The table below provides the altitude, range and times for the Space Shuttle Atlantis after its launch at 11:29:00 a.m. EDT from NASA's Cape Canaveral Space Center, Launch Pad 39A.
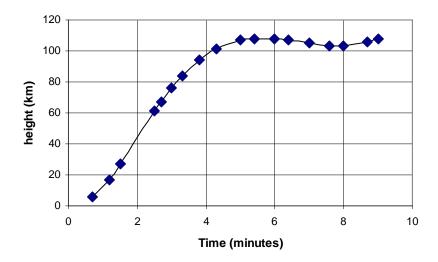
Problem 1 - Plot the altitude versus time for the launch.

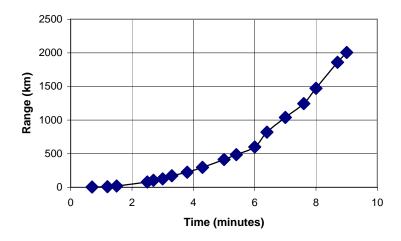**Problem 2** - Plot the down-range distance versus time for this launch.

Problem 3 - The actual distance traveled by the Shuttle can be found using the Pythagorean Theorem where the hypotenuse of the right triangle is formed from the distance traveled in altitude (vertical 'y' direction) and the distance traveled in range (horizontal 'x' direction). How far did Atlantis travel between 8.0 and 9.0 minutes after launch?

Problem 4 - What was the average speed of Atlantis between 8.0 and 9.0 minutes after the launch in: A) kilometers/minute? B) miles per hour?

Time (minutes)	Altitude (km)	Range (km)
0	0	0
0.7	6	5
1.2	17	10
1.5	27	20
2.5	61	80
2.7	67	104
3.0	76	126
3.3	84	172
3.8	94	224
4.3	101	297
5.1	107	413
5.4	108	486
6.0	108	600
6.4	107	821
7.0	105	1040
7.6	103	1245
8.0	103	1474
8.6	106	1859
9.0	108	2006

Problem 1 - Plot the altitude versus time for the launch.

Problem 2 - Plot the down-range distance versus time for this launch.

Problem 3 - The actual distance traveled by the Shuttle can be found using the Pythagorean Theorem where the hypotenuse of the right triangle is formed from the distance traveled in altitude (vertical 'y' direction) and the distance traveled in range (horizontal 'x' direction). How far did Atlantis travel between 8.0 and 9.0 minutes after launch?

Answer: Y = altitude difference = 108 - 103 = 5 kilometers .Y = range difference = 2006 - 1474 = 532 km, so the distance traveled = $(5^2 + 532^2)^{1/2}$ = **532 km**.

Problem 4 - What was the average speed of Atlantis between 8.0 and 9.0 minutes after the launch in: A) kilometers/minute? B) miles per hour?

Answer: A)   speed = distance/time so speed = 532 km/1 minute, speed = **532 km/minute**.
B) 532 km/minute x (60 minutes/1 hr) x (0.62 miles / 1 km) so **speed = 19,790 miles/hr**.

The data were obtained from the GOOGLE Earth tracking data using the application file available at: **http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/shuttle_google_earth.html**