Everyday Science

14 October 2005 Everett Lipman

Many everyday phenomena are complicated from a scientific point of view, but remain fascinating to the general public. When scientists are asked to provide explanations, they often resort to inaccurate oversimplifications, or at the other extreme, incomprehensible recitations full of jargon and unnecessary detail. We will try to strike a balance and practice this difficult task with an audience more forgiving than the general public.

Assignment

For next Friday, October 21, we will prepare group presentations on the topics listed below. Presentations should be 15 minutes long, and should be geared toward an audience of junior high students. Although the presentations will be limited in technical content by the intended audience, they should be rigorously correct and you should strive to avoid developing misconceptions.

Groups will consist of three (possibly four) students. The suggested division of labor is to have one student prepare a demonstration or illustration of the phenomenon, the second student give a general explanation, and the third provide answers to the detailed questions I have included with the topics.

Topics

1 Why Can Airplanes Fly?

- Must a wing have a specific shape to work?
- Does air that is split at the leading edge of a wing meet again at the trailing edge?
- How is it that some airplanes can fly upside down?
- Do wings work in any fluid? How about a superfluid?

2 Why Does a Flame Make Light?

- What is fire?
- Why are candle flames yellow/orange?
- Why are some flames (for example, on a stove) blue?
- How does light from a flame relate to light from a bulb or the sun?

3 What Keeps a Surfboard Above Water?

- Is the cause the same during paddling and wave riding?
- Is there a maximum paddling speed? If so, about how many strokes does it take to reach this speed?
- How does this problem relate to the maximum speed of a sailboat?

4 Why Does Water Boil?

- Why will it boil suddenly if it is hot and I throw spaghetti in?
- Why does it boil at room temperature in a vacuum?

5 What Causes a Rainbow?

- What conditions are necessary?
- Why does the rainbow appear to be a circular arc?
- What causes the secondary rainbow, and why are the colors reversed?

6 Why is the Sky Blue?

- Why is there any light at all coming from parts of the sky away from the sun (why isn't the sky black)?
- Why isn't the sky purple?
- Why wouldn't pure water scatter blue light?