

# Procedure

## **Materials needed for launch and pre-launches**

- Balloon
- 1000ft of string
- Anemometer
- 2 Theodolites
- String base
- Stopwatch
- Pencil
- Clipboard
- Log for data
- Gondola
- Laptop with programs needed
- Barometer
- Vernier Lab-Pro
- 3 Walkie Talkies

## **Pre-Tests done before launch**

- Check the batteries
- Test the anemometer for a given amount of time
- Review results on the computer
- Test theodolites
- Run as many practice runs as it takes till you get accurate and precise readings

## **Calculations needed before launch**

- Approximate volume of balloon
- Balloons lift
- Mass of balloon
- Mass of string
- Length of string
- Helium's lifting force

## **Preparations to launch**

- Reset data
- Prepare gondola with equipment
- Setup launch stations
- Setup altitude measurement stations

## **Preparations for balloon**

- Get the balloon filled to the volume needed
- Attach the gondola to the balloon
- Attach the balloon to the string

### **Launch**

- ❑ Start the timer
- ❑ Turn on the anemometer
- ❑ Start to unwind the string to 100ft of string
- ❑ Record the time of measurements of altitude
- ❑ Do five measurements of altitude every 100ft of string

### **Take down and clean up**

- ❑ Wind the string to bring the balloon back down
- ❑ Give balloon to the next group
- ❑ Pull out the barometer to check altitudes with readings
- ❑ Clean up stations

### **Calculations needed for presentations**

- ❑ Get anemometer from gondola
- ❑ Connect the anemometer to the computer
- ❑ Calculate all the altitudes
- ❑ Match the times of altitude measurements with wind speed
- ❑ Analyze data
- ❑ Finish power point