

## Peer Review & Reflection - Student Guide

The primary research question for this experiment is:

- How does the intensity of radiation from radioactive strontium-90 change as a function of distance from the source?

In any type of research and experimentation, a second vitally important question to ask is:

- How do you know if your data and analysis are accurate?

Now that you have completed the Radioactivity iLab, it's time to *think about what your results mean*. A good way to understand your data is to share and discuss it with others who have also done a similar experiment. Scientists do this often to judge the quality of their data, and better understand the phenomenon they are studying. In this case, each lab group had a different set of experimental parameter values, that is to say, different experimental designs, it is especially important that all the groups have a discussion about their data and conclusions from their analyses. We want to add a third question for consideration that is related to the first two:

- Does the design of an experiment influence the results and conclusions of the experiment, even if the researchers are using the same equipment?

### Purpose

This activity is for you to figure out what kind of relationship exists between radiation and distance, and to see if your data makes sense compared with other students' data. The Radioactivity iLab is a real experiment, and everyone's results will be somewhat different, even if you had exactly the same parameter values in your experimental design.

The **goals** of this activity are to:

- Share your lab reports, data, and best-fit analyses with the class.
- Try to determine the relationship between radiation and distance, based on what the class thinks is the best experimental design. Try to reach a class consensus, and make sure everyone understands why the class made its choice.
- Determine if there could be an even better design for this experiment.

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1. Sit as a whole class.
2. Share your lab report and analysis with the class. Tell the class:
  - Your research question
  - The distances, measurement time, and number of trials you chose in your experiment design
  - The type of best-fit function (either linear, power, or other) that best fits your Data. Do this for both graphs, one without background subtraction, and one with background subtraction. Do the fits change? If so, is the change for the better or for the worse?
3. Discuss the following questions:
  - How do your research questions compare to each other's? What were you trying to study in this lab?
  - Based on your analyses, what kind of relationship seems to exist between radiation and distance?

Does everyone's data show the same trend?

- Look back at your experimental designs. Did this have an influence on the trend shown in your analysis?
  - How do you know whose data and analysis are most accurate?
  - If you were to do the lab again, how would you change your experimental design, to better examine radiation over distance?
4. Based on the class discussion, **decide on a new experimental design that the class will use in a second run of the Radioactivity iLab.**

If your research question from the first experiment did not accurately describe what you were aiming to study in this lab, try to **improve your research question.**