

9-2010

Physics Lesson Plan: How far and fast does it travel?

Getaway Special Team 2010

Follow this and additional works at: http://digitalcommons.usu.edu/gas_educ

 Part of the [Aerospace Engineering Commons](#), [Mechanical Engineering Commons](#), [Physics Commons](#), and the [Science and Mathematics Education Commons](#)

Recommended Citation

Getaway Special Team 2010. (2010, September). Physics Lesson Plan: How far and fast does it travel?

This Other is brought to you for free and open access by the Getaway Special (GAS) at DigitalCommons@USU. It has been accepted for inclusion in Education and Outreach by an authorized administrator of DigitalCommons@USU. For more information, please contact dylan.burns@usu.edu.



Lesson Plan – Physics

Unit Theme: Distance, Velocity, and Acceleration Subject Area: Science
Lesson Title: How far and fast does it travel? Number of Learners: Entire class
Grade Level: 10th-12th Time Needed: 30-45 minutes

Curriculum

Standard I: Students will understand how to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and acceleration.

Objective 1: Describe the motion of an object in terms of position, time, and velocity.

Objective 2: Analyze the motion of an object in terms of velocity, time, and acceleration.

Materials Needed

- Distance, velocity, and acceleration graphs (below)
- AIAA Journal GAS Paper
- Microgravity Boiling on 2001 Experiment
- Microgravity and Gravity Boiling of 2010 Experiment Videos
 - Microgravity Link: <http://www.youtube.com/watch?v=h9PnK58m0tE>
 - Gravity Link: <http://www.youtube.com/watch?v=Z-N1j-8tR3s>
- GAS Team Summer 2010 NASA Experience Video
 - Link: <http://www.youtube.com/watch?v=7xQp8LWcqoE>

Learning Objectives

Students will be able to correctly draw the distance, velocity, and acceleration graph of a departing bubble from the 2001 microgravity boiling experiment. They will better understand how research is performed.

Background Knowledge

Teachers must know how to explain distance, velocity, and acceleration properly and be able to correctly draw the graphs of each.

Instructional Procedure

Begin the lesson by asking the students if they think research is fun. Not many hands will go up and this is expected. Next ask them how they think research is performed. Explain to them that it can be fun and they students can research whatever they are interested in whether it is plants, animals, medicine, or boiling bubbles. Emphasize the opportunity of hands-on research in higher education settings. Next discuss with them the opportunity some USU students had to do research on their own. Then explain to them that basic physics concepts played a large part in the research.

Show the video of the 2001 microgravity boiling experiment. Then assign groups for the students to work in and hand out the graphs. Explain to them that you are going to have them fill in each graph for the bubble. In the video it is the video departing horizontally in the top right corner. Allow the video to loop while the students fill out the graphs. Monitor the students' progress, keep them on task, and answer any questions that arise.

Bring the discussion back together and on the board draw the three graphs in the following order: distance, velocity, and acceleration. Ask or assign a student to come up and fill out the distance graph first and explain how they got their answer. Repeat for velocity and acceleration graphs. With the video still looping show the students how the distance graph was obtained and that it covered a lot of distance at first and then slowed down to a stop. Do the same with velocity and acceleration. Point out the negative acceleration graphs and ask the students why it was negative. Explain to them that it is because the bubble is slowing down and it has a negative velocity.

Next show the students the correct answer from the AIAA paper (page six). Then briefly run through the journal article and explain to the students that this paper was compiled by undergraduate research students. Emphasize that they can have the same opportunities if they would like.

Ask them why they think boiling in space would be useful. Bring out the usefulness of heat management systems and using it as a source of cooling. This potentially provides assistance for further space exploration. Explain to them that students at USU were wondering its usefulness and explain about the project. Show the students the boiling cube and pass it around. Next show them video footage of the 2010 experiment. Show them boiling in gravity first and ask them which way the bubbles are going. Then show them boiling in microgravity and ask them where those bubbles are going.

Boiling on Earth:

<http://www.youtube.com/watch?v=Z-N1j-8tR3s>

Boiling in Microgravity:

<http://www.youtube.com/watch?v=h9PnK58m0tE>

Finally show them the video of the NASA summer of 2010 experience video. Talk about the research performed, what we have learned, and what we continue to hope to learn.

<http://www.youtube.com/watch?v=7xQp8LWcqoE>

Wrap up with a few experiences from the trip and promote college and the opportunities you can have. Go Aggies! End with questions.

Assessment

The students drew the distance, velocity, and acceleration graphs correctly. They also used correctly terminology when they were explaining the principles. Students understand gravity's impact by proper explanations when asked questions during the discussion.

Extensions

The students could create their own scale and actually calculate the distance, velocity, and acceleration rather than drawing a general graph.