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Balloon Fest DESIGN



Abstract:

This document contains the Balloon Fest experiment design of the Four Horsemen. The experiment design has: the purpose of the experiment, research, hypothesis, and lastly, the proposed experiment design.



Name: The Four Horse Men

Date: 3/2/09

Balloon Fest Experiment Design

Purpose of this experiment:

The atmospheric pressure and temperature varies with altitude. Can we predictably and accurately measure the altitude by sensing the pressure and the temperature?

Research:

The Atmospheric Research Website describes three different models for the altitude dependence of pressure in the atmosphere: Meteorological model, Adiabatic Model, and the Standard Model. All three of these models are based upon a sea level pressure P_0 that varies up to 101.3 kPa over a time period because of weather. Thus any measurements we make will vary with time up to about 3 kPa/hour.

The Meteorological Model predicts that there should be a difference of 35 kPa between the surface and 1000 ft. This means that if a storm was moving in we could have an error of as much as 100 ft after 30 minutes.

Hypothesis A1:

We can use the barometer to accurately and repeatably measure the altitude.

Test 1: The altitude graph should go up and then down.

Test 2: The ending altitude should be exactly the same as the beginning altitude.

Test 3: The altitude changes should match the description in the experiment log.
(i.e. start time, end time, and plateaus)

Test 4: The calculated altitude should be the same as for the range-finder and the line-length methods.

Hypothesis A2:

The pressure is directly proportional to the altitude

Test 1: Twice the change in line length then twice the change in pressure.

Test 2: The graph of Pressure vs. line length should be a linear graph.

Hypothesis B:

We can accurately measure the Atmospheric Temperature Lapse Rate (temperature decreases linearly with altitude).

Typical procedure to test a hypothesis: release the rope to a measured length and pull it down to test the equipment.

Proposed Experimental Method:

We plan to let out 100 ft of line at a time using a line wheel.

We will send it up 100 ft then pull it down in order to check our measurements.

It will be important to make sure that our system is set up correctly and is turned on.