# The Attempts and Failures of Balloon Launching

## Data

Control Group: Data collected from cell phone.

We first started at 13:15, 12-15-2012:
Altitude: 169.95 feet *
Traveled: 0.14 miles
Current Speed: 0.0 mph

- 13:17
Altitude: 1564.99 feet
Traveled: 0.36
Current Speed: 16.13 mph

- 13:19
Altitude: 3041.99
Traveled: 0.78 miles
Current Speed: 15.58 mph

- 13:21
Altitude: 4326.44
Traveled: 1.34 miles
Current Speed: 18.22 mph

- 13:23
Altitude: 5523.62
Traveled: 2.14 miles
Current Speed: 24.83 mph

- 13:25
Altitude: 6768.04
Traveled: 3.12 miles
Current Speed: 34.83 mph

- 13:27
Altitude: 8029.2
Traveled: 3.87 miles
Current Speed: 19.15 mph

- 13:29
Altitude: 9277.56
Traveled: 4.55 miles
Current Speed: 21.22 mph

- 13:31
Altitude: 10536.42
Traveled: 5.28 miles
Current Speed: 23.6 mph

- 13:33
Altitude: 11861.55
Traveled: 6.04 miles
Current Speed: 29.04 mph
- 13:35
Lost contact.

*All feet are above sea level.

Experimental Group:

It burst before getting off of the ground.

## Topic

What is the highest point a weather balloon can go?

## Purpose

To determine the height at which a 300 gram weather balloon will burst.

## Hypothesis

If a weather balloon is inflated to 5 feet in diameter at launch, then it should ascend to approximately 50,000 feet above sea level before it bursts.

## Experiment

We launched two balloons in attempt to prove the hypothesis.

Independent Variable: The physical size of the balloon.

Dependent Variable: The height at which it will burst, the amount of volume it will have, and how much weight it will carry.

Control Group: 1st attempt

Experimental Group: 2nd attempt

## Steps

Control Group:

1. Buy a 300 gram weather balloon.
2. Buy helium.
3. Buy a disposable cell phone with GPS.
4. Load app onto cell phone.
5. Build box to hold the cell phone.
6. Call FAA to get permission to launch the balloon.
7. Attach the box to the balloon.
8. Fill the balloon with helium.
9. Launch balloon.
10. Trace the balloon via cell phone.
11. Retrieve the balloon.
12. Retrieve the data.

Experimental Group:

1. Buy a 300 gram weather balloon.
2. Buy helium.
3. Obtain a package less than three pounds.
4. Buy Raspberry Pi.
5. Buy GPS module.
6. Buy parachute.
7. Buy handheld radio.
8. Buy antenna.
9. Program the Raspberry Pi.
10. Call FAA to get permission to launch the balloon.
11. Inflate balloon.
12. Attach the package to the balloon.
13. Launch the balloon.
14. Collect data from the Raspberry Pi as it is transmitted.
15. After the balloon has burst, collect it.

## Background Information


Mullenix, Dave. "Ham Ballooning FAQ or "What Little I Know about Ham Ballooning""*Balloon FAQ*. N.p., 2 Mar. 2012. Web. 12 Nov. 2012. <http://www.eoss.org/pubs/faqloon.htm>.

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## Analyze

Control group:

October Launch: This project was built using a foam box, a Virgin Wireless Smartphone, a 300 gram weather balloon, and some string. The Smartphone had an app downloaded on it called Space Tracker, which kept track of the users time, date, exact altitude, longitude, and latitude, as well as how far the phone had traveled from the point in which the app was initialized, how far it had gone, and how fast it was going. We built our project for approximately an hour and a half, and then set about releasing it in Grace Methodist's parking lot at 13:16.

We followed it North on I-25 for about five miles. We lost visual contact about the same time we lost data feed. The balloon was 11,862 feet in the air and we estimate it was approximately 6 feet in diameter when we lost contact. It was first estimated that the balloon would go up 50,000 feet before it burst. Upon further research the burst altitude of a typical 300 gram balloon was determined to be about 82,000 feet.

Since the estimated burst altitude is 82,000 feet, and the typical burst diameter is 13 feet, and the increase in size is linear, if the percentage of 11,862 to 82,000 is about 15%, then that percentage multiplied by the burst diameter (13 feet) is about 1.9 feet. Our weather balloon was about 4.1 feet in diameter so 4.1 plus 1.9 is 6. This means that the balloon was about six feet in diameter when it was at that stage.

The ascent rate of our balloon was 643.535 feet per minute.

Experimental Group:

November Launch. On the 24th of November at noon we attempted to inflate our balloon, getting it to about 5 feet before it burst prematurely, ending this launch attempt.

This project was built using 300 gram balloon, payload package that is less than three pounds, Rasberry Pi, GPS module, battery, foam and cardboard, parachute, handheld radio, and an antenna.

The Rasberry Pi was programmed by Scott Clark of the Aiken Ammeture Radio Group to find the atmospheric pressure, temperature, the acceleration.

## Conclusion

Unfortunately, we cannot meet the objective of our experiment because we were not able to retrieve the balloon with the information attached to it. We cannot conclude anything absolute.

However, we learned a lot of things. We learned the rate of a ascension of a typical weather balloon, we learned that wind speed increases at higher altitudes, and we learned that cell phones stop communicating around 12000 feet.

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