

Electricity & Magnetism

Electricity & Magnetism 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: Electricity

Sequence Foldable

Step 1: Place two sheets horizontal and overlap them about an inch. Glue together. (For purposes of instructional photos I used two different colors.)

LIGHTNING

Lightning is one of nature's most beautiful phenomena. Lightning is a huge flash of electricity usually produced during a thunderstorm. It can travel from cloud to ground but can also travel between or inside clouds. So, what causes lightning? When clouds roll in during a storm, a lot of action is happening inside them. Water in the clouds begins forming raindrops, and they are being moved by air currents and gravity, forcing them to collide into ice crystals. (Frozen raindrops are called sleet.) This causes electrical charges to build up in the clouds. Research shows that the positive charges are concentrated in the upper part of your lightning foldable.

LIGHTNING SEQUENCE FOLDABLE

Directions:

1. Glue and fold two sheets of paper into a Sequence Foldable. (Follow teacher's directions).
2. Using the lightning template, cut out shape from notebook paper. (Follow teacher's directions.)

LIGHTNING TEMPLATE

Section 2: Electric Current

ELECTRICITY TIMELINE

Name _____ Date _____

Quiz: Electricity

Circle the term in parentheses that makes the most sense.

1. Rubber would be a good (conductor, insulator).
2. Accumulation of excess electric charge (electricity, charge).
3. Protons are (positive, negative), electrons and neutrons are (positive, neutral).
4. Opposite charges (attract, repel) each other.
5. The law of conservation of charge states (can, cannot) be transferred from object to object. (can, cannot) be created or destroyed.

Name _____

Quiz: Electricity

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Name _____

Section 3: Electrical Circuits

Instructions:

For this page in the Science Interactive Notebook, students will be practicing drawing circuits using correct symbols - making sure to follow specifics of each circuit. This is a good activity to do before having students build circuits in your classroom. (If funds are limited in your classroom, check out my *Electricity and Magnetism Inquiry Unit* in the Nitty Gritty Science store for a plan on how students can build a circuit using holiday lights, brass fasteners and aluminum foil.) Included in this section is the master reproducible of the Circuit Drawing Practice worksheet and of course a mini quiz.

Student Digital Notebook

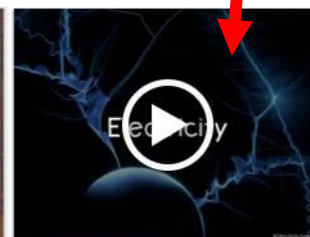
The student notebook is on Google Drive and ready for you to share with your students. Here's a quick overview of the features:

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: Determine if each object in the circuit is an insulator or conductor. Click and drag the lightbulbs from the blue box to each circuit to indicate if they will turn on or off.



Digital Textbook

For further exploration, click button(s) below:

▶ Name that Charge Game

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.

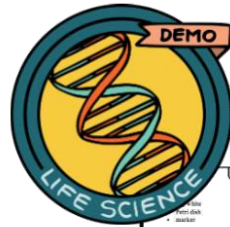
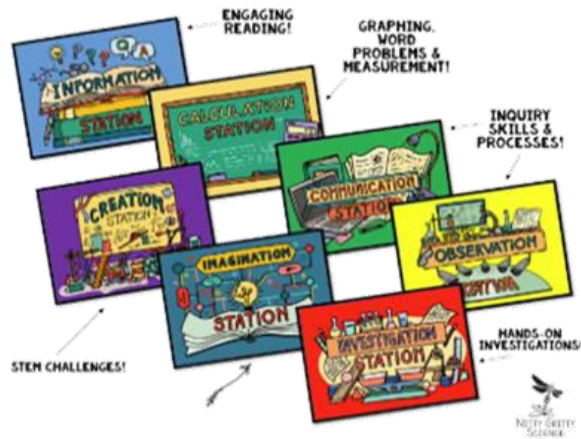
Demos, Labs, & Science Stations

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

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 because acid at this level is so strong that it is altering the entire structure of the proteins. Students must be made aware of the safety procedures associated with such an activity, gloves and aprons. Make sure they are aware of safety equipment - eye wash station, shower, fire blanket, etc.

Discussion:

Q: What happened to the "eye"?

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

Q: What types 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

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.

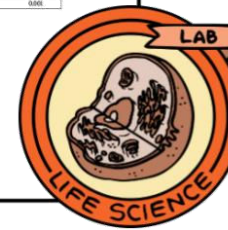
Prefix	Symbol	Abbreviation
Milli-	m	1/1000
Centi-	c	1/100
Deci-	d	1/10
Deci-	d	0.1
Centi-	c	0.01
Milli-	m	0.001

Materials:

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

Safety:

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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!!

Drip, Drop, Splat!

How does the density of a liquid and drop height affect the height 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

	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 **COMPLETE** Electricity & Magnetism
A _____ is a material that allows electrons to flow through it.

2 **DECIDE** Electricity & Magnetism
A path that allows only one route for an electric current is called a _____.

3 **COMPLETE** Electricity & Magnetism
A car battery is an example of a _____.

4 **DECIDE** Electricity & Magnetism
Electric charge that has accumulated on an object is referred to as _____.

5 **EXPLAIN** Electricity & Magnetism
A _____.

6 **IDENTIFY** Electricity & Magnetism
Using the diagram above, identify the parts of the circuit labeled A, B, and C.

7 **IDENTIFY** Electricity & Magnetism
What type of circuit is represented in the diagram above?

8 **DESCRIBE** Electricity & Magnetism
In the circuit above, what happens to light bulb A if light bulb C burns out?

9 **DECIDE** Electricity & Magnetism
Lightning is _____.

10 **IDENTIFY** Electricity & Magnetism
What circuit is represented in the diagram above?

11 **COMPLETE** Electricity & Magnetism
A magnetic field causes domains to _____.

12 **IDENTIFY** Electricity & Magnetism
Lightning is _____.

13 **DESCRIBE** Electricity & Magnetism
In the circuit above, what happens to light bulb A if light bulb C burns out?

14 **IDENTIFY** Electricity & Magnetism
What type of circuit is represented in the diagram above?

15 **DESCRIBE** Electricity & Magnetism
In the circuit above, what happens to light bulb A if light bulb C burns out?

16 **COMPLETE** Electricity & Magnetism
A magnetic field causes domains to _____.

Digital Task Cards

Electricity and Magnetism
A car battery is an example of a _____.

wet

Electricity and Magnetism
Which of these images is a closed circuit?

Electricity and Magnetism
Which of these items are conductors?

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

STUDY GUIDE

ELECTRICITY & MAGNETISM

Name: _____ Date: _____

SECTION 1

Directions: Answer these questions about electricity.

1. What is static electricity?

SECTION 2

Directions: Identify each of the following pictures as a conductor or as an insulator and write it in the box below.

SECTION 3

Directions: Answer the questions below about circuits.

What is a circuit?

SECTION 4

Directions: Fill in the blank with the correct word from the word bank below.

resistance Ohm's law
voltage difference electric current

1. A _____ is the movement of electric charge in a single direction through a wire or conductor.

2. The force that causes electric charges to move is called _____.

3. The closed path that an electric current flows through is called _____.

4. When a material opposes the flow of electrical energy into thermal and light energy, it is called _____.

5. _____ states that the current through a resistor is equal to the voltage difference divided by resistance.

Directions: Draw the circuit symbols in the box below.

Wire	Lightbulb	Closed Switch

SECTION 5

Directions: Label each circuit as parallel or series and then draw your own example in the box below.

Type: _____

Draw & label your own example.

What is a complex circuit? _____

How do circuit breakers and fuses work? _____

SECTION 6

Directions: Explain the interaction between the north and south poles in the pictures below.

Did you know some circuits contain enough iron that their pieces are attracted to magnets?

Directions: Define each of the terms in the graphic organizer below.

Magnetism	Magnetic Field	Magnetic domain	Permanent magnets

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.

The image displays a collage of educational assessment materials. On the left, there are two identical 'Quiz: Electric Current' forms. Each quiz includes a 'Name' and 'Date' line, followed by a 'Matching' section with five numbered items and their corresponding definitions. The items are: 1. Voltage difference, 2. Resistance, 3. Electric current, 4. Circuit, and 5. Ohm's law. The definitions are: a. current is equal to circuit divided by resistance, b. Flow of electric current, c. tendency of material to oppose the flow of electrons, d. a push that causes electrons to move, and e. closed path through which electrons flow.

In the center and right, there is a larger 'CHAPTER TEST' form. A red-bordered box at the top of this test states: 'EDITABLE CHAPTER TEST INCLUDES MULTIPLE CHOICE, FILL IN THE BLANK, INTERPRETING DIAGRAM, & SHORT ANSWERS QUESTIONS'. The test itself contains multiple-choice questions, fill-in-the-blank questions, and short-answer questions. A second red-bordered box at the bottom of the test states: 'ANSWER KEY INCLUDED — IMAGES ARE BLURRED FOR COPYRIGHT REASONS'.

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

