

# Journey to the Stratosphere



## Teacher Notes

7 8 9 10 11 **12**



TI-Nspire™



Activity



Student



30 min

There is no doubt that conducting the actual experiment would be a memorable experience for students, however the YouTube video serves as a quick, and free, alternative. Maxime Dehaye's complete video provides opportunities for other data related questions such as:

- How does pressure vary with altitude?
- How does temperature vary with altitude?

Note that natural variations in both temperature and pressure mean that samples need to be taken over a much greater time frame and less frequently.

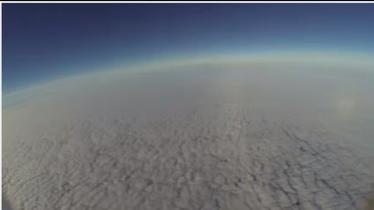
### Suggestions for working with the class:

- The lesson can be run with the video projected to the class and students recording the time and altitude with the teacher controlling the video.
- The lesson can also be run as a homework task with students watching the video for themselves.

The activity includes calculation of  $S_x$  and  $S_y$  and therefore  $a$  and  $b$ . The value of  $r$  is estimated as the calculation of  $r$  may add too many calculations to the activity. Of course all of these calculations may be over-looked and students simply determine the equation using the corresponding regression method and check interpolations and extrapolations.

A series of screen captures have been included here for quick reference. The resolution is sufficient to extract data, particularly if this document remains on the computer screen.

 <p>BHEEM-KC 001 - Telemetry  Time: 10:29:26  Flight Time: 00:00:00  Altitude: 127 m  Pressure: 1014.58 hPa  Outside Temperature: 13.1 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:29:36  Flight Time: 00:00:10  Altitude: 169 m  Pressure: 1009.35 hPa  Outside Temperature: 12.3 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:29:46  Flight Time: 00:00:20  Altitude: 223 m  Pressure: 1002.86 hPa  Outside Temperature: 12.3 c</p>
<b>Start</b>	<b>10second increments</b>	
 <p>BHEEM-KC 001 - Telemetry  Time: 10:29:56  Flight Time: 00:00:30  Altitude: 275 m  Pressure: 996.71 hPa  Outside Temperature: 12.5 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:30:06  Flight Time: 00:00:40  Altitude: 321 m  Pressure: 991.31 hPa  Outside Temperature: 12.5 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:30:16  Flight Time: 00:00:50  Altitude: 371 m  Pressure: 985.41 hPa  Outside Temperature: 12.3 c</p>
 <p>BHEEM-KC 001 - Telemetry  Time: 10:30:26  Flight Time: 00:01:00  Altitude: 426 m  Pressure: 979.00 hPa  Outside Temperature: 12.2 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:31:26  Flight Time: 00:02:00  Altitude: 714 m  Pressure: 945.81 hPa  Outside Temperature: 13.0 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:32:26  Flight Time: 00:03:00  Altitude: 1,040 m  Pressure: 909.36 hPa  Outside Temperature: 12.8 c</p>
	<b>1 min increments</b>	
 <p>BHEEM-KC 001 - Telemetry  Time: 10:33:26  Flight Time: 00:04:00  Altitude: 1,371 m  Pressure: 873.55 hPa  Outside Temperature: 12.6 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:34:26  Flight Time: 00:05:00  Altitude: 1,677 m  Pressure: 841.40 hPa  Outside Temperature: 11.1 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:35:26  Flight Time: 00:06:00  Altitude: 1,971 m  Pressure: 811.41 hPa  Outside Temperature: 10.1 c</p>

 <p>BHEEM-KC 001 - Telemetry  Time: 10:36:26  Flight Time: 00:07:00  Altitude: 2,248 m  Pressure: 784.02 hPa  Outside Temperature: 11.5 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:37:26  Flight Time: 00:08:00  Altitude: 2,534 m  Pressure: 756.55 hPa  Outside Temperature: 11.0 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:38:26  Flight Time: 00:09:00  Altitude: 2,845 m  Pressure: 727.47 hPa  Outside Temperature: 11.6 c</p>
 <p>BHEEM-KC 001 - Telemetry  Time: 10:39:26  Flight Time: 00:10:00  Altitude: 3,153 m  Pressure: 699.69 hPa  Outside Temperature: 10.8 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:40:26  Flight Time: 00:11:00  Altitude: 3,442 m  Pressure: 674.33 hPa  Outside Temperature: 10.0 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:41:26  Flight Time: 00:12:00  Altitude: 3,741 m  Pressure: 648.88 hPa  Outside Temperature: 9.0 c</p>
 <p>BHEEM-KC 001 - Telemetry  Time: 10:42:26  Flight Time: 00:13:00  Altitude: 4,042 m  Pressure: 624.08 hPa  Outside Temperature: 9.7 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:43:26  Flight Time: 00:14:00  Altitude: 4,345 m  Pressure: 599.86 hPa  Outside Temperature: 8.9 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:44:26  Flight Time: 00:15:00  Altitude: 4,676 m  Pressure: 574.33 hPa  Outside Temperature: 6.5 c</p>
 <p>BHEEM-KC 001 - Telemetry  Time: 10:49:26  Flight Time: 00:20:00  Altitude: 6,183 m  Pressure: 468.83 hPa  Outside Temperature: 2.1 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:54:26  Flight Time: 00:25:00  Altitude: 7,728 m  Pressure: 377.56 hPa  Outside Temperature: -4.3 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 10:59:26  Flight Time: 00:30:00  Altitude: 9,161 m  Pressure: 306.30 hPa  Outside Temperature: -9.6 c</p>

5 minute increments...			
 <p>BHEEM-KC 001 - Telemetry  Time: 11:04:26  Flight Time: 00:35:00  Altitude: 10,437 m  Pressure: 252.44 hPa  Outside Temperature: -16.3 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:09:26  Flight Time: 00:40:00  Altitude: 11,821 m  Pressure: 203.22 hPa  Outside Temperature: -22.3 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:19:26  Flight Time: 00:50:00  Altitude: 14,187 m  Pressure: 139.92 hPa  Outside Temperature: -20.5 c</p>	
10 minute increments...			
 <p>BHEEM-KC 001 - Telemetry  Time: 11:29:26  Flight Time: 01:00:00  Altitude: 16,540 m  Pressure: 96.56 hPa  Outside Temperature: -21.1 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:39:26  Flight Time: 01:10:00  Altitude: 18,858 m  Pressure: 67.00 hPa  Outside Temperature: -17.3 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:49:26  Flight Time: 01:20:00  Altitude: 21,391 m  Pressure: 44.96 hPa  Outside Temperature: -14.6 c</p>	
 <p>BHEEM-KC 001 - Telemetry  Time: 11:56:45  Flight Time: 01:27:19  Altitude: 23,320 m  Pressure: 33.42 hPa  Outside Temperature: -13.5 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:56:28  Flight Time: 01:27:02  Altitude: 23,227 m  Pressure: 33.87 hPa  Outside Temperature: -13.8 c</p>		
 <p>BHEEM-KC 001 - Telemetry  Time: 11:56:45  Flight Time: 01:27:19  Altitude: 23,320 m  Pressure: 33.42 hPa  Outside Temperature: -13.5 c</p>	 <p>BHEEM-KC 001 - Telemetry  Time: 11:56:46  Flight Time: 01:27:20  Altitude: 23,326 m  Pressure: 33.39 hPa  Outside Temperature: -13.3 c</p>		

<https://www.youtube.com/watch?v=ERMQh1mY27c>