**LOGS IN LIFE - A LOGARITHMS WEBQUEST**

**INTRODUCTION**

What do carbon dating, decibels, the Richter scale, the pH scale, and stellar magnitudes have in common?  They all use logarithms in their computation.  The webquest you will be completing will provide you with an opportunity to learn more about **ONE** of these applications of logarithms and share your new knowledge with your classmates.  It is important because it will allow you to better understand logarithms and see how they are useful beyond the math classroom.

**THE TASK**

Answer the following prompts and be sure to include any citations of any websites used (just list the URL is sufficient)

* Description and history of the application and why it is useful (e.g. "what is a decibel?" and "who invented the Richter scale and why?")
* Describe why your topic uses a logarithmic unit to measure pH, dB, or R(magnitude)
* Describe how logarithms are related to exponential functions
* Provide at least one numerical example (include any relevant calculations) of this inverse relationship for your topic.
* Description of at least one career in which this application is used and how and why it is used

The end product of your webquest will be a brochure describing what you've learned about your chosen application of logarithms.  It includes the following requirements:

* Turn your responses into a Brochure style (tri-folded) resource
* Typed, in your own words
* One relevant graphic that should be connected to your topic
* **WHEN YOU PRINT THIS MAKE SURE YOU FLIP ON THE SHORT SIDE SO YOUR DOCUMENT COMES OUT AS A BROCHURE (if you are not sure what a brochure should look like ask for a sample)**

This will be an in-class activity, but some of your research and completing your product will be done outside of classroom. Your final brochure is due when you arrive tomorrow.

**THE PROCESS**

**Day 1**

1. **Choose:**  At your table you will work in groups of 3 to produce one resource. **At your table**, make sure each group has selected a different topic.
2. **Research:** In class today, you will have time to research the application you chose, take notes, and begin working on your product following the guidelines outlined in the **THE TASK**.  Suggested websites provided. Each person is expected to participate in this portion and have written work to support your group effort.
3. **Homework:** Finish your product, following the guidelines listed in **THE TASK**.  It is important that you finish your product because you will share it with your peers during the next class meeting and it will help guide you in explaining your application.

**Day 2**

**Jigsaw - Learning Groups**

1. **In class today:** You will be given time to meet with other students at your table who researched different topics.  This will provide you with an opportunity to share and teach others about what you learned in your research and to learn about the other two applications from your peers.
2. **Learning-Reflection:** On the Notes sheet provide a short summary detailing at least 3 important facts you learned about the other two topics from members of your table AND your topic
3. **Application:** Go to pages 342-343 in the textbook complete problems #56, 58, 60, 62, 64, 68, 70, 72 and submit your complete solutions on the back of your reflection sheet – Workbook problems: Complete the two workbook problems associated with each topic.

 **EVALUATION**

This webquest assignment and jigsaw activity will be graded on a rating scale based on the criteria listed in the task section, as well as the following:

* Brochure/product (40%)
	+ Accurate responses to questions outlined in **THE TASK** (25%)
	+ Citations included (10%)
	+ Timely completion of brochure (10%): a complete product is submitted before the beginning of the next class
	+ Organization (5%): it is easy to follow and find responses to questions
* Day 1 In-class Participation (20%)
	+ In group discussion during creation of group document (10%)
	+ Completed the responses for your contributions to this project (5%)
	+ Discuss the layout/design before adding materials (5%)
* Day 2 In-Class Participation (40%)
	+ Make sure all group members have access to product (Bring 3 print outs or have electronic access to the product)
	+ Jigsaw reflection activity 🡪 3 most important things you learned from each topic
	+ Workbook problems on pages 342-343

**CONCLUSION**

When finished with the webquest and jigsaw activities you should have a good understanding of logarithms, how they are used, and why they are important.  This will be helpful in leading to a deeper understanding of the mathematics and fuller appreciation for learning about exponents and logarithms.  The overarching goal of this activity is to answer the questions, "why am I learning this?" and "when am I ever going to use this?" for the material we are covering.

**WEBSITES:**

**THE RICHTER SCALE**

["How are Earthquake Magnitudes Measured?"](http://www.geo.mtu.edu/UPSeis/intensity.html)

Michigan Tech Seismic Education Site

This page provides an introduction to the Richter Scale.  Be sure to click on the "table" link to see the magnitude scale.

[The Richter Magnitude Scale](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CCgQFjABahUKEwivzMil8JXJAhXFMyYKHV2eB28&url=http%3A%2F%2Fearthquake.usgs.gov%2Flearn%2Fglossary%2F%3Fterm%3DRichter%2520scale&usg=AFQjCNFYHH9SX8ECa16jBOq3lfJ7AYBk0A&sig2=53fM5ZnhIyJU3RJm9UxN1g)

United States Geological Survey

This website explains the Richter Scale and contains links to a glossary of terms, recent earthquake data, and interesting related articles.

[South Dakota Geological Study of Earthquakes](http://www.sdgs.usd.edu/publications/maps/earthquakes/earthquakes.htm)

Earthquakes in South Dakota

This website provides a visual picture of where earthquakes have happened in South Dakota.  Click on the three links at the top of the page to see a list of magnitudes, a visual picture of the Richter scale, and comparing the Richter scale to the Mercalli scale.

[Logarithmic Word Problems](http://www.purplemath.com/modules/expoprob.htm)

Purplemath is a website designed with the mission of "helping students gain understanding and self-confidence in algebra."  Toward the bottom of this page, there is a good example of an application word problem using the Richter Scale.

Video: [Math Factor: Using Logarithms with the Richter Scale](http://videos.howstuffworks.com/hsw/11131-math-factor-using-logarithms-with-the-richter-scale-video.htm)

HowStuffWorks videos website
Yes, I know the clothes are a bit outdated, but this video provides a great visual of the logarithmic scale, shows example problems being solved step-by-step, and talks about actual use of the Richter scale.

**DECIBELS**

[dB: What is a decibel?](http://www.phys.unsw.edu.au/jw/dB.html)

The University of New South Wales
This website provides a definition of a decibel and has examples of how logarithms are used.  There is also a review of logarithms at the bottom of the page.

[The Definition of Decibel](http://www.engineeringtoolbox.com/decibel-d_341.html)

The Engineering ToolBox website
This website provides a definition of the equations used to calculate decibels, converting between the exponential and logarithmic form.

[Decibel (dB](http://www.sfu.ca/sonic-studio/handbook/Decibel.html))

The Sonic Research Studio, School of Communication, Simon Fraser University

This page is another description of decibels.  At the bottom of the page is a table providing examples of different decibel levels.

[Logs and Music](https://redwood.berkeley.edu/bruno/psc129/handouts/logs-and-music/logs-and-music.html)

Redwood Center for Theoretical Neuroscience, University of California, Berkeley
Scroll down to the heading "Sound intensity - the decibel scale."  This gives a good background and description of why logarithms were chosen.

Video: [Math Factor: The Real World and Logarithms](http://videos.howstuffworks.com/hsw/11130-math-factor-using-logarithms-with-the-decibel-scale-video.htm)

HowStuffWorks videos website
Yes, I know the clothes are a bit outdated, but this video provides a great visual of measuring decibels and shows example problems being solved step-by-step.

**pH SCALE**

[What does it mean for a solution to be acidic or base (alkaline?)](http://www.sciencebuddies.org/science-fair-projects/project_ideas/Chem_AcidsBasespHScale.shtml)

Science Buddies
This website provides a good description of what an acid and a base are.

[pH Scale](http://www.school-for-champions.com/chemistry/ph_scale.htm)

School for Champions
This site describes what the pH scale is and gives pH values of some substances.  It also describes why a logarithmic scale is used.

[The pH Scale](http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=FDF30C16-1)

Environment Canada
This page contains a nice visual of the pH scale, listing examples, and a quick description of the use of logarithms in creating the scale.

Video: [Math Factor: The Real World and Logarithms](http://videos.howstuffworks.com/hsw/11132-math-factor-using-logarithms-with-the-ph-scale-video.htm)

HowStuffWorks videos website. Yes, I know the clothes are a bit outdated, but this video provides a definition of the pH scale, shows example problems being solved step-by-step, and explains some real-world uses of pH.