APRIL 4th, 2017

THE UNIVERSITY OF SCRANTON

KANE COMPETITION

THEME

TIME TRAVEL

Theme Overview

Flashback to the spring of 2003: Star Wars Episode Two Attack of the Clones was just in cinemas, NASA's Odyssey probe just found ice deposits on Mars, and the first Kane Competition takes place with only two schools, Wyoming Area High School and Scranton Preparatory School. Fourteen years later, the Kane Competition will have over thirty teams from around sixteen high schools in Northeastern Pennsylvania. At the 2017 competition, students will travel back in time to variations of some of our most successful events culminating in going back to the future to our newly named "The Hayes Family Science Competition".

General Rules

1. Teams may have between 5 and 7 members.
2. All teams must compete in all events.
3. Decisions of the judges are final in all events.
4. **Cell phones** and other electronic or communication devices will not be allowed in the competition.
5. Each student may bring one (1) calculator of any type (no cell phone calculators), but no other reference materials or devices are allowed apart from what is given to the teams on the day of the competition. Kane coaches are responsible for making sure graphing calculator memory does not contain anything to give their teams a competitive advantage.
6. Calculators **will not be provided**.

Competition Information

This is a competition designed, organized, and administered by the physics and engineering students of the Department of Physics and Electrical Engineering. Financial sponsorship is currently provided by the Hayes Family, specifically Edward '61 and Margaret Hayes. After the 2017 competition, this competition will be re-named "The Hayes Family Science Competition" in recognition of the generous financial support provided by the Hayes family. The competition itself will not change. The competition and its events have always been and will remain based on physics and engineering ideas and concepts. The wording of each event in this rule book has been prepared to define each task as much as possible without giving away the solutions.

Please send all inquiries to:

Prof. Nicholas Truncale – Competition Administrator
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Christian Anderson – Competition Student Coordinator
Christian.Anderson@scranton.edu

EVENT 1: *THE KANE QUIZ*

Remaining in the Present

The Kane Quiz will be a 30-minute multiple-choice test of general knowledge in mechanics, waves, optics, electromagnetism, and basic circuits. The three students with the top scores in the quiz event will advance to the Jeopardy Event at the conclusion of the competition. Quiz questions will be similar to those found on the AP physics exam.

Rules:

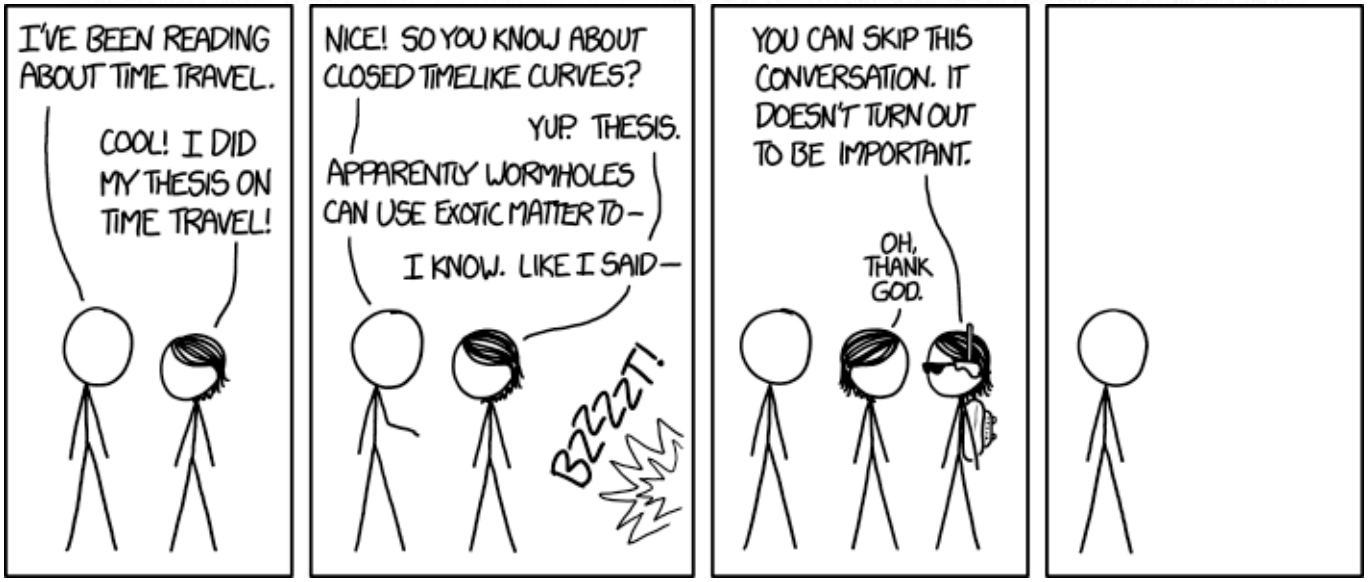
1. No outside materials other than your calculator may be used for the individual quiz competition. Pencils, scratch paper, and an equation sheet (similar to the one used in the AP physics test) will be supplied.
2. Team Competition: All students may compete in the quiz and the sum of the scores of all the students will be used to determine the team quiz score.
3. Jeopardy Qualifier: The students with the three highest quiz scores will qualify for the Jeopardy Event. In the case of a tie, a tie breaker quiz will be administered during the lunch break.

Scoring:

On the written quiz, one point will be awarded for each correct answer. Incorrect answers will be penalized -0.2 points to discourage random guessing. The team score will be calculated as follows:

$$Score = 100 \times \frac{S}{T}$$

Where S is average score of the teams' members and T is highest average scores across all competing teams.



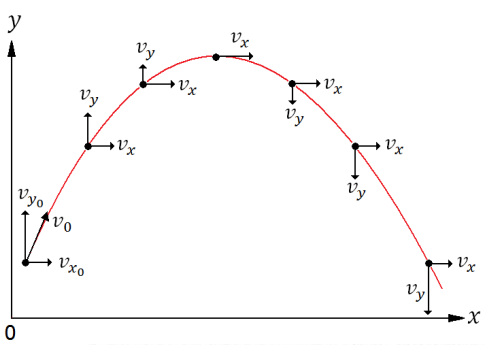
EVENT 2: A BLAST FROM THE PAST

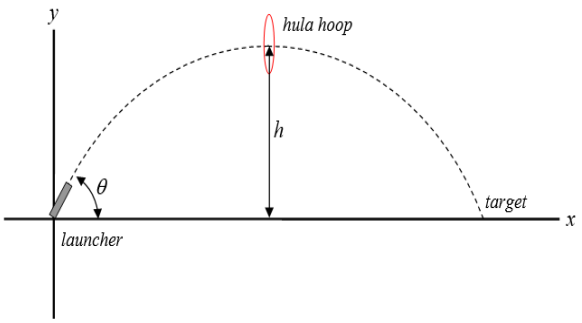
Traveling back to 2007 and 2012

Description: Teams will be asked to solve problems involving two apparatuses which launch projectiles. Students should be familiar with the following concepts:
Projectile motion, kinematics in multiple dimensions, pressure

Think about it: A device is set up to launch a ball in a certain direction at a certain initial speed with an initial direction. Describe the ball's motion in that direction. What does it depend on?

Launcher Demonstration Video: Link to Video
https://sites.google.com/site/phys2701/2017-kane-competion-apparatus-preview



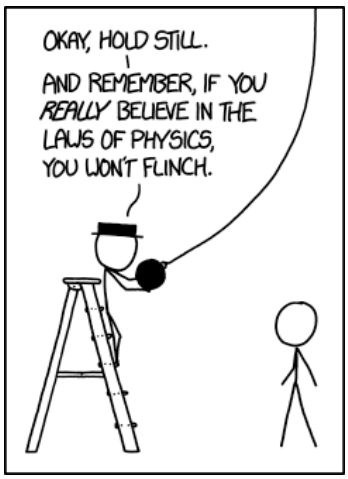


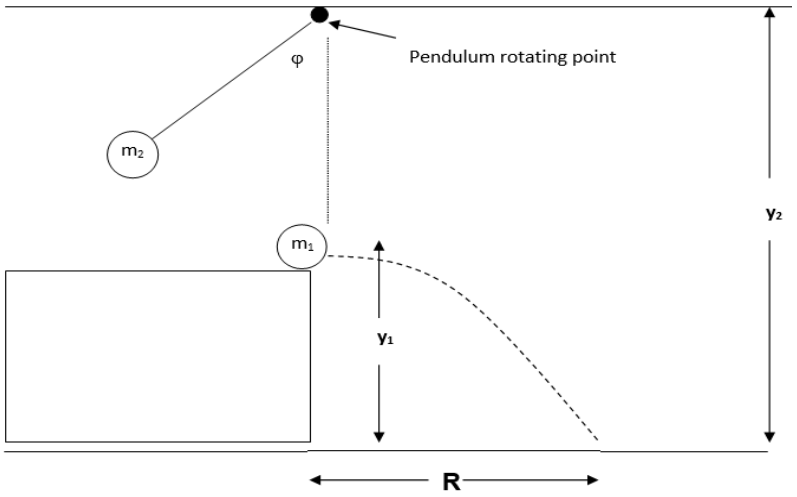
EVENT 3: A HITCHHIKER'S GUIDE TO PHYSICS

Traveling back to 2008 and 2014

Description: Combining two popular events from two different competitions was a fun task! Teams will be asked to solve a four-part problem utilizing a variety of Mechanics concepts. Students should be familiar with the following concepts: Simple harmonic motion with a pendulum, rotational kinematics, energy, momentum and collisions, other periodic motion

Think about it: A mass attached to a light rope, which is attached to the ceiling, is released from rest and collides with another mass. The combination flies off the edge…think of this event like the board game mousetrap!



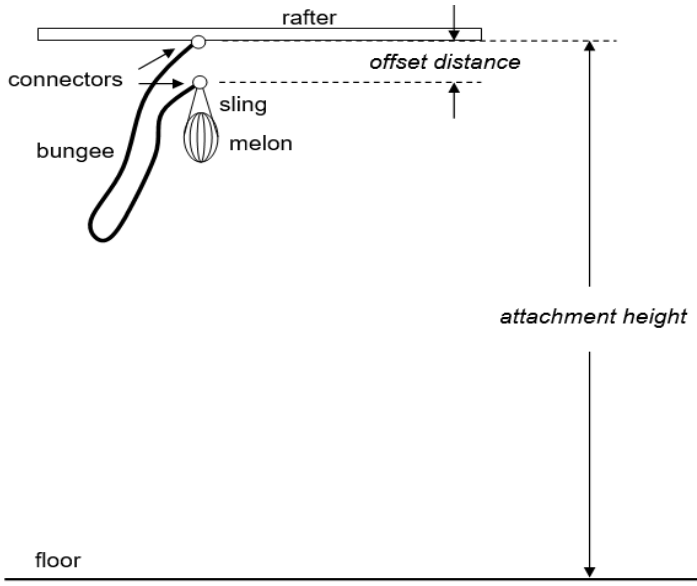


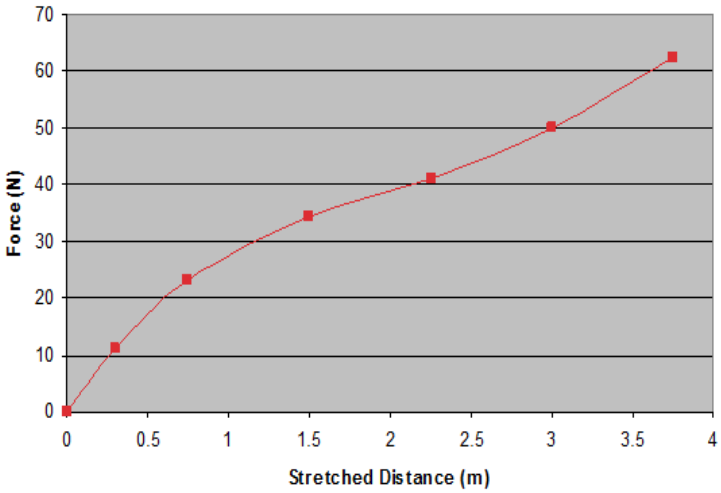
EVENT 4: *THE TIME IS RIPE*

Traveling back to 2006

Description: Probably one of the most successful events in the history of the Kane Competition (besides the unexpected oversized watermelons that were delivered), was the Melon Bungee-Jump event. Teams will be asked to determine the drop height from which to release a large piece of fruit enclosed within a net attached to a bungee cord. If dropped correctly, the fruit will just reach the floor where another part of the event will be triggered. Students should be familiar with the following concepts: Energy, energy loss, force vs. displacement, non-constant force, fruit physics, air resistance

Think about it: A piece of large fruit falling attached to a Bungee Cord…Sweet





EVENT 5: *BACK TO THE FUTURE*

Traveling to 2018

Description: After this year, the name of this high school completion will change. This change will allow us to re-invent how we do things. Travel back to the future to a whole new way of running a physics event. You will be asked to work with your team to successfully complete several tasks and show what it will take to win an event in the future. Yes, we are being vague on purpose! Students should be familiar with the following concepts: Physics

AWARDS

Team Prizes:

- Gold, silver, and bronze medals along with a trophy will be awarded to the three teams with the highest aggregate scores. A perpetual trophy, the "Kane Cup" will be awarded to the school sponsoring the team achieving the highest aggregate score.

- The Kane Ingenuity Awards will honor the best answers to each event. The judges will select those entries with that certain something that brightens a physics teacher's day; it is part flair/style/panache and part pure ingenuity.

Individual Prizes:

- A $1500 University of Scranton Scholarship will be awarded to the highest placing student in the Jeopardy round. The University of Scranton must be the recipient's choice for post-secondary education and begin attending in the fall of 2017. Otherwise it will be granted to the student with the highest written quiz score attending The University of Scranton in the fall of 2017. [1]

- Plaques will be presented to the top three Kane Quiz participants along with prizes that are tiered at $250, $150, and $100.

- The theme this year is TIME TRAVEL, which we assume may inspire many students to dress in costume. We encourage students to dress up as long as it is appropriate for school. A best costume award will be granted based upon the opinion of a committee of Kane volunteers.

[1] In the event the recipient of The University of Scranton Scholarship cannot accept the scholarship due to financial aid reasons, an alternative prize worth up to $600 will be awarded. Any questions about this should be directed to the Kane Competition Administrator.

EVENT SCHEDULE

Time	Team Groups		
8:00 – 8:30	Registration and Light Snack Breakfast		
8:30 – 8:40	Welcome, Introduction, Organization, and Rules Summary		
8:45 – 9:15	Event 1: Kane Quiz		
9:20 - 10:00	Event 2	Event 3	Event 4
10:05 – 10:45	Event 3	Event 4	Event 2
10:50 - 11:30	Event 4	Event 2	Event 3
11:35 - 12:25	Lunch and Photographs		
12:30 – 1:10	Event 5		
1:25 – 1:45	Jeopardy Quiz Finals in Moscovitz Theater - The DeNaples Center 401		
1:50 – 2:00	Award Ceremony		