Parachute: area and air resistance

Environment, Air

Parachute Investigation Lab Report Hypothesis: I predict that as the surface area of the canopy increases, the time it takes for the parachute to fall also increases. This is because the air resistance is larger, therefore the drag is increased. So the speed of the parachute decreases. This is because the forces (air resistance and gravity) are unbalanced. The change in air resistance is important because the larger the surface area of the canopy, the more air particles it is ‘ hitting’; therefore the air resistance is bigger. Variables:

In our investigation, the variable that we changed (the independent variable) was the surface area of the canopy of our parachutes. The result that we measured (the dependent variable) is the time taken for the parachutes to fall to the ground. The controlled variables were the altitude of the fall (height from which we dropped the parachute) and the weight and size of the plasticine. This is shown in the table below. Variable| Control| Height from which we dropped the parachute| * This was to make sure the parachutes fell from the same distance. * We did this by using the same balcony. Weight of the Plasticine| * This was to make sure only the area of the canopy affected the speed of the parachute. * We did this by weighing our plasticine on a scale. | Shape of Plasticine| * This was to make sure only the area of the canopy affected the speed of the parachute. * (Galileo’s Law of Falling Bodies states that the shape of an object affected the speed of a fall.) * We did this by creating identical balls of plasticine| The length of the rubber bands| * This was to make sure that only the area of the canopy affected the speed of the parachute. We did this by using the same sized rubber bands, then cutting them, ensuring that they would be the same

length. | Method: 1) Create canopies by cutting squares out of plastic bags, using a ruler and scissors. 2) Collect 4 rubber bands for each canopy, cut them and stick them to the corners of the canopies, using cello tape. 3) Attach all of the bands to a ball of plasticine. 4) Advance to the balcony overlooking the teacher/staff parking area. 5) Your partner should be on the pavement next to the parking area with a stopwatch.) On his/her command (indicating that he/she will activate the stopwatch), gently release the parachute. 7) Your partner must watch intensively as the parachute wafts down to the ground, where he/she must stop the stopwatch and record the number of seconds in your table. 8) Return to the parking area to retrieve your parachute. 9) Repeat this task 2 more times, and then move on to the next parachute. Each parachute should have three tests to ensure a fair test and to calculate an average. Data: Area of Canopy & Time Table

Area of Canopy (cm)| Test| Time Taken (s)| Average Time Taken (s)| | 1| 0. 97| | 5cm x 5cm - 25cm2| 2| 0. 90| 0. 87| | 3| 0. 75| | | 1| 2. 44| | 10cm x 10cm - 100cm2| 2| 2. 18| 2. 38| | 3| 2. 52| | | 1| 2. 47| | 15cm x 15cm - 225cm2| 2| 2. 50| 2. 91| | 3| 3. 75| | | 1| 3. 63| | 20cm x 20cm - 400cm2| 2| 5. 10| 4. 29| | 3| 4. 15| | | 1| 4. 88| | 25cm x 25cm – 625cm2| 2| 9. 27| 8. 5| | 3| 11. 36| | | 1| 8. 53| | 30cm x 30cm – 900cm2| 2| 3. 50| 9. 62| | 3| 16. 84| | This table shows us the time taken for each test of parachute to fall.

We calculated the average time by adding the times of the three tests of each parachute, then dividing it by the number of data (3). Area of Canopy (cm2)| Average speed (m/s)| 25cm2| 11. 5 m/s| 100cm2| 4. 2 m/s| 225cm2| 3. 4 m/s| 400cm2| 2. 3 m/s| 625cm2| 1. 2 m/s| 900cm2| 1. 1 m/s| Area of

Canopy & Speed Table This table shows us the average speed of each parachute. We calculated the average speed by dividing the distance (10 m) by the average time. For example, the average time for the first parachute, whose canopy was 5cm x 5cm, was 0. 87. 10 ? 0. 87 = 11. 49 m/s, which rounded up to one decimal place, is 11. 5 m/s.