

**The Eleventh Annual
University of Scranton**

2014 Kane Competition

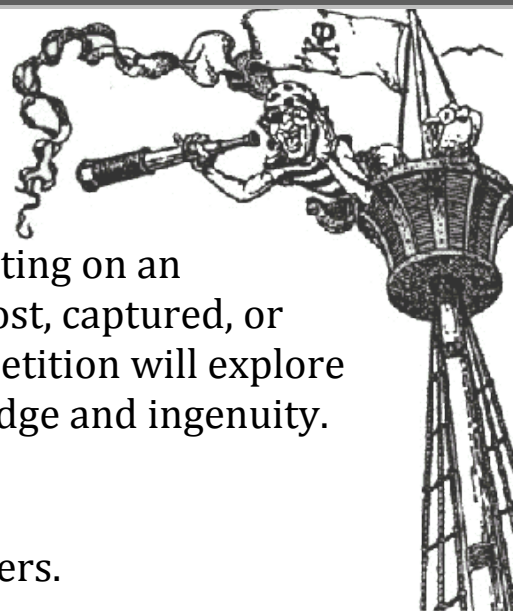
April 3rd, 2014

**Invention
Island**



Theme Overview

Whether ship-wrecked, plane-wrecked, or visiting on an uncharted island the possibility of becoming lost, captured, or forgotten is always possible. This year's competition will explore these possibilities to test your physics knowledge and ingenuity.



General Rules:

1. Teams may have between 5 and 7 members.
2. All teams must compete in all 5 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) scientific calculator, but no other reference materials or devices are allowed a part from what is given to the teams on the day of the competition.
6. Calculators **will not be provided**.
7. Each team event is worth 100 points.

Competition Information

The Kane Competition is sponsored by the University of Scranton. 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 provided by a gift from the Joseph Kane Estate and Mr. Edward Hayes.

The wording of each event in this rule book has been prepared to define each task as much as possible. Please direct all inquiries regarding rules to Mr. Dustin Frisbie via e-mail at dustin.frisbie@scranton.edu



Registration questions should
be directed to

Prof. Nicholas Truncale

Nicholas.truncale@scranton.edu

Event 1: Kane Quiz

The Kane Quiz will be a 30-minute multiple-choice test of general knowledge in mechanics, waves, optics, electromagnetism, and circuits. The students with the top three 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 test.

Rules

1. No outside materials other than your scientific 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.

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 of the average scores of all the teams.

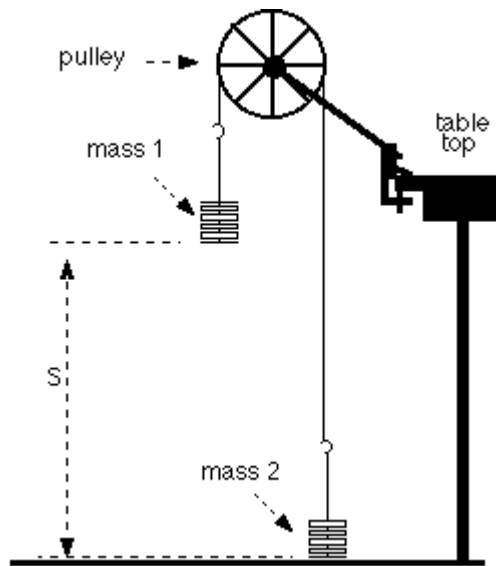
Event 2: Survival of the Fittest

Goal and Description

One of the first tasks on a deserted island is to figure out how to survive. In order to fulfill the nutritional wants of your group, a method for catching prey needs to be developed. Your goal will be to design and calibrate a food catching device.

Apparatus

The apparatus consists of pulleys, string, and weights. Knowledge of the classic Atwood machine will aid the teams in determining the information posed by the event leaders.



Materials

Each team will be provided with their own apparatus so they can experiment. At the end of the event round, a sample apparatus will demonstrate how it catches prey. Note: No actual prey will be harmed during this event. Artificial prey, in the form of a robot, will be used.

Event 3: Island Sustainability

What is Sustainability?

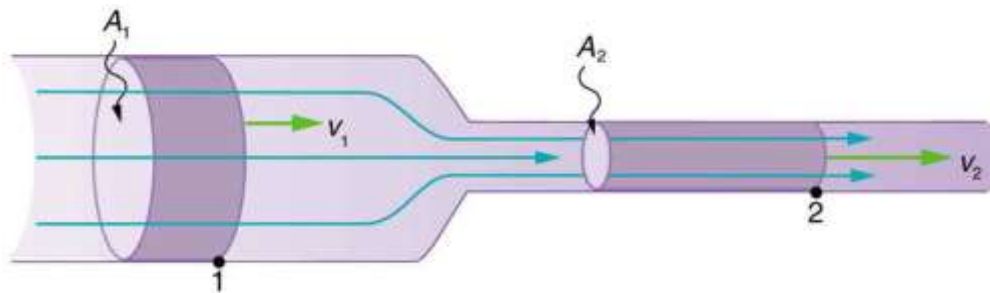
Sustainability involves meeting the needs of the present without compromising future generations. For human beings, sustainability is the potential for preservation of well-being, which has ecological, economic, political and cultural dimensions.

Goal and Description

A freshwater source, in the form of river, is found on the island. An aqueduct system will be designed to provide water to your camp. This aqueduct, however, must be designed to provide enough water to sustain your camp but also to leave the ecosystem of the island undisturbed.

Apparatus

One riverbed will be used during this event. Students will be allowed to view the riverbed and measure dimensions if necessary. Knowledge of basic fluid dynamics including but not limited to Bernoulli's principle and flow rates will be essential.



Materials

All the necessary constants and information about the apparatus will be given to the students at the beginning of the event. At the end of the event round, the sample riverbed apparatus will be used to demonstrate how to adequately supply your camp but sustain the environment of the island.



Event 4: Mystery Event

A famous scientist once said:


“Every day sees humanity more victorious in the struggle with space and time”

Description

You never know what you might find on an uncharted island. The leader of your camp was crystal clear when she induced your team to scavenge the island looking for anything useable. This is a task within your team’s capacity.

Materials

Each team will be provided with their own apparatus so they can experiment.



Event 5: Captured! Mad Scientist Physics

Goal and Description

It turns out this island was not uninhabited after all. A mad scientist has a laboratory at the center of the island. You are captured and given the opportunity to escape if you can solve the mad scientist's puzzle and use his own invention against him.

Apparatus

An incline and two large rotating disks separate you from escape. You will need to use your knowledge of inertia, rotational kinematics, and energy. You may also want to tell your physics teacher, if they are willing, to bring swim wear with them to the event this year. It turns out the mad scientist also has a sense of humor.



Materials

All the necessary constants and information about the apparatus will be given to the students at the beginning of the event. Every school whose teacher is willing to participate will be given a chance to use the apparatus.

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 that have that certain something that brightens a physics teacher’s day; it is part flare, style or panache and part pure ingenuity.

Individual Prizes:

- A \$1500 University of Scranton Scholarship will be awarded this year. The University of Scranton must be the recipient’s choice for post-secondary education and begin attending in the fall of 2014. It will be granted to the highest placing student in the Jeopardy round. Otherwise it will be granted to the student with the highest written quiz score not in the Jeopardy round.
- Plaques will be presented to the top three Kane Quiz participants along with college bookstore gift cards to the university/college they will attend. These prizes will be tiered \$500, \$300, and \$200.
- The theme this year is Invention Island which we assume will inspire many students to dress in costume. We encourage students to dress up island themed from pirates to mad scientists, 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.

School Technology Prizes:

- We will be giving each participating school a technology award. The piece of technology will be demonstrated to the Kane coaches during the morning events and presented at the award ceremony.





New Event Schedule

Time	Team Groups		
8:00 – 8:30	Registration		
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/Buffer		
12:30 – 1:10	Event 5: Captured! Mad Scientist Physics		
1:20 – 1:45	Jeopardy Quiz Finals in Loyola Science Center		
1:45 – 2:00	Award Ceremony		

Note to Kane Coaches

Having analyzed the past teams who placed in the team competition, it is clear from speaking with their Kane Coaches that ample time goes into preparing for the competition. We understand you may not cover nor plan to cover some of the physics in this rule book during your regularly scheduled physics classes. We are hoping to increase the amount of physics knowledge your students are learning.

Referring to you as “Kane Coaches” was by design. We hope you can spend time in your classes prepping for Kane *but also* after school or during open periods to prepare your students so they may excel at the competition.

We appreciate the extra time you put in to prepare your students. Our main goal is to increase interest in physics and engineering which we know is a goal we all share. We are looking forward to this year’s competition!

-The Kane Team

