostly multi-cellular, but some unicellular organisms.

(Fungi)

Name the 5 Kingdoms.

(Monera, Protista, Plantae, Fungi, Animalia)

A new organism is discovered that is unicellular, green, and mobile. To which Kingdom would it most likely belong?

(Protista)

Organisms in this Kingdom are rod, round, or spiral (coil) shaped organisms.

(Bacteria in Kingdom Monera)

Organisms in which Kingdom do not have internal organelles.

(Monera)

QUESTION CARDS

True or False: Protozoa are closely related to algae.

(True)

Organisms in this Kingdom help with digestion, cause disease, and aid decomposition.

(Monera)

Name the Kingdoms with unicellular members.

(Fungi, Protista, Monera)

Green organisms need this to produce food.

(Chlorophyll and/or sunlight)

Fermentation is caused by organisms called _____

.

(Yeasts)

True or False: Any organism with chloroplasts is green.

(True)

QUESTION CARDS

True or False: Yeasts are the only unicellular members of the Kingdom Fungi.

(True)

True or False: Mushrooms reproduce by spores.

(True)

True or False: Bacteria can be square.

(False: rod-shaped, round, or coiled)

True or False: Organelles are little organs.

(True)

True or False: Mushrooms only grow in sun.

(False)

True or False: Organisms that photosynthesize are only found in Kingdom Plantae.

(False)

QUESTION CARDS

True or False:
Unicellular plants and
animals are microscopic.

(True)

What two names are
scientific names made up
of?

(Genus and species names)

True or False: Common
names are a reliable way to
identify organisms.

(False: scientific names
are the same throughout
the world)

Name the categories
of the Taxonomic
Classification System.

(Kingdom, Phylum,
Class, Order, Family,
Genus, Species)

Which animal is most
closely related to snails:
octopus, clam, or slug?

(slug)

Snails are members of
which Kingdom?

(Animalia)

QUESTION CARDS

The organisms in this Kingdom are able to photosynthesize. Name it.

(Plantae, Protista)

True or False: Mobile means “able to move on its own.”

(True)

SAVE THE ECOSYSTEM CARDS

QUESTION CARDS

Save the
Ecosystem
Question Cards

Save the
Ecosystem
Question Cards

Save the
Ecosystem
Question Cards

Save the
Ecosystem
Question Cards

Save the
Ecosystem
Question Cards

Save the
Ecosystem
Question Cards

SAVE THE ECOSYSTEM CARDS

ORGANISM CARDS

Save the
Ecosystem
Organism Cards

Save the
Ecosystem
Organism Cards

Save the
Ecosystem
Organism Cards

Save the
Ecosystem
Organism Cards

Save the
Ecosystem
Organism Cards

Save the
Ecosystem
Organism Cards

SAVE THE ECOSYSTEM RULES

SAVE THE ECOSYSTEM OBJECTIVES

1. To accumulate representatives of all five kingdoms
2. To accumulate as many organisms in each kingdom as possible

PREPARE TO PLAY

1. Shuffle the game cards. Place them face down in separate stacks by the game board.
Save the Ecosystem Question Cards
Save the Ecosystem Organism Cards
2. Choose game pieces and decide who will be first. (Roll the die. Highest number goes first. Players take turns in order, moving clockwise.)

PLAY

1. Pick the top **Save the Ecosystem Question Card**. Without looking at it, hand it to the player on your right.
 2. That person reads the question (but not the answer). Do not read the answer until the player has answered.

If the answer is correct: Roll the die. Move the appropriate number of spaces. Take <i>one</i> Organism Card and place it in front of you. Your turn is over.	If the answer is not correct: Your turn is over.
---	--
 3. Continue taking turns, moving clockwise.
 4. The first player to reach FINISH ends the game. He/she earns two extra **Organism Cards**.

STRATEGY AND SCORING

1. Place your **Organism Cards** in piles according to Kingdom so other players can see them.
2. You may land on a Good News or Bad News Space on the game board. Follow the instructions.
 - Good News Spaces instruct you to move forward a number of spaces or take Organism Cards (sometimes from another player).
 - Bad News Spaces instruct you to lose a turn or move back a number of spaces.
3. Sometimes finishing first is a disadvantage. You may not have enough **Organism Cards**.
4. When the game is over, write the total number of organisms you have for each kingdom on your **Score Card**. (If you have 6 **Organism Cards** in your Kingdom: Animalia pile, write 6 on your **Score Card** under Kingdom: Animalia.)

SAVE THE ECOSYSTEM RULES

TOURNAMENT RULES

In the Tournament you are competing with all the other Preserves. Each player at your game table represents a different preserve. And each preserve has members at various game boards playing at the same time. Preserve Teams compete to have the most organisms in the most kingdoms.

1. Choose your game piece and locate your game board/table.
2. Play the game based on the **Save the Ecosystem Rules**.
3. When your game is over (someone at your game reaches FINISH), complete your **Score Card** and bring it to your teacher.
4. Your teacher adds your total (your organisms for each kingdom) to your Preserve's total tally. Remember that all the other members of your Preserve are playing at other game boards. You may not win at your game table, but your Preserve may still win overall.
5. A winning Preserve must have representatives in each Kingdom category. Of those Preserves that have organisms in all five Kingdoms, the winning Preserve is the Preserve with the greatest number of organisms in the greatest number of Kingdoms.

Congratulations! You have done the most to **Save the Ecosystem!**

SCORE CARD

Docent Name: _____

Preserve: _____

Kingdom: Animalia

Total Organisms _____

Kingdom: Plantae

Total Organisms _____

Kingdom: Fungi

Total Organisms _____

Kingdom: Protista

Total Organisms _____

Kingdom: Monera

Total Organisms _____

SCORE CARD

Docent Name: _____

Preserve: _____

Kingdom: Animalia

Total Organisms _____

Kingdom: Plantae

Total Organisms _____

Kingdom: Fungi

Total Organisms _____

Kingdom: Protista

Total Organisms _____

Kingdom: Monera

Total Organisms _____

SCORE CARD

Docent Name: _____

Preserve: _____

Kingdom: Animalia

Total Organisms _____

Kingdom: Plantae

Total Organisms _____

Kingdom: Fungi

Total Organisms _____

Kingdom: Protista

Total Organisms _____

Kingdom: Monera

Total Organisms _____

SCORE CARD

Docent Name: _____

Preserve: _____

Kingdom: Animalia

Total Organisms _____

Kingdom: Plantae

Total Organisms _____

Kingdom: Fungi

Total Organisms _____

Kingdom: Protista

Total Organisms _____

Kingdom: Monera

Total Organisms _____

TOURNAMENT GRID

Preserve

TABLE	1	2	3	4	5	6	7	8

SAVE THE ECOSYSTEM SCORE

								PRESERVE TEAM
								ANIMALIA
								PLANTAE
								FUNGI
								PROTISTA
								MONERA

FIRST PRIZE

For Saving the Greatest Number
of Individual Organisms
in the Most Kingdom Categories!

Presented to Docent:

Of The

Preserve

(date)



Select the Rubric that is most appropriate for your class.

Writing Rubric—Primary grades

WRITING RUBRIC

4— EXCEEDS!!! I did a great job!!!

- I have included all components as defined in the directions for this activity, but also have gone significantly beyond what was expected or asked.
- I have clearly expressed my ideas.
- I have appropriately included many adjectives and descriptive phrases.
- I have presented the assignment in an appealing and/or eye-catching way.
- I have very few, if any, significant errors in spelling or grammar.

3 — MEETS!! I did a good job!!

- I have included all components as defined in the directions for this activity.
- I have expressed my ideas.
- I have appropriately included some

adjectives and descriptive phrases.

- I have presented the assignment neatly.
- I have very few, if any, significant errors in spelling or grammar.

2 — NEARLY THERE. Oops, I forgot something!

- I have followed all but one of the directions for this activity.
- I need to correct my work and resubmit it as soon as possible.

1 — Back to the drawing board.

- I have not followed the directions.
- I need to see the teacher immediately for a plan of action.

Writing Rubric—Intermediate grades

WRITING RUBRIC

Level 4 — Exemplary

- Your writing clearly expresses your ideas
- Your writing includes all components as defined in the directions for the activity
- Your writing appropriately includes many adjectives and descriptive phrases
- Your writing consistently employs correct grammar, punctuation, and spelling

Level 3 — Expected

- Your writing expresses ideas
- Your writing includes many of the components defined in the directions for the activity
- Your writing includes some adjectives and descriptive phrases
- Your writing employs correct grammar, punctuation, and spelling

Level 2 — Nearly There

- Your writing has few ideas expressed
- Your writing includes some of the components defined in the directions for the activity
- Your writing includes few adjectives and descriptive phrases
- Your writing contains some grammatical, punctuation, and/or spelling errors

Level 1 — Incomplete

- Your writing contains few or no ideas expressed
- Your writing includes few components defined in the directions for the activity
- Your writing includes few to no adjectives and descriptive phrases
- Your writing contains many grammatical, punctuation, and/or spelling error

TEACHER FEEDBACK FORM

At Interact, we constantly strive to make our units the best they can be. We always appreciate feedback from you—our customer—to facilitate this process. With your input, we can continue to provide high-quality, interactive, and meaningful instructional materials to enhance your curriculum and engage your students. Please take a few moments to complete this feedback form and drop it in the mail. Address it to:

Interact • Attn: Editorial
10200 Jefferson Blvd. • P.O. Box 802
Culver City, CA 90232-0802

or fax it to us at **(800) 944-5432**

or e-mail it to us at **access@teachinteract.com**

***We enjoy receiving photos or videotapes of our units in action!
Please use the release form on the following page.***

Your Name: _____

Address: _____

E-mail: _____

Interact Unit: _____

Comments: _____

RELEASE FORM FOR PHOTOGRAPHIC IMAGES

To Teachers:

To help illustrate to others the experiential activities involved and to promote the use of simulations, we like to get photographs and videos of classes participating in the simulation. Please send photos of students actively engaged so we can publish them in our promotional material. Be aware that we can only use images of students for whom a release form has been submitted.

To Parents:

I give permission for photographs or videos of my child to appear in catalogs of educational materials published by Interact.

Name of Student: _____ (print)

Age of Student: _____ (print)

Parent or Guardian: _____ (print)

Signature: _____ Date: _____

Address:

Phone: _____

Interact

10200 Jefferson Blvd.
Culver City, CA 90232-0802
310-839-2436

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