



Weather and Climate

Intro to Earth Science 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 • INB Activity – INB output (homework if not completed in class)		x			
2	• Mini-quiz					x
	• Section 2 Notes – use PowerPoint • INB Activity		x	x		
3	• Mini-quiz					x
	• Guided Inquiry Lab – Student Led			x		
4	• Section 3 Notes – use PowerPoint • INB Activity		x	x		
	• Mini-quiz					x
5	• Section 4 Notes – use PowerPoint • INB Activity		x	x		
	• Mini quiz					x
6	• Science Stations				x	
	• 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.

Table of Contents: Weather and Climate

Description

Introduction

Section 1: Weather Patterns

Weather Fronts

Map Printable

Answer Key

Quiz: Weather Patterns

Section 2: Weather Forecast

Introduction

If you are new to the idea of using a Science Interactive Notebook in the classroom, stop by my **Nitty Gritty Science** shop and download **Science Interactive Notebooks Tutorial for FREE!** In there you will find out how to begin with your students, what materials to have on hand, and how to use them. I will also share some of my students' learning through their notebooks.

Section 1: Weather Patterns

Weather Fronts

Introduction: A **weather front** is a boundary between two air masses. Changes often occur at fronts, including changes in temperature, precipitation. A **cold front** forms when a colder air mass moves under a warmer air mass. Showers and thunderstorms often form along cold fronts. **Warm fronts** form when a warmer air mass moves over a colder air mass. When water vapor in the warmer air condenses, it often creates clouds that often bring steady rain or snow. **Stationary fronts** form when two air masses stall, the front is not moving. Light rain can be found. When a faster moving cold front catches up to a slower moving warm front, an **occluded front** forms, usually bringing rain or snow.

Name: _____ Date: _____

Quiz: Weather Patterns

Matching

1. cold front
2. high pressure system
3. low pressure system
4. hurricane
5. stationary front
6. blizzard
7. warm front
8. stationary front

Section 2: Weather Forecasts

A Weather Report

Introduction: Meteorologists are scientists who study the causes of weather and the atmosphere. Meteorologists use maps, charts, and computers to analyze weather data and prepare their weather forecasts.

A **weather map** is a quick snapshot of conditions at a particular time over a large area. From weather stations all over the country are collected and analyzed. A weather map using standard symbols that show information such as temperature, precipitation and changes in air pressure.

Directions:

1. Use the information from the weather map to fill in the table by using the weather station model symbols for the following cities: Kansas City, Mo., Denver, Colo., and Chicago, Ill.
2. Read the information in the table for Denver and Chicago and correct any errors. A key symbol is needed for each station model. Draw in the space provided.
3. Paste complete page in your Science Interactive Notebook.

Weather Forecasting

Weather Condition	Kansas City	Denver	Chicago
Temperature (°F)			
Cloud cover (eighths)			
Cloud type			
Precipitation			
Wind direction			
Wind speed (mph)			
Air pressure tendency			

Section 5: Climate Cycles and Recent Climate Change

Instructions:

Students will become dendroclimatologists for a day when they learn to use tree growth rings as evidence of past climate changes. Four tree samples will be given, and students will need to study the samples and find recurring patterns that may show signs of past drought or wet seasons.

A reading passage on dendroclimatology has been included along with the "core" samples, a data table and a teacher answer key. This section is wrapped up with the quick and easy mini-quiz.

Instructions:

Students now take on the role of a meteorologist and use the Weather Station Symbols reference guide to help them decipher a weather map.

Attached is an info sheet, a snapshot of a weather map, a data table, the Weather Station Symbols reference page, a teacher answer key, and of course a mini-quiz (which was made to be used with the reference page).

•• **HINT:** I usually have students paste all reference pages in their Interactive Notebooks for easy accessibility throughout the year.

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:

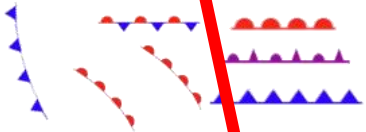
Set up like a traditional interactive notebook with input and output sides.

Hyperlinked tabs so student can easily move through chapter for review

Students watch video < 6 min to complete notes.

Introduction: A weather front is a boundary between two air masses. Drastic weather changes often occur at fronts, including changes in temperature, humidity, clouds, wind, and precipitation. A cold front forms when a colder air mass moves toward a warmer air mass. Showers and thunderstorms often form along cold fronts. Warm fronts form when less dense, warmer air moves toward colder, denser air. When water vapor in the warm air condenses, it often creates clouds that often bring steady rain or snow for long periods. When the boundary between two air masses stalls, the front is called stationary. Here cloudy skies and light rain can be found. When a faster moving cold front catches up with a slow-moving warm front, an occluded front forms, usually bringing with it some precipitation.

Read the weather reports and click and drag the correct front on the proper location on the map of the United States. Make sure your front is moving in the right direction.



High-pressure System	
Low-pressure System	

Air Mass -

Air masses are classified by _____ and _____ and those that form over water are called _____ and those that form over land are called _____ Warm masses _____ and cold masses are _____

Colliding air masses can form four types of fronts:

- Cold front -
- Warm front -
- Stationary front -
- Occluded front -

Storm -

- Thunderstorm -
- Tornado -
- Hurricane -
- Blizzard -



Digital Textbook

For further exploration, click button(s) below:

Daily Weather Maps

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.

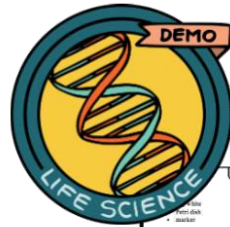
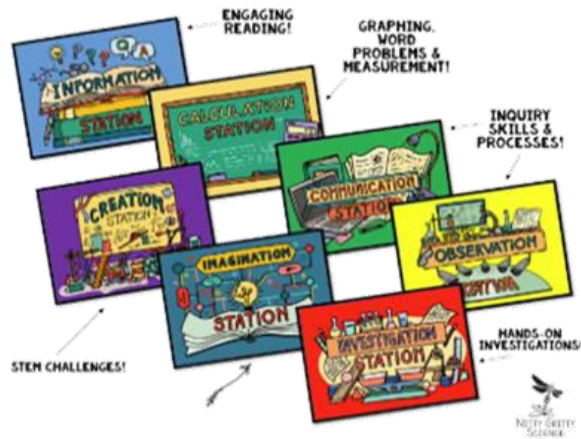
Demos, Labs, & Science Stations

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

Materials:

- projector
- strong acid (HCl or acetic acid)
- eye dropper
- water

Procedure:

1. Draw an eye on the underside of the Post-It and display for class using the projector.
2. Cook over the egg and place the egg white only in the front 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 (other reactions and systems used to understand that a chemical can cause severe 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, shower, fire blanket, etc.)

Demonstration

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, hot this 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!



Name _____ Date _____

Measure with SI Units

SCIENCE SKILLS AND LAB SAFETY

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:

- measured words
- tape
- balloon
- posting wall
- explosive/empty small milk cartons
- fertilizer solution
- metric ruler
- 10-mL graduated cylinder
- colored pencils

Safety:

⚠️

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)

Color	3	25	50	75	100
Colored Water					
Colored Syrup					

Height of Drop vs. Splatter Size

Number of Drops (mm)

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

1 **DECIDE**
Strong tropical storms with high winds are called _____.
a. hurricanes c. tornadoes
b. blizzards d. thunderstorms

2 **COMPARE**
Compare the types of weather that _____.

3 **DECIDE**
An air mass that forms over an ocean is called _____.
a. continental c. polar

4 **LIST**
List the four types of fronts.

5 **DECIDE**
_____ are lines joining places on a map that have the same air pressure.
a. Millibars c. Boundaries
b. Isotherms d. Isobars

6 **DECIDE**
Ice caps and the tundra are features of a _____ climate.
a. dry c. polar
b. tropical d. temperate

7 **COMPLETE**
Climates are classified by two major factors: _____ and _____.

8 **COMPLETE**
A _____ is a wind circulation pattern that changes directions with the seasons.

9 **IDENTIFY**
Identify the type of front that is represented by this symbol.

10 **IDENTIFY**
Identify the direction of the wind from this weather station.

Digital Task Cards

1 **Weather and Climate**
Identify the type of front that is represented by this symbol.

2 **Weather and Climate**
_____ are lines joining places on a map that have the same air pressure.
Millibars
Boundaries

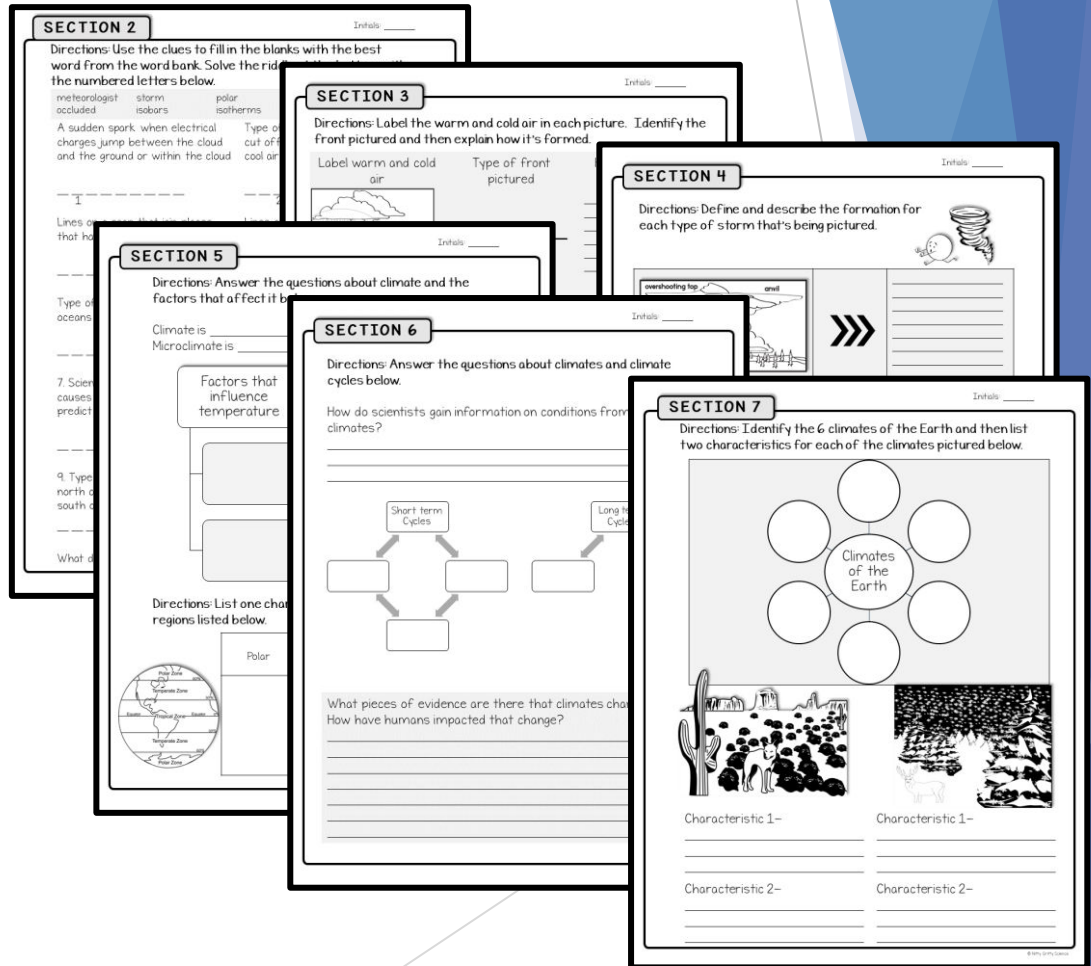
3 **Weather and Climate**
A(n) _____ front is when cold air moves under warm air which forces the warm air up.

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



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.

Two overlapping images of assessment materials are shown. The left image is a 'Quiz: Weather Patterns' with a matching section. The right image is a 'CHAPTER TEST' with various question types. Red boxes highlight key features of the chapter test.

EDITABLE CHAPTER TEST INCLUDES MULTIPLE CHOICE, FILL IN THE BLANK, INTERPRETING DIAGRAM, & SHORT ANSWER QUESTIONS

ANSWER KEY INCLUDED — IMAGES ARE BLURRED FOR COPYRIGHT REASONS

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