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Measurement, Graphing, and Safety

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WebQuest Description: The purpose of this WebQuest is to make students aware of the safety procedures that must be followed in the laboratory setting, and learn to avoid dangerous situations in the lab
Grade Level: 9-12
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Introduction

If there was an accident in the science lab, would you know what to do?   What should you do if your lab partner has a chemical on his or her fingers and accidentally rubbed their eyes?   What if your clothing caught on fire?   The purpose of this WebQuest is to make you aware of the safety procedures that must be followed in the laboratory setting, and learn to avoid dangerous situations in the lab. Lab experiences give us the much needed hands-on opportunities to learn, but we need to be safe so that everyone enjoys the experience.   How do we make sure that our labs are conducted in a safe way?
ESSENTIAL QUESTIONS: What are the critical safety rules that every student should know and why is that important to the physical protection of the entire class?   How can a student identify what is hazardous about a particular chemical or science activity that requires special attention for the safety of all involved? How does a graph show the inter-relationship between different sets of data and why is it important to be able to identify trends within graphs?   What techniques doe a scientist use to make accurate and precise measurement and why is this so important in any scientific investigation?
GUIDING QUESTIONS: What are the responsibilities of the student when conducting lab investigations? What are the hazards that can result from not following lab safety rules in class?   What are some of the topics taught in a physics course and how do they impact your life? How do I construct a graph of data and use that graph to analyze the information it contains?
At the end of this WebQuest you should be able to:

 interpret safety symbols commonly encountered in the science classroom. (1A)
 apply safe practices while performing lab investigations and activities (1A)
 distinguish "safe" behaviors versus "unsafe" behaviors (1A)
 Identify the proper techniques to handle lab emergencies (1A)
 evaluate situations -- what to do "if" or what's wrong (1A)
 pass a written safety test covering safety rules and regulations specific to chemistry (1A)
 dispose of leftover materials and chemicals in a safe and proper manner (1B)
8.   list common steps in any scientific investigation (2E)
9.   make measurements with scientific tools with accuracy and precision (2H)
10. create and interpret graphs to analyze and predict from data (2J)
11. manipulate equations to solve for variables (3F)
12. identify proper units for various measurements (2H)
13. analyze available information to solve real world problems (3K)
14. describe the contributions Galileo made to the study of science (3D)

Tasks

Your team has been assigned to create a top 10 list of safety rules we should have in our lab. You will use the links provided. You and your team will present your top 10 to the class, and we will all vote on our most commonly chosen rules for our lab. We will graph the results in class.
You will also complete all of the assignments in this WebQuest in your interactive notebook.   By completing this WebQuest, you should achieve the following goals: 1) linst common steps in any scientific investigation; 2) use the power of the Internet for advanced exploration; 3) learn information about key aspects of lab safety; 4) identify lab safety violations; 5) make measurements with scientific tools with accuracy and precision; 6) create and interpret graphs to analyze and predict from data; 7) manipulate equations to solve for variables; 8) identify proper units for various measurements; 8) analyze available information to solve real world problems; 9) describe the contributions of Galileo to study the work of science; 10) work with teammates.

Process

Step 1:   You will be working together as a group exploring web sites that your teacher has selected. These sites are important because they will provide basic information about the topic as a whole. The following activities should be done in your interactive notebook unless otherwise specified.

CreateAGraph - Practice creating various types of graphs.
SignificantFigures - Practice with significant figures.

Antoine Uncertainty in Measurement Tutorial http://antoine.frostburg.edu/cgi-bin/senese/tutorials/sigfig/index.cgi This site provides an interactive look at precision and significant figures in measuring applications. The students are taken through a tutorial designed with appropriate feedback and remediation at each level. Be sure to review the material if you miss any questions. These answers should be recorded in your interactive notebook.
Antoine Significant Figures Quiz http://antoine.frostburg.edu/chem/senese/101/measurement/sigfig-quiz.shtml The Antoine site provides a randomly generated quiz for students to test their application knowledge of significant figures, accuracy, and precision. I must see your quiz score for this to be valid. Do not close it until I have seen it. This is an individual activity and you should each attempt it alone. Your final test will be taken alone so your need to know if you can do it.

Step 2: Follow the links and complete the associated tasks.

http://www.safety.sciencewithsandy.com/sequip001.htm

http://www.safety.sciencewithsandy.com/sequip002.htm

MeasurementA - Complete this unless told otherwise.
MeasurementB - Modified version of the above assignment.

Evaluation

The final 20% will be given for a final 2 part quiz. Another 5% will be given upon completion of the entire project. This includes proper labeling of the notebook as described in the Policies document as well as neatness.

Category and Score	Beginning 1	Developing 2	Very Good 3	Examplary 4	Score
Creating a top 10 science rules and answering other safety questions.	Top 10 list was not turned in to teacher or second activity was done.	Less than 10 rules were turned into teacher and less than 4 violations given on second activity.	Top 10 list was turned into teacher. List shows adequate understanding of science rules. On second activity, at least 5 violations are identified.	Top 10 list was turned in to teacher. List shows exemplary understanding of science rules. On second activity, all 7 violations are identified.	15% - 5%
Createing a graph activity, scientific notation activity, and significant digits activity.	Unable to enter the data or unwilling to attempt any activities.	Data entered but unable to generate a graph or graph created but unable to identify when it should be used; unable to complete sig. fig. or scientific digit activity beyond 50%.	Data entered and able to generate at least one graph correctly as well as identify when it should be used. Completes at least one of the other activities with 100% or each with at least an 80%.	Data entered and able to correctly generate each type of graph as well as identify when each should be used. Shows mastery of each of the other activities.	25%
Identifying Safety equipment/Summarize assigned articles.	No equipment was identified correctly/Did not complete summaries.	Few of the equipment was identified correctly/Incomplete or unacceptable summary. Student completed 1 of 2 summaries.	Most of the equipment was identified correctly/Students complete both summaries.	All of the equipment was identified correctly/ Students complete both summaries with appropriate detail and information, good grammar and punctuation, and neatly done.	10% /10%
Participation/ Cooperation	No cooperation was seen amongst team members. Computer station was left in poor condition.	Little cooperation was seen amongst team members, and/or computer station was left in poor condition.	Cooperation amongst team members was evident, and computer station was left in adequate condition.	Team members worked together in an exemplary way. Helping members of their own team and others.	10%

Category and Score	Beginning 1	Developing 2	Very Good 3	Examplary 4	Score
				Total Score	100%

Conclusion

Nice work. You should be proud of yourselves! You should now all be experts of labatory safety and proceedures. Think about why labatory safety is important and how it can be applied to other situations other than science labs. You also know how to use various lab tools in the physics lab to be successful this year.

Teacher Page

Sam Houston Hurricanes!

Reviews

Footer

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