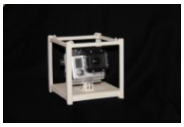
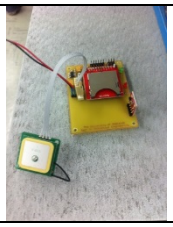
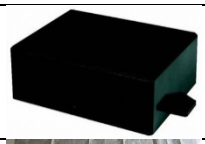
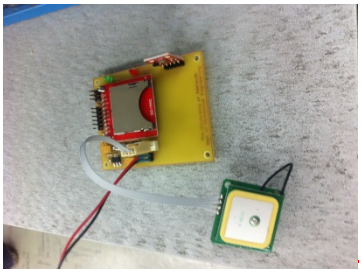
CubeSat Equipment and Specifications

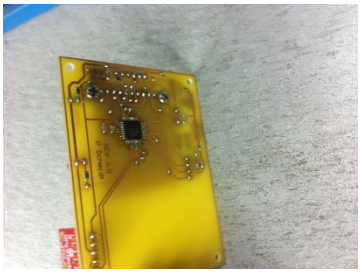
Item		Description	Mass	Notes
Frame		1U 3d Printed version of the real structure of SUSat Satellite	**160**	The camera will be positioned as shown and the electronic and the GPS will be places behind the camera. There will be 4 frames in one launch, and 4 in another one (2 balloons)
Camera: Go Pro 3 Hero White		Battery BacPac™ Limited Edition and Anti-Fog Inserts SanDisk Ultra Micro 32gb Class 10 Card	**110**	Each satellite will have a camera and its components. The school can decide where they would like to position the camera (what directions in the stack) Class 10 memory card required for 0.5 sec Time Lapse
GPS: U-blox NEO-6M GPS module		Standalone GPS receiver Operating temperature range: -40 TO 85°C Build in 18X18mm GPS antenna Rechargeable battery for Backup	14g	Every satellite will have a GPS but they will be operated so that they don't interfere during the mission.
SD Card Breakout		2 Gb micro SD card will be provided		
Pressure Sensor: Bosch BMP180 digital barometer		300 to 1100 hectopascals (hPa) The Sensor also reports the current temperature	2g	The code on the Arduino will provide barometric pressure and temperature
Arduino Pro Mini 328 - 5V/16MHz		The arduino is a microcontroller that is programmed to undertake a number of processes.	2g	It programmed to take the measured barometric pressure, temperature and calculate the altitude. The data from the sensor and the GPS is saved on the SD card (2GB of data available). The data saved is the pressure, altitude, temperature and the GPS coordinates. A FTDI with USB port will be provided to allow the connection of the PCB to the computer.
Battery pack		9V	37g	Energizer Lithium were selected for the good performance at extreme weather conditions. The battery is connected to the PCB via a snap and it is allocated next to the PCB in the plastic box.

PCB		The electric circuit is printed on a PCB that it is screwed inside the plastic box.	30g	The electric schematic is provided below. The mass shown is the total mass of the electronics expect the GPS and the battery
Wiring			26g	
Plastic Box		The plastic box protects the electronics from external weather condition (not the temperature change)	57g	
Parachute		Made of Low-porosity 1.1 Rip-stop Nylon. Reinforced with nylon webbing.	200g (7ft)	Tubular shroud lines sewn over top of the canopy. 4 shroud lines reduce chances of tangling A 3ft parachute is provided for testing A 7ft parachute will be used for the launch
Foam Box		A foam box will protect all the satellites from the impact on the ground	80g	impact velocity 5m/s

This photo shows the relative sizes of the components.



Mounted SD card, pressure sensor and GPS



Arduino Chip

Questions:

1. The atmospheric pressure on the weather reports is usually in kilopascals (kPa). What is the relationship between kPa and hPa.
2. Knowing the air pressure we can determine the altitude. **Research** to find out the formula that relates air pressure and altitude.
3. What is the importance of the Arduino in this project?
4. What data will the Arduino report?

BALLOON CONFIGURATIONS

Item	Qty	Mass each (g)	Total (g)	Schools
Balloon 1				
Number of standard frame	5	160	800	ASMS standard Kit
Camera Setup	5	110	550	Mitcham primary
Electronics and box	4	170	680	Mitcham secondary
Little weather Station (primary school experiment)	1	150	150	Hamilton College
Horus electronics (cut down system &telemetry)	1	245	245	Reynella
Parachute (7ft)	1	200	200	
Foam Box	1	80	80	
Total mass			2705	
Balloon 2				
Number of standard frame	4	160	640	CBC
Camera Setup	4	110	440	Fremont-Elizabeth
Electronics and box	4	170	680	Thebarton
UniSa Hardware	1	200	200	Hallett Cove
Horus electronics (cut down system & telemetry)	1	245	245	
Parachute (7ft)	1	200	200	
Foam Box	1	80	80	
Total mass			2485	