



Extra Credit Summer Project

Conduct your experiment

We missed out on our Fernbank field trip ☹️. You all had put together some fabulous bird flight experiments, and I want to give you an opportunity to complete that project for extra credit for the next school year. This summer, if you visit Fernbank Museum of Natural History (not to be confused with Fernbank Science Center which is nearby and has an observatory) you can explore the Fantastic Forces exhibit and conduct your bird flight experiment. Don't forget to bring your science lab journal with you, and feel free to do more than the 4 tests we originally planned. The more data you collect, the better.

Graph your data

Once you complete your experiments, graph your data and add to your journal. You may choose to do line graphs or bar charts depending on your experiment.

Write a CER (in your lab journal)

Claim:

- Restate your hypothesis. Answer the question, "Do your results support your hypothesis?"
 - If yes, then restate your hypothesis.
 - If no, then start with: "My original hypothesis was... However, the results do not support that hypothesis." Make a new claim based on your results.

Evidence:

- Write one or two sentences illustrating your data that supports your claim/hypothesis. For example, "With higher air pressure (thrust), the birds flew an average of 2' further".

Reasoning

- Explain your results using scientific terms from physics of fluids and aerodynamics (remember, air is a fluid). Use the links below to help refresh your memory of these topics.
- Include any problems you encountered with conducting the experiment and how you would redesign the experiment to get more consistent results.

Extra Credit

You can turn in your journal at the beginning of the next school year to receive extra credit. Explore the following links for a refresher on physics of flight of birds.

- Video: <https://youtu.be/4jKokxPRtck> Smarter Everyday – how bird wings work
- Article: <https://ucmp.berkeley.edu/vertebrates/flight/physics.html>
- Article: <https://askabiologist.asu.edu/how-do-birds-fly>

Here are some guiding questions for the other exhibits. You may answer these in your journal for a 2nd extra credit grade.

Pull Yourself Up

1. Closely observe the pulleys. How are they different? (You may draw a diagram.)
2. Describe which pulley was the easiest to use.
3. Describe which was the hardest.
4. What did you learn about pulleys from this exhibit?

Tug of War

5. Draw a diagram of the exhibit.
6. What is a lever?
7. What's one way you use a lever in your life?

Blast Off

8. What forces slow down the rocket and bring it back to the launch pad?

Twist it Up

9. How does changing the position of the wind tunnel panels affect the development of the tornado?

Defying Gravity

10. Write your observations at this station.
11. Use Bernoulli's principle to explain the behavior of the objects.

Up, Up and Away

12. What do you observe about the shapes of objects and their behavior in the wind tunnel?

Super Charged—Take an inside look at lightning. Bulb or key experiment.

Spin Out

13. What different things do you notice about the effect of centripetal force on the various objects?
14. How does friction affect the behavior of the objects?

Into the Vortex—explore gravitational pull and planetary orbits with balls, coins and a funnel.

15. Explain how a funnel illustrates the orbit of planets under a gravitational pull of the sun.
16. Where do objects orbit the slowest?
17. Where do objects orbit the fastest?

Sinking Feeling

18. Why does shaking cause the objects sink?

Shake it Up

19. Describe a structure that holds up well on the earthquake table.
20. Describe a structure that does not do well on the earthquake table.

Explosive Earth

21. Describe what a shield volcano looks like when using wax.
22. What would a volcano look like if the material was thicker than the wax?
23. What would a volcano look like if the material was thinner than the wax?