

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.

Introduction
If you are new to the idea of using a Science Interactive Notebook in your classroom, stop by my Nifty Nitty Science shop on Science Interactive Notebooks Tutorial For FREE! It will show you how to begin with your students, what materials to use, and how it will enhance your students' learning experience.

Section 1: Types of Chemical Bonds
Directions: Using the following terms or phrases, complete this concept map on Chemical Bonds, and then cut out and paste into your Science Interactive Notebook.

Force	Mixtures	Chemical Bonds
Energy	Atomic Structure	Novelty & Fun
Model & Diagrams	Linear	Linear

Name _____ Date _____
Quiz: Types of Chemical Bonds
Multiple Choice
1. A positively or negatively charged particle is called a(n) _____.
2. A compound is a substance composed of two or more different elements chemically combined in a fixed ratio.

Layered Book Foldable x 2
Step 1: Fold one sheet of paper in half horizontally and cut down the fold line so you end up with two sheets.
Step 2: Stack the two pieces on top of each other, cutting on the fold line.
Step 3: Layer two sheets on top of about 1 cm below the bottom of the sheets to form equal tabs. Repeat steps 1 and 2 to have two identical foldables.

Writing Formulas
Naming Compounds

Teacher Notes: Writing Formulas and Naming Compounds
If the students make the foldables correctly, they should perfectly on the boxes in the above printable. I have cut-outs for each of the foldables.
For my Science Interactive Notebook, these are the steps I use with my students:
Writing Formulas:
Step 1: Write the symbol of the element of the polyatomic ion that has the positive oxidation number (hydrogen, ammonium, or metals).
Step 2: Write the symbol of the element of the polyatomic ion that has the negative oxidation number (nonmetals and polyatomic ions other than NH_4^+).
Step 3: Add subscripts so that the sum of the oxidation numbers in the formula is zero - use the criss-cross method (without the sign) of one ion becomes the subscript of the other ion. (Show examples)

Naming Compounds:
Step 1: Write the name of the first element. *Note: subscripts do not become part of the name for ionic compounds but determine prefixes when naming covalent compounds.
Step 2: Write the root of the name of the second element. Chlorine root is chlor-, oxygen root is ox-, bromine root is brom-.
Step 3: Add the ending -ide to the root. Examples: (Ions) Barium Fluoride, AlCl_3 - Aluminum Chloride, (Covalent) Nitrogen Dioxide, CO - carbon monoxide.

Section 2: Writing Formulas and Naming Compounds
Writing Formulas
Naming Compounds

Section 3: Chemical Reactions
Chemical Reactions
Writing Formulas
Naming Compounds

Instructions:
There are actually two parts to this student output page of their Science Interactive Notebook. Part A has students cutting out terms and labeling the parts of a chemical equation. Part B asks students to study two different chemical equations and answer questions relating to the information found in each equation. Both parts have cut-out lines for students to cut and paste when they are finished.
A mini-quiz and a printable for the Parts of a Chemical Equation cut-out and worksheet are included.

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 page titled "WRITING FORMULAS & NAMING COMPOUNDS". The page is divided into several sections:

- STEPS TO WRITING FORMULAS:** Includes three steps with input boxes and a list of ions: 1. Na⁺, Cl⁻; 2. Zn²⁺, S²⁻; 3. Zn²⁺, OH⁻; 4. Al³⁺, Cl⁻; 5. K⁺, PO₄³⁻; 6. Fe³⁺, O²⁻; 7. Mn²⁺, Br⁻; 8. H⁺, Cl⁻.
- STEPS TO WRITING COMPOUNDS:** Includes three steps with input boxes and a list of compounds: 1. NaCl; 2. Na₂S; 3. CaCl₂; 4. SO₂; 5. PBr₃; 6. Hg(NO₃)₂; 7. P₂O₅; 8. CO₂.
- WRITING FORMULAS & NAMING COMPOUNDS:** Includes sections for Binary compound-, Oxidation number-, Binary ionic compounds will have a net charge of ____, Polyatomic ions - (with a checkbox "What does the prefix poly- mean?"), Hydrate-, Covalent compounds can form compound with each other. Scientists use Greek to indicate # of atoms in binary compounds. (with a checkbox "What would a chemist name the compound PBr₃?"), and a "Digital Textbook" link.

On the right side, there is a vertical navigation menu with tabs for: CHEMICAL FORMULAS & NAMING COMPOUNDS, CHEMICAL REACTIONS, BALANCING EQUATIONS, TYPICAL VALUES, and CLASSROOM LIBRARY. Below the menu is a video player titled "Writing Formulas and Naming Compounds" with a play button. Below the video is a table titled "PREFIXES FOR BINARY COVALENT COMPOUNDS" with columns for # of atoms (1-8) and rows for prefixes (mono, di, tri, tetra, penta, hexa, hepta, octa). Below the table is a "For further exploration, click button(s) below:" section with a "Polyatomic Ions Table" button.

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.

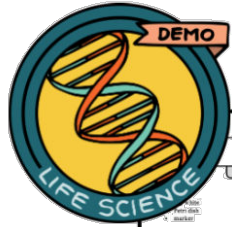
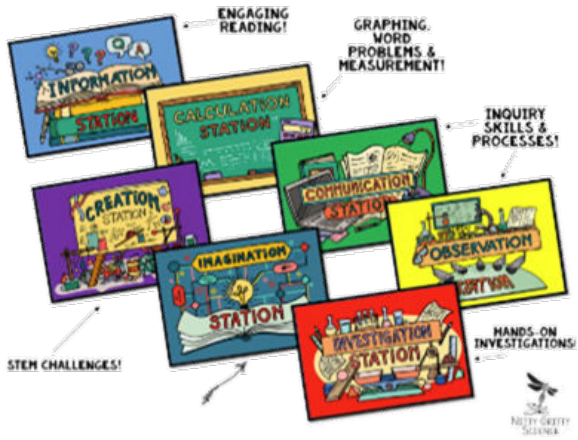
Demos, Labs, & Science Stations

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: _____

Materials:
 1. projector
 2. colored paper
 3. marker

Procedure:
 1. Place an eye on the underside of the Post-it and display for class using the projector.
 2. Each uses the opposite glass for the eye vision only for the first glass.
 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 who has been scratched and has scratched out one their eye - call a doctor of aid to the eye whites.
 5. Ask students to make observations of what is happening to the egg whites.
 6. For ability want to remove the yolk. (Have students make observations.)

What's Happening?
 (The proteins in the egg white become cloudy when they start to separate from the yolk. This is a chemical reaction and students need to understand that a chemical reaction can occur even though it is not visible to the eye. Students must be able to see if the yolk protein comes back to its normal state, if not, it is a chemical reaction. Make sure they are aware of safety equipment: eye wash station, gloves, fire blanket, etc.)

Discussion:
 1. What happened to the "eye"?
 2. The protective layer between the eye and the world.
 3. Explain that safety equipment must be worn when doing lab!
 4. Explain safety, but not gloves.

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Teacher guide and answer key offered for every lab!
 Easy-to-get materials!

Measure with SI Units

SCIENCE SKILLS AND LAB SAFETY

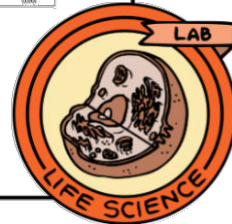
Name: _____ Date: _____

The standard system of measurement used by scientists around the world is known as the International System of Units, which is abbreviated as SI. We never use feet to measure things. Our height is 5 feet 10 inches. In SI units, we would say we are 1.78 meters tall. (1 meter is equal to 100 centimeters.) The following table lists the prefixes used to name the base units in SI.

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:
 1. graduated cylinder
 2. paper
 3. balance
 4. metric ruler
 5. pipette or syringe
 6. small beaker
 7. graduated cylinder
 8. colored pencils

Safety:
 1. Wear safety glasses.



Discussion questions and teacher set-up included!

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 affect drop height, color, 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 pieces 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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Name: _____ Date: _____

Hypothesis

Color	Drop Height (cm)			
	5	25	50	100
Colored Water				
Colored Syrup				

Height of Drop vs. Splatter Size

Number of Drops

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

Chemical Bonds and Equations 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 NGS Magnified 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 stack, showing various question types:

- Card 1 (COMPLETE):** An atom has gained or lost electrons is called a(n) ____.
- Card 2 (DECIDE):** correct formula for oxide?
- Card 3 (COMPLETE):** What type of chemical reaction is: $Mg + 2HCl \rightarrow MgCl_2 + H_2$
a. synthesis
- Card 4 (COMPLETE):** Molecules that do NOT have oppositely charged ends are ____ molecules.
- Card 5 (DECIDE):** Which of the follow has GAINED an electron?
a. negative ion
b. positive ion
c. nonpolar molecule
d. polar molecule
- Card 6 (COMPLETE):** A ____ is formed when atoms gain, lose, or share electrons.
- Card 7 (DETERMINE):** Determine the name of the following covalent compound:
 $AlCl_3$
- Card 8 (EXPLAIN):** Explain why some elements are stable on their own while others are more stable in compounds.
- Card 9 (IDENTIFY):** What does the following symbol mean in the following chemical equation?
 $Li(s) + H_2O \rightarrow LiOH(aq) + H_2(g)$

Digital Task Cards

The digital task cards are displayed with interactive elements:

- Card 1:** A bond that forms between atoms when they share electrons is a(n) ____ bond.
Buttons: polyatomic, electrical, cov
- Card 2:** Determine the total number of atoms in the following compounds:
- Card 3:** Because a water molecule has a slight positive charge at one end and a slight negative charge at the other end, it is a ____ molecule.
Diagram: A water molecule model with one red oxygen atom (O) and two white hydrogen atoms (H).
Buttons: polar, nonpolar

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.

Name _____ Date _____

Quiz: Writing Formulas and Naming Compounds

Write compound Formulas from the following ions (use criss-cross method):

1. Na^+ , Cl^- _____	6. SO_3^{2-} _____
2. Zn^{2+} , S^{2-} _____	7. N_2O_5 _____
3. K^+ , S^{2-} _____	8. MgCl_2 _____
4. Mn^{2+} , Br^- _____	9. CO_3^{2-} _____
5. Fe^{3+} , O^{2-} _____	10. I_2Br _____

Name _____ Date _____

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3. K^+ , S^{2-} _____	8. MgCl_2 _____
4. Mn^{2+} , Br^- _____	9. CO_3^{2-} _____
5. Fe^{3+} , O^{2-} _____	10. I_2Br _____

EDITABLE CHAPTER TEST INCLUDES MULTIPLE CHOICE, FILL IN THE BLANK, INTERPRETING DIAGRAMS, & SHORT ANSWERS QUESTIONS

ANSWER KEY INCLUDED — IMAGES ARE BLURRED FOR COPYRIGHT REASONS

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Contact Information:

Email: admin@nittygritty.com

Website: www.NGSmagnified.com

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