Radioactivity iLab Guide

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Credit: University of Queensland, Australia

After reviewing the Radioactivity iLab with your teacher, you are going to do the iLab yourself. You will go through each of the scientific investigation cycle steps, including **researching** background information, creating a **question** to guide your experiment, **designing** your experiment, **investigating** radiation over distance by collecting data, **analyzing** your data, and **interpreting** your data. Use the instructions on the next page to start the Radioactivity iLab.

In many of the steps, you will be asked to answer questions about the decisions you make during the lab. **Provide reflective answers that demonstrate your thinking about the scientific phenomenon involved in the lab.** When you get to the **Analysis** step, you will create graphs of your data. All of your lab journal responses and graphs will be automatically saved and recorded in a pdf file.

At the end of your experiment, download and print your lab report. Bring this to class to discuss with your classmates.

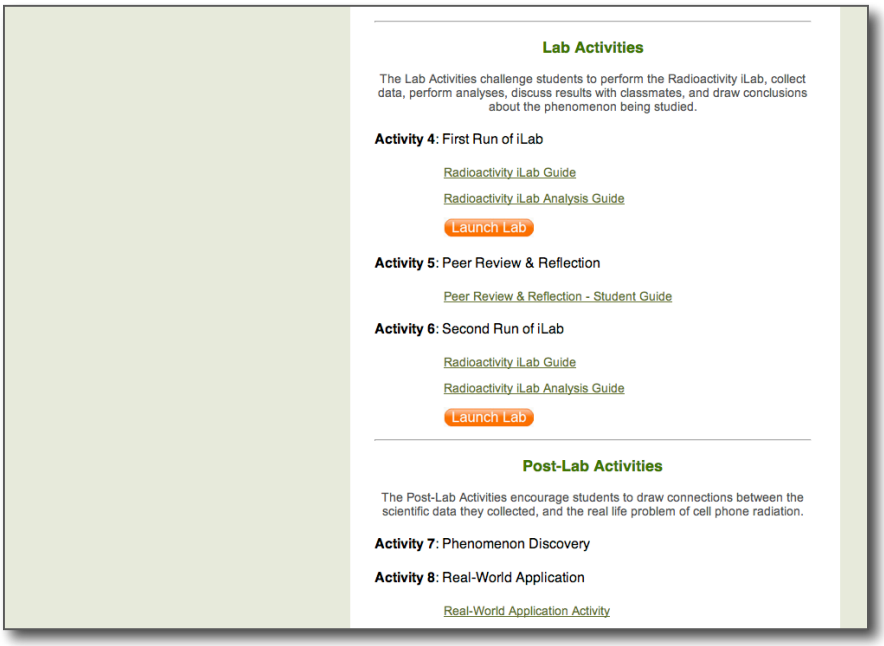
Instructions to Start the Radioactivity iLab

1. Go to http://www.iLabCentral.org/radioactivity. Then click on the curriculum you are doing to get to the homepage for your curriculum.

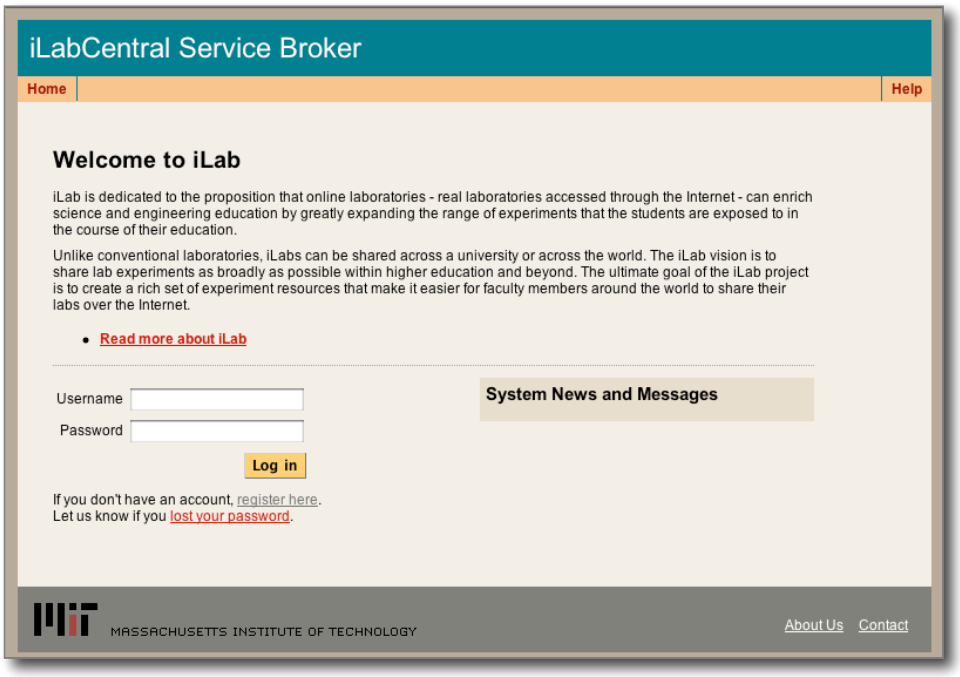
2. Scroll down to the Lab Activities, and click on the orange button labeled **Launch Lab.**

If another page doesn't come up when you click this link, you may need to change a setting in your web browser that allows pop-ups. For instructions on how to disable your pop-up blocker, you can use the website below for help:

https://host.softworks.ca/Agate3/blocker/disable-blockers.htm



3. To enter the lab for the first time, you must register for a new account. Under the log in button, click on **register here.** If you have already created an account, enter your username and password here, and click the yellow button **Log in**, and skip ahead to step 9.

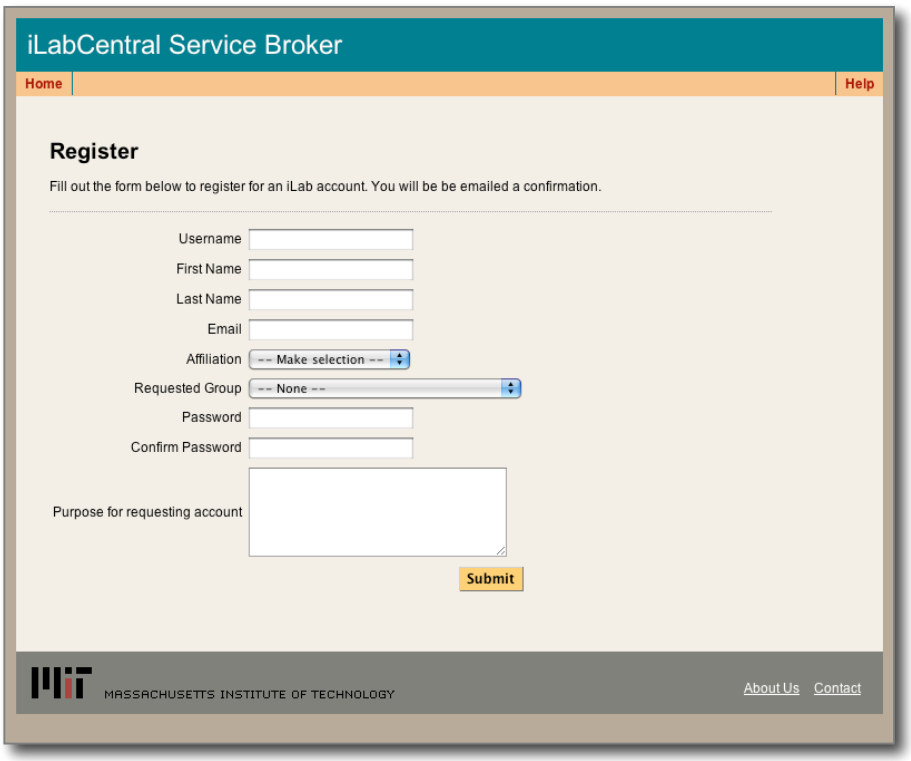


4. Create a username. Then, enter your first and last name and a valid email address.

5. Under **Affiliation,** select Student.

6. Under **Requested Group**, select **Open Experiment Group**.

7. Enter a password of your choice. You may want to write your password down somewhere so that you remember it in the future.

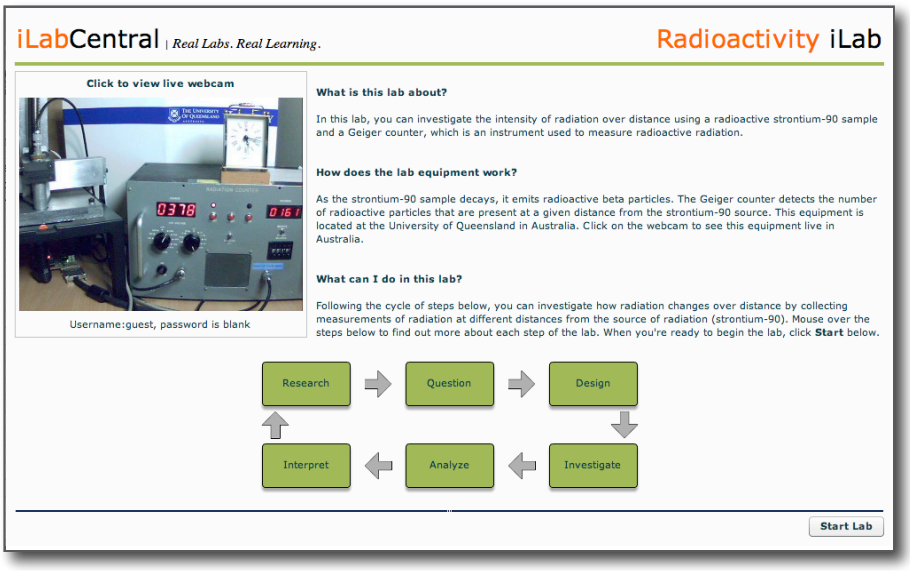


8. Click **Submit**.

9. Click the yellow button **Launch Lab** to enter the lab. Again, if nothing happens when you do this, you probably need to disable the pop-up blocker in your web browser.

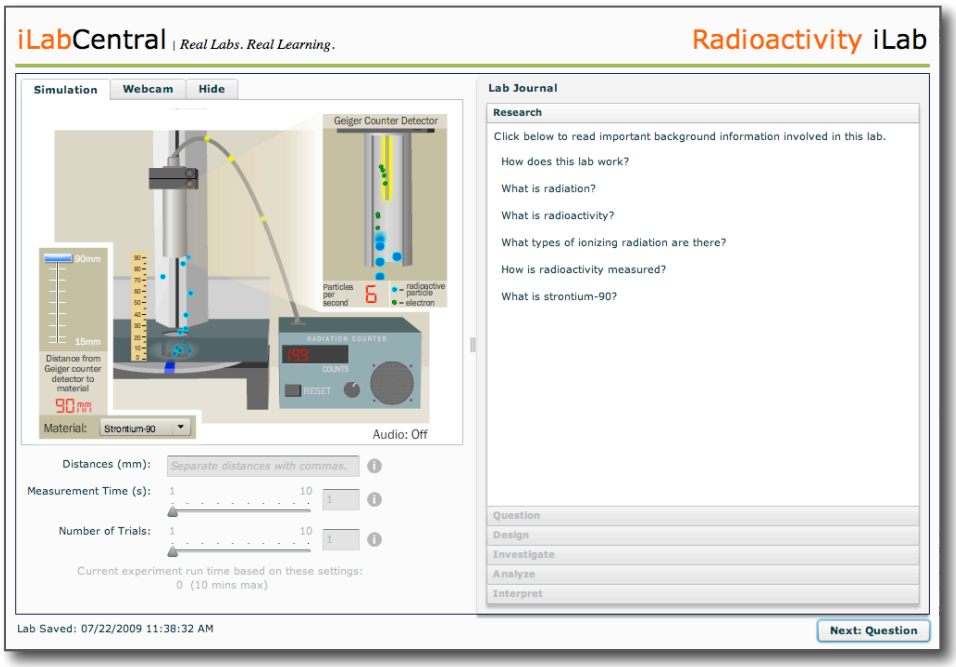
10. You have now entered the Radioactivity iLab. Begin the lab by reading the introductory text and mousing over the cycle steps to learn about them. You may need to download the latest version of Adobe Flash Player to view the lab. If you do not have it, you can download it at:

    http://get.adobe.com/flashplayer/



11. Click the **Next: Research** at the bottom right button to begin the lab.

12. On the right side of the screen is your lab journal, where you will do readings and record responses for each step of the experiment.



    On the upper left side are different views and models of the experiment. In the **Simulation** tab, you can see an interactive model of the experiment, which shows you how beta particles radiate off of the decaying strontium-90 sample and are counted by a Geiger counter. **The simulation is not real – it is just an animated demonstration of what happens in this lab.* You can adjust the distance away from the strontium-90 that the Geiger counter measures radiation, by moving the blue slider up and down. In the **Webcam** view, you can watch a live webcam of the actual lab equipment in Queensland, Australia.

    On the bottom left side will be your workspace where you will set up and conduct the experiment.

Then continue the **Research** step by clicking on the questions in the journal to learn background information involved in the lab.

13. When you are finished reading the answers to the questions in the **Research** step of the lab, playing with the simulation, and looking at the webcam, click **Next: Question.** Continue through the next steps of the lab.

14. When you get to the **Analyze** step, click on **Graph Data** to graph your data and best-fit functions. For each graph you want to include in your lab report, click on **Insert Graph** when you have finished editing it.

    a. If your teacher has asked you to analyze your data in a spreadsheet analysis tool like Microsoft Excel or Open Office, click on **Export Results** in your results table. Follow the directions in the pop-up window to download instructions for your version of one of these programs, and click on **Export Results for Analysis.**

    b. Note: If you have left the lab for more than 20 minutes, you will see a message that tells you that your experiment has been saved, but you have been logged out. Click **OK** – this will bring you back to the Radioactivity iLab homepage. Click again on the orange button **Launch Lab**. Toward the top of the page, click on the tab **My Labs**. Then click on **Radioactivity iLab → Launch Lab**, as you did before. Before entering the lab, you will be asked if you want to resume your existing lab or start a new lab. **Click **Resume**. *This is very important – you must click **Resume** in order to access the journal responses you've entered for this lab.* You will be brought back to the place where you left your lab – in the Analysis step.

15. Complete the questions asked in the **Interpret** step. Then click **Download Lab and Exit**. This will prompt you to save your lab report in a pdf file. Save and print this document.

16. Bring both your completed lab report into class.

Activity Rubric

Total Possible Score: 30 points

Score	Reflection	Analysis
30	○ All answers are complete and clearly demonstrate reflection. ○ The research question is thoughtful and complete. ○ All experimental variables defined in the design phase (Distances, Measurement Time, and Number of Trials) are clearly justified.	○ Data is clearly labeled and organized. ○ All trials and average of trials are clearly graphed with the linear and power best-fit functions, equations and R^2 values for each fit functions, and labels for axes with correct units.
25	○ Some answers are complete and moderately demonstrate reflection. ○ The research question is somewhat thoughtful and complete. ○ Some experimental variables defined in the design phase (Distances, Measurement Time, and Number of Trials) are clearly justified.	○ Data is moderately labeled and organized. ○ Some data is graphed with best-fit functions, equations, R^2 values, and labels are somewhat clear.
20	○ Most answers are incomplete and demonstrate poor reflection. ○ The research question is incomplete and not thoughtful. ○ Most experimental variables defined in the design phase (Distances, Measurement Time, and Number of Trials) are poorly justified.	○ Data is poorly labeled and organized. ○ Data and best-fit functions are not properly graphed or labeled.
15	○ All answers are incomplete and demonstrate no reflection. ○ The research question is incomplete and not thoughtful. ○ None of the experimental variables defined in the design phase (Distances, Measurement Time, and Number of Trials) are justified.	○ Data and graphs are incomplete.