

TO: MR. BOROWSKI

FROM: DREW NELSON & TAMMY RADEMACHER

DATE: March 31, 2025

RE: PHYSICS LAB TRIP TO GREAT AMERICA

We would like our students to have the opportunity to go to Great America for Physics Day on Friday, May 23, 2025. We would leave Waunakee High School at 8:00 a.m. and return to Waunakee by approximately 6:30 p.m. In previous years over 24,000 students had the opportunity to "experience physics" at Great America. As you realize, physics is used everywhere, but at Great America physics teachers and engineers have developed numerous practical experiments for the students to conduct. The students meet with engineers and experience behind-the-scenes activities that no one else can experience. Our students take lab materials along to conduct experiments on that day---on no other day will the park allow this to be done. Students get very excited about this opportunity. This is physics in action and is a highly motivated activity that ties together many of the areas of their physics learning.

The total cost to students is approximately \$85 depending on the number of students who attend. The price includes the tickets to get into Great America and the per student portion to rent a bus to get there. If some of the students elect NOT to go for various reasons, then they stay in school and watch a video on the "Physics of Roller Coasters" plus complete some activities at a playground area with a swings, merry-go-round, etc.

This is an EXTREMELY EDUCATIONAL EXPERIENCE for our students, not just a fun day for them. There are numerous experiments that students must do while there, other activities on the bus going & coming back, and there are write-ups to be done when students get back to Waunakee High School. If you have any questions please do not hesitate to contact us.

## Physics I – Amusement Park Physics Project

### Objectives:

- 1) Students will plan their own investigation and assessment to be used at 6 Flags Great America.
- 2) Students will examine physics at least one roller coaster at 6 Flags Great America.
- 3) Students will compare their results and calculations to known values.

### Timeline:

	Requirement
4/29 (B) or 4/30(A)	Students will learn about and apply the law of sines and triangulation in order to find the height of a distant object.
5/13(B) or 5/14(A)	Students will have checked their completed assessments with their instructors and shared them via google docs.
5/15(B) or 5/16(A)	Students will put together an Amusement Park resource bag that includes a paper copy of their assessment as well as any tools that they will need in order to make measurements at the park.

### Requirement Descriptions and Examples

1. *Number of Calculations* – Students will calculate at least 8 different pieces of Physics information to receive full credit.
  - a. Maximums (v, a, force, energy, p, etc.)
  - b. Values at specific points of interest/note (v, a, force, energy, p, etc.)
2. *Measurements Made at the Park* – Students will make at least 4 measurements to receive full credit.
  - a. Time, Height, and Angle are going to be the primary measurements all calculations are made from.
3. *Compare Results to Known Values* – Students will compare at least 2 of their calculated results to the know values provided by Park Resources in to receive full credit.
4. *Number of Different Equations Used* – Students will use at least 5 different Physics equations to make calculations to receive full credit.
  - a. Constant Velocity Equation
  - b. The Big Four
  - c. Law of Sines
  - d. Rotational Motion Equations (provided during project work time.)
5. *The Correct Units are Included on all Numbers* – Students will label all numbers with the appropriate units to receive credit.
6. *A Reasonable Number of Significant Digits are Used* – The students will answer all questions with a reasonable number of significant digits to receive credit.
7. *All Assumptions are Clearly Declared* – The students will declare any assumptions they are making about the roller coaster and/or its passengers. These assumptions will be clearly declared prior to the solving of that equation to receive credit.
  - a. Ex. Mass of the contents of the cart, starting speed, etc.
8. *All Work is Shown* – Students will show all algebraic work that is done in order to solve an equation to receive credit.
9. *All Work is Accurate* – The students will produce their own work in an accurate manner to receive credit.
10. *All Work is Legible* – The students will present their work in a neat and easily legible manner to receive credit.
11. *All work is Easily Followed* – The students will organize all of their work in a logical, easy to follow manner to receive credit.
12. *The Final Answer is Accurate* – The students will provide a final answer that is logical and accurate based on the measurements they made while at the park to receive credit.

## Physics I – Amusement Park Physics Project – Alternative Assessment

### Objectives:

- 1) Students will plan their own investigation and assessment to be completed in place of the 6 Flags Assessment.
- 2) Students will examine physics features of equipment at a local park or playground.

### Timeline:

	Requirement
4/29 (A) or 4/30 (B)	Students will learn about and apply the law of sines and triangulation in order to find the height of a distant object.
5/13 (A) or 5/14(B)	Students will have checked their completed assessments with their instructors and shared them via google docs.
5/21(A) or 5/22(B)	Students will turn in their completed assessment.

### Requirement Descriptions and Examples

1. *Number of Calculations* – Students will calculate at least 8 different pieces of Physics information to receive full credit.
  - a. Maximums (v, a, force, energy, p, etc.)
  - b. Values at specific points of interest/note (v, a, force, energy, p, etc.)
2. *Measurements Made at the Park* – Students will make at least 4 measurements to receive full credit.
  - a. Time, Height, and Angle are going to be the primary measurements all calculations are made from.
3. *Error Analysis* – Students will cite at least 2 sources of error encountered at the Park and declare ways those errors could be prevented in the future in order to receive full credit.
4. *Number of Different Equations Used* – Students will use at least 5 different Physics equations to make calculations to receive full credit.
  - a. Constant Velocity Equation
  - b. The Big Four
  - c. Law of Sines
  - d. Rotational Motion Equations (provided during project work time.)
5. *The Correct Units are Included on all Numbers* – Students will label all numbers with the appropriate units to receive credit.
6. *A Reasonable Number of Significant Digits are Used* – The students will answer all questions with a reasonable number of significant digits to receive credit.
7. *All Assumptions are Clearly Declared* – The students will declare any assumptions they are making about the equipment and/or its users. These assumptions will be clearly declared prior to the solving of that equation to receive credit.
  - a. Ex. Mass of the contents of the cart, starting speed, etc.
8. *All Work is Shown* – Students will show all algebraic work that is done in order to solve an equation to receive credit.
9. *All Work is Accurate* – The students will produce their own work in an accurate manner to receive credit.
10. *All Work is Legible* – The students will present their work in a neat and easily legible manner to receive credit.
11. *All work is Easily Followed* – The students will organize all of their work in a logical, easy to follow manner to receive credit.
12. *The Final Answer is Accurate* – The students will provide a final answer that is logical and accurate based on the measurements they made while at the park to receive credit.