BUOY OH BUOY!
(PHYSICAL SCIENCE LAB)

DESCRIPTION: Teams will compete in activities and answer questions about the determination of density of solids, liquids, and gases; the determination of concentrations; the behavior of gases according to the gas laws (Boyle's Law, Charles Law and Pascal's Principle); and using Archimedes's Principle.

EVENT PARAMETERS: Students may bring and use any non-programmable calculator. No other resource material may be used unless provided by the event supervisor.

A TEAM OF UP TO: 2 **APPROXIMATE TIME**: 50 Minutes

THE COMPETITION: The competition will consist of experimental tasks and questions related to those tasks in specific areas of Physical Science. Some mathematical relationships may be provided by the event supervisor, but the students are expected to know basic arithmetic; definitions of mass density, number density, area density, concentration, and pressure; use of appropriate units, and graphing. Students may bring and use calculators, metric rulers, and scissors.

SAMPLE STATIONS: **(This list is not intended to be an exhaustive list of possible stations.)**

- **The measurement or calculation of the mass density of a given solid.**
  Students will collect, a volume of gas, measure its volume and mass, and calculate the mass density.
- **The measurement and/or calculation of the number density of objects.**
  Given a small bag of M&M's they must determine the number density of the brown M&M's in the bag.
- **Determine the lifting force of a helium balloon.**
  Given a helium balloon and a balance students must determine the amount of mass that the balloon could theoretically lift.
- **Determine the depth to which a solid object will sink when placed in water.**
- **Answer questions regarding any of the gas laws.**

SCORING: Points will be awarded for correct answers, measurements, calculations, and analysis of data. Supervisors are encouraged to provide a standardized form on which students can show all measurements and calculations. Ties will be broken using a designated task(s) or question(s) that may be noted on the student answer form.