

April 11, 2020

A Tiny Dino and Iron Rain

Activity Guide for Students: The Home as Laboratory

Directions:

Many scientific investigations can be made outside of the laboratory, without the use of beakers and microscopes. Look around your home. No matter where you live, there are many questions you could ask about what's going on around you. You might notice your little brother taking a long time to brush his teeth. Or how the temperature inside your home remains fairly constant even though the temperature outside is changing. These, and many other events, can provide data that can inspire research questions.

This activity is going to take place in your home, with discussions and data-sharing happening in a virtual environment. You are going to choose a phenomenon (or your teacher will assign one), create a methodology for observing this phenomenon, collect and analyze some data through observation and then develop a research question and hypothesis based on that data. Your teacher will provide instructions for participating in group discussions and sharing your data remotely.

Background discussion questions

Scientists use observations to study the natural world and to formulate hypotheses for future experiments. These questions will ask you to think about the role of observations in science, as well as data collection and presentation.

1. Give a few examples of how scientists in particular subfields collect data through observation?
2. What kinds of scientific data could you collect in or around your own homes?
3. What does "quantitative data" mean? What forms can these data take? Give some examples of measurements that yield quantitative data.
4. How do scientists display quantitative data?

Group planning

You are now going to be collecting quantitative data in or around your home. Your teacher will assign a phenomenon or give you instructions for choosing your own, as well as explaining the timeline for data collection. You will need to establish a methodology in advance. If you are working in a group, you will need to discuss with your group how you can use similar methods so that you can successfully compare

your data. If you are working on your own, you will still need to consider how to collect and record your data so that other scientists can interpret and repeat your investigation.

5. What phenomenon are you interested in that can be observed or tracked over time?

6. How can you observe it in a quantitative way?

7. What data will you collect and how (be sure to include the timeframe and time interval for data collection)?

8. What background information do you need to know in order to collect this data?

9. Do any necessary background research, taking notes you may need to reference in the space provided here.

Data collection and analysis

Now that you have determined your methodology, answer the following questions about how you will record and analyze your data. Your answers may differ from other members of your group since your phenomena may differ slightly.

10. Create a data table to record your findings. Be sure to include columns for the time (or time period) and any relevant observations or notes. Remember to indicate units.

11. How could the data you collect be analyzed? What general information would you find from that analysis?

12. Now complete your observations over the time period and fill in your table with your data. Once completed, do your analyses (adding columns to your data table as necessary). Based on what you know about representing data, how could your data best be displayed? Why?

13. What information will your display need to include? How can you make it easy to read? Be sure to be specific about what your axis labels will be and identify any information that should be included in the key.

14. How will you identify trends in your data?

15. Create your visual display of your data. Be sure to include your labels and/or a key as necessary.

Data sharing

Work remotely with your group to review the outcomes from your investigations.

16. What trends did you notice in your own data?

17. What trends did you notice in your group's data? Do these trends match the trend you found in your own data?

18. What do these trends suggest about electricity usage in your home?

19. Did anything surprise you about your data or your group's data?

Developing a research question

20. What research questions could the data you collected help answer?

21. Based on the data collected, what research question would you be most interested in exploring? Support your answer.

22. How would you investigate that question? What additional observational data might be useful? What additional experimental data might be useful?

23. What would your hypothesis be, based on the existing data?

24. What steps would you take to design an experiment to test your hypothesis?

