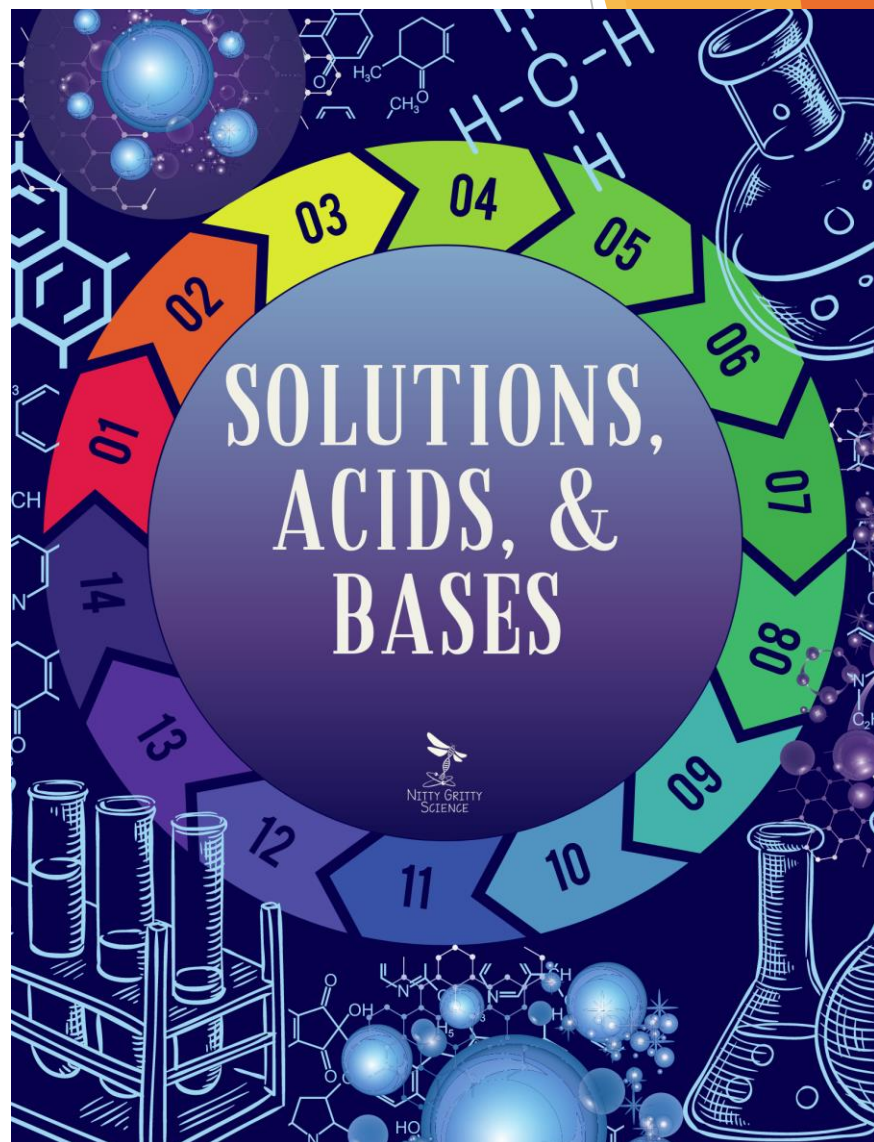


# Solutions, Acids, & Bases

Solutions, Acids, & Bases 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: Solutions, Solubility & Concentration

#### Dissolving Rates of Saltwater Solutions

**Objectives:** Students will explain the effects of particle size, temperature on solution.

**Materials (per group):**

- 6 - clear plastic cups labeled A-F
- 100 mL graduated cylinder
- 3 g - table salt
- 3 g - rock salt
- Hot water
- Cold water

**Procedure:**

1. Use Table 1 below to set up your six labeled cups and pour the correct amount of water.

Name \_\_\_\_\_ Date \_\_\_\_\_

**Quiz: Solutions, Solubility and Concentration**

1. In a solution, the substance being dissolved is the \_\_\_\_\_.  
a. solute b. solvent c. liquid d. gas
2. A solution that contains all of the solute it can normally hold at a certain temperature is \_\_\_\_\_.  
a. supersaturated b. unsaturated c. saturated d. conc.

### Section 2: Acids, Bases and Salts

#### Brochure: Should Soda Be Allowed In Schools?

After reading the article(s) on the effect of acid found in soda on your teeth, you will design and create a brochure arguing for or against soda machines in school. The following guidelines will need to be used when designing your brochure. When complete, paste your brochure into your Science Interactive Notebook.

- **Brochure layout** - brochure will need to be a tri-fold design with back, middle page left blank for gluing into Science Interactive Notebook.
- **Graphics/Illustrations** - Graphics complement the text with a good mix of text and pictures. Brochure is well-organized, neat and easy to read. Brochure are accurate with sources documented.

### Teacher Resource - Links to Articles/Videos

You can either have students research or help you find articles, or here are some found on the internet. Please be aware of news sites, so there may be links to inappropriate for certain ages. I have the article and keeping a class set.

Lloyd, Robin. "Acids in Popular Sodas Erode Teeth." *ABC News*. 21 Mar. 2007. Web. 11 Sept. 2013. <http://www.livescience.com/7198-acid.html>

Maxfield, Lindsay. "This is What Happens to Your Teeth When You Drink Soda." *Happy Living KSL Broadcasting*. 28 Sept. 2013. Web. 11 Sept. 2013. <http://www.ksl.com/2nd=101085>

"The Effect of Soda on Teeth." *ABC News*. 11 Sept. 2013. <http://abcnews.go.com/GMA/video>

Name \_\_\_\_\_

**Quiz: Acids, Bases and Salts**

Read each description below. Write the name of the acid or base that describes the properties best.

_____ 1. can be slippery	_____ 6. can be corrosive
_____ 2. bitter taste	_____ 7. neutral
_____ 3. can cause tissue damage	_____ 8. produces hydroxide ions (OH <sup>-</sup> )
_____ 4. sour taste	_____ 9. can be corrosive
_____ 5. produces hydroxide ions (OH <sup>-</sup> )	_____ 10. can be slippery

Name \_\_\_\_\_

**Quiz: Acids, Bases and Salts**

Read each description below. Write the name of the acid or base that describes the properties best.

_____ 1. can be slippery	_____ 6. can be corrosive
_____ 2. bitter taste	_____ 7. neutral
_____ 3. can cause tissue damage	_____ 8. produces hydroxide ions (OH <sup>-</sup> )
_____ 4. sour taste	_____ 9. can be corrosive
_____ 5. produces hydroxide ions (OH <sup>-</sup> )	_____ 10. can be slippery

### Section 3: Strength of Acids and Bases

#### Instructions:

Students will begin to understand the strength of common acids and bases when completing this activity on the pH Scale. You will cut out pictures of common items and paste them on the proper location of the pH scale, then categorize them as strong or weak. I've included two versions: common items with their known pH labeled or another version that DOES NOT label the pH and students have to research each item to find the pH and students have to research each item to find the pH. A mini-quiz, a pH scale printable and both versions of the cut-out pages of common acidic and basic items are included.

**Directions:** The pH values of several common items are shown below. Cut and paste each item as close as you can to the proper location on the pH scale. Draw a line from the pH scale to the item. When finished, write the name of each substance in the Strong or Weak Table. Note: Acids with a pH below 7.0 are considered strong and Bases with a pH higher than 10.0 are considered strong.

**Directions:** The pH values of several common items are shown below. Cut and paste each item as close as you can to the proper location on the pH scale. Draw a line from the pH scale to the item. When finished, write the name of each substance in the Strong or Weak Table. Note: Acids with a pH below 7.0 are considered strong and Bases with a pH higher than 10.0 are considered strong.

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**Directions:** The pH values of several common items are shown below. Cut and paste each item as close as you can to the proper location on the pH scale. Draw a line from the pH scale to the item. When finished, write the name of each substance in the Strong or Weak Table. Note: Acids with a pH below 7.0 are considered strong and Bases with a pH higher than 10.0 are considered strong. Can you think of 5 more acids or bases to add to the pH scale?

# 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 with two main sections. The left section is titled 'DISSOLVING RATES' and includes a 'Directions' box, a 'Materials' list, a 'Procedure' list, and a data table. The right section is titled 'SOLUTIONS, SOLUBILITY & CONCENTRATION' and includes a video player, a 'Digital Textbook' button, and a 'Factors that affect solubility' button. A vertical sidebar on the right contains hyperlinked tabs for 'SOLUTIONS, SOLUBILITY & CONCENTRATION', 'ACIDS, BASES & SALTS', 'STRUCTURE OF ATOMS', 'MATTER', and 'CLASSIFICATION OF MATTER'.

**DISSOLVING RATES**

Directions: Define each term in the space provided.

Materials:

- 6 - clear cups labeled A-F
- Table salt
- Rock salt
- Spoon
- Hot water
- Cold water
- Stopwatch

Procedure:

- Use the table on your page to set up your cups
- Pour 1/4 c water at correct temperature into each cup.
- Add 1 tsp of correct salt to each cup one at a time.
- As soon as you add a sample of salt, start your stopwatch and time how long it takes for salt to dissolve completely. Remember when adding salt to cups B and F, begin stirring immediately. Record dissolving rate in data and observation table.
- Record dissolving rate in data and observation table.
- Answer the questions that follow.

Set Up	Cup A	Cup B	Cup C	Cup D	Cup E	Cup F
Water Temp	Hot	Hot	Cold	Cold	Cold	Cold
Salt type	Rock	lobble	Rock	lobble	Rock	lobble
Stir	N/A	N/A	N/A	N/A	Yes	Yes

**Data and Observations**

Time (s)	Cup A	Cup B	Cup C	Cup D	Cup E	Cup F

1. How did the size of the salt particles affect the rate at which it dissolved in water?

2. How did temperature affect the rate at which salt dissolved in the water?

3. How did stirring affect the rate at which salt dissolved in the water?

**SOLUTIONS, SOLUBILITY & CONCENTRATION**

Solution -

Solute -

Solvent -

✓ List three ways to speed up the rate of the dissolving process when forming a solution.

- 
- 
- 

Solubility -

Concentration -

>concentrated

>dilute -

**Solutions, Solubility & Concentration**

Digital Textbook

For further exploration, click button(s) below.

▶ Factors that affect solubility

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.

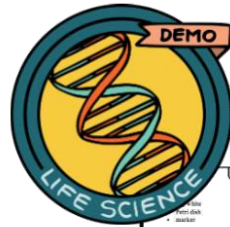
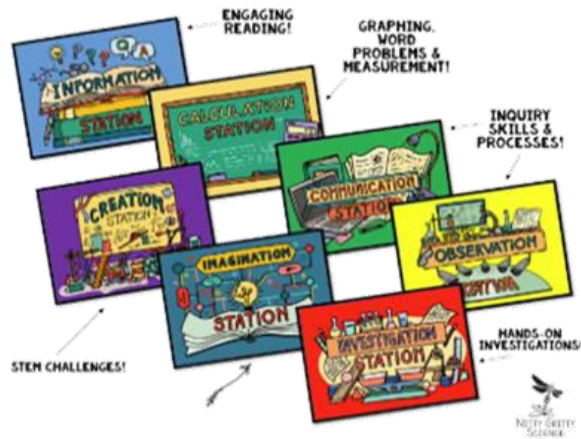
# Demos, Labs, & Science Stations

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.

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, 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.

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

Materials:

- scattered seeds
- tape
- balance
- postage scale
- paper/cup/empty small milk carton
- 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 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**

Drop Height (cm)

Color	3	25	50	75	100
Colored Water					
Colored Syrup					

Height of Drop vs. Splatter Size

Number of Drops (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
--	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Size of Splatter (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

Digital Task Cards



# 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**

**SOLUTIONS, ACIDS, & BASES**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**SECTION 1**

Directions: Read each statement and determine if it is true or false. If false, rewrite it to be true.

1. When stirring a solution, the solute is always dissolved in the solvent.

**SECTION 2**

Directions: Define each type of solution. Give one example of each.

Saturated \_\_\_\_\_ Unsaturated \_\_\_\_\_

**SECTION 3**

Directions: Fill in each graphic organizer with characteristics of acids and bases and then list common examples of each.

**SECTION 4**

Directions: Using this line, draw a pH scale. Label the terms *acidic*, *basic*, and *neutral* on the scale.

	Strong Acids
Definition	


Directions: Match each definition to the correct term.

**COLUMN A**

- Substance with a pH of 12
- Changes color in the presence of an acid or base
- pH of 7
- Negative ions of an acid combine with positive ions of a base
- Substance with a pH of 2
- 0 to 14
- The amount of acid or base dissolved in a solution


**SECTION 5**

Directions: Scan the QR code to watch the video about solutions and then fill in the blanks with the correct information below.



An example of a mixture is \_\_\_\_\_. In sugar water, the solute is the \_\_\_\_\_ and the solvent is the \_\_\_\_\_. Solutions can be \_\_\_\_\_ again and put back into the substances that made them. The ability of something to be dissolved is called its \_\_\_\_\_. Sand has \_\_\_\_\_ solubility in water because it doesn't dissolve easily. When something cannot dissolve any longer, it has reached its \_\_\_\_\_. The substances from the tea can be taken apart again. If the iced tea is heated, the water in the solution changes from a \_\_\_\_\_ to a \_\_\_\_\_ and it evaporates in the air leaving the sugar behind.

Did you know in ancient Rome salt was so valuable soldiers were paid with it?



# 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 two sample assessment pages. The left page is a 'Quiz: Acids, Bases and Salts' with a name and date line, followed by instructions to write the term ACID, BASE or BOTH and the description that describes the properties best. It contains 10 numbered items, each with a blank line for an answer. The right page is a 'CHAPTER TEST: ACIDS AND SALTS' with a name and date line, followed by instructions to write the term ACID, BASE or BOTH and the description that describes the properties best. It contains 20 numbered items, including multiple choice, short answer, and diagram interpretation questions. A red box highlights a section of the chapter test with the text: 'EDITABLE CHAPTER TEST INCLUDES MULTIPLE CHOICE, FILL IN THE BLANK, INTERPRETING DIAGRAM, & SHORT ANSWERS QUESTIONS'. Another red box at the bottom of the chapter test page states: 'ANSWER KEY INCLUDED — IMAGES ARE BLURRED FOR COPYRIGHT REASONS'.

# Terms of Use

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