

Balloon Fest Experimental Analysis

The Bugz

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Experiment to compare amount of tether let out to calculated altitude using a two-theodolite station method.

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Experiment Purpose

We had the opportunity to design our own experiment to execute during balloon fest. Our group of three came up with the idea to compare the amount of tether let out by the balloon to the altitude found by the theodolites to figure out how the weather effects the tether-to-altitude ratio.

Origin of Data

Data would be collected from two theodolite stations that would take two angle measurements (horizontal and vertical) simultaneously at intervals of every hundred feet of balloon tether let out. Using a program in a TI-83 calculator, we would plug in these angle measurements to calculate altitude.

Experiment Description

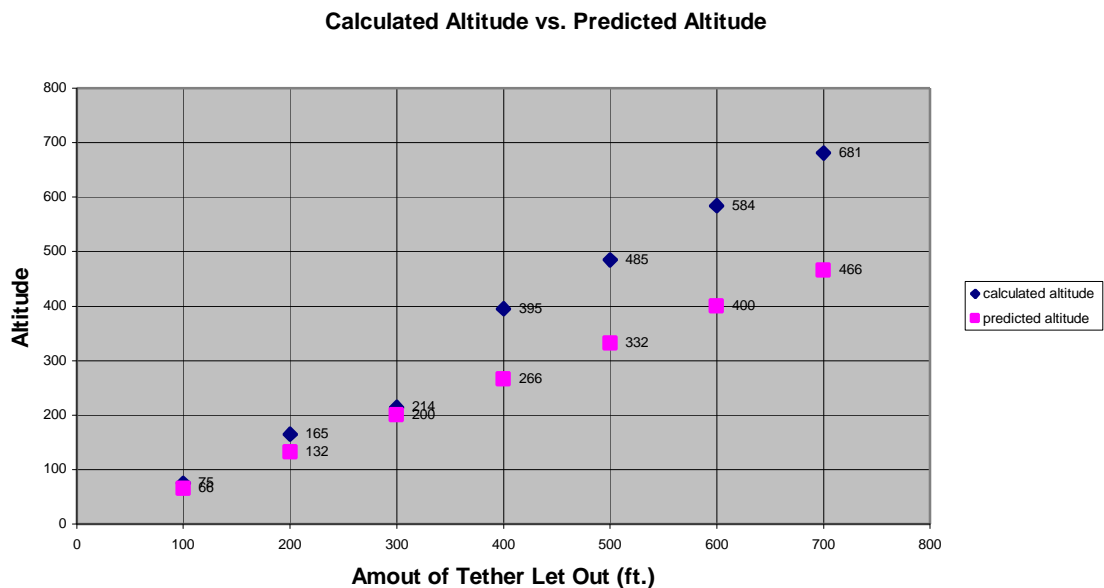
Set up two theodolite stations that are .2 miles apart. Using these to find the altitude of balloon every 100 ft. intervals to 700 ft. based on the horizontal and vertical angle measurements. While doing so, taking observations of the weather conditions around the balloon that may have an affect on it.

Background Research

In order to do this experiment, our group had to research ways to calculate altitude. Using a two-theodolite system that required two angle measurements from each station, we used a model to write a calculator program that would do this for us.

Data

Our analyzed data displayed on a graph:



Hypothesis A

? For every 300 ft. of tether let out, the altitude of the balloon will be 200 ft.
(Ratio of 3:2)

Test 1: Calculate the altitude of the balloon at 300 feet

Hypothesis B

-The ratio of tether let out and measured altitude will change substantially depending on whether conditions, however will never reach 1:1.

Test 1: Take observations of the weather conditions and the tether

Test 2: Calculate the altitude of the balloon when the wind is blowing and compare it to the amount of tether let out.

Conclusion

We found Hypothesis A was incorrect because the altitude at 300 feet was not 200 feet, but was calculated at 290 feet. Also, calculations at different ratios proved the 3:2 ratio hypothesis to be consistently incorrect.

Hypothesis B however, was proved to be correct, because while weather conditions did affect the altitude of the balloon, the amount of tether let out was never equal to the calculated altitude.

Overall this experiment we learned many things such as ways to calculate altitude using different tools. Also, the mentors were a great help. In addition, we answered many questions and raised many others.