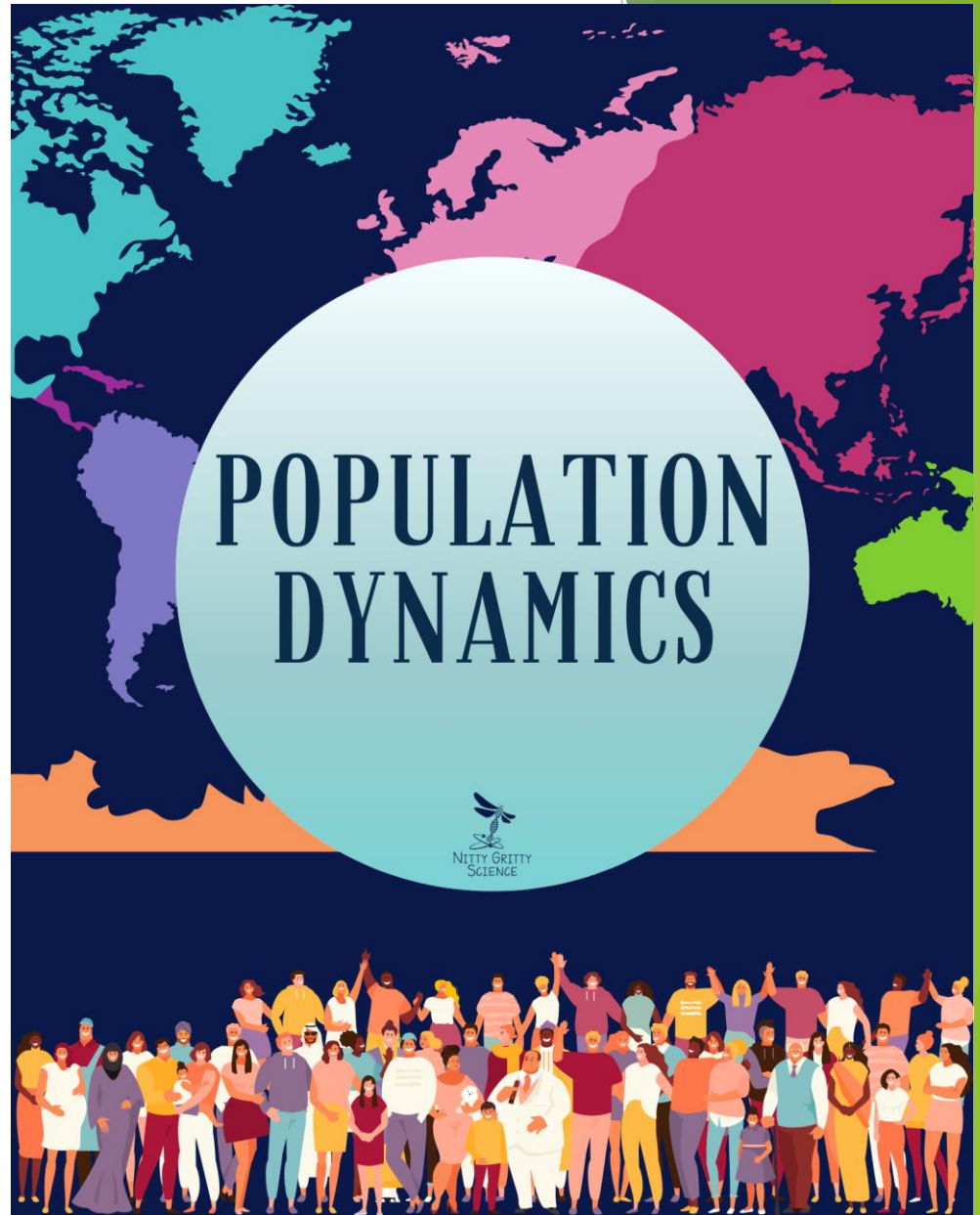


Population Dynamics



Population Dynamics 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: Characteristics of Populations

Directions: Use the sampling technique to count the population of bacteria in the following data table. This sampling technique is only a small portion of the entire population, you will need to multiply 1000. Graph data when completed, answer questions, and then paste in your notebook.

Time	Trial A	Trial B	Trial C	Total	Average
0 Hours					
24 Hours					
48 Hours					

Bacteria Population Study

Directions: The grids below represent a sampling technique in which a petri dish is placed on special slides with gridlines to help you count the colonies. Count the total number of "bacteria cells" in each of the three trials and record the number counted on your data sheet.

Time	Trial A	Trial B

Quiz: Characteristics of Populations

Name _____ Date _____

Circle the word that makes each statement true.

- The number of organisms a population can support over an area is called its (growing, carrying) capacity.
- A (J, S) -shaped curve describes the tendency of a population to increase its size.
- Drought is an example of a density-(independent, dependent) factor.
- Disease is an example of a density-(independent, dependent) factor.
- A (J, S) -shaped curve describes the tendency of a population to decrease as resources become less available.

Quiz: Human Population

Name _____ Date _____

- Which age structure graph shows a high birth rate and a high death rate?
- Which age structure graph shows a low birth rate and a low death rate?
- Which age structure graph represents a typical third world country?
- Which age structure graph represents an industrialized nation?
- How do you calculate the Population Growth Rate?

Energy Conservation

Name _____ Date _____

Quiz: Renewable and Nonrenewable Resources

- What is the difference between renewable and nonrenewable resources?
- What effect does deforestation have on forest resources?
- What human activities have affected our water and ocean resources?
- What human activities have led to desertification?
- What are some efforts taken by humans to reduce air pollution and acid rain?

Section 4: Biodiversity

Handwritten notes on a spiral notebook page about biodiversity, including definitions and examples of species diversity, genetic diversity, and ecosystem diversity.

Global Invaders

Invasive Species	How was species introduced?	Problems caused	Action taken
Cane Toad			
Lionfish			
Feral Pigs			
Sea Lamprey			
Kudzu			
Zebra Mussels			
Gray Squirrel			
Invader of Choice			

Instructions:

For this concept, students are asked to research different types of energy sources. You can choose from the following:

Oil	Hydro
Natural gas	Hydro
Coal	Coal-based
Nuclear	Wood

The student worksheet for this concept contains specific questions to research.

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.

The screenshot shows a digital notebook with two pages. The left page is titled 'GLOBAL INVADERS' and contains a table with four columns: 'Invasive species', 'How was species introduced', 'Problems caused', and 'Action taken'. Below the table is a section for 'Your choice'. The right page is titled 'BIODIVERSITY' and contains sections for 'Biodiversity -', 'Threats to Biodiversity', and 'Invasive Species'. A sidebar on the right contains hyperlinked tabs for 'Biodiversity', 'Invasive Species', 'Ecosystems', and 'Classroom Library'. A video player is visible on the right side of the notebook.

Directions: Research the following invasive species, report on how they were introduced, what problems they have caused, and what actions are now being taken.

Global invaders

- Cane toad
- Lionfish
- Feral pigs
- Sea lamprey
- Kudzu
- Zebra mussels
- Your choice

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

The screenshot shows a video player with a play button and the title 'Biodiversity'. Below the video are buttons for 'Digital Textbook' and 'Invasive Species Article'.

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

Demos, Labs, & Science Stations

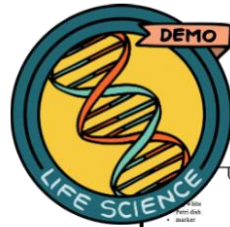
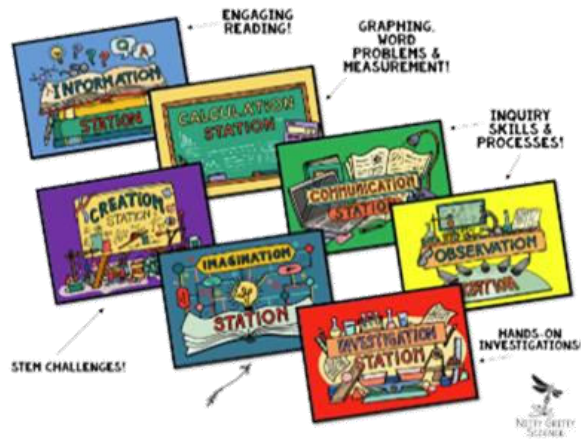


Working in the lab and being engaged in science experiments is the most exciting part of science.

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 is an irreversible chemical reaction and students need to understand that a chemical reaction cannot reverse damage to their eyes or skin if not used properly. Students must be made aware of the safety procedure 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.

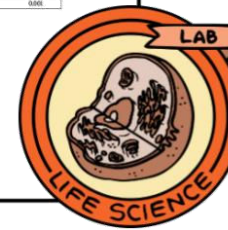
Prefix	Symbol	Abbreviation
kilo-	k	1,000
hecto-	h	100
deka-	da	10
deci-	d	0.1
centi-	c	0.01
milli-	m	0.001

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.



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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USER-FRIENDLY PAGES: Students easily recognize which answer sheet to use at each station by matching station icons located on each page!!

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)

Legend:

- Water
- Syrup

Analyze and Conclude:

1. _____
2. _____

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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!

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

1 **DECIDE**
The proportion of people in each of the three age groups of a population is its _____.
a. age structure c. slow
b. fertility d. rapid

2 **DECIDE**
The population growth of a country depends on its birthrate, death rate, and ____ rate.
a. age structure c. slow
b. fertility d. rapid

5 **DECIDE**
Identify three density-dependent limiting factors.

6 **IDENTIFY**
Identify three density-dependent limiting factors.

9 **DECIDE**
If all the people your age live to be 100, the overall population growth will be _____.
a. age structure c. slow
b. fertility d. rapid

13 **DECIDE**
If you know a population has a large group in pre-reproductive years, you would predict that soon the population growth will be _____.
a. age structure c. slow
b. fertility d. rapid

14 **DECIDE**
The amount of Earth's fresh water supply available to plant and animal life is about ____%.
a. 0.1 c. 3
b. 20 d. 50

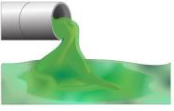
11 **COMPLETE**
The part of the atmosphere that protects organisms on Earth's surface from harmful ultraviolet radiation is the _____.
cons

15 **COMPLETE**
Natural disasters such as volcanoes and floods are density-_____ limiting factors.

16 **DEFINE**
Define extinction.


Digital Task Cards

Population Dynamics
The proportion of people in each of the three age groups of a population is its _____.

Population Dynamics

_____ is the contamination of the

Population Dynamics
Read the statement and then determine which term is being described.

The Sumatran Elephant is likely to disappear.

 endangered extinct threatened

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

POPULATION

STUDY GUIDE

Name: _____ Date: _____

SECTION 1

Directions: Explain what a population is and how it can change using the terms *exponential growth* and *carrying capacity*.

SECTION 2

Directions: Fill in the blanks with the correct terms from the unit, and then find the word in the word search.

Y	G	U	R	V	S	A
H	H	T	W	O	R	G
P	U	P	P	Z	Z	E
A	H	U	L	W	R	S
R	E	T	A	R	H	T
G	W	F	E	G	Q	R
O	G	C	Y	E	H	U
V	X	T	G	C		
U	R	N	O	T		
T	E	C	A			

SECTION 3

Directions: Explain four ways humans have impacted the biosphere, and then give two examples of ways we can help conserve our biodiversity.

SECTION 4

Directions: For each resource, identify if it's renewable or nonrenewable, the issues that arise due to human use, and provide a possible sustainable development or solution to the problem.

Land	Forest	Fish
Type _____	Type _____	Type _____
Issue _____	Issue _____	Issue _____
Solution _____	Solution _____	Solution _____

SECTION 5

Directions: Explain each of the terms below.

Ecosystem Diversity ↔ Species Diversity

Directions: Draw a line to match these threats to the correct definition.

Extinction	When development separates ecosystems
Endangered species	Damage to the environment by pollution
Habitat Fragmentation	Species that are overpopulated
Habitat degradation	When a species disappears
Invasive species	A species whose numbers are increasing

SECTION 6

Directions: Scan the QR code to watch the video and answer the questions below.

BIODIVERSITY

1. Why is biodiversity a good thing?

2. The narrator describes several things we need to maintain biodiversity—pick two of them and explain why we need them.

3. How has biodiversity been reduced?

4. Why is biodiversity as important as climate change?

Did you know coral reefs have the most diversity of all ecosystems on Earth?

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