Grade(s): 5th	**Topic:** Water and the pH scale	**Time Frame:** 4 (30min.) lessons

Lesson Description: This lesson explores acids and bases using the pH scale and how water provides a neutral basis for comparison. Students will have the opportunity to test and analyze unidentified substances using litmus strips or an electronic pH sensor. Extension activities include a close reading of a non-fiction text, writing prompt, and a standards based math problem solving activity.

Specific Learning Outcomes:	**Resources Needed:**
• TSW identify pH as a chemical property of matter. • TSW explain the pH scale and how it relates to acids and bases. • TSW identify water as the neutral substance on the pH scale. • TSW apply their knowledge of the pH scale to performing an experiment and analyzing the data recorded.	1. Litmus Strips 2. Electronic pH sensor (required only for math extension) 3 Visual of pH scale (McMillan pg. 296) 4. "Losing Nemo-acid oceans prevent baby clownfish from finding home" text retrieved from http://phenomena.nationalgeographic.com 5. Lab instruction sheet (optional) 6. Math word problem sheet

Activity Standards

TN Science Standards	Next Generation Standards	Common Core Standards
SPI 0507.9.1 Distinguish between physical and chemical properties.	Practice 3: Planning and carrying out investigations	Math-MP2 Reason abstractly and quantitatively. MP4 model with mathematics. MP5 Use appropriate tools strategically.
SPI 0507.2.3 Use information about the impact of human actions or natural disasters on the environment to support a simple hypothesis, make a prediction, or draw a conclusion.	Practice 4: Analyzing and interpreting data	Reading and Writing- W.5.9 Draw evidence from literary or informational text to support analysis, reflection, and research.

Guiding Questions

Also known as your essential questions. What do you want the students to be able to answer by the end of this lesson

1. Why is pH considered a chemical property of matter?
2. What is the pH scale and how does it work?
3. Why is water the center of the scale?
4. How can changes in the pH of the ocean effect the environment?

Possible Preconceptions/Misconceptions

1. Neutral on the pH scale does not occur at zero.
2. As substances become more acidic, the scale number becomes lower.
3. Strength and concentration mean the same thing.

Activities/Task

What learning experiences will students engage in?

Day 1:

- TSW participate in a direct instruction and discussion of acids and bases as chemical properties of matter.

Day 2:

- TSW complete the *Testing the Water Lab* (attached document).
- TSW test mystery substances, record data on a chart, and analyze the data.

Day 3:

- TSW perform a close reading activity and write an explanation using the non-fiction text as a reference.

Day 4:

- TSW apply data collected to integrate math practices (attached document).

Reading Task	**Writing Task**
One of the literacy shifts in common core is for students to focus on more complex, non-fiction literature.	In science students are responsible for writing either an explanatory or argumentative piece. Below simply type the writing prompt in which students will dive into.
TSW perform a "close" reading on "Losing Nemo" marking the text as needed with pens, pencils, and highlighters.	Explain the effect a change in pH could have on an ocean ecosystem. (prior knowledge: food webs).

Assessment

How will your students be assessed? How will you use the above learning experiences as formative assessment opportunities? (If activity is several days long, please specify the day with the activity/reading task)

Formative:

- Day 1: TSW draw and label a pH scale in their notes or as an exit ticket.
- Day 2: TSW complete a data chart and analysis of their experiment results.
- Day 3: TSW use a pen, pencil, and highlighter to perform a "close" reading sample.
- Day 4: TSW use their data chart to solve decimal word problems if an electric pH sensor was utilized.

Graded Assessment:

- Day 3 Writing prompt graded.
- Day 4 Math word problems graded.
- Quiz at the end of the Chemical Properties section.

Modification/Accommodations:

What curriculum modifications and/or classroom accommodations can be made for students with disabilities in a class

- Students can verbally respond to formative assessment activities.
- Students can complete activities with a teammate or peer coach as needed.
- Teacher can scribe for students as needed.