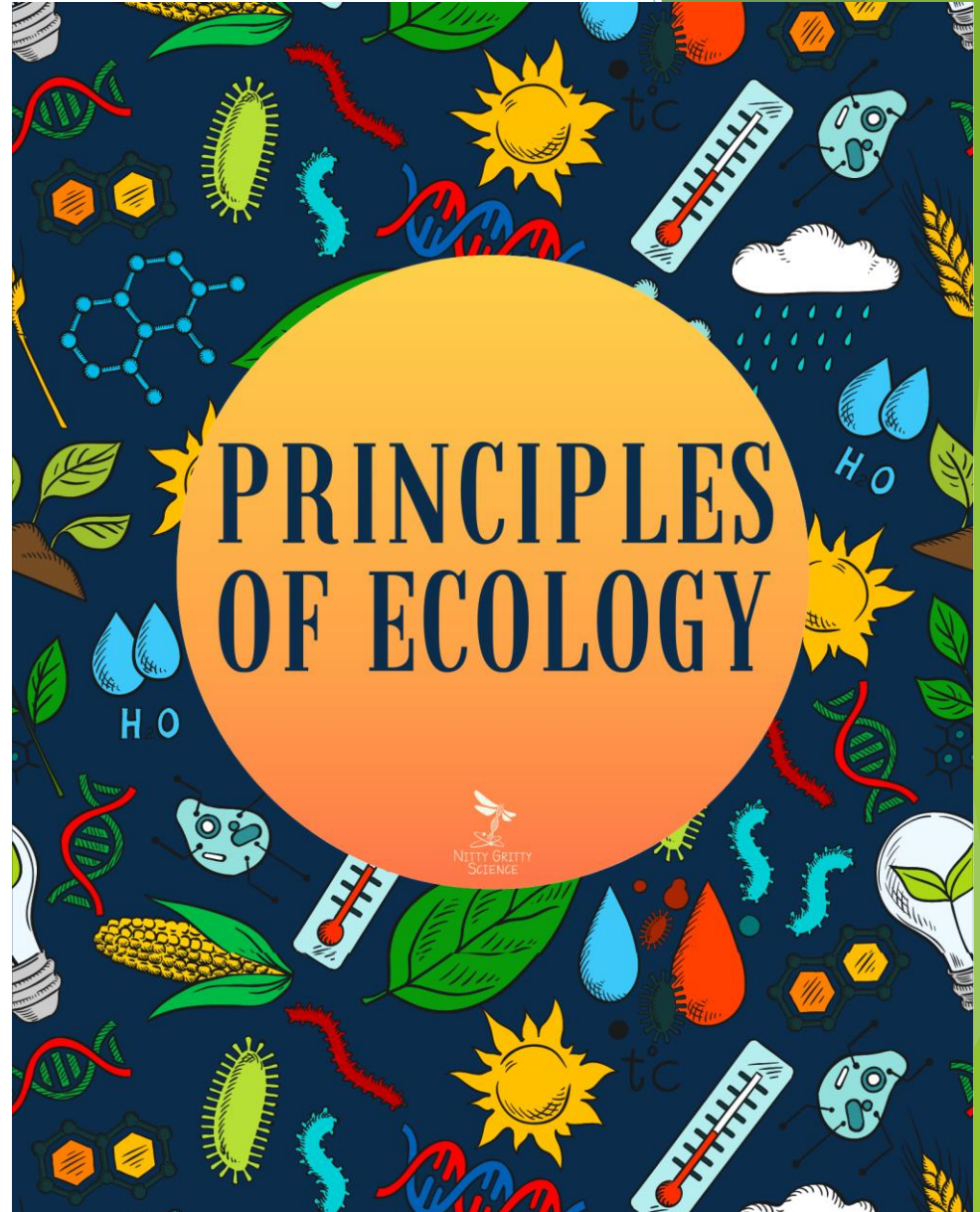


Principles of Ecology



Principles of Ecology Unit includes:

- Print and digital Interactive Notebooks
- Editable Resources including notes, PowerPoints, and test
- Instructional Videos
- Teacher-led Demos & Guided Inquiry Labs
- Task Cards & Digital Task Cards
- Study Guides





Suggested Pacing Guide



The following is a **suggested pacing guide** for my COMPLETE COURSES (Earth, Life or Physical Science) which are based on 50-minute class periods. There are three variations below. Each variation is based on the **number of sections in your SCIENCE INTERACTIVE NOTEBOOK chapter**.

Based on a **4-Section Chapter**

Day	Lesson/Activity	Engage	Explain	Explore	Elaborate	Evaluate
1	• Teacher Demo	x				
	• Section 1 Notes – INB input		x			
	• INB Activity – INB output (homework if not completed in class)			x		
2	• Mini-quiz					x
	• Section 2 Notes – use PowerPoint		x			
	• INB Activity			x		
3	• Mini-quiz					x
	• Guided Inquiry Lab – Student Led			x		
4	• Section 3 Notes – use PowerPoint		x			
	• INB Activity			x		
5	• Mini-quiz					x
	• Section 4 Notes – use PowerPoint		x			
	• INB Activity			x		
6	• Mini quiz					x
	• Science Stations				x	
7	• Science Stations				x	
8	• Final draft and testing for Creation Station (STEM)				x	x
9	• Task Card Review (game-style, full class, partner)				x	
10	• Chapter Test					x
	• Have students complete notes for next chapter*	x				

* **Note-taking option:** Once students are done with chapter test, they get the next set of notes and work quietly on completing them while other students finish up. All notes are to be completed when they return to class. Have students glue each page of notes into the next few pages of their INB (right side only). This way, when you go over the PowerPoint each day, they have already reviewed topic and are ready for class.

5 E Model

Engage – Teacher-led demos foster wonder and classroom discussion and serve as the hook for the lesson. Videos and images of natural phenomena also foster questioning and communication. NGSS phenomena are aligned to middle school NGSS standards.

Explain – PowerPoints, instructional videos, and guided notes (input side of interactive notebooks) provide definitions, explanations, and information through mini-lecture, text, internet, and other resources which encourages students to explain concepts and definitions in their own words.

Explore – Students investigate problems, events, or situations. As a result of their mental and physical involvement in these activities, students question events, observe patterns, identify and test variables, and communicate results.

Elaborate – It is important to involve students in further experiences that apply, extend, or elaborate the concepts, processes, or skill they are learning. Elaborate activities provide time for students to apply their understanding of concepts and skills. They might apply their understanding to similar phenomena or problems.

Evaluate – Use a variety of assessment to gather evidence of student's understanding and provide opportunities for them to assess their own progress.

Student Interactive Notebook



Each concept shares:

- Actual photos of both the INPUT and OUTPUT pages of Science Interactive Notebook
- Instructions on how to create/use/complete activity for OUTPUT side
- Mini-Quizzes for each concept to check students' understanding
- Answer Keys for all mini-quizzes
- Appendix with Teacher Notes for Interactive Notebook in LARGE print.

Section 1: Nutrition and Energy

Herbivores, Carnivores and Omnivores – Teeth Comparison

Introduction: When comparing mammals' feeding habits, you can determine the food they eat based on the shape and adaptations of their teeth. Teeth are specialized for different types of food. Most mammals have three main types of teeth: canines, incisors, and molars. **Canines** are used for stabbing and tearing, **incisors** gnaw or cut, **premolars** crush and shear, and **molars** grind food.

Name: _____ Date: _____

Directions: Read the strips below. Match nature cycle from Strip A with one from Strip B. Cut strips on bold lines, and fold on dotted line. When attaching the two strips, you will create a Mobius Strip by gluing the two strips together where sentence connects at Point A, and then glue end with Point B a half twist before gluing other ends together. Place all Mobius Nature Cycle Strips in the labeled pocket (made from gluing edges of paper) in your Science Interactive Notebook.

Section 2: Energy Flow in Ecosystems

Directions: Complete the table below. When finished cut and paste into your Science Interactive Notebook.

Mammal Skull	Teeth Description			Type of Heterotroph	Animal
	Canine	Incisor	Molar/Premolars		

Section 3: Cycles in Nature

Instructions: This Mobius Nature Cycle Strip activity is a fun one, especially for your spatial/logical learners. A Mobius Strip is a one-sided, non-orientable strip of paper that has no end. The strip "ends" at the beginning! I thought this would be a fun way to learn about cycles that are constantly being recycled in nature. The following includes directions on how to make the printables for the Mobius Nature Cycle Strip pocket (just have students glue down edges to make a pocket to place their strips in) and a

Directions: Read the strips below. Match nature cycle from Strip A with one from Strip B. Cut strips on bold lines, and fold on dotted line. When attaching the two strips, you will create a Mobius Strip by gluing the two strips together where sentence connects at Point A, and then glue end with Point B a half twist before gluing other ends together. Place all Mobius Nature Cycle Strips in the labeled pocket (made from gluing edges of paper) in your Science Interactive Notebook.

Section 4: Folding a Mobius Strip

Step 1: Cut out the strips from the printable and fold in half lengthwise so writing on both sides.

Step 2: Connect the sentences together by joining Strip A to the complete. Glue the strips together.

Step 3: Bring other ends together, but before gluing together make 1/2 twist.

Step 4: Glue ends together, and you have now formed a Mobius Strip where Cycle description continues without an "end."

Section 5: Biomes

Instructions: Students will need to use resources to find information to fill out the Biome cards for both aquatic and terrestrial biomes. They will need to find abiotic factors, geographical distribution, plants and animals for each biome. Have students fold a sheet of paper in half and glue the edges. Then glue securely to Science Interactive Notebook to form a pocket to place their cards in. Included for this concept are blank biome cards and a mini-quiz.

Student Digital Notebook

The student notebook is on Google Drive and ready for you to share with your students. Here's a quick overview of the features:

Set up like a traditional interactive notebook with input and output sides.

Hyperlinked tabs so student can easily move through chapter for review

Students watch video < 6 min to complete notes.

Directions: The following organisms are part of an arctic food web. Draw arrows between the organisms to complete the food web, making sure to use different colors to represent each food chain in the food web. When complete, identify each organism as producer or consumer (1st, 2nd, 3rd, or 4th level).

- Polar bear: consumer
- Ringed seal: consumer
- Arctic cod: consumer
- Arctic wolf: consumer
- Walrus: consumer
- Arctic hare: consumer
- Krill: consumer
- Purple saxifrage: producer
- Phytoplankton: producer



Digital Textbook

For further exploration, click button(s) below:

Ecological Pyramids

Encouraging independent learners. Directions for output side are here along with what they need to complete the activity.

Notes are chunked into manageable sections with large spaces for textboxes

Some pages have links so students can go deeper into the topic if they need.

Demos, Labs, & Science Stations

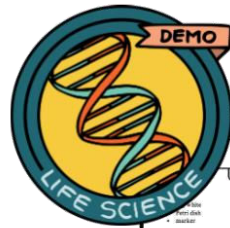
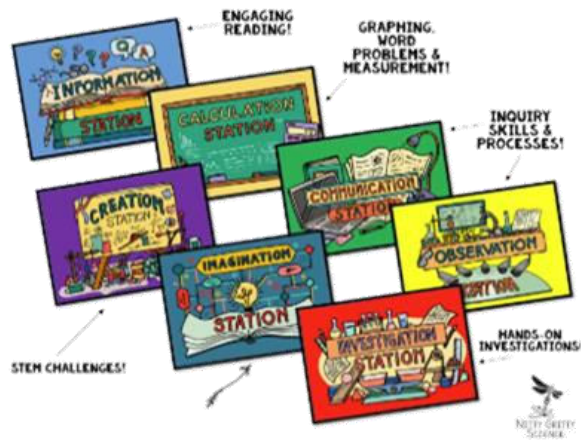


Working in the lab and being engaged in science experiments is the most exciting part of science.

Demo, Labs, and Science Stations Includes:

1. **SCIENCE STATION SIGNAGE** for all 7 stations is provided in color and in black and white (see preview) and all student answer sheets have icons that correspond with each station for ease of use.
2. **DEMONSTRATION** (teacher-led) allows teachers to invite scientific discussions and can help uncover misconceptions and, most importantly, lead to heightened curiosity and interest in the topic being studied.
3. **GUIDED INQUIRY LAB** which is a traditional lab that allows students to perform an investigation in order to solve a problem. Students will hypothesize, collect and analyze data and communicate their results.
4. **TEACHER GUIDES to DEMOS & SCIENCE STATIONS** help get you started and give you background information to make your science lessons engaging.
5. **7 SCIENCE STATIONS** which are designated locations in the classroom with activities that challenge students to extend their knowledge and elaborate on their science skills by working independently of the teacher in small groups or pairs. Stations included are:
 - **INFORMATION STATION** – Group members will read an interesting and relevant science passage then complete a task to help increase science literacy and deepen their understanding of the science concept.
 - **OBSERVATION STATION** – Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic. Using what they've learned, they will need to apply their observation skills to complete the questions attached to each.
 - **CALCULATION STATION** – Group members use their math skills to complete the station challenge. Skills may include graphing, analyzing data, using models, measurement, and calculating formulas or word problems.
 - **INVESTIGATION STATION** – Group members will work with one another to explore the concept through hands-on activities so they may practice specific inquiry process skills as they learn.
 - **COMMUNICATION STATION** – There are three different options for this station: interviews, video, group essay. Depending on the option you choose, group members will communicate what they know by answering questions in creative ways.
 - **CREATION STATION** – Group members will work together to solve a STEM (Science, Technology, Engineering, Math) challenge by creating models or designs that demonstrate their understanding of the science topic being taught.
 - **IMAGINATION STATION** – This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.
6. **INQUIRY PROCESS SKILLS CHECKLIST** is provided with each set to show teachers and administrators the inquiry skills used by students in each activity. These skills include, but are not limited to, communicating, creating models, inferring, classifying, identifying variables, measuring, observing, predicting, gathering and organizing data, comparing and contrasting, interpreting data, and manipulating materials.

SCIENCE STATIONS



Eye Safety

SCIENCE SKILLS AND LAB SAFETY

Name: _____ Date: _____

Procedure:

1. Draw an eye on the underside of the Petri dish and display for class using the projector.
2. Crack open the egg and place the egg white only in the Petri dish.
3. Explain that the proteins in egg whites are similar to those found in the protective layer of the eye.
4. Tell them that someone was not being cautious and has splashed acid into their eye - add drops of acid to the egg white.
5. Ask students to make observations of what is happening to the egg white.
6. Try adding water to reverse the effects. Have students make observations.

What's Happening?

The proteins in the egg white become cloudy when the acid is causing a denaturation of the proteins. This can't be reversed chemically and students need to understand that a chemical can cause serious damage to their eyes or skin if not used properly. Students must be made aware of the safety procedures associated with such as wearing goggles, gloves and aprons. Make sure they are aware of safety equipment - eye wash station, showers, fire blanket, etc.

Discussion:

Q: What happened to the "eye"?

A: The protective layer became cloudy and damaged the eye.

Q: What type of safety equipment must be worn when doing Lab?

A: goggles, apron, lab kit, gloves

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Discussion questions and teacher set-up included!

Teacher guide and answer key offered for every lab!

Easy-to-get materials!



Measure with SI Units

SCIENCE SKILLS AND LAB SAFETY

Name: _____ Date: _____

The standard system of measurement used by scientists around the world is known as the International System of Units, which is abbreviated as SI. SI units are easy to use because they are based on multiples of 10. Each unit is ten times larger than the next smallest unit and one-tenth the size of the next largest unit. The following table lists the prefixes used to name the most common SI units.

Prefix	Symbol	Abbreviation
kilo-	k	1,000
hecto-	h	100
deka-	da	10
deci-	d	0.1
centi-	c	0.01
milli-	m	0.001

Materials:

- scattered seeds
- tape
- balance
- postage scale
- capsaicin (strong) small milk cartons
- fertilizer solution
- metric ruler
- 50 mL graduated cylinder
- colored pencils

Safety:

Wear goggles and gloves.

USER-FRIENDLY PAGES:

Students easily recognize which answer sheet to use at each station by matching station icons located on each page!!

Drip, Drop, Splat!

How does the density of a liquid and drop height affect the size and shape of droplet splatters?

Materials:

- colored water (graduated cylinder A)
- colored syrup (graduated cylinder B)
- eye dropper
- paper
- metric ruler
- meter stick

Procedure:

1. Make a hypothesis of how density of a liquid will affect splatter size on your lab sheet.
2. Place the piece of paper down on the lab table in order to catch splatters.
3. Measure the heights listed in the data table using a meter stick. Place meter stick with end starting at zero on paper and move up stick when increasing height of drop.
4. Use the eye dropper to drop ONE drop of colored water and ONE drop of colored syrup. Make sure to drop on different places on paper.
5. Measure the size of the splatter in MILLIMETERS. Record in data table on answer sheet.
6. Repeat for each height.
7. Use the collected data to graph the splatter size versus drop height for each liquid.

Analyze and Conclude

1. Was your hypothesis correct? Explain.
2. What are two controls in your experiment that helped you collect the most accurate data possible?

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TEACHERS SAVE TIME:
Laminate station pages and reuse for each class and for years to follow!
Inquiry skills used are timeless!

Name: _____ Date: _____

Hypothesis

Drop Height (cm)

	3	25	50	75	100
Colored Water					
Colored Syrup					

Height of Drop vs. Splatter Size

Number of Drops (cm)

Size of Splatter (mm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Water																					
Syrup																					

Legend:

- Water
- Syrup

Analyze and Conclude:

1. _____
2. _____

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Instructional Videos



The Intro to Life Science Instructional Videos and Digital Assessments are designed to help teachers move instruction from the group learning space to the individual learning space. Not only does this give students independence in their learning, but it also allows more time for dynamic and interactive learning when teachers meet with students in a group setting.

This resource is perfect for:

- Flipped Classroom
- Absent students
- 1:1 Classrooms
- Sub Plans
- Hybrid Schedules
- Teachers who want more time to guide students as they apply concepts and engage creatively in the subject matter

Features of this resource include:

- Instructional videos which are six minutes or less to keep students focus
- Videos and assessments can be completed independently
- Auto grading and reporting in Google Forms
- Share link with students through educational platforms or email
- Quizzes are editable with 5 – 8 questions per quiz
- Information in video pairs with Nitty Gritty Science Interactive Notebooks

Task Cards & Digital Task Cards

Task cards are a great tool for concept review that can be used in a variety of ways - pairs, small groups, team games, or individually. The reason they are so effective is there is only ONE task per card, allowing students to focus on that single task until they have successfully completed it. Answers sheet and answer key for teachers are included.

The digital, self-checking task cards are hosted at Boom Learning™ and are compatible with Google Classroom. These are perfect for displaying on your interactive whiteboard and leading class games or review sessions.

Print Task Cards

The print task cards are arranged in a grid. Each card has a green header with the title 'Principles of Ecology' and a small circular icon with a number. The cards contain the following tasks:

- Card 1 (DECIDE):** A group of organisms of the same species that interbreed and live in the same place are called ____.
- Card 2 (COMPARE):** (Text partially obscured)
- Card 3 (DECIDE):** A single living thing is called a(n) ____.
- Card 4 (DETERMINE):** Determine how many consumer levels are in this chain. (Includes a diagram of a food chain with a hawk, a snake, a frog, and a mouse.)
- Card 5 (DECIDE):** The entire planet and all of the living and nonliving parts are called ____.
- Card 6 (COMPLETE):** Food space ____
- Card 7 (DECIDE):** Interactions between biotic populations and abiotic factors in a community are called ____.
- Card 8 (DECIDE):** The relationship between cats and mice could be best described as ____.
- Card 9 (COMPLETE):** A ____ is where an organism lives its life.
- Card 10 (COMPLETE):** A cattle ____ the c ____ the c ____
- Card 11 (COMPLETE):** A species ____ includes how a species uses and affects its environment.
- Card 12 (LIST):** List at least three aquatic biomes.

Digital Task Cards

The digital task cards are displayed in a 3D perspective. Each card has a green header with the title 'Principles of Ecology' and a decorative border. The cards contain the following tasks:

- Card 1:** A group of organisms of the same species that interbreed and live in the same place best describe which of the following? (Includes an image of two lions.)
- Card 2:** The entire planet and all of its living and nonliving parts is called which of the following? (Includes an image of a globe.)
- Card 3:** The branch of biology called ____ is the study of interactions between organisms and their environment. (Includes an image of a desert landscape with a cactus and a coyote.)

Study Guides: Includes *print* or *digital* options

Nitty Gritty Science Study Guides are directly aligned to the notes and assessments offered by Nitty Gritty Science and include a variety of review strategies which meet the needs of your learners for independent study and indirect instruction.

Each study guide provides a combination of strategies which may include:

- Graphic organizers
- Vocabulary building
- Compare and contrast
- Problem solving
- Concept mapping
- Interpreting data
- Critical thinking
- Theme connection
- Matching
- Fill-in-the-blank
- Short answer
- Real world application
- QR videos with accompanying questions

SECTION 2 Intials: _____
Directions: Explain how autotrophs use photosynthesis and chemosynthesis. Then give an example for each.

Photosynthesis

SECTION 3 Intials: _____
Directions: Define each term and then draw a picture example for both.

Autotrophs

SECTION 4 Intials: _____
Directions: Answer the questions below.

1. How does energy flow through an ecosystem?

SECTION 5 Intials: _____
Directions: Use the pictures to answer the questions about each cycle in nature.

The Water Cycle

The Nitrogen Cycle

The Carbon Cycle

SECTION 6 Intials: _____
Directions: Define each of the words and give examples.

Biotic Factors

Abiotic Factors

Directions: How would you describe the habitat picture. Include in your description specific details about its

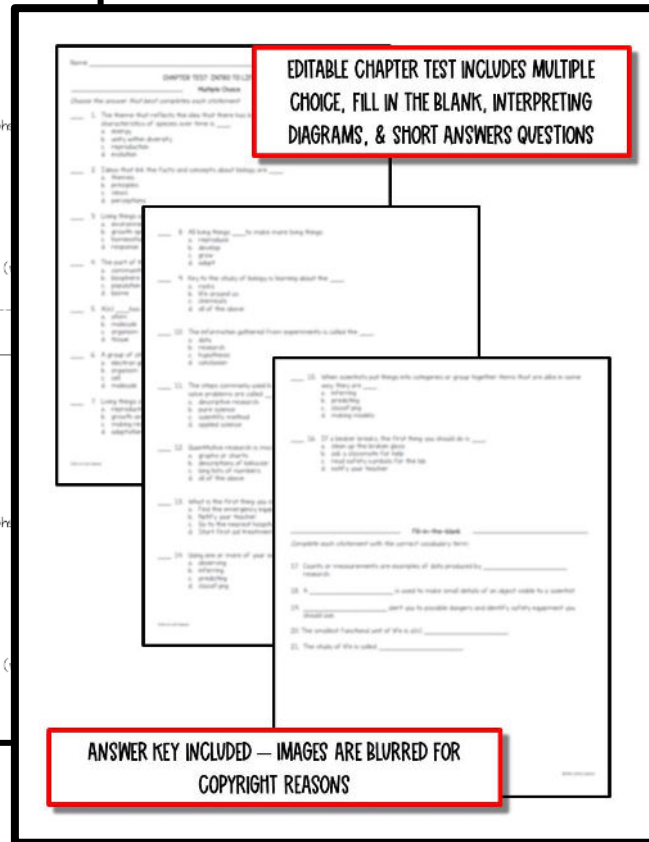
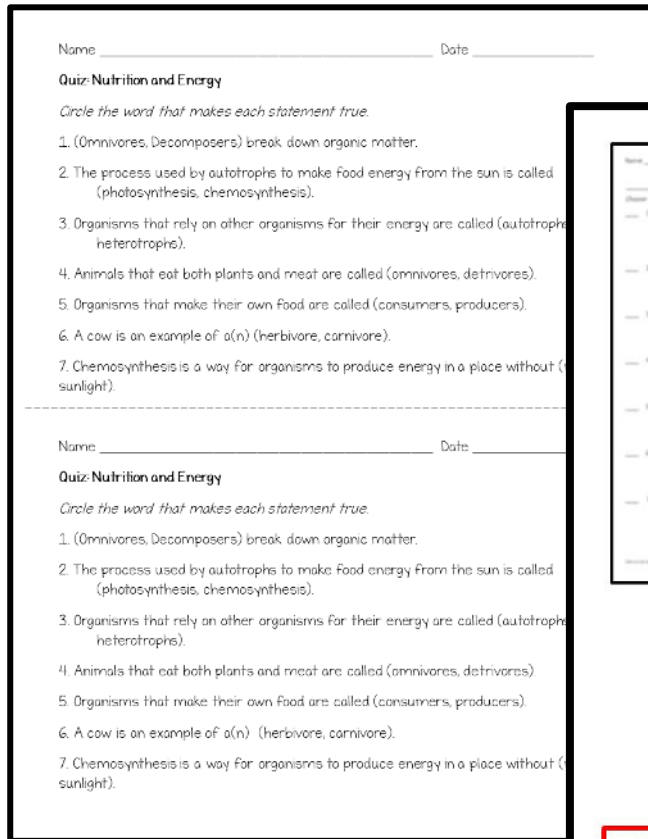
SECTION 7 Intials: _____
Directions: Complete the table below using your knowledge of symbiosis.

Symbiosis	Description	Draw an example
Mutualism	_____	_____
Commensalism	_____	_____
Parasitism	_____	_____

If these two animals were to encounter one another in the wild, which one would be the predator, and which one would be the prey? Explain your answer.

Assessments:

Teachers can use a variety of assessments to evaluate student progress throughout the unit. The curriculum provides mini-quizzes for each Interactive Notebook chapter and an online assessments that goes with the instructional videos. The chapter test includes multiple choice, short answer, interpreting diagrams, and an essay.



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<https://www.teacherspayteachers.com/Store/Nitty-Gritty-Science-Jr>

